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general management plan
development concept plan
environmental assessment

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GENERAL MANAGEMENT PLAN / DEVELOPMENT CONCEPT PLAN

and

ENVIRONMENTAL ASSESSMENT

ARCHES NATIONAL PARK

Utah

The National Park Service proposes the improvement and expansion of some visitor and administrative facilities at Arches National Park to (1) remove people and property from the 500-year floodplain, (2) correct traffic hazards along the main park road, (3) provide adequate visitor orientation and information, (4) meet the existing demand for parking at most overlooks and trailheads, (5) confine the impacts of vehicle and foot traffic, (6) make the Delicate Arch viewpoint accessible to all visitors, and (7) rectify miscellaneous visitor use, resource management, and operational problems. The net effect of these actions would be an overall mitigation of existing adverse impacts on natural and cultural resources and the visitor experience. Under the proposal, no additional facility expansion would occur until a detailed information base was established and evaluated to ensure that there would be no unacceptable impacts on resources or the visitor experience.

Three alternatives are evaluated in this document: the preferred alternative (the proposed action); a no-action alternative, which would continue existing management and facilities; and a minimum requirements alternative, which would include only those improvements necessary for life safety and resource protection.

For further information, contact

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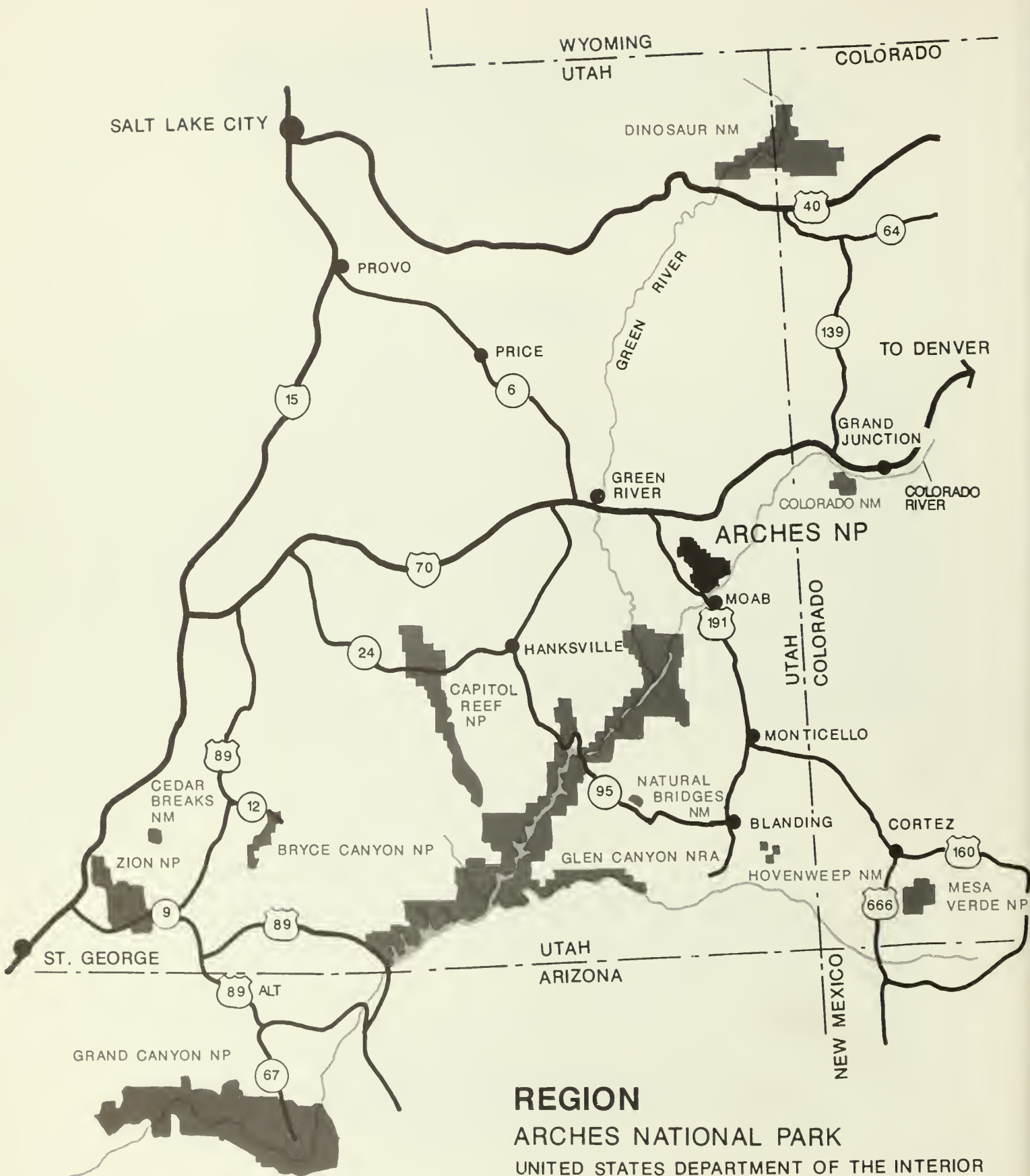
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20 0 20 40 MILES

DSC/DEC 1988/138-20,041

INTRODUCTION

Arches National Park is in the high desert country of southeastern Utah, part of the Colorado Plateau. Lying entirely within Grand County, and north of Moab, Utah, the park contains 73,379 acres. Sandstone canyon walls, slickrock terraces, towering monoliths, and intricately eroded arches dominate the landscape. The park contains the greatest concentration of natural stone arches in the country, with examples of developing, complete, and collapsed arches all evident. There are nearly 700 openings in the park that would qualify as arches by most definitions. Landscape Arch is the largest, with a span of 306 feet and a height of 105 feet. Delicate Arch, balanced precariously on a precipitous ridge, is the most famous arch in the Southwest, if not the world. Distant landscapes extending well beyond the park boundary form a highly scenic background for the park's dramatically eroded sandstone features. Prehistoric rock art and historic remains of past ranching activity are listed on the National Register of Historic Places. Archeological sites represent at least three Indian cultures.

Arches was originally designated as a national monument of 4,520 acres, established by Presidential Proclamation 1875, on April 12, 1929 (appendix A). The purpose was to "protect extraordinary examples of wind erosion in the form of gigantic arches, natural bridges, 'windows,' spires, balanced rocks, and other unique wind-worn sandstone formations, the preservation of which is desirable because of their educational and scenic value."

The monument was enlarged to 29,160 acres by Presidential Proclamation 2312 on November 25, 1938, with additional wording changes to include protection of "prehistoric structures of historic and scientific interest." The boundary was adjusted again by Presidential Proclamation 3360, dated July 26, 1960, which added 480 acres in Salt Valley and deleted 720 acres north of the Windows. The proclamation stated that "it would be in the public interest to add to Arches certain contiguous lands on which outstanding geological features of great scientific interest are situated and certain other lands adjacent to the monument which are essential to the proper care, management, and protection of the objects of scientific interest situated on such lands and on lands now comprising a part of the monument."

On January 21, 1969, Presidential Proclamation 3887 enlarged the monument by 48,943 acres to a total of 77,863 acres, extending the boundary to the Colorado River, including Dry Mesa and Cache Valley.

On November 12, 1971, an act of Congress (Public Law 92-155) changed the title of the area from national monument to national park. There was no language adding to the definitions of values to be preserved, except that "the National Park Service, under the direction of the Secretary, shall administer, protect, and develop the park subject to the provision of the Act entitled 'An Act to establish a National Park Service, and for other purposes,' approved August 25, 1916." A tract at Eagle Park at the north end of the park was added, and a tract of 9,559 acres, including Dry Mesa and most of Cache Valley, was deleted from the park, resulting in the current park boundary and area of 73,379 acres. The deleted portions are now administered by the Bureau of Land Management and the state of Utah.

TO SALT LAKE CITY

TO GRAND JUNCTION AND DENVER



VICINITY

ARCHES NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

0 5 10 20 30 MILES



PURPOSE OF AND NEED FOR THE PLAN

A general management plan is needed to establish the overall direction for management and use of the park. The major planning issues are described below.

Capacity

Visitor use within the park has been increasing steadily over the years, especially at Balanced Rock and at the Delicate Arch and Devils Garden trailheads. Facilities are no longer adequate to accommodate parking and foot traffic in these areas, with the result that visitors are parking along the road shoulders and creating multiple social trails. Vegetation is being damaged, and the quality of the visitor experience may also be deteriorating. Similar kinds of conditions, although less severe, are occurring at many of the other pulloffs along the park road. The projected increase in park visitation – 36 percent by the year 2005 – could potentially result in unacceptable resource damage and overcrowding. However, the Arches staff currently does not have the monitoring capability to predict with reliability the point at which further action to accommodate increasing use (expansion of parking facilities, in particular) would have unacceptable adverse effects on resources and visitor experiences. This capability needs to be developed so that the National Park Service can ensure long-term compliance with its mandate to protect park resources while providing for visitor enjoyment.

Deficient Informational and Interpretive Signing

Park signing is deficient. The names of pullouts are often misleading, and there is little on-site interpretation. The themes and messages of the few wayside exhibits do not provide an integrated, cohesive understanding of park resources. Even with the self-guiding media and the scope of subject matter interpreted through personal services, visitors do not obtain a clear and coherent understanding of the natural processes and human influences at Arches.

Lack of Handicapped Access

At present, visitors with severe mobility handicaps cannot observe an arch at close range because of the lack of a fully accessible trail, and there are no special facilities or interpretive opportunities for those with sensory or mental handicaps. Although the Park Avenue viewpoint is handicap-accessible and there are handicap-accessible restroom facilities at the Windows and Devils Garden, there is no cluster of handicap-accessible facilities at a destination resource area that would facilitate and enhance the experience of handicapped visitors by allowing for more time spent at the resource and less time spent in vehicles.

Inadequate Visitor Center/Entrance Facilities

The visitor center at the headquarters area is extremely crowded, especially on holidays. It is not uncommon for visitors to be waiting three and four deep at the information desk. When one or two buses arrive simultaneously, it becomes impossible to provide visitor services. The auditorium was designed for 30 people, too small to accommodate bus tour groups totaling up to 80. The overcrowding results in disruption of the audiovisual program, extremely poor visibility of the screen, and numerous complaints. Most exhibits in the visitor center are 20 years old and are somewhat worn and faded. Although some panels have been touched up and one has been entirely replaced, none of the exhibits utilize innovative exhibit methods, including color graphics, characteristic of modern museums.

Staff space in the building is inadequate. The current administrative office is overcrowded due to additions of new equipment and facilities, such as a copier, computers, a supply cabinet, and central files. It is an area that is utilized by all staff members, thus adding a severe congestion problem. The mail room is used for fee deposits and also handles mail for Canyonlands Natural History Association (CNHA), both of which create security problems, and it also accommodates some seasonal work stations, which makes it a severely congested area. The interpretive office has become overcrowded with the addition of another desk for the permanent ranger and a computer station. An extra ranger's desk has also been moved into the chief ranger's office, and that office receives heavy traffic by people using the fee safe and other facilities in the adjacent room. Because of the overcrowding on work stations there is no storage space available or space for an employee break room.

The visitor and employee parking areas are congested, and the overall traffic flow is confusing to some visitors. Because the entrance station precedes the parking lot entrance, visitors have to pay their fees before seeing the visitor center, whether or not they decide to proceed into the park. During the summer months, traffic is sometimes backed up beyond the turnoff to the service road.

Flood Hazard at Headquarters Area

The Arches headquarters area is a high-hazard flash flood area, with a warning time of less than half an hour. Flooding could result from rapidly rising waters in Bloody Mary Wash, which runs parallel to US 191 just south of the headquarters development, or from sheetwash from adjacent rocky slopes to the north. The existing entrance road crosses Bloody Mary Wash and acts as a dam: In the event of a severe flood, floodwaters would overtop the road and swing to the north toward the apartments and the adjacent residence (residence #3). Waters nearly overtopped the park road just west of the maintenance area in a 1987 flood. Of the development at headquarters, the apartment building and residence 3 are in the 100-year floodplain; the park library (where the museum collection is stored) and maintenance compound are in the 500-year floodplain; and the visitor center/administration building and CNHA building (the historic caretaker's residence) are in the probable maximum flood (PMF) zone. The three other residences (residences 5, 6, and 10) are located on a hill out of the flood hazard area. These and all following references to floodplains refer to Bloody Mary Wash unless otherwise specified. Portions of the development are also subject to sheetwash flooding from the north.

According to park records, a drainage channel that runs along the base of the slope behind the headquarters development seems to protect structures from minor sheetwash flooding estimated at a 200-year flood.

In the event of a severe flood, rapidly rising waters could soak and damage structures, facilities, and collections. Visitors at the visitor center area (children, the elderly, and the handicapped, in particular) and staff (especially those living in the residences within the flood zone) could be injured or swept into the floodwaters.

Contamination by or damage to utility systems could also occur. Sewage is currently treated with separate septic tanks and leachfields for individual structures or groups of structures. All the fields are in either the 100-year or the 500-year floodplain, and severe flooding could wash out and damage the systems and possibly introduce contaminants to the water supply. The fields are closer to wells than is normally permitted by state regulation, and contamination of water sources is possible, even though no contamination has yet been documented. Water, power, and telephone lines are also located within the 100-year floodplain, and severe flooding could sever the buried lines, disrupting essential services. The maintenance building and fenced compound east of the visitor center are within the 500-year floodplain. Flooding could lead to contamination of the water supply and surrounding area by gas and chemicals stored within the compound and could lead to contamination of the water treatment facility located in the east end of the building. These conditions are contrary to NPS final procedures for implementing executive orders 11988, "Floodplain Management," and 11990, "Protection of Wetlands," and compliance is required.

Inadequate Facilities for the Treatment and Storage of Museum Collections

The park museum collections and library are housed in a building immediately east of the CNHA building. This repository has inadequate controls on access, temperature, humidity, and light, and no safeguards against flood, and it does not comply with the standards for collection storage outlined in the *Cultural Resources Management Guidelines* (NPS-28) and the *Interpretation and Visitor Services Guidelines* (NPS-6). In addition, the museum and library materials must be inventoried, classified, cataloged, and properly controlled for user benefit, but the substandard curatorial work areas do not allow for proper cataloging and treatment. Without meeting the established curatorial standards, the prospects for deterioration and loss of valuable cultural resources are high.

Limited Access to Delicate Arch and Wolfe Ranch

The 3-mile graded spur road leading to the Wolfe ranch/Delicate Arch trailhead and Delicate Arch viewpoint was not improved and paved with the other park roads in the mid-1960s. In its present condition, the Delicate Arch road provides an opportunity for a semiprimitive driving experience, an experience available elsewhere within the park only along the Salt Valley road. Because the Delicate Arch road accesses several major, well publicized features, however, the standard of the road does not match the volume of traffic and types of vehicles the features attract. Traffic on this road has grown proportionately with overall increases in travel at Arches. About 70 percent of park visitors drive at least some part of the road, even though it is not surfaced. The route is dusty, wash-boarded, and in some places poorly drained. It requires frequent

maintenance and has a record of minor accidents. Flooding is a problem. Near the Wolfe ranch the road crosses three washes – Salt Valley, Salt, and Winter Camp. All drain large areas, converge just below the ranch, and are subject to flash floods. For six weeks in the summer of 1984, the road was closed because of washouts and mud, and visitors have at times been stranded in their vehicles.

Buses cannot drive farther than the Wolfe ranch because of the stream level crossings of Salt and Summer Camp washes. This precludes most people on tours, including many senior citizens, from getting to the Delicate Arch viewpoint, which is the only place accessible by road where visitors can see that arch.

Flood Hazard at Wolfe Ranch

Because the floodplain situation in the Wolfe ranch area is extremely complex, with three washes converging just south of the road, specific floodplain areas could not be determined in time for use in the general management plan. The parking area and trailhead are within the Salt Wash flood zone, but because they are probably not in the main flow high-hazard area, visitors and facilities are probably not at highest risk. The ranch, however, may be within the 100-year floodplain of Salt Wash, and the log cabin, root cellar, and corral could collapse if flooded.

Need to Protect and Interpret the Moab Panel

The Moab rock art panel on the north side of US 191 is an important and very accessible cultural resource, yet there is no interpretation or other measures to protect the rock art. The panel, which has been listed as a nationally significant resource on the National Register of Historic Places since 1975, is within sight of US 191. The proximity to the highway has made it particularly vulnerable to various forms of vandalism, including shooting bullet holes in the figures, carving modern graffiti on the images, and deliberately effacing some of the figures. Visitors currently stop at small gravel pulloffs on both sides of the highway and walk up to the panel, but there are no signs and no defined trail. The apparent vandalism, the tramped vegetation and eroded soils, and the hazard of having to cross a busy highway all diminish the potential for visitor enjoyment of this site.

Adjacent Lands and Boundary Issues

Adjacent lands and boundary issues were examined as part of the planning process as specified in section 604 of the National Parks and Recreation Act of 1978 (16 USC 1a-5 et seq.). Areas of concern were the boundary in Moab Canyon along US 191, the BLM Lost Spring Canyon wilderness study area, and the Dry Mesa and Cache Valley areas.

The 3.5-mile segment of the park boundary along US 191 was originally set in 1938 along the north side of the right-of-way of old route 450. The existing highway was constructed along a new alignment, and the boundary is now an irregular distance from the new right-of-way and even crosses the highway at several points. Five sliver-shaped tracts of land, including three privately owned tracts and two BLM tracts, are now between the park boundary and the highway right-of-way. The privately owned tracts could potentially be developed or put to other uses that would be visually intrusive to the

park scene along the north side of the highway. The boundary is difficult to precisely locate because most of the old road is obliterated and most of the original brass cap angle point markers are missing.

Lost Spring Canyon adjacent to the northeastern park boundary is a wilderness study area of 3,880 acres administered by the Bureau of Land Management. The Bureau's statewide wilderness study and environmental impact statement are nearing completion. The area has been administered as wilderness during the interim, but it could be returned to multiple use management if dropped from the wilderness proposal. In a resource assessment completed in 1984 the National Park Service, in response to H.R. 1214, recommended that 2,882 acres of the Lost Spring Canyon study area be added to the park. The area has arches, scenic canyon walls, and cultural resources that are similar to park features, and it would complement the park resource base and provide outstanding opportunities for solitude and primitive outdoor recreation. The NPS study area is delimited by cliff rims as natural boundaries as much as possible, while the BLM study area is delimited by straight lines, including less scenic areas above the canyon rims.

Although Dry Mesa and Cache Valley were added to the monument in 1969, most of the lands were deleted when the park was established in 1971. The deleted area of 10,000 acres is administered by the Bureau of Land Management, except for one section owned by the state of Utah. Portions of Dry Mesa outside the park are visible from the Windows and along the main park road near the La Sal Mountain viewpoint, and it forms a scenic background for views from the park. Cache Valley is nearby and visible from the Delicate Arch viewpoint. Both Dry Mesa and Cache Valley are under multiple use management, including oil and gas leasing. Access is only by primitive road from the main park road. Heavy equipment for mineral exploration has used the park road in the past for access to leased areas on the mesa. Exploration licensees or prospecting permittees that possess no interest in adjacent federal lands are not permitted to use park roads for commercial vehicle operation. The National Park Service is concerned that future oil and gas activity could potentially degrade the scenic backgrounds visible from major park features.

The issues described above are the main issues to be addressed by the *General Management Plan*. Proposals for resolving these issues are outlined in the next section of this document. In addition, the "Proposed General Management Plan" incorporates information from the park's approved *Natural Resource Management Plan*, *Cultural Resource Management Plan*, and *Land Protection Plan*, making it a comprehensive overview of the proposed management direction for Arches National Park.

PROPOSED GENERAL MANAGEMENT PLAN

RESOURCE MANAGEMENT AND PROTECTION

Management Zoning

For NPS management purposes the park will be divided into four zones – natural, cultural, development, and special use (see the Management Zones map).

The natural zone (65,914.62 acres) will be managed to conserve the natural resources and processes of the park while accommodating uses that do not adversely affect those resources and processes. Facilities in this zone will be dispersed and limited to those that have little effect on scenic quality and natural processes. Examples of facilities typical of the natural zone include foot trails, signs, and trailside information displays. Within the natural zone are two subzones – outstanding natural feature subzone and natural environment subzone. Geological features possessing unusual intrinsic value and uniqueness, such as Delicate Arch, Landscape Arch, and Balanced Rock, will be placed in an outstanding natural feature subzone, which will total 4,700 acres. The remainder of the natural zone (61,184.62 acres) will be managed as a natural environment subzone.

The historic zone (120 acres) will be managed to preserve, protect, and interpret cultural resources (both historic and prehistoric) and their settings.

The development zone will provide the necessary space for visitor and management facilities (71 acres) and roads (179.4 acres).

The special use zone (7,123.96 acres) will include those lands within park boundaries where uses are carried out by other government agencies or private interests. NPS control over the use of lands in this zone is either lacking or secondary to that of another party. The three subzones in this zone will be mining lease (40 acres), nonfederal lands (7,035.47 acres), and utilities (48.49 acres).

Natural Resource Management

Protection and preservation of the natural environment to ensure ecosystem integrity while providing for visitor enjoyment will be the principal consideration of park managers. Programs for the study and protection of natural resources have been developed and assessed in the park's *Natural Resources Management Plan and Environmental Assessment*, which was revised and approved in 1986. Implementation is underway; however, additional funding will be needed for full implementation. Following is a brief description of the proposals from the approved resource plan. More detailed information can be found in the 1986 plan/environmental assessment.

The lack of adequate baseline information is a general resource management problem. Some resource components have never been studied, and little is known about others. Research projects will continue to upgrade understanding of natural resources in the park. Management of resource data is a growing concern as research becomes more specialized and data storage and retrieval needs increase. Upgrading of computer capability for data storage and processing will continue as new hardware and software are acquired.

LEGEND

ACREAGE % OF PARK

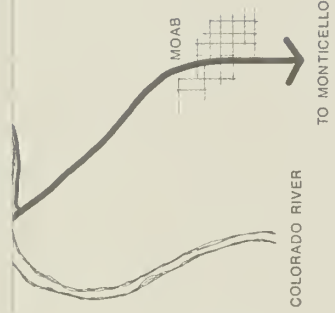
OUTSTANDING NATURAL FEATURE	4700.00	6.40
NATURAL ENVIRONMENT	61184.62	83.40
HISTORIC DEVELOPMENT		0.16
PAVED ROADS, 4WD, GRAVEL, 1	179.40	0.24
OTHER DEVELOPMENT	71.00	0.11
STATE OF UTAH LANDS ¹	6932.41	9.43
GRAND COUNTY LANDS ²	133.03	0.14
MINERAL LEASES ³	40.00	0.05
UTILITIES ⁴	48.49	0.07
TOTAL	73378.98	100.00

1. PROPOSED FOR ACQUISITION IN LAND PROTECTION PLAN WHEN ACQUIRED, THESE LANDS WOULD BE PLACED IN THE NATURAL MANAGEMENT ZONE.

2. RECREATIONAL PATENT

3. POTASSIUM LEASE TO BE READJUSTED OUTSIDE PARK BOUNDARY IN 2005.

4. GAS PIPELINE BY SPECIAL USE PERMIT WILL EXPIRE DECEMBER 31, 1989

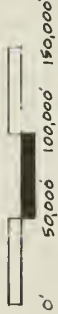


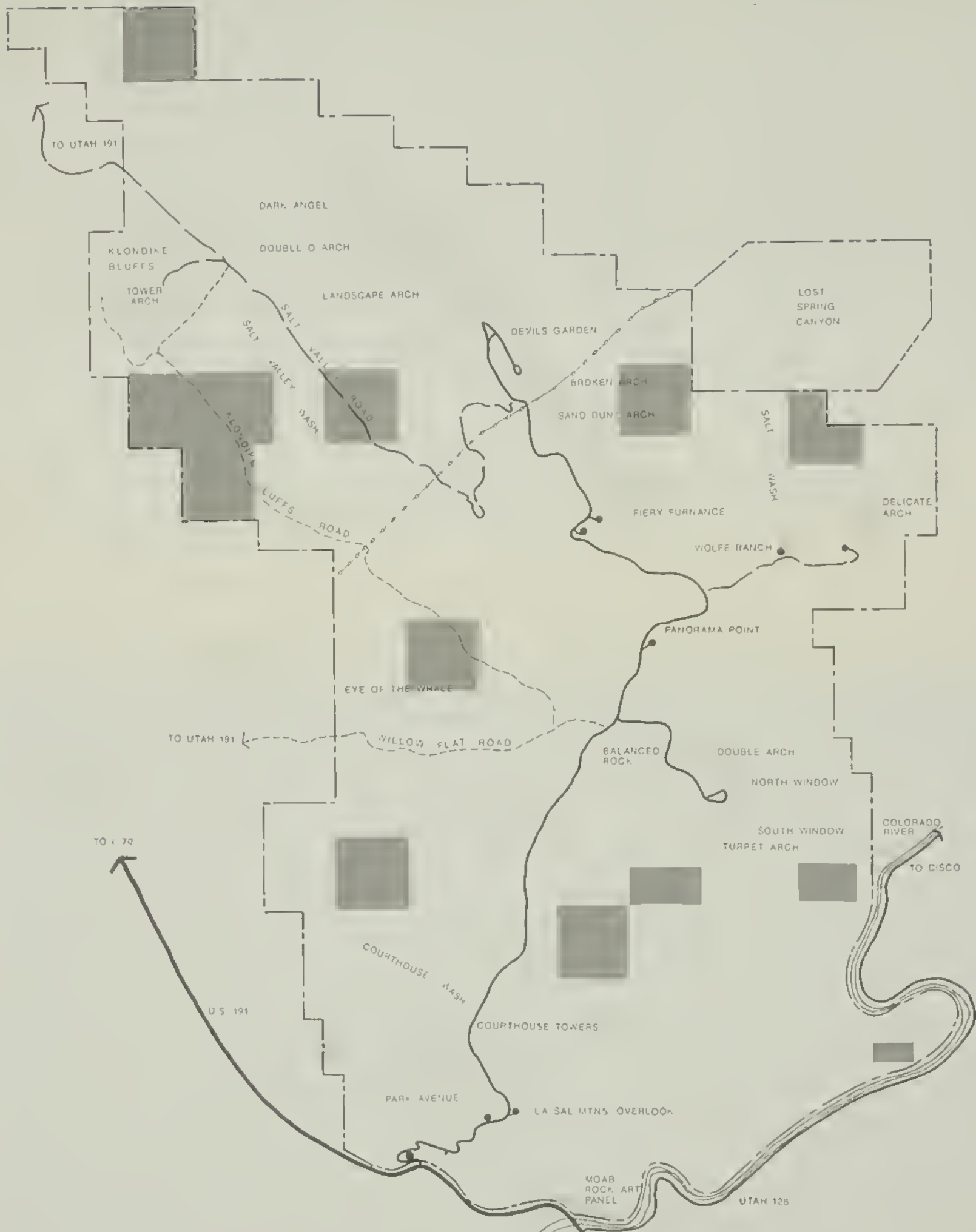
MANAGEMENT ZONES

ARCHES NATIONAL PARK
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



NORTH





LEGEND

	ACREAGE	% OF PARK
OUTSTANDING NATURAL FEATURE	4700.00	6.40
NATURAL ENVIRONMENT	6118.62	83.40
HISTORIC DEVELOPMENT		0.16
PAVED ROADS, 4WD, GRAVEL, 4WD	171.40	0.24
OTHER DEVELOPMENT	71.00	0.11
STATE OF UTAH LANDS ¹	6932.44	9.43
GRAND COUNTY LANDS ²	133.03	0.14
MINERAL LEASES ³	40.00	0.05
UTILITIES ⁴	48.49	0.07
TOTAL	73,378.98	100.00

¹ PROPOSED FOR ACQUISITION IN BIODIVERSITY PROTECTION PLAN. WHEN ACQUIRED, THESE LANDS WOULD BE PLACED IN THE NATURAL ENVIRONMENT ZONE.
² RECREATION BATTERY.
³ POTASSIUM LEASES TO BE REQUESTED OUTSIDE PARK BOUNDARY IN 2005.
⁴ GAS PIPELINE AS SPECIFIC USE PERMIT WILL BE REQUIRED BY 2005.

MOAB
UTAH 128
COLORADO RIVER
TO MONTICELLO



MANAGEMENT ZONES

ARCHES NATIONAL PARK
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Air quality monitoring efforts will be expanded to ensure baseline data in case of future degradation of this important park resource. At a minimum, particulate sampling and photography will be used to document air quality conditions. Effects on sensitive plant species will be determined and monitored, along with effects on archeological resources. Interpretation will be increased to explain the importance of air quality to natural and recreational values. The National Park Service will review appropriate permit applications to determine possible air pollution impacts and to make recommendations to prevent or mitigate adverse impacts on park air quality. The National Park Service will continue to work closely with the Environmental Protection Agency (EPA) and state of Utah to ensure development of emission control strategies needed to eliminate existing and prevent future visibility impairment at Arches.

Radiation (radon) monitoring has been conducted in the headquarters and housing area in the past, and monitoring will be continued in the future to assess the hazard from radioactive material.

Water resources include two wells for domestic water, backcountry springs and seeps, and two perennial streams. Backpackers depend on springs, some of which receive concentrated use. Monitoring of seven springs will continue to amass baseline data on water quality. Historic livestock-watering improvements will be allowed to deteriorate. Water rights will be secured to ensure park uses and resource values. The park's subsurface hydrology will be researched. A comprehensive water resource management plan will be prepared to guide and coordinate monitoring, research, and management related to a variety of water issues.

Trespass livestock continue to impact vegetation and springs in the park, even though livestock grazing was phased out of the park in 1982. Several springs, seeps, and streams have high coliform counts, probably due to trespass livestock. Sixteen miles of the park boundary will be fenced to protect park resources from trespass grazing. Monitoring and documentation of trespass livestock will continue.

Pronghorn antelope may have existed in the park area. Their occurrence and habitat requirements will be studied to determine if reintroduction would be appropriate. If so, the National Park Service will cooperate with the state of Utah to reintroduce pronghorn into the park.

Reintroduction of desert bighorn sheep is a long-term resource management goal that appears to have been successful in Arches. Monitoring of the herd will continue, and individuals will be transplanted if deemed necessary to prevent inbreeding.

Perpetuating the two endangered fish species in Colorado River tributary streams inside the park is a major fishery management concern. Only three species of fish occur in the park more than 1 mile from the Colorado River. Sport fishing is of little or no interest. Native and nonnative fish will be monitored to identify population numbers and trends and the need for mitigating measures to protect native species.

Relatively little is known about the rare, threatened, and endangered animal species in the park. Wildlife sightings are recorded, but data are collected on an opportunistic basis, instead of through long-term, systematic studies, and baseline information is generally lacking. Sensitive birds and mammals may be disturbed by some recreational activities. A systematic monitoring program will be designed and implemented, selected

species will be studied, conflicts with man will be identified, and reintroduction programs may be implemented as part of the management of special status species.

A raptor study has been proposed for fiscal year 1989, and it appears funds will be made available. If funds are not allocated in 1989, a request will be made for funding a study in the future. The scope of the research will include the habitat requirements, reproductive success, and human-caused disturbance of nesting raptors, including eagles, hawks, and owls.

Past wildfire suppression combined with livestock grazing has altered native plant communities, resulting in a reduction of perennial grasses and an increase of woody shrubs. The park's *Fire Management Plan* was approved in 1987. The important role of fire in the ecosystem will be restored by allowing natural fires to burn. All man-caused fires will be suppressed. Fire will be suppressed in zones surrounding developments and along the park boundary. Post-fire studies of vegetation plots will document long-term vegetation changes.

A number of nonnative plant species have invaded the park as a result of land disturbances caused by overgrazing and road construction, introduction as ornamental plantings, or volunteer spread. Some disturbed areas are succeeding to native vegetation following termination of livestock grazing. Selected sites will continue to be monitored using transects and photo points. Construction and maintenance will be planned and performed to reduce the perpetuation or introduction of exotic plant species. Certain species will be controlled at selected sites through cutting, burning, and use of approved herbicides, following the techniques of integrated pest management.

Outbreaks of insects and plant diseases have affected both native plants and ornamental trees in developed areas. In the past, insecticides have been applied to nonnative elm trees that provide shade in the headquarters areas. In the future, nonnative ornamental and shade trees that are subject to infestation will be phased out as part of the park's integrated pest management program.

The Arches region has a high incidence of endemic plant species because of harsh environmental conditions and geographic isolation. The survey of rare, threatened, and endangered plants will continue, and selected sites or habitats will be monitored.

A vegetation rehabilitation program will be continued to help reduce and mitigate previous disturbances. A parkwide study of impacted areas and revegetation needs will be conducted to aid restoration of native plant communities. Manipulative actions such as prescribed burning and seeding and transplanting native vegetation may be performed to accelerate restoration of natural vegetation on impacted sites. Research will be performed on blackbrush regeneration and revegetation of other native species.

A *Backcountry Management Plan* has been drafted to help ensure resource protection and a quality experience. The backcountry user permit system will be continued as a means of recording and dispersing use. Campsites and critical resource areas will be monitored to ensure resource protection. Use limits may become necessary in certain areas.

Management of landscapes and vegetation in developed areas will continue on several levels. Existing disturbed sites with nonnative vegetation or a paucity of vegetation due to trampling will continue to be treated and monitored by park staff. Site revegetation or

restoration will be funded as part of construction project costs on major projects. The disturbed zones around construction sites will be kept to a minimum by careful design and project supervision. Revegetation of disturbed sites will include regrading, seeding with native plants, and follow-up treatments where necessary. At areas of concentrated use, pedestrians will be encouraged to stay on hardened paths. Cars will be contained on established roads and in parking areas by barriers such as curbs and gutters, guardrails, or rocks.

The special use permit for the natural gas pipeline allows annual inspection by vehicle, which may lead to disturbance of vegetation. Depending on vegetation and soil conditions, portions of the disturbed swath have revegetated, while other areas remain visible after more than 20 years since construction. It is proposed that the pipeline be rerouted outside the park when replacement or significant reconstruction is required.

Threats to park resources from sources beyond the park boundary are becoming more numerous with increased regional development. Examples are mineral extraction activities, land development, utility line construction, emissions from new distant power plants, and aircraft overflights. Data collection to establish baseline conditions, and monitoring of park resources to identify trends or unusual changes, will allow managers to identify the effects of these external influences. Early identification of impacts to sensitive resources will be necessary for corrective actions to be effective. The National Park Service will participate in land use planning of other agencies and review environmental documents to help mitigate impacts on scenic values.

Wilderness

A recommendation that 62,947 acres within the park be designated as wilderness has been submitted to Congress. These lands will be managed as wilderness until Congress acts.

Proposed removal of the existing Salt Valley overlook road, removal of the existing Delicate Arch viewpoint parking area, and conversion of a portion of the Delicate Arch road to a trail (see "Site Development and Interpretive Media") will allow 55 acres of currently disturbed lands to be restored to natural conditions. These lands will be adjacent to recommended wilderness and may be suitable for addition to any wilderness area designated by Congress.

Conversely, proposed relocation of the Cache Valley four-wheel-drive access road and construction of a Double Arch handicap-accessible trail (see "Site Development and Interpretive Media") will involve 26 acres of lands included in the wilderness recommendation currently before Congress. The implementation of these proposals will be contingent on Congress excluding these lands from designated wilderness.

If Lost Spring Canyon is added to the park, it will be considered for potential addition to wilderness.

Cultural Resource Management

Significant cultural resources will be located, evaluated, preserved, protected, and interpreted in a manner that leaves them unimpaired for future generations. Programs for the identification and preservation of cultural resources are outlined in the *Cultural Resources Management Plan*, which was approved in late 1986. The status of cultural resource programs and current proposals are summarized below.

The first phase of a parkwide historic resource study and an updated list of classified structures was completed by Dr. Steven F. Mehls in 1986; this survey identified all historic resources (except archeological) and determined their significance.

Two properties are currently listed in the National Register: The Moab rock art panel (national significance) and the Wolfe Ranch Historic District (local significance). Four additional sites were included in a multiple-resource nomination in early 1987 and may be determined eligible for the National Register: the caretaker's residence, the Ringhoffer inscription near Klondike Bluffs, the Denis Julien inscription panel in the vicinity of Dark Angel Arch, and a segment of the Old Spanish Trail near the visitor center. Determinations of eligibility have been requested for nine additional sites (see the "Description of the Environment").

All properties in or potentially eligible for the National Register will be managed in accordance with *Cultural Resources Management Guidelines* (NPS-28), the National Historic Preservation Act (16 USC 470 *et seq.*), and Executive Order 11593, "Protection and Enhancement of the Cultural Environment" (*Federal Register* 36:8921). Properties recorded in the register will be given the highest priority for protection and will receive preservation maintenance. Other properties on the List of Classified Structures will have a lower priority for protection; however, no potentially historic property will be removed or destroyed without consultation with the Utah state historic preservation officer and the Advisory Council on Historic Preservation.

One of the major problems in planning is the lack of information. Baseline data about cultural resources, including geographic and geologic distribution, significance, and threats to sites, is needed to determine future management actions. The following inventories are required:

- an inventory and catalog of the museum collection

- an inventory and catalog of the archival library

- an inventory and classification of items in the various park collections, such as photographs, slides, archeological materials, plant materials, and study specimens

- a parkwide inventory and catalog of old roadways and dugways and an assessment of their historical and archeological significance

- a historic resources base map

- a complete parkwide archeological survey that includes rock art sites

Studies and guides that are still needed include

- a cultural resources maintenance guide

- a scope of collections statement and collections management plan

- determinations of significance for archeological resources

- historic structure reports and historic preservation guides for the Wolfe ranch, the caretaker's residence, and any other buildings or sites determined to be significant

- historic preservation guides for these significant properties

- an administrative history of the park

- photographs and scale drawings of the park's pictographs and petroglyphs

In addition to the approved cultural resource program, described above, the following actions are proposed for incorporation into the park's *Cultural Resources Management Plan*. To reduce the impacts of visitor use and the potential for vandalism, on-site patrols and interpretation by rangers will be increased at the Moab rock art panel and Wolfe ranch; public programs will be provided to advise visitors about the value and protection of these resources; and archeological resources will be monitored to detect vandalism, illegal collection, and other deterioration. Low metal barriers and interpretive exhibits will be installed to help protect the Moab rock art panel, which has been vandalized twice in the last ten years, and the Ute petroglyphs near the Wolfe ranch.

Action will be taken to prevent deterioration of the structures in the Wolfe Ranch Historic District. However, the Wolfe cabin and root cellar are in the 100-year floodplain, and it is infeasible to floodproof these historic structures. Relocation is also infeasible because it would radically alter the historic setting.

If Lost Spring Canyon was added to the park at some future date, the National Park Service would be responsible for future protection and treatment of the Cordova cabin and ranch and also several archeological sites in the canyon. These latter sites are prehistoric and include several dry-cave or alcove sites. The crumbling state of the Cordova cabin makes it more a subject of archeology than of history. It has been nominated to the National Register, but the determination of its eligibility has not yet been completed. In addition, a survey would be conducted to determine any additional cultural resources.

Adequate protection is required for the park's museum collection as well as for the archival library. The residence now used to store these collections would probably be damaged in certain instances of 500-year flooding. As shown on the site plan map for the headquarters area, a new building outside the probable maximum floodplain will be built for the display-quality items in the museum collection. The collection storage building will be fitted with the necessary protection devices. Certain items in the park collections will be shipped to the Western Archeological and Conservation Center in Tucson, Arizona.

Land Protection

A *Land Protection Plan* was written and approved in 1985, identifying management actions needed to protect nonfederal lands within the park boundary. Of the 73,379 acres of land within the boundary, all is federally owned except 6,902.44 acres of state-owned land, 320 acres with state-owned mineral rights, and 133.03 acres with a recreational patent held by Grand County. There are no privately owned lands within the park.

State land interests include surface interests and mineral rights. These lands are managed to produce maximum revenues to help support public schools. There are grazing permits and one oil and gas lease on some of the parcels. Although the permits and lease are not currently active, the potential for use exists. Fee acquisition of the state lands and interests is necessary to meet the park purposes of protecting the values of potential wilderness and preventing development and uses that would impair scenic and other resource values. The National Park Service is concerned that seismic exploration or drilling for hydrocarbons could damage significant park features. Another concern is the potential for visual intrusions. It is recommended that these tracts be acquired through a state-federal land exchange under existing procedures for implementing the Federal Land Policy and Management Act (43 USC 1714 et seq.). Once the tracts are acquired, action will be taken to phase out state oil and gas leases and grazing permits for the purpose of resource protection. Some of the federal land needed for exchange may be available from the Bureau of Land Management. The bureau has made an isolated tract of approximately 2,240 acres (3.5 sections) available for disposal. This tract is along the park boundary, west of Herdina Park, and the National Park Service has requested that it be kept available for a state-federal land exchange. The isolated BLM tract has oil and gas leases and, if transferred to the state, would continue to be managed for oil and gas extraction.

No action is recommended for the 133-acre Grand County tract as long as use complies with stipulations of the original patent. The county acquired a patent to the tract, which is along the Colorado River just north of the US 191 bridge, in 1961 under the Recreation and Public Purposes Act, prior to the tract's addition to the park in 1969. Existing uses that are allowed by stipulations of the patent are boat launching and docking, car parking, camping, picnicking, and storage. In 1985 Grand County requested that the patent be amended to allow addition of a restaurant, lodge, and convention facility. Most of the development would require tunneling into the canyon wall, with some of the facilities located near the top of the cliff. Rock removed from excavation would be placed in the floodplain to raise the area for parking. The National Park Service now administers the patent but does not have authority to amend it. Furthermore, the National Park Service is concerned that development of the tract beyond uses already permitted would adversely affect the resources the park was established to protect. The tract is partially within the 100-year floodplain of the Colorado River, within 1 mile of habitat used by endangered bald eagles and peregrine falcons, and it is a highly visible section of the canyon scene.

The Northwest Pipeline Corporation has a special use permit (SP 1340-8-0001) for a 26-inch natural gas pipeline right-of-way some 6.8 miles long across the park. The right-of-way is 50 feet wide. The existing permit expires on December 31, 1989, and allows for annual inspection and maintenance. This permit was written with a provision that if the line is ever replaced, it will be rerouted outside the park.

A federal potash lease (U-067454) overlaps 40 acres of park land along the southwest boundary. Federal potash leases do not expire, but they are readjusted every 20 years, with the next adjustment to be made in 2005. To eliminate or at least mitigate the potential impacts of the potash lease, the National Park Service will either (1) request the lessee to surrender the entire lease or portion thereof (under regulations at 43 CFR 3523.1) and request the Bureau of Land Management to arrange an exchange for federal lands of comparable value located outside Arches (under regulations at 43 CFR 3526.0-1), or (2) consider purchase of the lease interest within the park boundary.

No valid mining claims exist within the park. All federal oil and gas leases within the park have expired.

Adjacent Lands and Park Boundary Adjustments

The National Park Service will recommend to the secretary of the interior and Congress that the park boundary along the 3 -mile section of US 191 in Moab Canyon be realigned to follow the north boundary of the Utah Department of Transportation (UDOT) right-of-way. This would be consistent with the original intent of Congress to use the highway right-of-way as the south park boundary. At least one piece of park land within the existing boundary is south of the right-of-way, and several more parcels are within the highway right-of-way. These parcels would be transferred to the Bureau of Land Management and then relinquished by that agency to the Utah Department of Transportation.

Five non-NPS tracts between the existing boundary and the highway would be added to the park boundary and would be acquired by the National Park Service. Existing abandoned roadway sections inside the park would be removed, regraded, and revegetated. An alternative to the boundary uniformly following the right-of-way would be to follow the top or bottom of cut-and-fill slopes in cases where this distance is within the right-of-way and to otherwise follow the uniform UDOT right-of-way on flat terrain.

In compliance with Executive Order 12630, "Government Actions and Interference with Constitutionally Protected Property Rights," a takings implication assessment may need to be prepared. Department of the Interior implementing regulations are under preparation.

The National Park Service supports potential congressional action designating the Lost Spring Canyon wilderness study area as BLM wilderness. However, if the study area is deleted from wilderness consideration and returned to multiple use management, the National Park Service proposes that 2,882 acres be added to Arches National Park. The addition would follow the NPS recommendation in the *Resource Assessment for Lost Spring Canyon Wilderness Study Area* (NPS 1984) and utilize topographic features such as cliff rims for boundaries. A portion of one section owned by the state of Utah would be within the addition. The addition would complement the park resource base, provide excellent outdoor recreation opportunities, and extend protection to cultural and natural resources.

The National Park Service will consult with the Bureau of Land Management and participate in the review of oil and gas and mineral leasing projects affecting scenic values in those portions of Dry Mesa and Cache Valley visible from park roads and viewpoints. The National Park Service will seek to minimize adverse effects on scenic Lost Spring Area map

resources critical to the vistas enjoyed by visitors at the Windows, Panorama Point, and Delicate Arch.

Use of park roads by federal mineral lessees to access lands outside Arches may be permitted under "Commercial Vehicle" regulations (36 CFR 5.6(c)) *only* if no other access to these lands is available and providing the lessees use existing park roads.

VISITOR USE

Information/Orientation/Interpretation

The *Interpretive Prospectus* for Arches, approved in 1979, has been partly implemented, but some portions of the document no longer meet visitor and management needs. The current annual statement for interpretation more realistically identifies the following parkwide interpretive themes:

Geology: Erosion continually shapes the landscape into a spectacular array of arches, spires, fins, and balanced rocks.

Plant and Animal Adaptations: Survival of life on this high desert plateau is a process of adaptation to extremes.

Archeology: Preserving archeological resources is a vital first step toward understanding and saving our past for future generations.

Human History: Mining and ranching in Arches are historically significant and have an effect on the natural landscape.

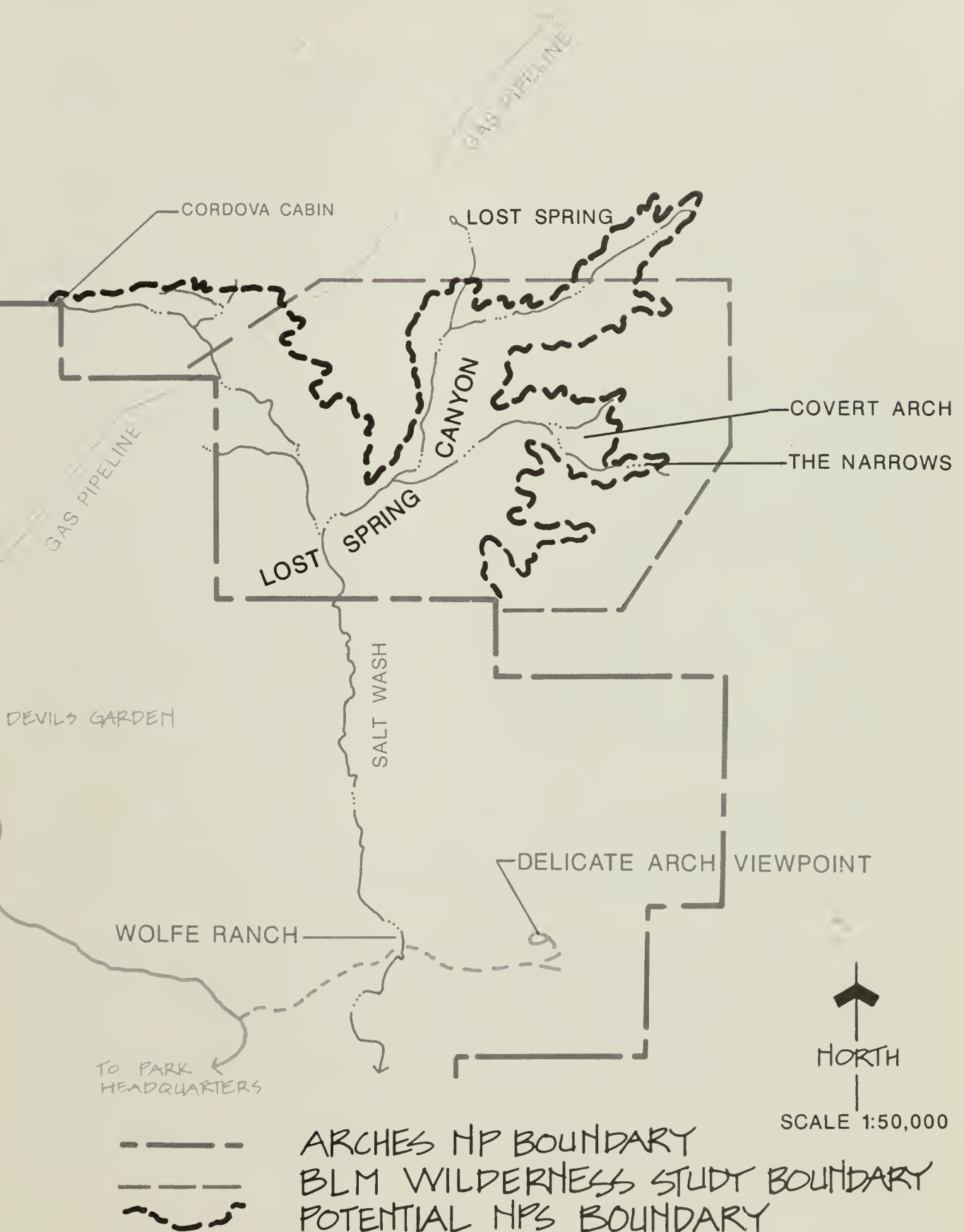
Safety: Trip preparation and awareness of potential hazards are critical to safe and enjoyable frontcountry and primitive backcountry travel.

A variety of approaches will be used to present these themes and to interrelate them in an effective impression of the Arches landscape. A new visitor center will be constructed at the headquarters area. The center will provide the beginning point where visitors will receive information and orientation about the park and enough interpretation to stimulate an interest in exploring the park and its features. The level of interpretation will be just enough to motivate visitors to enter the park and see the resources for themselves.

A new series of wayside exhibits will provide on-site interpretation of specific features, placing them in the context of the themes described above. Each exhibit will stand on its own, while contributing to an overall understanding of the dynamic processes that have shaped and continue to shape the park. A site-by-site analysis was undertaken as part of this plan to identify the best places to demonstrate the various facets of the park's natural and cultural history. The proposed topics for interpretation at each site are described under "Site Development and Interpretive Media." A wayside exhibit plan will be prepared to guide the specific contents of the exhibits (see "Future Plans and Studies"). Existing waysides will be evaluated for their effectiveness and how well they fit into the plan, and those that are not relevant will be removed.

The road guide will be updated as soon as possible for use until the wayside exhibits can be installed along the main road. Eventually the road guide will supplement the

LOST SPRING AREA



wayside exhibits, giving visitors more in-depth information and providing an inexpensive souvenir.

A hiker's guide with maps and descriptions of trails and cross-country routes will also be prepared. Discussions of appropriate safety measures for desert hiking and resource protection measures will be integrated throughout the guide.

Recreational Activities

Recreational activities will include sightseeing (vehicle tours), interpretive activities, hiking, backpacking, camping, bicycle touring, mountain biking, horseback riding, and four-wheel driving. The park will be divided into experience zones (see the Visitor Experience Zones map), within which certain kinds of activities and experiences will predominate. Specific zoning for backcountry hiking, backpacking, and horse use is provided in the *Backcountry Management Plan*.

Frontcountry Sightseeing. The highest percentage of total park visitors (95%) will exclusively use this zone, where they can easily and quickly see many of the park's outstanding features by way of paved roads and short, well-defined trails. Throughout this zone, use will be encouraged and accommodated by facilities such as a visitor center, a campground, restrooms, picnic areas, and handicap-accessible trails. There will be interpretive publications available at the visitor center, on-site exhibits at the major natural and cultural features, interpretive programs at the campground, and guided interpretive activities. A moderate to high frequency of encounters with others will give visitors the perception of a low degree of self-reliance. Despite the high frequency of encounters, there will be occasional opportunities for solitude in this zone.

The main park road and all of its pull-offs, and the spur roads to the Windows and the Delicate Arch viewpoint, will be included in this zone. The Windows will continue to be the primary destination of at least 40 percent of all park visitors – those who spend a half day (four hours) or less in the park. The site is particularly popular because there are many arches in a relatively small area, and they are highly visible and readily accessible by trail. Building on these assets, the Windows will be enhanced as a major day use activity area for all visitors, including the handicapped.

Visitors who plan to spend one or more full days in the park will travel more widely throughout this zone. An estimated 23 percent of visitors currently travel to the end of the paved road at Devils Garden. Although there might be fewer total visitors in the northern half of this zone, the experience will not be significantly different from the experience in the southern half of the zone.

The road to the Delicate Arch viewpoint will be paved to facilitate access to that outstanding feature. Paving the road will change the visitor experience from one of driving on a gravel road with some risk to a continuation of the main road driving experience. The amount of traffic on the road and the number of people at the trailheads and on the trails will probably increase. Although paving the road will facilitate access and make it possible for more people to see the arch, it might detract from some visitors' enjoyment, and visitor displacement is possible.

Backcountry, Motorized Recreation. About 2 percent of total park visitors will use this zone. Features will be accessible by primitive roads suitable for high-clearance or

four-wheel-drive vehicles and mountain bikes and by marked hiking routes or cross-country travel. There will be no facilities and little, if any, on-site interpretation. A low frequency of encounters with others will give visitors the perception of a moderate degree of self-reliance and reasonable opportunities for solitude. The Salt Valley road, the two four-wheel-drive roads, and the Klondike Bluffs area will be included in this zone.

Backcountry, Nonmotorized Recreation. About 5 percent of total park visitors will use this zone. Access will be by foot or horseback on primitive trails or by cross-country hiking. As in the backcountry motorized recreation zone, there will be no facilities and no on-site interpretation, and the emphasis will be on independent learning.

Encounters with others will be infrequent or nonexistent, giving visitors the perception of a high degree of self-reliance and the greatest opportunity for solitude.

Concession Activities

Authorized concession services (guided tours by bus, van, jeep, horseback, and bicycle) are satisfactory and, in fact, are underutilized. There will be no concession facilities in the park. The nearby communities at Moab can provide merchandise sales, food and beverage service, and lodging.

Capacity

The demand for use of the park is expected to increase by 36 percent by the year 2005; however, sufficient data do not exist to determine whether or not this amount of use can be accommodated without causing unacceptable deterioration of natural or cultural resources or visitor experiences. To gather the necessary data for decisions on capacity, a Visitor Impact Management (VIM) program will be implemented. The program will use the National Parks and Conservation Association visitor impact management process (Graefe et al 1987), which calls for determination of standards for key impact indicators, comparison of these standards with existing field conditions, and determination of appropriate management strategies to deal with probable causes of impacts. The principle of visitor impact management has long been an integral part of NPS resource management practices. Thus, the VIM program will not introduce a new management concept, but it will provide a formalized framework for applying the concept to all aspects of visitor use. An outline of the VIM process (with an example of how the process can be applied to a specific area within Arches), a list of potential impact indicators, and a discussion of how the program will be implemented are included in appendix C.

The capacity of facilities, in particular parking, throughout the park road corridor controls much of the use in front- and backcountry dispersed use areas. Concurrently with the implementation of the VIM program, parking and other trailhead facilities at Devils Garden, the Wolfe ranch, and the Delicate Arch viewpoint will be expanded to accommodate the existing demand (average 1989 summer weekend demand). Providing larger and more structured parking areas will be accompanied by the elimination of roadside overflow parking, and the net effect is expected to be an improvement, rather than a deterioration, in resource conditions and visitor experiences. Even though the parking areas will be larger and more structured with the addition of barriers, these

DEVILS GARDEN

EAGLE PARK

DARK ANGEL

- ON-SITE INTERPRETATION AND GUIDED HIKES
- FACILITIES (COMFORT STATIONS, CAMPGROUNDS, ETC.)
- FREQUENT ENCOUNTERS WITH OTHERS

BACKCOUNTRY, MOTORIZED RECREATION

- PRIMITIVE ROADS
- MARKED ROUTES
- NO ON-SITE INTERPRETATION
- NO FACILITIES
- SOME ENCOUNTERS WITH OTHERS

BACKCOUNTRY, NONMOTORIZED RECREATION

- NO ROADS; FOOT OR HORSEBACK ACCESS ONLY
- FEW TRAILS OR MARKED ROUTES
- NO ON-SITE INTERPRETATION
- NO FACILITIES
- FEW TO NO ENCOUNTERS WITH OTHERS

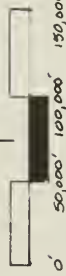
VISITOR EXPERIENCE ZONES

ARCHES NATIONAL PARK

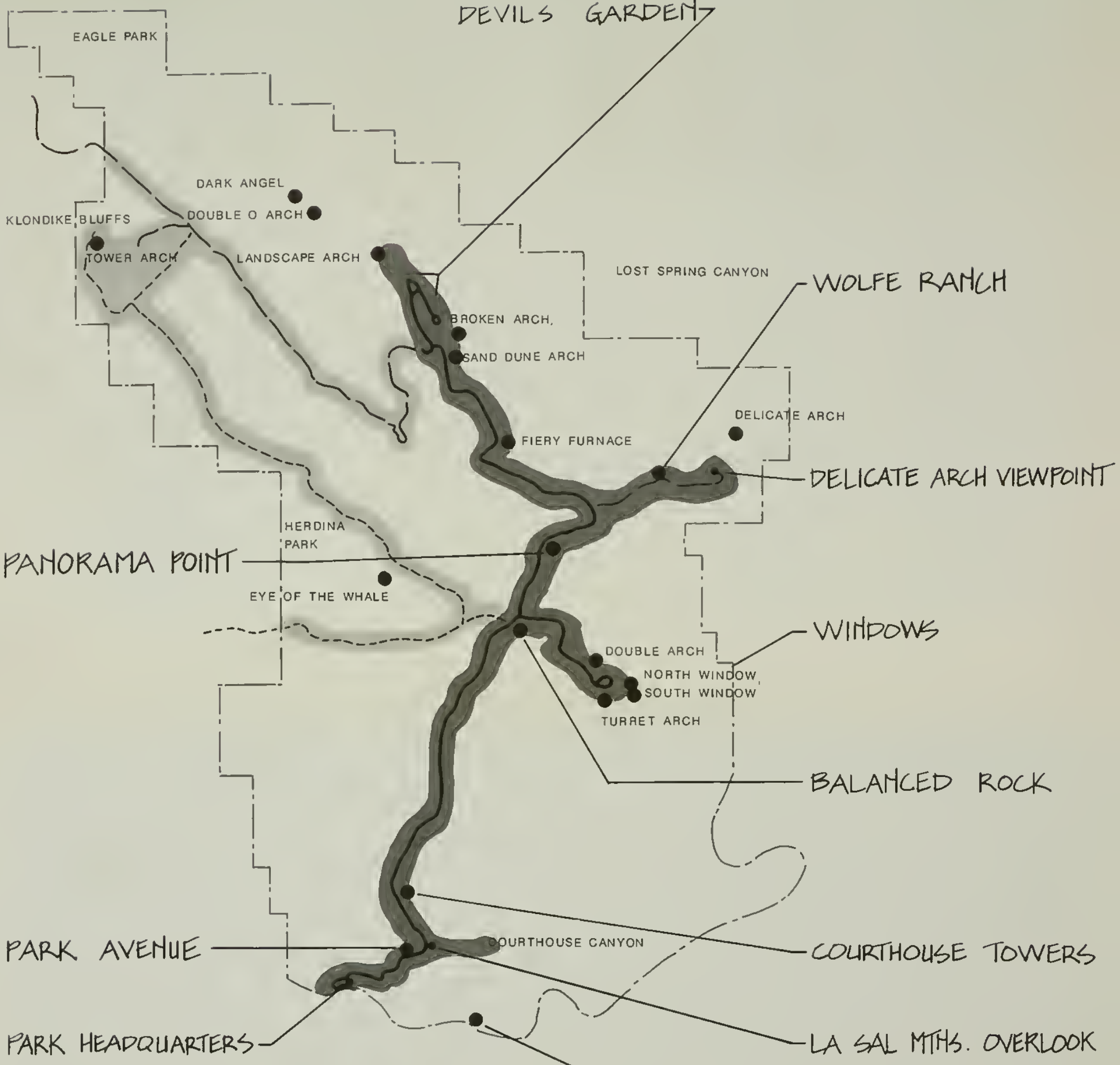
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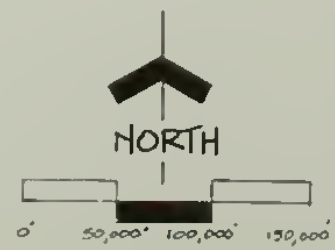
NORTH



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- LEGEND**
- FRONTCOUNTRY SIGHTSEEING**
- PAVED ROADS
 - TRAILS AND MARKED ROUTES
 - ON-SITE INTERPRETATION AND GUIDED HIKES
 - FACILITIES (COMFORT STATIONS, CAMPGROUNDS, ETC.)
 - FREQUENT ENCOUNTERS WITH OTHERS
- BACKCOUNTRY, MOTORIZED RECREATION**
- PRIMITIVE ROADS
 - MARKED ROUTES
 - NO ON-SITE INTERPRETATION
 - NO FACILITIES
 - SOME ENCOUNTERS WITH OTHERS
- BACKCOUNTRY, NONMOTORIZED RECREATION**
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VISITOR EXPERIENCE ZONES
ARCHES NATIONAL PARK
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

changes will probably not have a major impact on visitor experiences because the number of cars and the number of people on the trail will remain about the same.

At Balanced Rock, parking will be expanded as much as possible on the existing site, but the additional parking needed to accommodate the existing demand at that location could not be provided without developing an entirely new access road and parking, and there is a strong concern that unacceptable resource deterioration would result from such development. Once the VIM program is implemented, it will be determined with certainty whether or not visitor facilities can be expanded further at Balanced Rock.

Table 1 lists the maximum parking capacities that will exist in the road corridor once the proposed parking improvements are implemented. From these capacities, the theoretical maximum number of persons at one time (PAOT) was calculated by multiplying the average number of persons per car (3.4) times the number of parking spaces. The theoretical daily capacity of persons was derived by totaling the PAOT and multiplying that by a turnover rate of 3 (based on a nine-hour use day with an average length of stay of three hours). Site-specific turnover rates were not used to calculate daily capacity because in many cases the length of stay is only 5 or 10 minutes or visitors do not stop at all; thus, the results would be grossly inflated and of little value.

Table 1: Road Corridor Parking Capacity, Proposal

Sites serving frontcountry¹	<u>Vehicle Spaces</u>	<u>Theoretical Max. Persons at One Time</u>	<u>Theoretical Daily Capacity</u>
Visitor center	59	200	
Moab Fault	5	17	
Park Avenue	33	112	
Courthouse Towers	20	68	
Balanced Rock	16	54	
Garden of Eden	10	34	
Windows	64	218	
Panorama Point	55	187	
Delicate Arch Viewpoint	28	95	
Subtotals	290	985	2,955
Sites serving backcountry²			
La Sal Mountains Viewpoint	28	95	
Wolfe Ranch/Delicate Arch trailhead	44	150	
Fiery Furnace	15	51	
Sand Dune Arch	18	61	
Devils Garden	58	197	
Broken Arch trailhead	8	27	
Klondike Bluffs	8	27	
Subtotals	179	608	1,824
Totals	469	1,593	4,779

¹Length of stay is less than 45 minutes. Primarily viewpoints with trails less than 1 mile.

²Length of stay is greater than 45 minutes. Trailheads for trails longer than 1 mile, incidental viewpoints.

Based on the breakdown between backcountry trailheads and frontcountry viewpoints, as shown in the table, about 40 percent of the daily visitor use occurs in the backcountry and 60 percent occurs in the frontcountry. The theoretical maximum capacities assume equal distribution of use and full use of all parking. Actual use figures indicate that this is currently not the case and that in a few instances there are radical differences. Some sites, notably Panorama Point, have capacities far in excess of actual use, while sites

like Balanced Rock cannot accommodate half the existing demand. Today the people who cannot find parking at the most popular destinations generally are not dispersing to sites with excess capacity. Thus, the theoretical maximum capacities are exaggerated and will remain unrealistically high if existing use patterns continue.

Until the VIM program is operational, increases in use will be accommodated only to the extent that excess demand can be redistributed to currently underutilized areas. For example, overcrowding at the Fiery Furnace area will be alleviated by spreading use more evenly over the day (by offering four guided tours per day instead of one) and by initiating similar tours of the Courthouse Canyon area (which is currently underutilized).

As stated above, visitor projections indicate a potential increase in visitation of 36 percent by 2005. Peak period daily use averaged 2,600 people per day in 1987. Using the projection figure of 36 percent, peak period daily use could be expected to average 3,536 by 2005. This projection is well below the theoretical maximum daily capacity of 4,779 people who could be accommodated by the parking proposed in the general management plan if use was equally distributed.

Further expansion of roads, parking, and other facilities will occur only if it is determined through the VIM program that additional visitors can be accommodated without causing unacceptable deterioration of natural or cultural resources or visitor experiences.

Other focuses for the VIM program will be raptor nesting areas and the Colorado River shoreline. Nesting by raptors could potentially be disturbed by visitor use during the critical spring nesting season in the Klondike Bluffs area, along the Colorado River cliffs, and in other areas of the park. The population density and dynamics of these species and the effects of motorists, hikers, and boaters on nesting activity will be determined so that future management actions can be planned. Closely related research will be conducted to help determine the effects of public use on the 11-mile segment of the Colorado River paralleling the park boundary. The mouth of lower Salt Wash, an occasional boating stop, is outside the park but within 600 feet of the boundary. In addition to disturbance of nesting raptors, other concerns include the removal and burning of wood and improper disposal of human waste. Research will establish baseline conditions and sensitive habitats and determine types and levels of recreational use and impacts of current use.

Handicap-Access

A cluster of handicap-accessible facilities will be developed at the Windows. Minor accessibility improvements, such as better signing, curb cuts, parking space striping, ramps, and restroom alterations, will be made throughout the park in the course of routine maintenance. Any new visitor or employee facilities and any alterations to existing facilities will comply with all appropriate laws and regulations, including the Architectural Barriers Act of 1968 (42 USC 4151 et seq.) and the Rehabilitation Act of 1973 (29 USC 792 et seq.). Where possible, facilities and interpretive programs will be available for the sensory and mentally handicapped, and information on the location of accessible facilities and opportunities will be available. The wayside exhibit plan and interpretive prospectus will address specific proposals for programs.

SITE DEVELOPMENT AND INTERPRETIVE MEDIA

Parkwide Roads and Trails

The width and standard of the main park road will remain the same. Parking pullouts along the road will be redesigned as necessary for safety. This will require some widening and lengthening of existing pullouts and possibly eliminating others (see the individual site development plans, below, and the "Road System Evaluation" in appendix D). Road signs will be evaluated and changes made as necessary, in accordance with a parkwide sign plan (see "Future Plans and Studies").

The Delicate Arch road will be paved to the end of the road (at the proposed new Delicate Arch viewpoint parking area), and bridges or culverts will be constructed across washes to facilitate access to the Wolfe ranch and the Delicate Arch viewpoint. The Salt Wash crossing is programmed for 1991, but the Winter Wash crossing still needs to be programmed. These actions will prevent road closures due to flooding and reduce maintenance. The existing alignment will be maintained as much as possible, and the road designed at a 25 mph standard, thereby minimizing cut and fill and retaining a quality driving experience.

The Salt Valley road and both four-wheel-drive roads will remain at their existing standards.

As now, the park will contain few designated trails. Stream washes and canyons, which provide many outstanding natural corridors for cross-country travel, will continue to be major means of backcountry access. Proposed trail improvements and new trails are described under the individual site development plans, below. Trail class standards are defined in appendix E.

The park staff will develop a parkwide plan for trail and road signs, establishing a standard format and design that will be compatible with the natural environment and consistent in appearance throughout the park. All signing will be visible but not overpowering to the site. Signs will be clustered in a pleasing and functional manner, and messages will be eye-catching, simple, and uncluttered. All regulatory, directional, and informational road signs will conform to standards in the *Manual of Uniform Traffic Control Devices* (MUTCD).

Exhibits at all trailheads, except where single trails lead only short distances to viewpoints, will have a standard format including a map, a bulletin board, and an interpretive message. The text for trailhead signs will be specified in the wayside exhibit plan. The maps will be prominent features of the exhibits, made highly visible through their placement rather than size or contrast. They will show the trail configurations, mileages, major features, elevation gains or losses, and relative difficulty. Current safety information and park regulations will be posted on bulletin boards incorporated into the exhibits, allowing for information to be easily updated. Positive wording will be emphasized. Interpretive messages will be included where appropriate in accordance with the wayside exhibit plan. At trailheads for backcountry zones, such as Fiery Furnace and Lost Spring, the messages will emphasize safe backcountry travel and resource protection.

At numerous areas within the park, trampling of vegetation and soil erosion are occurring due to the development of shortcut trails at trailheads and overflow parking along road

shoulders. Physical barriers will be installed to prevent these problems and to communicate to visitors the need to protect resources. The barriers need to be effective, visually compatible with the natural scene, and relocatable or removable if necessary. Double-railed cedar fencing will be used at trailheads to prevent shortcutting, and boulders will be used along parking area roadways to prevent shoulder parking. Fencing will be used only in the immediate vicinities of the trailheads, on the same side of the road as the trailhead and not along the roadway. Boulders will be buried to approximately one-third of their depth and installed in informal, irregularly-spaced groupings to ensure a naturalistic appearance.

Visitor Center/Headquarters

The park headquarters site will be redeveloped to accommodate the new visitor center and to protect visitors, staff, and facilities from flooding (see the site plan map). The proposed new visitor center will be larger and better designed to meet visitor and staff needs. It will include

- an entryway, where basic information will be available 24 hours a day

- a lobby with an information desk, a scale model of the park, exhibits oriented to trip planning and safety, and a publication sales area

- a small exhibit room designed to give visitors an overview of park resources and motivate them to explore the park first-hand

- an auditorium

- restrooms

- offices for visitor center staff

The facility will be fully handicap-accessible and include programs for the sensory and mentally impaired. A detailed discussion of the size and functions of the proposed visitor center is included in appendix F.

The visitor center will be located just northwest of the existing visitor center/administration building. This site offers superb vantage points for visitors to see typical Arches terrain (slickrock slopes, cliffs, towers, and rock wall seeps). The building will have large windows facing north to take advantage of these special features. Windows could be in the lobby and/or incorporated into the auditorium to provide a dramatic conclusion to the audiovisual program. Exhibit space will be windowless to allow maximum flexibility in exhibit design and placement. An outdoor deck will be provided on the north side for outdoor viewing and interpretive talks relating to the scenery. There will be orientation panels on the exterior of the building near the entrance to serve those visitors arriving after hours. Design of the building will also take full advantage of the site's potential for conserving energy by utilizing solar power.

The existing visitor center/administration building will be remodeled to house all the Arches administrative offices. The proximity of this building to the new visitor center will facilitate communication among the staff. The building currently has a unisex handicap-accessible restroom and men's and women's restrooms that are handicap-accessible

DEVILS GARDEN

- EXPAND EXISTING TRAILHEAD PARKING, ADD TURNAROUND LANE
- ADD TRAILHEAD EXHIBIT; COMFORT STATION
- ADD 10 WALK-IN TENT CAMPING SITES
- REDESIGN AMPHITHEATER
- ADD DUMP STATION
- ADD NEW RANGER RESIDENCE; OFFICE
- REDESIGN UTILITY SYSTEM
- LIMIT SIZE; USES OF MAINTENANCE AREA

PARK HEADQUARTERS

- ADD NEW VISITOR CENTER
- CONVERT EXISTING VISITOR CENTER TO OFFICES
- MITIGATE FLOOD HAZARD THROUGH DESIGN
- REDESIGN SEWAGE TREATMENT SYSTEM
- ESTABLISH COMMON ARCHITECTURAL MOTIF

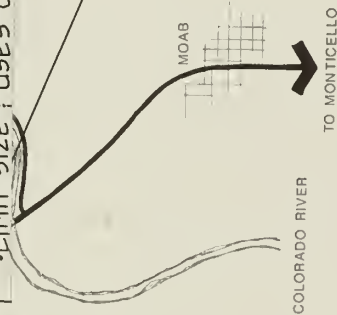
RESET PARK BOUNDARY TO NORTH SIDE OF RIGHT-OF-WAY OF NEW HIGHWAY IN MOAB CANYON

REVISE EXHIBIT AT MOAB FAULT OVERLOOK

- LA SAL MTHS. OVERLOOK
- MAKE VIEWPOINT HANDICAP ACCESSIBLE
- REVISE VIEWPOINT EXHIBIT
- DEVELOP PRIMITIVE ROUTE TO COURTHOUSE WASH; ADD EXHIBIT

MOAB ROCK ART PANEL

- ADD INTERPRETIVE EXHIBIT; PROTECTIVE BARRIER
- ADD TRAIL TO PANEL IF FORMAL PARKING; CROSSWALK PROVIDED BY UTAH DEPT. OF TRANSPORTATION

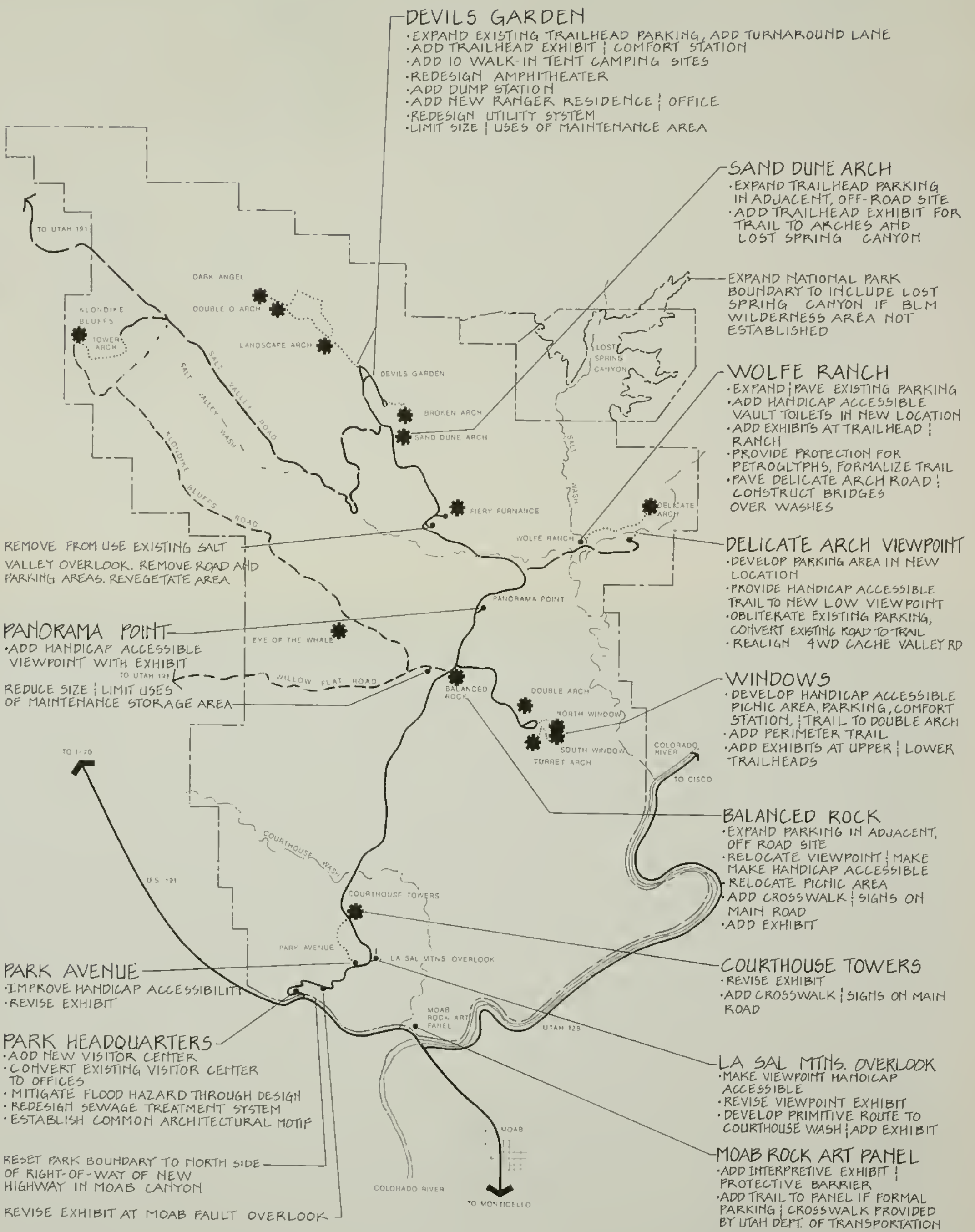


LEGEND

- ARCHES NATIONAL PARK BOUNDARY
- NPS RECOMMENDATION FOR EXPANDED PARK BOUNDARY
- BLM WILDERNESS STUDY AREA BOUNDARY
- NATURAL FEATURE
- PARKING AND/OR TRAILHEAD
- PAVED ROAD
- GRAVEL ROAD
- FOUR-WHEEL-DRIVE ROAD
- TRAIL

PROPOSED DEVELOPMENT

ARCHES NATIONAL PARK
UNITED STATES DEPARTMENT OF THE INTERIOR
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DEVILS GARDEN

- EXPAND EXISTING TRAILHEAD PARKING, ADD TURNAROUND LANE
- ADD TRAILHEAD EXHIBIT | COMFORT STATION
- ADD 10 WALK-IN TENT CAMPING SITES
- REDESIGN AMPHITHEATER
- ADD DUMP STATION
- ADD NEW RANGER RESIDENCE | OFFICE
- REDESIGN UTILITY SYSTEM
- LIMIT SIZE | USES OF MAINTENANCE AREA

SAND DUNE ARCH

- EXPAND TRAILHEAD PARKING IN ADJACENT, OFF-ROAD SITE
- ADD TRAILHEAD EXHIBIT FOR TRAIL TO ARCHES AND LOST SPRING CANYON

EXPAND NATIONAL PARK BOUNDARY TO INCLUDE LOST SPRING CANYON IF BLM WILDERNESS AREA NOT ESTABLISHED

WOLFE RANCH

- EXPAND | PAVE EXISTING PARKING
- ADD HANDICAP ACCESSIBLE VAULT TOILETS IN NEW LOCATION
- ADD EXHIBITS AT TRAILHEAD | RANCH
- PROVIDE PROTECTION FOR PETROGLYPHS, FORMALIZE TRAIL
- PAVE DELICATE ARCH ROAD | CONSTRUCT BRIDGES OVER WASHES

DELICATE ARCH VIEWPOINT

- DEVELOP PARKING AREA IN NEW LOCATION
- PROVIDE HANDICAP ACCESSIBLE TRAIL TO NEW LOW VIEWPOINT
- OBLITERATE EXISTING PARKING; CONVERT EXISTING ROAD TO TRAIL
- REALIGN 4WD CACHE VALLEY RD

WINDOWS

- DEVELOP HANDICAP ACCESSIBLE PICNIC AREA, PARKING, COMFORT STATION, | TRAIL TO DOUBLE ARCH
- ADD PERIMETER TRAIL
- ADD EXHIBITS AT UPPER | LOWER TRAILHEADS

BALANCED ROCK

- EXPAND PARKING IN ADJACENT, OFF ROAD SITE
- RELOCATE VIEWPOINT | MAKE MAKE HANDICAP ACCESSIBLE
- RELOCATE PICNIC AREA
- ADD CROSSWALK | SIGNS ON MAIN ROAD
- ADD EXHIBIT

COURTHOUSE TOWERS

- REVISE EXHIBIT
- ADD CROSSWALK | SIGNS ON MAIN ROAD

LA SAL MTNS. OVERLOOK

- MAKE VIEWPOINT HANDICAP ACCESSIBLE
- REVISE VIEWPOINT EXHIBIT
- DEVELOP PRIMITIVE ROUTE TO COURTHOUSE WASH | ADD EXHIBIT

MOAB ROCK ART PANEL

- ADD INTERPRETIVE EXHIBIT | PROTECTIVE BARRIER
- ADD TRAIL TO PANEL IF FORMAL PARKING | CROSSWALK PROVIDED BY UTAH DEPT. OF TRANSPORTATION

PANORAMA POINT

- ADD HANDICAP ACCESSIBLE VIEWPOINT WITH EXHIBIT

REDUCE SIZE | LIMIT USES OF MAINTENANCE STORAGE AREA

PARK AVENUE

- IMPROVE HANDICAP ACCESSIBILITY
- REVISE EXHIBIT

PARK HEADQUARTERS

- ADD NEW VISITOR CENTER
- CONVERT EXISTING VISITOR CENTER TO OFFICES
- MITIGATE FLOOD HAZARD THROUGH DESIGN
- REDESIGN SEWAGE TREATMENT SYSTEM
- ESTABLISH COMMON ARCHITECTURAL MOTIF

RESET PARK BOUNDARY TO NORTH SIDE OF RIGHT-OF-WAY OF NEW HIGHWAY IN MOAB CANYON

REVISE EXHIBIT AT MOAB FAULT OVERLOOK

LEGEND

- ARCHES NATIONAL PARK BOUNDARY
- - - - - NPS RECOMMENDATION FOR EXPANDED PARK BOUNDARY
- BLM WILDERNESS STUDY AREA BOUNDARY
- ★ NATURAL FEATURE
- PARKING AND/OR TRAILHEAD
- ===== PAVED ROAD
- ===== GRAVEL ROAD
- FOUR-WHEEL-DRIVE ROAD
- TRAIL

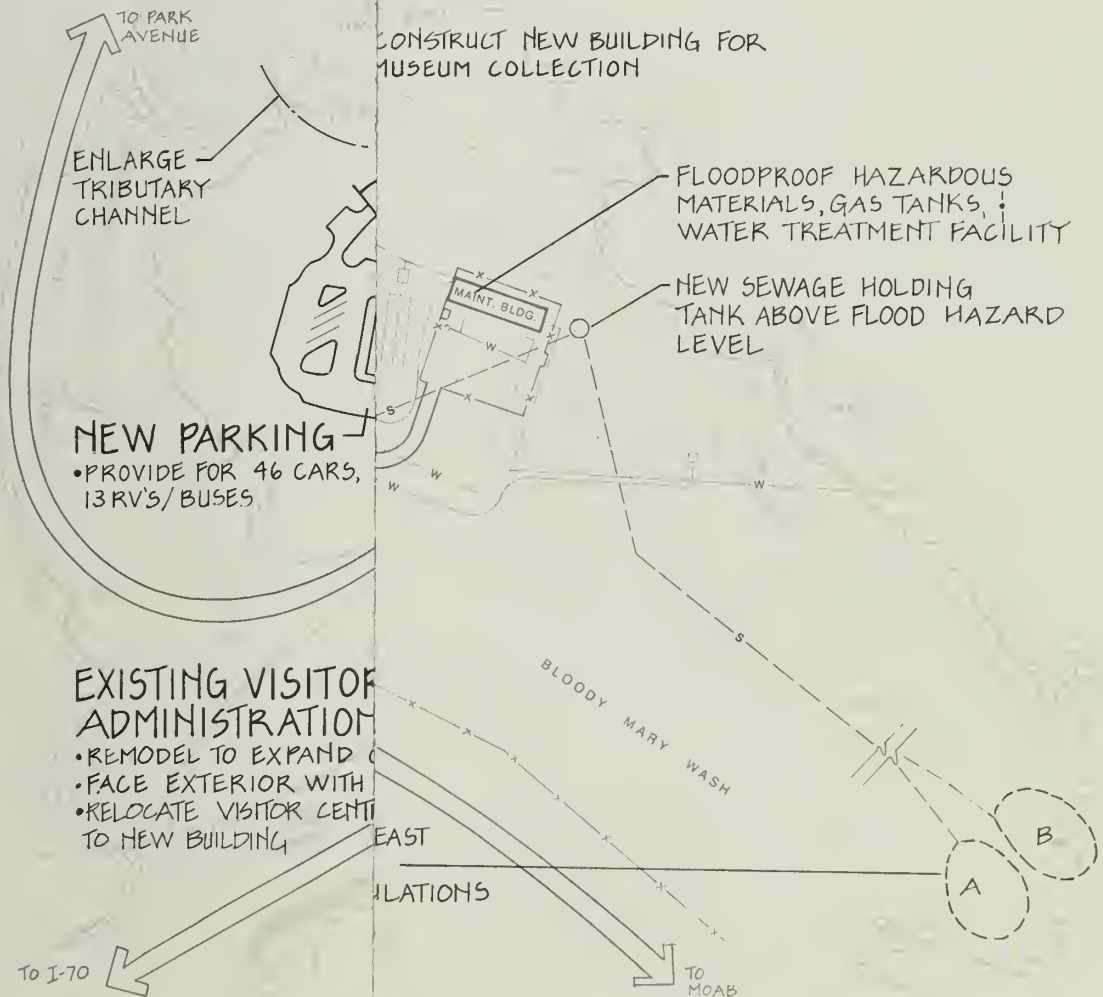
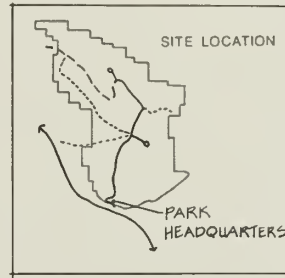


PROPOSED DEVELOPMENT

ARCHES NATIONAL PARK
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NEW VISITOR CE

- 9000 SQ FT
- DEVELOP ARCHITECTURAL MOTIF



DEVELOPMENT CONCEPT PLAN

PARK HEADQUARTERS

ARCHES NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR

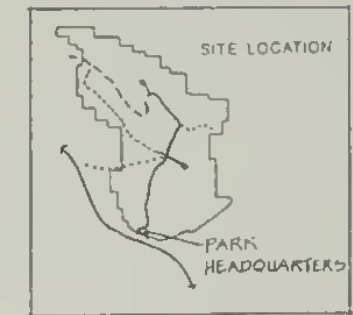
NATIONAL PARK SERVICE

NEW VISITOR CENTER

- 9000 SQ FT
- DEVELOP ARCHITECTURAL MOTIF

EXPAND UTILITY SYSTEMS

- DEVELOP NEW WASTEWATER TREATMENT SYSTEM FOR NEW VISITOR CENTER
- EXTEND POWER TELEPHONE LINES, ADD TWO TRANSFORMERS
- EXTEND WATERLINE



TO FARM AVENUE

ENLARGE TRIBUTARY CHANNEL

NEW PARKING

- PROVIDE FOR 46 CARS, 13 RV'S/BUSES

EXISTING VISITOR CENTER ADMINISTRATION BLDG.

- REMODEL TO EXPAND OFFICES
- FACE EXTERIOR WITH STONE
- RELOCATE VISITOR CENTER FUNCTION TO NEW BUILDING

CONSTRUCT NEW PARKING FOR APARTMENTS

INSTALL FLAPGATE ON CULVERT

ADD NEW VISITOR CENTER SIGN
MODIFY LEACHFIELD AS NECESSARY (REMOVE UNUSED)

ADD TWO CULVERTS FOR FLOOD PROTECTION

CONSTRUCT NEW BUILDING FOR MUSEUM COLLECTION

FLOODPROOF HAZARDOUS MATERIALS, GAS TANKS, WATER TREATMENT FACILITY

NEW SEWAGE HOLDING TANK ABOVE FLOOD HAZARD LEVEL

PARK ENTRANCE

- ADD SECOND ENTRANCE STATION LANE
- PROVIDE TURNAROUND EMERGENCY/RESTRICTED ACCESS TO VISITOR CENTER PARKING

MODIFY CHAIN LINK FENCE AROUND WEATHER STATION TO REDUCE VISUAL IMPACT

ADD NEW LEACHFIELD AT LEAST 1000 FT. FROM WELL:
A) IN FLOODPLAIN IF REGULATIONS PERMIT, OR
B) IN SUITABLE AREA ABOVE FLOODPLAIN

BLOODY MARY WASH

TO MCAB

LEGEND

EXISTING

PROPOSED

ELEVATE ROAD FOR FLOOD PROTECTION (AVG. 4')

WATER

SEWER

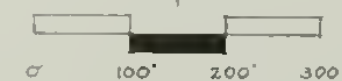
UNDERGROUND POWER

POWER

FENCE

CULVERT

NORTH



DEVELOPMENT CONCEPT PLAN

PARK HEADQUARTERS

ARCHES NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

from an outside entrance serving the parking lot; however more work needs to be done to fully meet accessibility standards. This will be accomplished when the building is remodeled.

To minimize congestion on the entrance road, a second entrance station and approach lane will be added adjacent to the existing station. Visitors will turn off to the new visitor center before driving through the entrance station, allowing them to decide whether or not they want to proceed into the park before they pay their fees. A turnaround lane will be provided for visitors who drive straight to the entrance station and then decide either to go back to the visitor center or to leave the park. During periods of very heavy use, entrance station staff will have the option of allowing those visitors to proceed directly into the visitor center parking lot through a short service/emergency access spur connecting the park entrance road with the parking lot.

The turnoff to the visitor center access road will be a sufficient distance from the entrance stations to prevent cars waiting to go through the entrance stations from blocking the intersection. The new access road will be a sufficient distance from the CNHA building (historic custodian's residence) to preserve the building's landscape setting. The headquarters service road will tie into the new visitor center access road, and the existing turnoff to the service road will be eliminated to reduce the number of intersections and improve the visual quality of the entrance to the headquarters area.

Visitors and staff will share a new parking lot, which will be designed to accommodate 46 cars and 13 recreation vehicles or buses (existing demand plus a projected 36 percent visitation increase factor). Spaces in the row closest to the administration building will be designated for staff.

A new parking lot for the employee apartments will be provided east of the building, and the existing lot in front of the building will be removed. The existing lot is a visual intrusion along the visitor center access road and would not be easily accessible from the adjacent service road once the road is raised for flood protection purposes.

A new collection storage building will be provided northwest of the maintenance building, outside the potential maximum floodplain.

The new visitor center and new collection storage building will be connected to existing water and power sources. The existing water system, with primary and secondary wells, meets all needs at the headquarters area, and the power supply is also adequate. The existing telephone and radio systems are inadequate and will be replaced and extended as necessary to serve the administration and visitor center buildings.

The existing sewage treatment system is adequate to serve existing development and will be retained. The leachfield serving the administration building might have to be relocated in the same general vicinity to accommodate the new visitor center access road. A new sewage treatment system will be developed for the new visitor center. The proposed system will transport effluent to leachfields in the Bloody Mary Wash floodplain east of the maintenance area.

If it is determined that the leachfields must be located above the floodplain, the suitability of upslope areas directly to the north, out of the floodplain, will be determined. If no suitable areas are found, other alternatives will be considered, including the development of flood-proofed elevated sand mounds and the use of flood protection berms as multipurpose flood control/wastewater treatment structures.

A number of actions will be taken to protect people and property in the floodplain (see "Floodplain Compliance" at the end of this section).

Several improvements in the visual quality of the headquarters area will be incorporated into the redesign. The contemporary style of most of the existing structures imposes a highly visible intrusion on the natural setting. To establish a more appropriate and consistent architectural motif, the new visitor center and the modern existing structures visible from the entrance road (administration building, library, apartments, and residence 3) will be faced with native materials that will blend with the surrounding landscape and be compatible with the more vernacular stonework of the CNHA building. The high chain-link fence around the weather station, a visual intrusion along the visitor center access road, will be replaced with a nonreflective earth-toned fence to help minimize visual impacts.

Fire protection systems are in place in the CNHA building and the library. An intrusion-detection alarm is also in place in the library. Humidity-control devices will be installed in the museum collection storage building.

Moab Fault

The Moab fault is an important part of the geologic story, and the existing overlook is the only place along the road where the faulted landscape can be seen; however, few people stop here because they have just entered the park and are eager to see an arch. The existing wayside exhibit message will be evaluated for its effectiveness and replaced if necessary.

Park Avenue (previously South Park Avenue)

The grandiose view at this first stop along the park road makes it the ideal site for introducing the story of geologic processes as evidenced by sheer walls, a balanced rock, layering, and erosion. Since there is no arch here and the road sign indicates only a hiking trail, visitors currently tend to stop for a very short time, if at all. The road sign will be changed in accordance with the parkwide sign plan to indicate that this is an interpretive stop, and the trailhead sign at the parking lot will emphasize the short distance to the viewpoint. Information about the trail to Courthouse Towers will include distance, type of terrain, walking time, and driving time for those picking up hikers at Courthouse Towers. The name "South Park Avenue" is confusing because there is no corresponding "North Park Avenue." Therefore, the name of this pullout and trailhead will be shortened to "Park Avenue."

The short paved trail out to the Park Avenue viewpoint is handicap-accessible, but the safety of the 6 percent downslope on the last short section of trail is questionable, given its proximity to the sharp dropoff at the overlook. To remedy this problem, the last section of the viewpoint trail will be removed, the slope will be reduced, and the section will be resurfaced to match the existing trail.

A 1/2-mile primitive trail/marked route (class D/E, as described in appendix E) leads from Park Avenue to Courthouse Towers. The trail will be retained at its existing standard.

La Sal Mountain Viewpoint

This overlook and trailhead will be developed to encourage more visitors to enjoy the views and to offer a similar experience to that available at the overcrowded Fiery Furnace area. This overlook has excellent potential for identifying skyline features, yet few visitors currently stop here because the name suggests only a view of the La Sal Mountains, which have been visible for some distance along the road. It may be possible to make visitors aware of the excellent views of many important park landmarks by changing the name to something more descriptive, such as Panorama Overlook. The potential name change will be explored in greater detail during preparation of the park's interpretive prospectus and wayside exhibit plan. Exhibitory at the overlook will provide 280-degree skyline identification of the prominent features, including Courthouse Towers, Balanced Rock, the Windows, the La Sal Mountains, and the Spanish Valley escarpment.

A primitive marked route (class E) will be developed from here to lower Courthouse Canyon, which is a red sandstone canyon with an intricate system of tributaries. The route will serve both independent hikers and groups on guided walks that will be offered as an alternative to the Fiery Furnace walks. Trailhead signing will include information about safe travel in desert, slickrock, and canyon terrain.

The layout of the existing parking lot will remain the same, but parking spaces will be striped to make the most efficient use of the existing space. Handicap-accessible parking spaces will be developed near the beginning of the overlook trail, and the trail will be repaved at the proper width and grades to make it fully accessible to all visitors (class A), making this 360-degree skyline panorama available to handicapped as well as other visitors.

The parking lot is reached by way of a short spur road off the main park road. Sight distance is marginal for buses and motorcycles approaching the spur road intersection from the north and for vehicles returning to the main road. To mitigate the limited sight distance, a warning sign will be installed along the main road north of the spur road intersection.

Courthouse Towers

Interpretation will continue the geologic story introduced at Park Avenue, focusing on how arches grow and evolve. The existing exhibit "Destiny of an Arch" will be reevaluated for its effectiveness, and the message will be improved as needed. The other existing wayside exhibit on adaptation to the desert will be removed. New exhibits will name the prominent landmarks and provide information about the trail to Park Avenue.

The Park Avenue trail starts/ends across the road from the Courthouse Towers parking lot, making visitors cross the main park road. Signs and a crosswalk will be added to increase the safety of this crossing.

Balanced Rock

Balanced Rock is one of the first major park features visible from the main road, and it attracts a majority of park visitors. However, the parking lot, a small pullout adjacent to the road, cannot accommodate even half the existing demand. Because of the congestion, people park wherever they can on both sides of the road, and drivers often have to back into the main road traffic lane to exit the parking lot. People who park across the road, either along the Willow Flats road or at the picnic area, must walk across the main road to reach the interpretive trail. The area will be redesigned to accommodate more people and to make it safer for pedestrians and motorists.

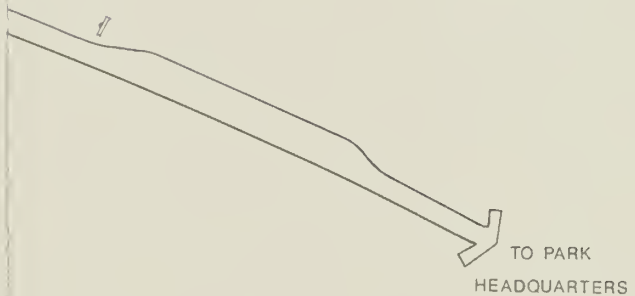
A parking lot with approximately twice the capacity of the existing lot will be developed in the same general area as the existing lot. The new lot will be physically separated from the main road so that drivers no longer back into the main stream of traffic. The expanded lot will satisfy the off-season demand; however, during the heavier use season, from May to September, many visitors will still not be able to stop and walk the trail. The possibility of constructing a new spur road with a larger parking lot was considered but determined to be infeasible because of the impacts and cost involved (see "Alternatives Considered but Rejected"). Explosives will not be used during construction of the parking area to avoid any adverse effects on Balanced Rock.

The picnic area will be relocated farther from the main road, and the existing picnicking sites will be blocked off with barriers and revegetated to discourage overflow parking. A crosswalk will be added for people crossing the road from the picnic area to Balanced Rock, and signs will warn motorists approaching from both the north and south of the pedestrian and vehicle congestion in this area.

A new trail will lead from the parking area to a new viewpoint, then connect with the existing trail around the base of Balanced Rock. The trail, whose surface will blend with the natural scene as much as possible, will be handicap-accessible (class A) as far as the new viewpoint only; the remainder of the trail will remain at the existing standard. An exhibit at the viewpoint will explain how Balanced Rock was formed by the erosion of rock strata. Geologic processes will be illustrated through a discussion and photo of the smaller adjacent balanced rock that fell a few years ago. A trailhead sign will invite visitors to continue on the loop trail around the rock. This trail offers a closer look at the precariously balanced rock from all sides and impresses visitors with how large the rock is.

At the existing picnic area picnickers are exposed to traffic noise from the adjacent main road, but at the new location they will be removed from these intrusions and be able to enjoy views of both Balanced Rock and Salt Valley to the north. To minimize the visual intrusion on the natural scene, existing vegetation, instead of architectural structures, will be used to provide shade. The parking area for the picnic sites will be dirt with delineated boundaries and will be located just off the existing dirt road to Willow Flats. The intersection of that road with the main road will be realigned to improve circulation.

About a quarter of a mile west of Balanced Rock on the Willow Flats road there is a materials storage and mixing area that is an intrusion on the otherwise natural scene visible to visitors driving by. No further mixing of road repair materials will be allowed at this location, and space used for storage of materials such as gravel will be limited to 10,000 square feet. All mixing and all other storage will be outside the park.



SITE PLAN

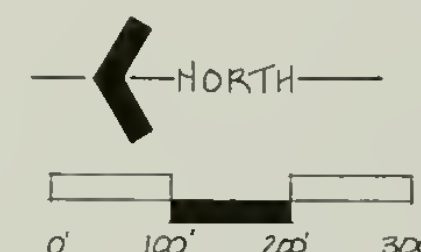
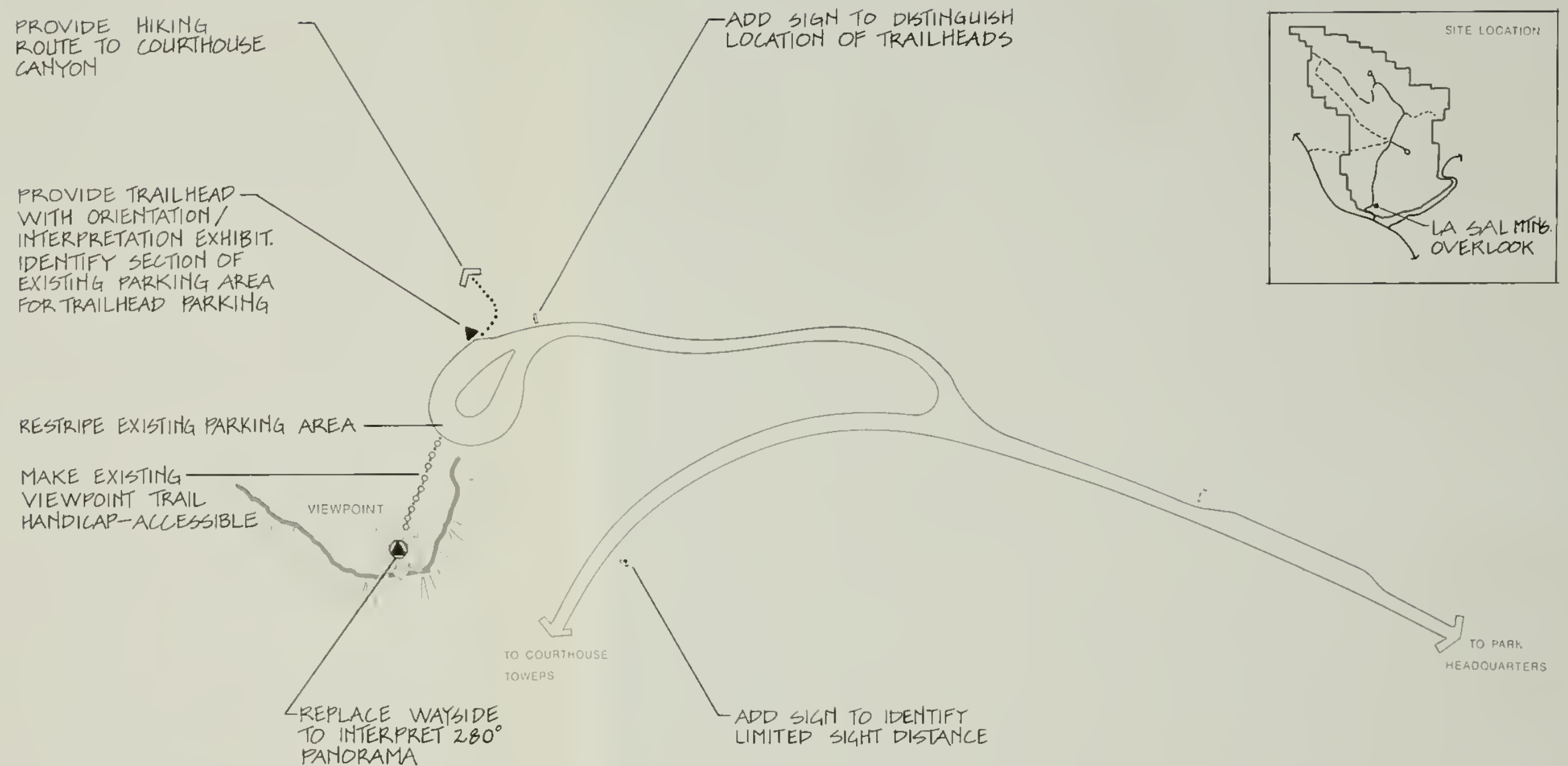
LA SAL MOUNTAINS OVERLOOK

ARCHES NATIONAL PARK

UNITED STATES DEPARTMENT

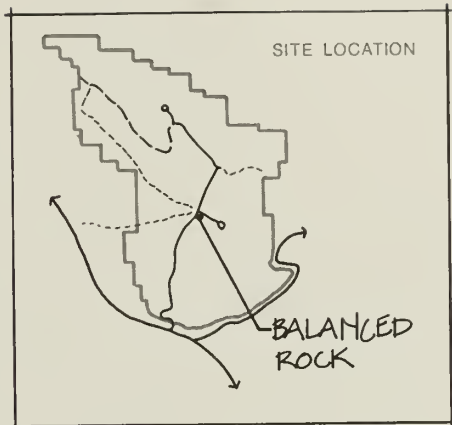
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SITE PLAN
LA SAL MOUNTAINS OVERLOOK
ARCHES NATIONAL PARK
 UNITED STATES DEPARTMENT
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RELOCATE
AREA AND
PIT TOILETS



TO WILLOW FLATS

REALIGN DIF



REMOVE SECTIONS OF TRAIL
FROM USE AND REVEGETATE

TO PARK
HEADQUARTERS

EXISTING

.....

(P)



SITE PLAN

BALANCED ROCK

ARCHES NATIONAL PARK

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Garden of Eden

The name of this site implies the presence of an outstanding feature or viewing opportunity that is not there; however, the site does offer a different perspective of features seen and identified elsewhere and the opportunity for short exploratory walks into adjacent slickrock. The name could be eliminated and the site given a generic identification such as vista point. This potential name change will be explored in more detail during preparation of the park's interpretive prospectus and wayside exhibit plan. No other changes will be made.

The Windows

The Windows loop road works well for visitor access and circulation, and the parking capacity is adequate. The upper lot is 80-100 percent full on summer weekends, and the lower lot is rarely if ever full. The only problem with the existing development is the confusing layout of the trails and the lack of handicap-accessible facilities.

The lack of clear trail definition has resulted in trail shortcutting and ever-widening trails throughout the Windows area, causing damage to soils and vegetation. To resolve this problem a new class C perimeter trail will be developed to connect the separate parts of the entire Windows alcove for hikers (see the site plan map). This trail will not simply link the arches but will also provide a variety of hiking experiences ranging from close views of desert washes to expansive vistas. Barriers will be used as necessary to prevent shortcutting at trailheads.

Exhibits at the upper parking area will identify the arches by name and provide comparative information about their types, sizes, and ages. In addition to the standard trailhead exhibit, a handout map will be available to guide hikers through the entire interlinking trail system. A standard trailhead exhibit will also be placed at the lower parking area, and the handout map will be available there, as well.

The opportunity will be provided for all visitors, including people with handicaps, to experience an arch at close range and to enjoy sightseeing and picnicking in the park. Double Arch was chosen for handicap access because, of all the major arches accessible by a short trail from an established parking area, it is the one where a trail of appropriate grade could be developed with the least amount of environmental modification and cost, and because it is convenient for visitors planning to spend only a half day in the park.

The trail to Double Arch will be realigned as necessary to reduce slopes and surfaced to accommodate wheelchairs (see appendix E for a description of standards for class A trails). Boardwalks will be installed where necessary to negotiate washes, and small rest stops with rustic benches will be added at appropriate intervals to benefit all visitors. The trailhead for this trail will be clustered with other handicap-accessible facilities at the lower parking lot. Facilities will include designated parking spaces, vault toilets, picnic sites, and a crosswalk over to the Double Arch trailhead. The picnic sites will take advantage of existing vegetation and rock slopes for shade, wind protection, and privacy. Trails to the picnic sites and toilets will be of a standard appropriate for use by visitors in wheelchairs. All handicap-accessible trails will have hardened surfaces textured to blend with the natural ground surface. Care will be taken not to introduce vertical or otherwise visually incompatible elements that would compromise the visual quality of the area.

Panorama Point

This pullout has an excellent view of the Salt Valley (much better than the Salt Valley overlook farther up the road). Thus, interpretation of this superb example of a collapsed and eroded salt anticline will be relocated to this more southerly overlook, whose name may be changed accordingly. The name change will be explored in greater detail during preparation of the park's interpretive prospectus and wayside exhibit plan. Interpretation will explain the collapse of the anticline and why its sides are composed of jointed Entrada sandstone (the Fiery Furnace on the east side of the anticline and Eye of the Whale and Klondike Bluffs on the west side, all visible from this point). The idea of fins as seen across the valley at Fiery Furnace will be introduced here.

The parking area will be striped to improve use of existing space. Handicap-accessible parking spaces will be designated, and a handicap-accessible viewpoint will be developed adjacent to the parking area.

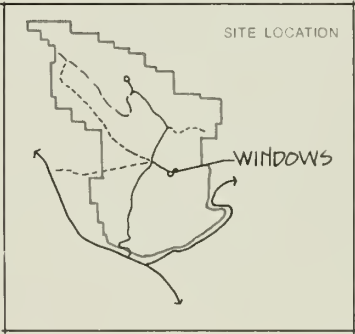
The viewpoint currently used to interpret the Salt Valley will be obliterated. It has low interpretive and recreational value, and the sight distance is limited for a turn at this location. The pavement will be removed and the area regraded and revegetated as necessary to return it to a natural appearance. Revegetation will be funded as part of the cost of removing the pavement.

Wolfe Ranch/Delicate Arch Trailhead

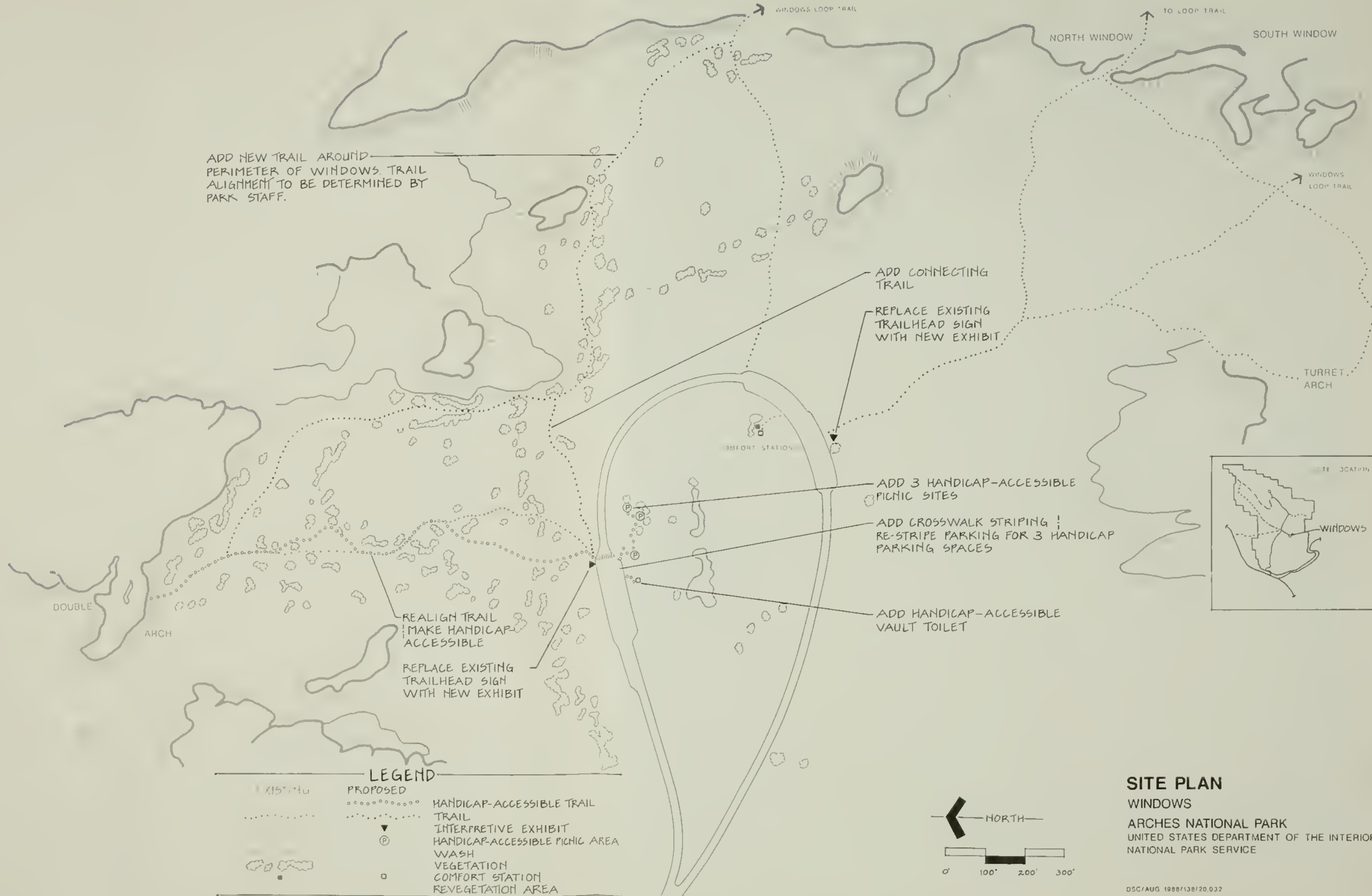
On most summer days the demand for parking exceeds the capacity of the parking lot, and visitors have to park along the road. The demand for parking will probably increase once the road is paved; however, because of site constraints the lot will be expanded only to accommodate existing demand (1989 summer weekend demand; see the site plan map). The parking lot is in the flood zone of Salt Wash; however, since other possible parking sites are probably within a higher velocity area of the high-hazard flood zone, parking will not be relocated (see "Alternatives Considered but Rejected"). The one-way circulation pattern will be reinforced by removing the second entrance, which currently encourages some drivers to enter from the wrong direction. Barriers will be maintained or added as necessary to prevent shortcutting on the east side of the lot and to prevent road shoulder parking.

The existing parking lot, vault toilets, and oversized trailhead signs are visual intrusions on the historic scene; however, the ranch was determined to be eligible for the National Register with these intrusions present; therefore, they are not considered a threat to the significant values of the site. To mitigate intrusion on the historic scene the pit toilets will be replaced with handicap-accessible, visually compatible vault toilets located to the south of the trail, where they will be screened from the ranch area by existing natural vegetation. The parking lot will be expanded along its existing axis to avoid disrupting the natural course of the primary washes immediately to the west, and the artificial drainage north of the lot will be redirected as necessary.

A standard trailhead sign will provide information about the trails to the Wolfe ranch, the Ute petroglyphs, and Delicate Arch. An interpretive exhibit at the trailhead will discuss the adaptations necessary for survival in a desert environment where the availability of water fluctuates so greatly. The special problems and adaptations of plants, animals, settlers, and Indians will be compared. Another interpretive exhibit will be placed at the



SITE PLAN
WINDOWS
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SITE PLAN
WINDOWS
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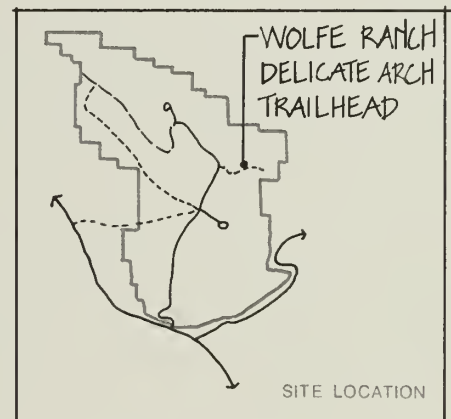
ADD INTERPRETIVE WAYSIDE AND
PROVIDE PHYSICAL PROTECTION FOR
PETROGLYPHS

ARCH

DEFINE MAIN TRAILS. REVEGETATE
SIDE TRAILS.

PAVE ROAD AND CONSTRUCT BRIDGES
AT WASH CROSSINGS

WASH



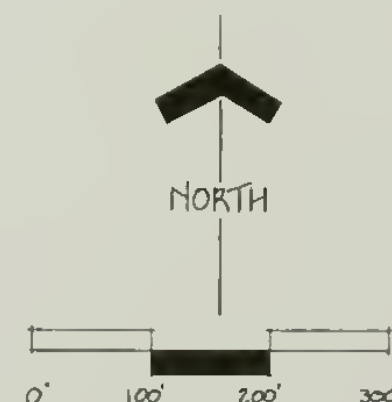
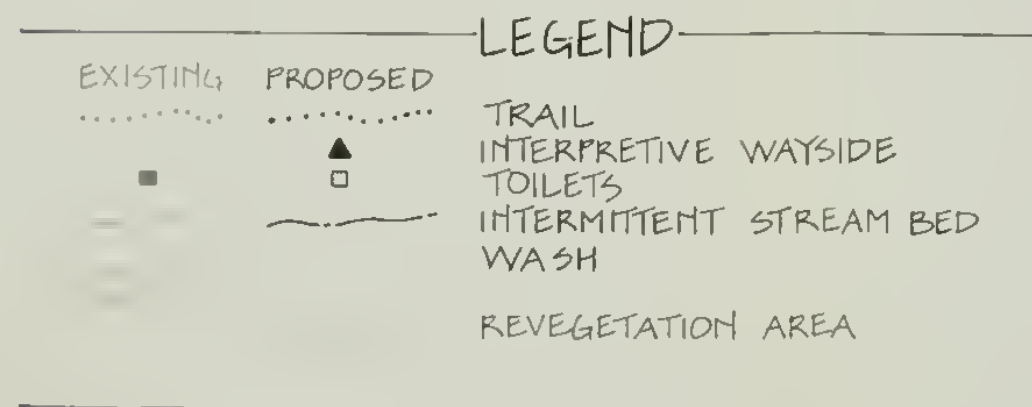
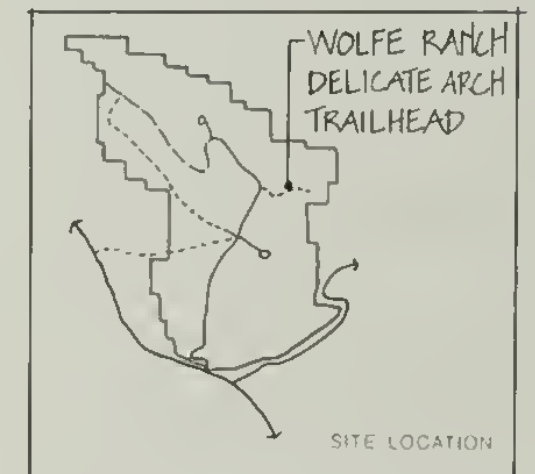
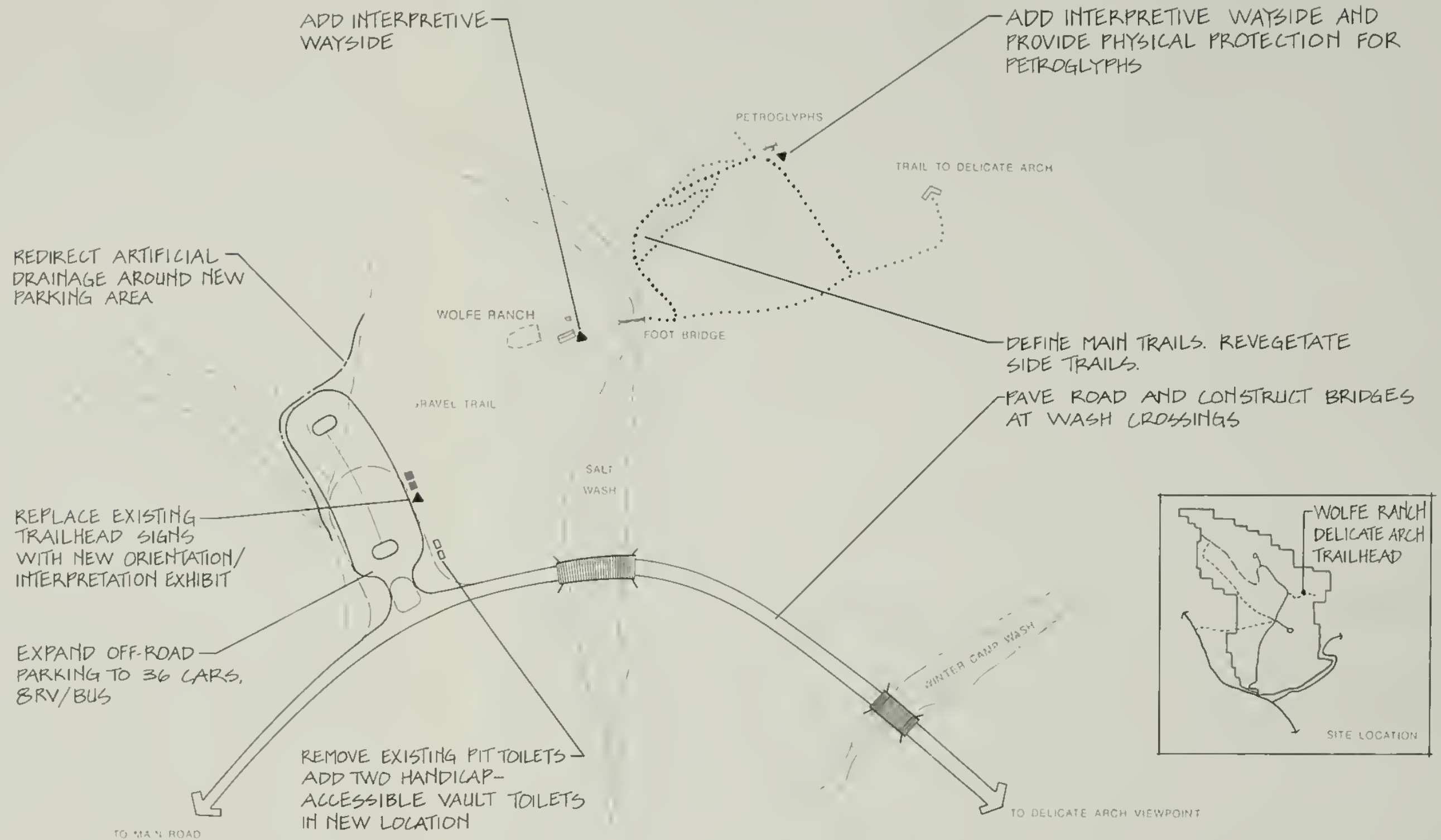
DELICATE ARCH VIEWPOINT

SITE PLAN

WOLFE RANCH/DELICATE ARCH
TRAILHEAD

ARCHES NATIONAL PARK
UNITED STATES DEPARTMENT
OF THE INTERIOR
NATIONAL PARK SERVICE

DSC/DEC 1988/138/20,027



SITE PLAN
 WOLFE RANCH/DELICATE ARCH
 TRAILHEAD
 ARCHES NATIONAL PARK
 UNITED STATES DEPARTMENT
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Wolfe ranch to discuss the history of the ranch and the effects ranching has had on the land.

The gravel trails leading to the Wolfe ranch and Delicate Arch will be retained at their existing standards. The trail to the ranch is accessible to most handicapped persons. The Ute petroglyphs near the Wolfe ranch are not served by any formal trail, but visitors have learned of them and created numerous social trails to the site, which is damaging the vegetation. To minimize impacts in this area, a single trail to the Ute petroglyphs will be clearly defined and maintained at a class C standard, and other unofficial trails will be obliterated and revegetated. A low barrier will be provided at the petroglyphs, and a small wayside exhibit will discuss the importance of protecting the panel.

Actions to mitigate the flood hazard in this area are described under "Floodplain Compliance," below.

Delicate Arch Viewpoint

The Delicate Arch viewpoint and parking area will be relocated to provide a more dramatic view of the arch with less intrusion on the views seen by people who are at the arch. The view from the existing viewpoint does not fully show sky beneath the arch. Also, vehicles at the viewpoint parking area are visible to people who have hiked up to the arch and are standing beneath it. The highly visible vehicles, sometimes reflecting sunlight, intrude on the impressive natural vistas seen from the arch, and this detracts from the experience of some visitors.

To improve the quality of the view from the arch, parking will be relocated behind a ridge to the south of the existing parking area, out of view of the arch (see the site plan map). The parking area will be paved, and designated spaces will be provided for cars, recreation vehicles, and buses. Spaces nearest the trailhead will be reserved for handicap access. The section of the existing dirt road that is not incorporated into the new access road will be partially restored and converted to a class C trail connecting the new parking area with the existing trail to the existing viewpoint. A new viewpoint offering a full skyline view of the arch will be developed east of the new parking lot. The viewpoint will be accessible to all visitors, including the elderly and handicapped, by way of a class A trail. A standard trailhead sign will provide information about the viewpoint trail and let visitors know that the trail does not go to Delicate Arch itself. Delicate Arch serves as its own exhibit and needs no further interpretation.

A section of the four-wheel-drive road leading to Cache Valley and Dry Mesa will be rerouted to the south of the new parking area and will reconnect to the east. The unused section of four-wheel-drive road will be restored.

Fiery Furnace

Guided interpretive walks into the rugged Fiery Furnace area have traditionally been offered to guide visitors through steep and confusing terrain in a safe, enjoyable, and resource-conscious manner. The objective of these guided tours is to introduce visitors to unique geologic features and plant life. Guided tours are necessary because the terrain is extremely difficult to travel in and visitors may have difficulty finding their way through the fins. The ideal group size for the guided tours is 20, yet because of the

popularity of these walks, as many as 145 visitors have shown up. Even the average size of tours is too large to achieve the feeling of unrushed exploration in a "wilderness of rock."

Although hikers are not required to be accompanied by a guide, there is no self-guiding route through the Fiery Furnace. Some of the park staff believe that a self-guiding trail would be unsuitable because of hazardous slickrock and deep crevices. The existing wayside exhibit and ambiguous trail access offer little encouragement for visitors to explore on their own. Trail shortcutting and other damage is often a result of those who do attempt to find their way into the Fiery Furnace.

Guided walks through Fiery Furnace will continue, but the number of people on any one hike will be limited to 25. This will be made possible by offering four walks per day (instead of one), possibly by requiring advance reservations, and by providing the option of taking a walk through Courthouse Canyon.

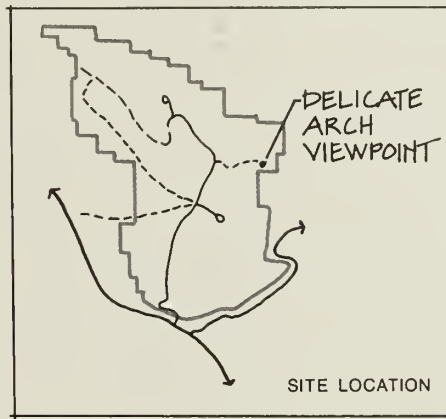
For visitors inclined to visit Fiery Furnace on their own, a standard trailhead sign will provide information about the difficulty and potential hazards of independent exploration of Fiery Furnace and a discussion of trail abuse problems and how visitors can help prevent them. Undesignated trails will be obliterated and revegetated. Barriers will be added to prevent the shortcutting that is occurring now at the trailhead and at other points adjacent to the parking area.

Sand Dune Arch Trailhead

The Sand Dune Arch trailhead will be redesigned and expanded to adequately serve the Lost Spring Canyon area in addition to Sand Dune Arch and Broken Arch. A new parking area with approximately twice the capacity of the existing pullout will be developed in the low area between the main road and the rock outcrop to the east (see the site plan map), where it will be least visible from the trail. The entrance to the parking will be realigned to improve the sight distance. The National Park Service will cooperate with the Bureau of Land Management to create a new class D trail to Lost Spring Canyon. The trail will head north from the parking area to the south arm of the canyon, then descend the canyon floor following the natural gas pipeline. A trailhead sign will provide special information about traveling in primitive areas (Lost Spring Canyon) in a manner that is safe and least damaging to fragile resources as well as standard information about the trails to Sand Dune Arch and Broken Arch.

Devils Garden Trailhead

From May to September, the parking demand at the Devils Garden trailhead is approximately double the existing capacity, requiring visitors to park along the shoulder of the access road, where they damage vegetation and aggravate the congestion problem. Because of the shortage of parallel parking spaces for larger vehicles, RVs and buses often take up several car spaces, which also contributes to congestion. To solve these problems, the capacity of the parking area will be increased to accommodate existing (1989) average summer weekend demand, with buses and RVs separated from automobiles. Barriers will be added along the access road to prevent shoulder parking.



— CONVERT ROAD TO TRAIL (PARTIAL
REVEGETATION OF EXISTING DIRT ROAD)

— ADD INTERPRETIVE TRAILHEAD
EXHIBIT

— CONSTRUCT HANDICAP-ACCESSIBLE
TRAIL TO NEW VIEWPOINT

— CONSTRUCT NEW VIEWPOINT ; TRAIL
TO RIDGETOP

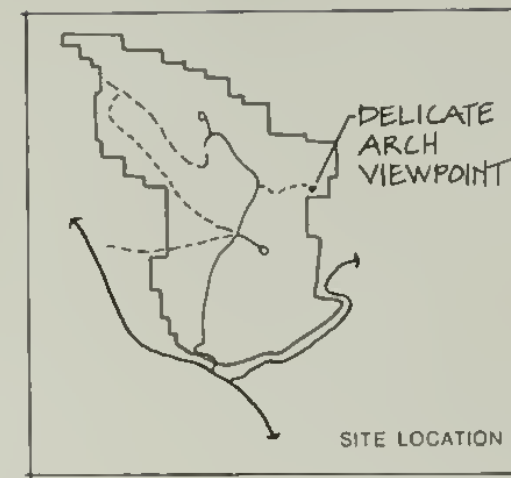
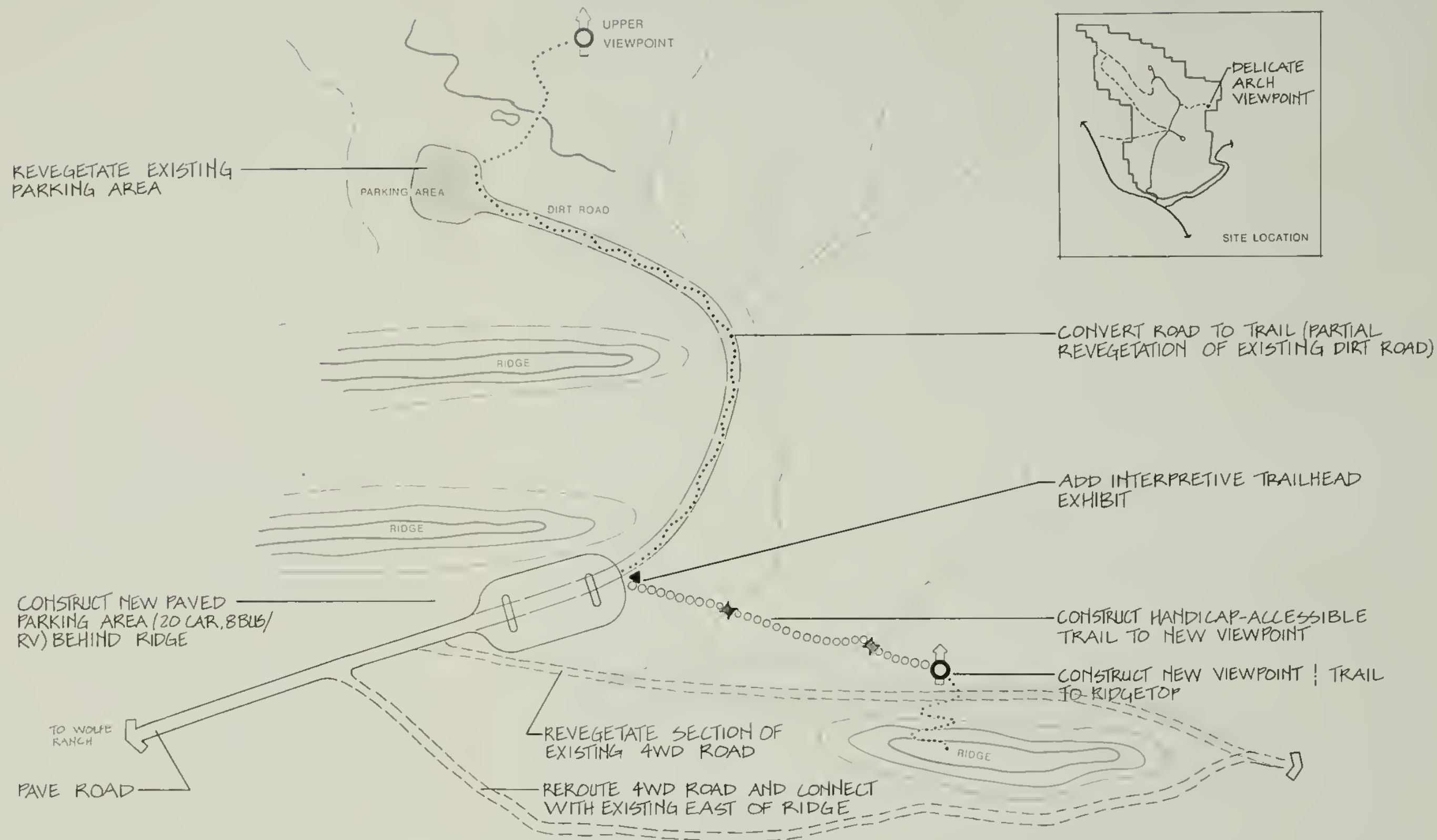


SITE PLAN

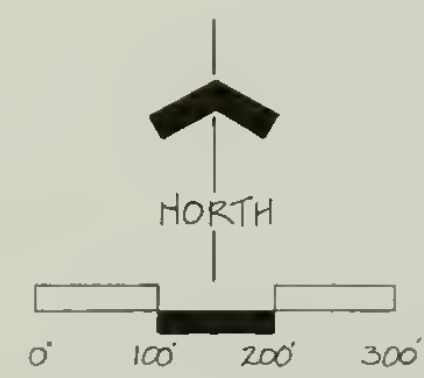
DELICATE ARCH VIEWPOINT

ARCHES NATIONAL PARK

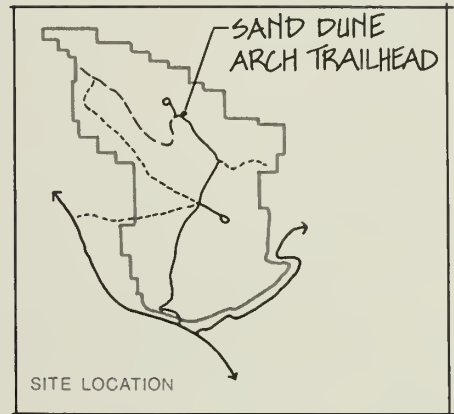
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



LEGEND	
EXISTING	PROPOSED
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	■
	FOUR-WHEEL-DRIVE ROAD
	TRAIL
	HANDICAP-ACCESSIBLE TRAIL
	INTERPRETIVE WAYSIDE
	INTERMITTENT STREAM
	REVEGETATION AREA
	FOOTBRIDGE



SITE PLAN
 DELICATE ARCH VIEWPOINT
 ARCHES NATIONAL PARK
 UNITED STATES DEPARTMENT OF THE INTERIOR
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— REVEGETATE SECTION OF EXISTING TRAIL

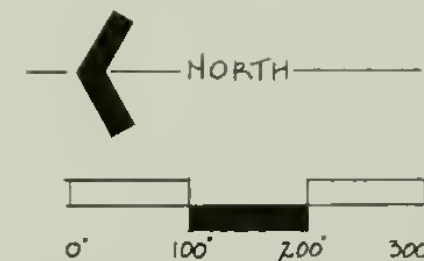
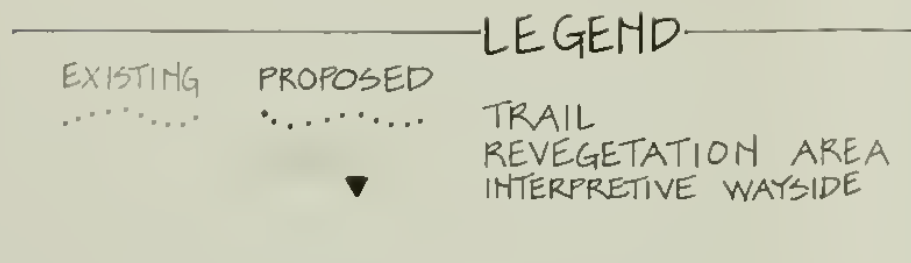
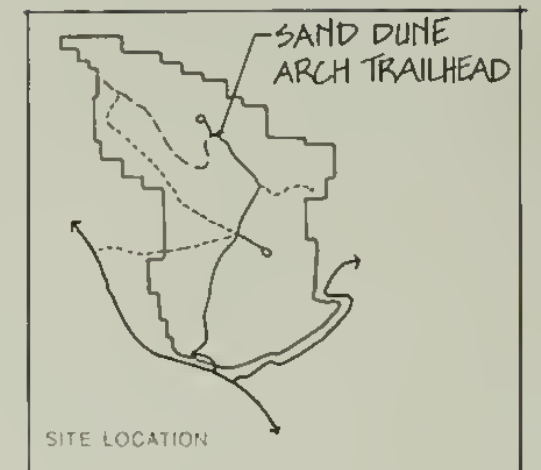
— OBLITERATE EXISTING PARKING PULLOUT
AND REVEGETATE SITE



TO FIERY FURNACE

SITE PLAN

SAND DUNE ARCH TRAILHEAD
ARCHES NATIONAL PARK
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SITE PLAN
 SAND DUNE ARCH TRAILHEAD
 ARCHES NATIONAL PARK
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The existing signs will be replaced with a standard trail sign with a trail map informing visitors of hiking distances and times, trail conditions, and safe travel techniques. A new self-guiding trail leaflet will more clearly show the trail route to Landscape Arch and the whole trail system in Devils Garden beyond.

The log and rope barriers used to prevent shortcutting on the trail near Landscape Arch have been the subject of criticism, and they will be replaced with more visually compatible barriers. An interpretive exhibit at Landscape Arch will describe the efforts to restore the vegetation and emphasize the importance of staying on the designated trails. Photos will be used to illustrate the progress made in restoring the area.

The trailhead needs its own restrooms because the picnic area facilities are more than a quarter of a mile away. The existing trailhead vault toilet is inadequate to handle demand during the high-use season, and it becomes malodorous during the warmer months. It will be replaced with a new comfort station with flush toilets.

The generator at the maintenance area can be heard occasionally at the trailhead and the campground entrance. The generator housing will be replaced with a soundproofing structure to help confine the motor noise to the immediate area. The amount of stored materials and number of parked vehicles at the maintenance area will be limited to control the visual intrusion on the natural scene. The temporary materials storage area adjacent to the generators will be limited to 1,500 square feet and will not be used extensively as an area to store equipment.

Devils Garden Campground

The 53-site campground is full six months of the year, from mid-April to mid-October. Ten tent walk-in sites will be added to provide separate sites for tent campers. At present, there is no separation between tent and RV sites, and noise from RV motors impinges on the experience of tent campers. The new walk-in sites will be located where the terrain is suitable for shade, wind protection, and privacy, close to an existing comfort station, and at a distance from the group camping sites.

In spite of the fact that many people who would prefer to camp at Arches cannot find sites, no further campground expansion will occur. The number of drive-in sites will remain limited to ensure that the quiet camping experience in relatively natural surroundings now available is maintained. Additional demand can be satisfied by private campgrounds in the Moab area and public campgrounds in nearby state and federal areas.

A handicap-accessible campsite and restroom are already available, and they will be retained.

The road and campsite surfaces are already scheduled for rehabilitation, which will solve the drainage problems and enlarge the few drive-in sites that are not currently large enough to accommodate RVs.

The three campground comfort stations are in need of rehabilitation to correct problems including insufficient water pressure. Upgrading the water and sewer systems within the campground will involve adding water distribution lines, adding a float valve in the

reservoir, connecting the first campground comfort station to the new sewage treatment system, and replacing flush valves with flush tanks in all three comfort stations.

The current lack of a sanitary dump station has led to cases of illegal dumping along park roads. A new dump station will be developed near the campground intersection, where it will be accessible to visitors as they leave the campground and will not introduce more development into the campground.

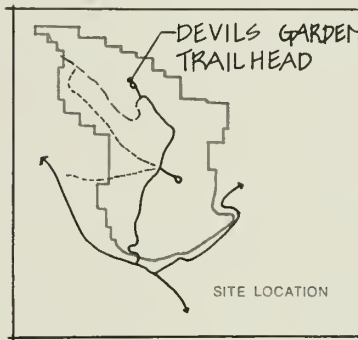
The size and design of the existing amphitheater compromises program quality and visitor enjoyment. The 105-capacity seating area is too small, and at 80 percent of the programs several people must stand. Periodic replacement of the rustic benches is required. The projection box is vulnerable to break-in, and there is no amplification system, making communication with the audience very difficult on windy nights. Drainage is poor, and after a rain the ranger must stand in mud. A paved walkway leading to the amphitheater is accessible by wheelchair; however, handicapped visitors cannot actually reach a convenient viewing area because the walkway stops at the edge of the amphitheater. Wheelchairs sitting at the edge of the walkway obstruct people's movement into and out of the amphitheater. The amphitheater will be expanded and redesigned to solve these problems. The new amphitheater will have a 120-person capacity and include a viewing area for handicapped persons. The seating will be integrated into a rock slope (see sketch) and be oriented to views of Skyline Arch and the La Sal Mountains.

Occupancy at Devils Garden by two seasonal employees is required to provide adequate visitor safety and resource protection. However, the large temporary trailer now used as a ranger station and ranger residence is unsightly. Also, its location does not allow enough privacy for the resident rangers. The housing management plan for Arches gives first priority to replacing this trailer with permanent residences. The two proposed ranger residences and a new ranger station will be built near the existing trailer site (see the site plan map for the Devils Garden trailhead and loop road). Part of the existing trailer pad will be retained for use by a campground host. The campground host will handle the routine administration of the campground, while the rangers will handle resource management and visitor protection. Clustering the new facilities will facilitate communication between visitors, the campground host, and the rangers; minimize visual intrusion; and reduce the impact and cost of new utility systems. The location of the new residences will afford the rangers some privacy while still making them accessible to visitors and the campground host in the event of an emergency. The proposed site for the residences has uneven terrain and is close to small drainage channels, which will require sensitive design to minimize impacts on the natural landscape.

Visitors and rangers currently share the same small parking lot, which results in crowding and overflow parking along the road. Visitors will have separate parking in the future. Visitors will be able to park and access the ranger station from either the loop road or the campground road. The station, the parking, and the walkways will be handicap-accessible.

Circulation in the campground intersection area is congested and awkward. There is not enough space for larger vehicles to turn around, either at the intersection or elsewhere along the loop road. Circulation will be improved by adding a one-way turnaround lane at the south end of the loop and by providing space for vehicles to turn around at the campground intersection (see the site plan map).

ADD COMFORT
REMOVE VAULT



TRAIL TO LAND
CAMPGROUND ROAD

ADD TRAILHEAD
INTERPRETIVE

RESIDENCE/OFFICE

CONSTRUCT RANGER OFFICE

CONVERT TO HOST
TRAILER SPACE

CONSTRUCT TWO RANGER
RESIDENCE UNITS

PROVIDE DIRT ACCESS
ROAD AND PARKING FOR
RANGERS

ADD WASTEWATER TREATMENT
SYSTEM FOR NEW RESIDENCES,
OFFICE, HOST TRAILER, DUMP
STATION, AND COMFORT STATION #1
(REMOVE EXISTING SYSTEM)

SITE PLAN

DEVILS GARDEN TRAILHEAD AND LOOP ROAD

ARCHES NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR

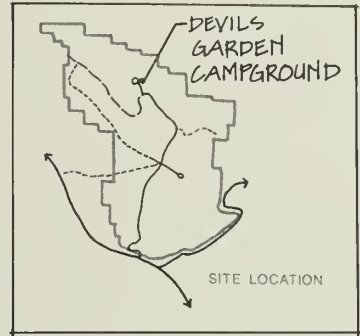
NATIONAL PARK SERVICE

line
ch

PLAN VIEW
(NO SCALE)

screen

SECTION B-B₁
(NO SCALE)



EW DISTRIBUTION LINES
ERVOIR TO COMFORT
AND DRINKING FOUNTAINS

AMPHITHEATER
(EPT SKETCHES)

SITE PLAN

DEVILS GARDEN CAMPGROUND

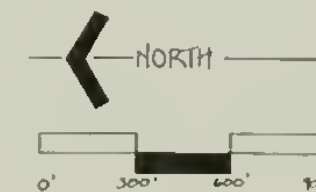
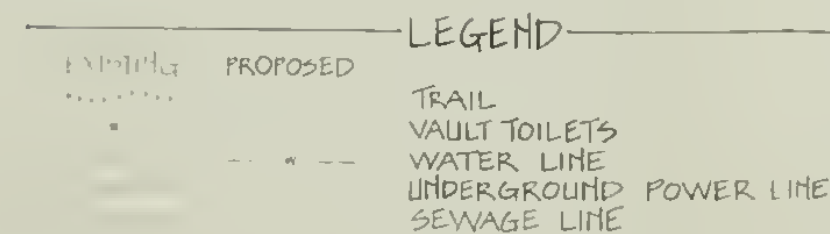
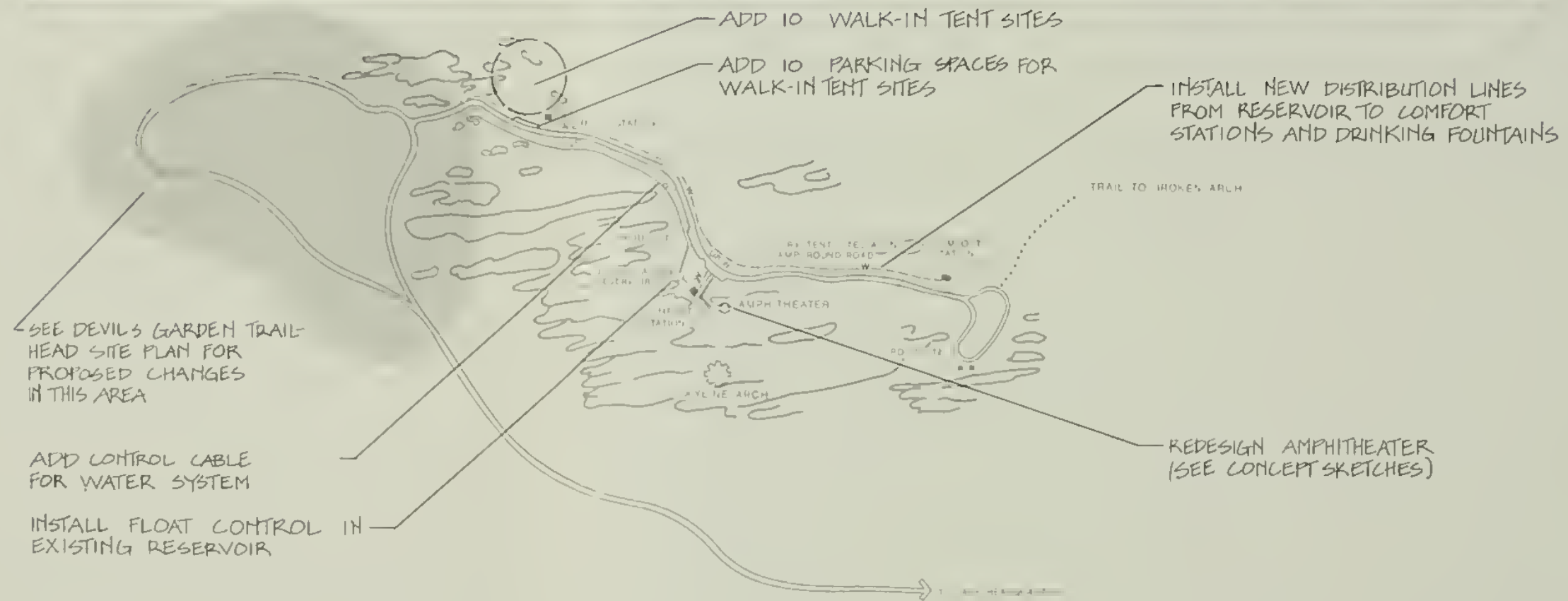
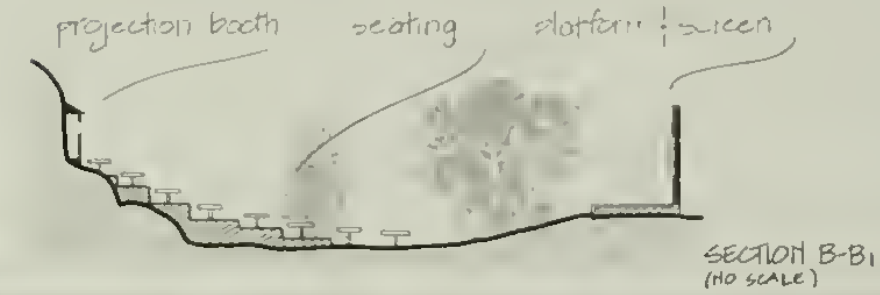
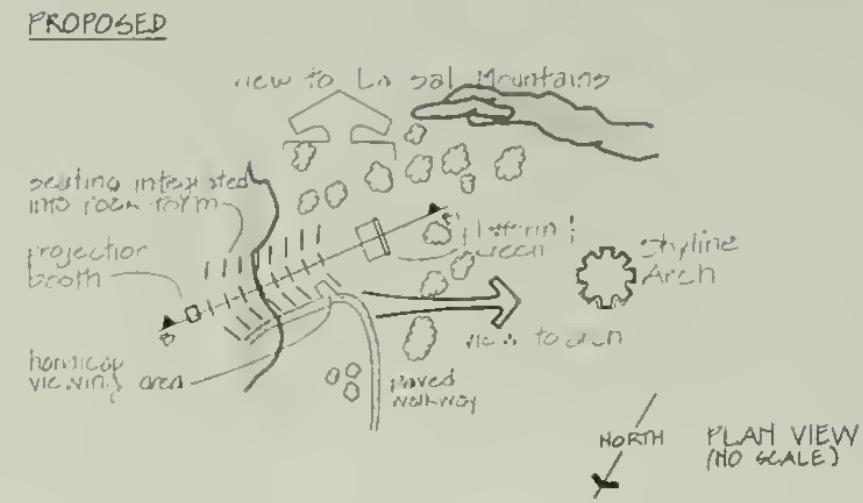
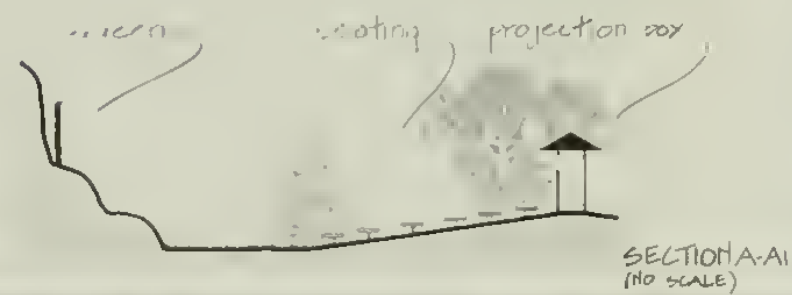
ARCHES NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR
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300'

DSC/AUG 1988/138/20,035

AMPHITHEATER CONCEPT SKETCHES



SITE PLAN

DEVILS GARDEN CAMPGROUND

ARCHES NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR

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Moab Panel

An interpretive exhibit will be installed at the Moab rock art panel to promote visitor understanding and appreciation of this important cultural resource and the problems of protecting it. A color photograph will illustrate how the panel looked before it was vandalized. To help deter further vandalism, a low metal barrier will be installed in front of the panel. The barrier will be as visually compatible with the scene as possible and will not obstruct visitors views of the rock art. An interpretive message incorporated into the exhibit will explain why a barrier has been erected to protect the panel from further defacement.

Redesign of US 191 in this vicinity is planned by the Utah Highway Department to improve the bridge and curve at Courthouse Wash. The National Park Service has requested that the Highway Department provide parking on the north side of the road for people interested in seeing the Moab panel, so that they no longer have to cross the highway from an informal pulloff on the south side. The department has declined the request, but there is still a need for parking in this area, so the National Park Service will continue to work to resolve this issue as the highway redesign proceeds. Once safe parking is in place, a trailhead sign and defined trail will be provided.

Floodplain Compliance

The most serious floodplain problems addressed by this plan occur at the existing park headquarters site. The flood hazard will be mitigated by designing physical protection and warning systems, rather than by relocating facilities. Two additional culverts faced with stone to appear similar to the existing bridge will be installed where the park entrance road crosses Bloody Mary Wash. This will allow a much larger flow to be transmitted directly down the channel and reduce the amount of water diverted northward in the event of a severe flood. In addition, sections of the park entrance road and the service road, totaling about 1,600 linear feet, will be raised an average of 4 feet. With these modifications, all areas where visitors or staff might congregate and all facilities and developments west of where the entrance road crosses Bloody Mary Wash will be outside the 500-year floodplain of Bloody Mary Wash. The housing east of the road is already out of the floodplain; however, the maintenance building will remain in the 500-year floodplain. Also, throughout the headquarters area, many facilities and developments will remain susceptible to floodwaters in the event of a probable maximum flood (PMF). Although PMF protection is preferred for flash-flood areas, structural modifications (such as berming or raising the road surface) will not be made to provide this level of protection because they would result in an unacceptable degree of visual impact.

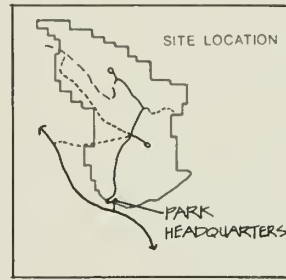
To further protect the developed area from floodwaters coming from the slickrock slopes to the north, the existing drainage channel just north of the new visitor center will be widened, deepened, and stabilized, and the berm on the south side of the channel (now 2 to 5 feet high) will be raised by no more than 2 feet. Raising the berm more than 2 feet would cause adverse visual impact. Some of the runoff that enters this channel from the west might be redirected to flow into another channel on the west side of the main park road, thus diverting it away from the headquarters area, if necessary, to help protect the headquarters area. Additional floodplain and topographic information must be gathered and analyzed before determining whether that action will be necessary. Further

action to protect the headquarters area from a 500-year flood of runoff coming from the north is not considered feasible because of the adverse environmental effects.

To mitigate any remaining flood hazard, an emergency flood response and evacuation plan will be prepared to warn visitors and staff throughout the headquarters area of an approaching flood. Alarms will be placed in all structures within the probable maximum floodplain, including the visitor center, the administration building, the CNHA office building, the library, residence 3, the apartments, and the maintenance building. The new visitor center and adjacent areas will be designed to minimize susceptibility to tributary flooding. Potentially hazardous materials and water treatment facilities at the maintenance complex will be structurally floodproofed. Provisions will also be made for emergency water, sewer, power, and telephone service in the event of damage to utility lines. To ensure emergency radio contact in the event of a severe flood, a high priority will be given to replacement of the existing radio system, which transmits through telephone lines, with an independently operable system.

Museum collections will be removed from the floodplain, as described under "Cultural Resource Management".

A floodplain study will be completed for the Wolfe ranch/Delicate Arch trailhead area on a high priority basis, the results used to evaluate the proposal for the area, and modifications made as necessary (see "Future Plans and Studies"). The parking area and vault toilets at the Wolfe ranch/Delicate Arch trailhead will be kept out of the higher velocity sections of the high-hazard flood area, but on-site interpretation facilities at the ranch will remain within the 100- or 500-year floodplain. Washes will be bridged to protect travelers and the road from flooding. An emergency flood response plan will also be developed for the Wolfe ranch area.



EXISTING FLOOD PLAIN

PARK HEADQUARTERS

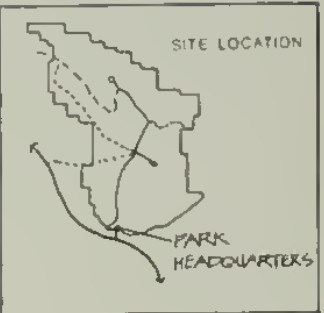
ARCHES NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

300'

DSC/AUG 1988/138/20,037

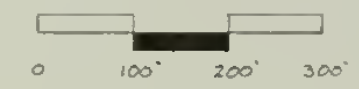


LEGEND

- POSSIBLE MAXIMUM FLOOD
- 500-YEAR FLOOD FREQUENCY LEVEL
- 100-YEAR FLOOD FREQUENCY LEVEL

NOTE: AREA SUBJECT TO FLASH FLOODS, TIME-TO-PEAK IS LESS THAN 0.7 HOUR FOR POSSIBLE MAXIMUM FLOOD

SOURCE: NATIONAL PARK SERVICE, WATER RESOURCES DIVISION, FT. COLLINS, COLORADO



EXISTING FLOOD PLAIN
PARK HEADQUARTERS
ARCHES NATIONAL PARK
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

DSC/AUG 1988/138/20,037

Development Priorities and Costs

Phasing priorities and estimated development costs are summarized below. The estimates represent gross costs (including project planning, construction supervision, and contingencies) in 1988 dollars. The portions of the total project costs eligible for Federal Lands Highway program (FLHP) funding are also identified. More detailed cost estimates are provided in appendix G.

1. Rectify visitor and staff vulnerability to high-hazard conditions:

--Install culverts in entry road, elevate road sections, enlarge/stabilize tributary channel, and replace radio system at headquarters <i>(\$107,500 FLHP eligible)</i>	\$ 570,200
--Develop emergency flood-warning system and response plan for headquarters, and emergency flood response plan for the Wolfe ranch	91,800
--Construct bridges across Salt Valley, Salt, and Winter Camp washes along Delicate Arch road <i>(\$397,800 FLHP eligible)</i>	397,800
--Add pedestrian crosswalk and warning signs at Balanced Rock <i>(\$2,500 FLHP eligible)</i>	2,500
Subtotal <i>(\$507,800 FLHP eligible)</i>	\$ 1,062,000

2. Rectify vulnerability of people to moderate hazards and threats to facilities:

--Add pedestrian crosswalk and warning signs at Courthouse Towers <i>(\$2,500 FLHP eligible)</i>	\$ 2,500
--Reduce grade of Park Avenue handicap-accessible trail	5,000
--Add sign to warn of limited sight distance near La Sal Mountain viewpoint <i>(\$1,000 FLHP eligible)</i>	1,000
--Add comfort station with flush toilets at Devils Garden trailhead	235,000
--Floodproof water treatment facility and potentially hazardous materials at headquarters maintenance area	46,800
Subtotal <i>(\$3,500 FLHP eligible)</i>	\$ 290,000

3. Protect natural and cultural park resources from abuse and overuse:

--Provide physical protection for Moab and Wolfe ranch rock art panels	\$ 3,800
--Protect museum collection and custodian's residence at headquarters	100,000
--Add sanitary dump station at Devils Garden	54,600
--Install barriers to prevent trailhead shortcutting and shoulder parking <i>(\$154,000 FLHP eligible)</i>	163,500
--Limit size and uses of materials storage areas near Balanced Rock and Devils Garden	15,300
--Implement visitor impact management program (cost to be determined later as a component of NPS construction packages)	
Subtotal <i>(\$154,000 FLHP eligible)</i>	\$ 337,000

4.	Provide facilities needed to accommodate existing demand:	
	--Develop a new Arches visitor center with parking and other support facilities	\$ 3,671,400
	--Pave Delicate Arch road (\$1,078,200 FLHP eligible)	1,078,200
	--Rehabilitate main road and pullouts and restripe some existing parking areas (\$5,489,700 FLHP eligible)	5,489,700
	--Develop new parking trail and picnic area at Balanced Rock (\$80,300 FLHP eligible)	111,800
	--Expand and pave parking, rehabilitate trails, and replace exhibits and toilets at Wolfe ranch (\$172,200 FLHP eligible)	238,100
	--Relocate and pave parking and develop new trail at Delicate Arch viewpoint (\$162,400 FLHP eligible)	182,100
	--Expand trailhead parking, add visitor contact station, redesign campground road intersection area, redesign amphitheater, add tent walk-in sites, and rehabilitate comfort stations (\$118,000 FLHP eligible)	492,100
	--Add or replace waysides at several locations	15,000
	--Face existing headquarters buildings with stone	237,200
	Subtotal (\$7,100,800 FLHP eligible)	\$11,516,000
5.	Improve the quality of the working environment at Arches and increase management efficiency:	
	--Remodel the existing visitor center to house all park administrative offices and workspace	\$ 29,700
	--Provide new ranger residence and host site and make necessary modifications to utility systems at Devils Garden	451,800
	--Close and restore the Salt Valley overlook (\$37,400 FLHP eligible)	37,400
	Subtotal (\$37,400 FLHP eligible)	\$ 519,000
6.	Provide for new visitor opportunities at Arches:	
	--Develop handicap-accessible facilities and new primitive trail at Windows (\$6,400 FLHP eligible)	\$ 202,500
	--Develop new primitive route and make viewpoint trail handicap-accessible at La Sal Mountain viewpoint (\$4,000 FLHP eligible)	30,100
	--Expand parking and trails at Sand Dune Arch trailhead (\$57,400 FLHP eligible)	61,500
	--Construct handicap-accessible viewpoint at Panorama Point (\$6,700 FLHP eligible)	10,600
	--Formalize trail and add identification sign at Moab rock art panel (if Utah Department of Transportation establishes safe parking area)	27,000
	Subtotal (\$74,500 FLHP eligible)	\$ 332,000
	Total gross development costs (\$7,878,000 FLHP eligible)	\$14,056,000

STAFFING

Arches National Park will continue to be managed as a unit of the Southeast Utah Group. Management assistance will be available from the group office, particularly in areas of administration and maintenance. Personnel from Arches may occasionally be used to assist other areas in the group on large-scale projects requiring employees with special expertise or with operations such as fee collection and trails maintenance. Performance of activities at the existing staffing level is dependent on supplemental labor obtained through programs such as Student Conservation Aids, the Green Thumb program, the Federal Job Training Partnership, the Work Experience and Training program, and other state of Utah social programs.

Proposals to increase resource protection and interpretive programming and to provide additional park facilities will require additional staffing. Staffing requirements will increase by 1.0 full-time equivalent (FTE) position in the Division of Management Administration, 4.3 FTEs in the Division of Interpretation, 4.0 FTEs in the Division of Resource Management and Visitor Protection, and 4.8 FTEs in the Division of Maintenance. Total staffing will be 31.4 FTEs at full plan implementation see table 2. The work to be performed by the additional staff is described in appendix H.

Most of the staff will continue to live outside the park. The park's approved *Housing Management Plan* calls for housing for four permanent employees and 12 to 15 seasonal employees inside the park. This level of housing is adequately met with the exception of the housing for two required seasonals at the Devils Garden area, which will be upgraded from a trailer to permanent residences.

Table 2: Staffing Requirements

<u>Position</u>	<u>Grade</u>	<u>Salary (1988 \$)</u>	<u>FTE</u>
Division of Management and Administration			
Existing Staff			
Superintendent ¹	GS 12		1.0
Administrative clerk	GS 05		1.0
Additions to Staff			
Clerk typist	GS 04		<u>1.0</u>
	Increase ²	\$ 19,600	1.0
	Subtotal	\$ 75,900	3.0
Division of Interpretation			
Existing Staff			
Chief ¹	GS 11		1.0
Park ranger ¹	GS 05/07/09		1.0
Park ranger (seasonal)	GS 04		2.3
Additions to Staff			
Park ranger (seasonal)	GS 06		0.7
Park ranger (permanent part-time)	GS 05		0.8
Park ranger (seasonal)	GS 05		<u>2.8</u>
	Increase ²	\$ 77,300	4.3
	Subtotal	\$162,700	8.6
Division of Resource Management and Visitor Protection			
Existing Staff			
Chief ranger ¹	GS 11		1.0
Park ranger ¹	GS 05/07/09		1.0
Park ranger (seasonal)	GS 05		2.1
Park ranger (seasonal)	GS 03		1.9
Additions to Staff			
Park ranger (permanent part-time)	GS 05		0.8
Park ranger (seasonal)	GS 05		1.8
Park ranger (seasonal)	GS 03		<u>1.4</u>
	Increase ²	\$ 74,000	4.0
	Subtotal	\$189,100	10.0
Division of Maintenance			
Existing Staff			
Chief of Maintenance ¹	WS 09		1.0
Maintenance worker ¹	WG 09		1.0
Maintenance worker (permanent part-time)	WG 08		0.8
Maintenance worker (seasonal)	WG 05		1.7
Maintenance worker (seasonal)	WG 03		0.5
Additions to Staff			
Maintenance mechanic (seasonal)	WG 09		1.5
Maintenance worker leader	WL 06		1.0
Maintenance worker (seasonal)	WG 05		0.5
Maintenance worker (seasonal)	WG 05		0.5
Maintenance worker (seasonal)	WG 03		<u>1.3</u>
	Increase ²	\$114,500	4.8
	Subtotal	\$240,400	9.8
Total		\$668,100	31.4
Total increase over existing staff		\$285,000	14.1

¹Denotes existing positions that would receive a grade level increase under the plan. Proposed grade levels as well as salary figures for those levels are listed.

²Increase totals include salaries that accompany proposed grade level increases.

FUTURE PLANS AND STUDIES NEEDED

Flood Studies and Plans

An emergency flood warning and response plan will be prepared and implemented to warn of an oncoming flood up to the level of a probable maximum flood in any area of the park susceptible to flooding. The plan will address issues such as design and installation of a flashflood warning alarm system and evacuation procedures for visitors and staff at headquarters, the Wolfe ranch, and other areas as necessary.

A study will be conducted to determine the extents of the 100-year, 500-year, probable maximum, and flashflood floodplains in the Wolfe ranch area. Depending on the result, the Wolfe ranch site plan will be refined or modified as necessary to ensure public safety and protection of property.

Visitor Impact Management Program

A Visitor Impact Management program will be implemented to help managers identify and predict impacts of management strategies on resources and visitor experiences, and to help determine visitor carrying capacities for different park resources (see appendix C).

Interpretive Prospectus

The Harpers Ferry Center will prepare a new interpretive prospectus to replace the currently outdated one. The prospectus will be a comprehensive parkwide plan to define interpretive content and media. This plan will address the needs of mobility, sensory, and mentally impaired persons and propose programs to meet their needs.

Visitor Center Facility Plan

The Harpers Ferry Center will prepare a detailed facility plan concurrently with the preparation of the comprehensive design for the new visitor center to ensure that the building and its interpretive contents, such as exhibits and audiovisual media, are compatible and functional and that they address the needs of mobility, sensory, and mentally impaired persons.

Parkwide Sign Plan

A sign plan will be prepared by the park staff to establish a common format and appearance for all park signs. Park signs should be compatible with the natural features of the park, yet easily visible from roads or at trailheads. Sign messages should be clear, concise, and quickly understood. Regardless of the message conveyed, each sign should be recognizable as an Arches National Park sign. The sign plan will be prepared before the wayside exhibit plan described below so that exhibit planners can follow park sign standards.

Wayside Exhibit Plan

A wayside exhibit plan will be prepared by the Harpers Ferry Center to identify the messages and the materials for the proposed wayside exhibits. The exhibit hardware will be compatible with the parkwide sign format.

Collections Management Plan

A collections management plan will be prepared to help direct activities related to both cultural and natural collections. If Arches serves as the depository for the entire Southeast Utah Group, the need for this plan will be particularly high.

Resource Management Studies

Numerous resource studies are proposed in the park's approved *Natural Resource Management Plan* and *Cultural Resource Management Plan*.

ALTERNATIVES

GMP ALTERNATIVES

Three alternatives are analyzed in this assessment: no action, minimum requirements, and the preferred alternative (the proposed general management plan). The notable differences among the alternatives are compared in table 3.

Under the no-action alternative, existing management would continue, and existing resource and visitor use problems would continue.

The minimum requirements alternative includes the minimum actions needed to mitigate health/safety and resource deterioration problems. The flood hazard at the headquarters would be mitigated by removing the apartment house and the residence from the 100-year floodplain and having most employees find housing outside the park. The library building and the maintenance building would remain in the 500-year floodplain, but the effects would be mitigated by relocating the museum collections to a new structure to be built outside the floodplain and by floodproofing the hazardous materials storage and water treatment facilities at the maintenance area. An emergency flood warning system and response plan would be developed to mitigate the remaining flood hazard. Traffic hazards throughout the park would be reduced by installing signs and crosswalks and by redesigning pullouts and parking where necessary. Resource damage would be confined by installing barriers to prevent shoulder parking and trail shortcutting. Existing visitor use patterns would continue. Some staffing increases would be required under the minimum requirements alternative to adequately address health and safety issues and to alleviate major problems of resource damage, deteriorating facilities, and overcrowded visitor programs. Staffing requirements are summarized and compared in table 4.

Like the minimum requirements alternative, the preferred alternative would also mitigate health/safety and resource deterioration problems. The flood hazard at headquarters would be mitigated by raising the road and installing culverts to channel floodwaters away from the developed area. These design measures would place all the development except the maintenance facilities outside the 500-year floodplain, although still within the probable maximum floodplain. The museum collections would be relocated to a new structure outside the probable maximum floodplain, and hazardous materials storage and water treatment facilities would be floodproofed. Any remaining flood hazard would be mitigated by developing an emergency flood warning system and response plan. Traffic hazards along the main park road would be reduced the same as described for the minimum requirements alternative. The preferred alternative would enhance existing visitor use patterns by providing a new visitor center and entrance facilities, improving access to the Delicate Arch trailhead and viewpoint, accommodating the existing demand for parking wherever possible, and improving interpretive waysides. A Visitor Impact Management program would be implemented to monitor the effects of visitor use and to help park managers identify and avoid adverse impacts on park resources and visitor experiences. This alternative is described in detail in part one of this document.

Resource management would be similar under all three alternatives. The park's approved *Natural Resource Management Plan*, *Cultural Resource Management Plan*, and *Land Protection Plan* would be implemented independently of the *General Management Plan*. The only resource management options addressed in this document are possible new museum collection storage facilities, the possible installation of protective barriers in

front of rock art panels, possible boundary adjustments along US 191, and whether or not the National Park Service would recommend the inclusion of Lost Spring Canyon in Arches National Park if it was rejected for wilderness by the Bureau of Land Management (see table 3).

Table 4: Summary Comparison of Staffing (FTEs)

<u>Division</u>	<u>Preferred Alternative</u>	<u>No Action</u>	<u>Minimum Requirements</u>
Management and Administration	3.0	2.0	3.0
Interpretation	8.6	4.3	5.7
Resource Management and Visitor Protection	10.0	6.0	7.4
Maintenance	9.8	5.0	6.8
Total FTEs	31.4	17.3	22.9
Annual Salary Cost	\$668,100	\$382,700	\$491,100

Table 3: Summary Comparison of Development

<u>Preferred Alternative</u>	<u>No Action Alternative</u>	<u>Minimum Requirements Alternative</u>
Park Headquarters	Park Headquarters	Park Headquarters
Mitigate flood hazard by installing culverts, raising roads, building a new collection-storage facility outside the floodplain, and floodproofing critical activities	Retain existing visitor center/administration offices, housing, and maintenance facilities, all in flood hazard area	Mitigate flood hazard by eliminating some housing from park, building a new collection-storage facility outside the floodplain, and floodproofing critical activities
Provide new visitor center; redesign entrance road and parking; provide second entrance station		Renovate existing visitor center
Renovate old visitor center/administration building for additional offices		Relocate some administrative functions to leased space in Moab
Relocate parking for apartments		
Park Avenue (formerly South Park Avenue)	South Park Avenue	South Park Avenue
Improve handicap access to viewpoint; replace wayside exhibit	Retain existing parking and handicap-accessible viewpoint	Same as no action
La Sal Mountain Viewpoint	La Sal Mountain Viewpoint	La Sal Mountain Viewpoint
Install new road sign; restripe parking area; upgrade trail; and replace wayside exhibit	Retain existing parking, trail, and viewpoint	Install road sign; restripe parking area
Develop a trailhead and marked route to Courthouse Canyon for guided and self-guiding walks		
Courthouse Towers	Courthouse Towers	Courthouse Towers
Install road signs and crosswalk; provide new wayside exhibits	Retain existing parking and viewpoint	Install road signs and crosswalk
Balanced Rock	Balanced Rock	Balanced Rock
Expand parking to accommodate part of existing demand; add barriers to prevent shoulder parking	Retain existing parking and picnic area	Expand parking to accommodate part of existing demand; add barriers to prevent shoulder parking
Relocate picnic area away from road; install crosswalk and signs		Relocate picnic area away from road; install crosswalk and signs
Add new trail segment, viewpoint, and wayside exhibit		Add new trail segment and viewpoint

<u>Preferred Alternative</u>	<u>No Action Alternative</u>	<u>Minimum Requirements Alternative</u>
Windows	Windows	Windows
Add peripheral trail and barriers to prevent shortcutting; add wayside exhibits	Retain existing parking and trails	Install barriers to prevent trail shortcutting
Panorama Point	Panorama Point	Panorama Point
Restripe parking area; add viewpoint and wayside exhibit	Retain existing parking	Restripe parking area
Wolf Ranch/Delicate Arch Trailhead	Wolf Ranch/Delicate Arch Trailhead	Wolf Ranch/Delicate Arch Trailhead
Pave road to the new Delicate Arch viewpoint parking area and construct bridges across washes	Retain dirt/gravel road with wash crossings	Resurface road with gravel and construct bridges across washes
Expand parking to accommodate existing demand; add barriers to prevent shoulder parking	Retain existing parking	Retain existing parking; add barriers to prevent shoulder parking
Retain existing trails; designate a trail to rock art and add barriers to prevent trail shortcutting	Retain existing trails to ranch and arch	Same as preferred alternative
Add handicap-accessible toilets in new location	Retain existing toilets	Add handicap-accessible toilets
Install physical protection for rock art		Same as preferred alternative
Delicate Arch Viewpoint	Delicate Arch Viewpoint	Delicate Arch Viewpoint
Relocate parking outside the view from the arch and expand to accommodate existing demand	Retain existing parking, viewpoint, and trail	Same as no action
Fiery Furnace	Fiery Furnace	Fiery Furnace
Retain existing parking; add barriers to prevent shoulder parking	Retain existing parking	Same as preferred alternative
Provide four interpretive tours pr day during the peak season (20 persons per tour)	Provide one interpretive tour per day (up to 145 persons per tour)	Provide two interpretive tours per day during the peak season (40 persons per tour)
Sand Dune Arch Trailhead	Sand Dune Arch Trailhead	Sand Dune Arch Trailhead
Expand and redesign parking; add barriers to prevent trail shortcutting	Retain existing parking and trails	Retain parking; add barriers to prevent trail shortcutting
Add trailhead and trail for Lost Spring Canyon		

<u>Preferred Alternative</u>	<u>No Action Alternative</u>	<u>Minimum Requirements Alternative</u>
Devils Garden	Devils Garden	Devils Garden
Add 10 walk-in tent campsites and rehabilitate existing sites	Retain existing campground	Retain campground at existing capacity and rehabilitate existing sites
Add dump station		Same as preferred alternative
Provide new site for campground host		Same as preferred alternative
Reorient and enlarge amphitheater to seat 150; improve handicap access	Retain 105-seat amphitheater	Rehabilitate amphitheater
Construct permanent ranger residences at new site	Retain ranger residence (trailer)	Construct permanent ranger residences at existing site
Expand trailhead parking to accommodate existing demand; add barriers to prevent shoulder parking	Retain existing trailhead parking	Retain existing trailhead parking; add barriers to prevent shoulder parking
Moab Panel	Moab Panel	Moab Panel
Improve parking as part of highway project; add trail and interpretive exhibit	Retain unimproved parking adjacent to highway	Improve parking as part of highway project
Install physical protection for rock art		Same as preferred alternative
Boundary along US 191	Boundary along US 191	Boundary along US 191
Redefine boundary to follow highway rights-of-way; acquire lands	Retain existing boundary	Same as preferred alternative
Lost Spring Canyon	Lost Spring Canyon	Lost Spring Canyon
Recommend addition to Arches National Park if area not designated as BLM wilderness	Retain in BLM ownership	Same as preferred alternative
Capacity	Capacity	Capacity
Persons at one time: 1,593 Daily total: 4,779	Persons at one time: 1,399 Daily total: 4,197	Same as no action
Total Development Costs	Total Development Costs	Total Development Costs
\$14,055,700*	\$0	\$8,991,500*

*Total development costs for the preferred and minimum requirements alternatives include \$5.5 million for rehabilitating the main park road. See appendix G for an itemized listing of development costs.

OPTIONS CONSIDERED BUT REJECTED

Immediately Expand Parking to Accommodate Demand Projected for the Year 2005

In this option, parking areas at major trailheads would be expanded to accommodate average summer weekend demand projected for the year 2005 (the anticipated life of the plan), assuming an average annual visitation increase of 3 percent. This would exceed the parking increases proposed in the preferred alternative, which are intended to satisfy the existing (1989) average summer weekend demand, as follows: At Balanced Rock parking would be expanded from 16 spaces in the preferred alternative to 28 spaces; at the Windows, from 55 spaces to 68; at the Wolfe ranch, from 44 spaces to 60; at the Delicate Arch viewpoint, from 28 spaces to 38; at the Devils Garden trailhead, from 60 spaces to 82; and at Fiery Furnace, from 15 spaces to 22. This alternative was rejected because of concern about possible adverse impacts on resources and visitor experiences.

Implement Public Transportation System

A public transportation system was studied as a possible alternative to expanding the parking at interpretive viewpoints and trailheads. The study, which is summarized in appendix I, concluded that public transportation would be quite costly and might not be economically feasible given the projected level of visitation and transportation system ridership in the foreseeable future.

Consolidate the Visitor Center and Park Offices in a New Building

In this alternative, all park offices would be consolidated in the new visitor center building. The existing visitor center would be removed and the area restored. Although communication between administrative and interpretive staffs would be facilitated by this move, the option was not chosen because it would not meet the objective of retaining as much existing development as possible and keeping overall building costs to a minimum.

Remodel/Enlarge Existing Visitor Center and Move Most Offices to Moab

The existing visitor center would be remodeled to provide adequate space for the Arches visitor center and interpretive offices. Other offices would be relocated to leased space in Moab. Although the auditorium could be enlarged, workspace provided, and the visual tie with the resource enhanced by remodeling, the separation of visitor services/interpretation and other park functions would make communication more difficult and have an overall detrimental effect on park operations. For this reason, this alternative was rejected.

Alternative Sewage Treatment Systems

Two alternatives to the proposed sewage treatment system for the headquarters area were analyzed. One alternative, which called for expansion of the existing septic tank and leachfields to accommodate sewage from the new visitor center, was rejected because of the increased potential for groundwater pollution. State regulations for the

protection of groundwater have become more stringent since the water system was improved in 1984, and the existing leachfields are closer to the water supply than allowable under the new regulations. Another alternative, which called for an on-site treatment plant, is no longer being considered because of the high cost involved. The estimated cost of that alternative would be \$1.2 million, whereas the proposed system is estimated to cost \$380,000.

Another preliminary alternative considered construction of a 5-mile-long forcemain to transport all sewage generated at the Arches headquarters area to the Moab sewage treatment facility. One section would cross the Colorado River, and it would be insulated to prevent freezing. Although this alternative would eliminate the need for on-site treatment at headquarters, it was rejected because of the prohibitively high cost of construction and the likelihood of extensive required maintenance.

Relocate Balanced Rock Parking

This alternative would accommodate a greater percentage of the parking demand at Balanced Rock by providing an enlarged parking area for approximately 30 vehicles, or twice the number that can be accommodated in the proposed lot. The new parking area would be located southeast of the existing parking pullout and immediately southwest of Balanced Rock and would be accessible by way of a new spur road. This alternative was rejected for further consideration because it would disturb 2-3 acres of previously undisturbed land, because heavy equipment use would threaten Balanced Rock, and because of the visual intrusion of development and vehicles on views of the rock.

Relocate Picnicking from Balanced Rock to Windows

The objective of this alternative was to move the picnic facilities away from the noise and fumes of the main road and reduce congestion and the number of visitors crossing the main road in the Balanced Rock area. Because of strong public support for retaining facilities in the Balanced Rock vicinity, however, this alternative was rejected.

Relocate Wolfe Ranch Parking

In this alternative, the parking area for Wolfe Ranch and the Delicate Arch trailhead would be relocated to the east of Salt Wash and north of the road, between Salt Wash and Winter Camp Wash. The new parking area would have the same capacity as in the preferred alternative. In this location, vehicles and toilet structures would not intrude on the historic scene at the ranch. However, this alternative was not chosen because the new location is probably within the high-hazard, high-velocity flow area of the Salt Wash floodplain, and visitors, staff, and facilities would probably be at higher risk than at the location of the existing parking area.

Expand Delicate Arch Viewpoint Parking in Its Existing Location

In this alternative, the existing Delicate Arch viewpoint parking area would be paved and expanded to accommodate buses and increased parking demand. The opportunity for disabled persons to view Delicate Arch from their vehicles, or just outside their vehicles at the parking area, would be retained. This alternative was not chosen, however,

because an increase in the number and size of vehicles in the parking area would result in a greater visual intrusion on the landscape seen by hikers standing beneath the arch. This alternative would potentially set a precedent for even more development in this visible area.

Close Delicate Arch Viewpoint

In this alternative, the Delicate Arch road would end at the Wolfe ranch parking lot. A bridge would be installed over Salt Valley Wash, ensuring access to the Wolfe ranch area, but no bridges or other improvements would be made to the road beyond the Wolfe ranch. The remainder of the road would gradually revert to a four-wheel-drive standard. The Cache Valley four-wheel-drive road would still be accessible. Visitors without four-wheel-drive vehicles would have to hike the 1.5-mile trail from the Wolfe ranch trailhead to see Delicate Arch. This alternative was rejected because it would deny visitors unable or unwilling to hike the opportunity to see the most publicized arch in the park.

Enlarge Devils Garden Campground

Except at extreme peaks of use, the demand for vehicle campsites in the Arches region is satisfied by the existing combination of private campgrounds in the Moab area and public campgrounds on nearby state and federal lands. However, the demand for the 53 sites at the Devils Garden campground at Arches is frequently exceeded during six months of the year from mid-April to mid-October. This contributes to illegal camping along the Salt Wash and Delicate Arch roads and in the visitor center parking lot. Many people who would prefer to camp at Arches cannot, and complaints are common. The planning team explored the possibility of adding additional vehicle campsites. However, it was determined that the existing campground could not be expanded without seriously degrading the camping experience currently available at this small aesthetically pleasing campground. Expansion would have to take place to the east, in flatter, more open terrain. The new sites would not offer the same experience as the present campsites, which are tucked in among the rock formations and clumps of pinyon pine and juniper. Also, a larger expanse of campsites would inevitably give the entire campground a more crowded, developed feeling, contrary to the existing experience for this campground, which is to provide a quiet, semiprimitive camping experience for visitors.

Provide a Campstore Near Devils Garden Campground

A study was conducted to determine the feasibility of providing a concessioner-operated campstore at the Devils Garden campground. It was found that for a campstore to be economically feasible, it would be necessary to expand the 53-site campground to 150 sites. Because of site limitations, expanding the campground to 150 sites would result in a denser camping experience, not at all like the quiet, low-density camping experience now available. This option was rejected because it would conflict with the existing camping experience at Arches (see above). Tripling the capacity of the campground would also likely cause unacceptable congestion and resource impacts at the nearby heavily used trailhead and trails in this part of the park.

Separate Parking from the Main Road at the Devils Garden Trailhead

The objective of this alternative was to reduce congestion at the trailhead by separating the parking lot from the loop road. This would allow some visitors – those leaving the park from the campground, for instance – to bypass the parking area. This alternative was rejected because the great majority of visitors to the Devils Garden area have the trailhead as their destination, and relatively few visitors want to bypass the parking lot.

Construct a New Ranger Residence Near Devils Garden Maintenance Area

Given the nature of existing development and natural terrain in the Devils Garden area, the most feasible locations for construction of the new ranger residences are the campground road intersection (the preferred alternative) and near the maintenance area (1/8 mile north of the maintenance area, separated from the trailhead by sandstone fins). The second location was not selected because of the need for a ranger to be accessible to visitors and the need for close communication between the campground host and the ranger.

Salt Valley Road Improvements

The Salt Valley road starts near Devils Garden and leads 10 miles northwest to Klondike Bluffs, the Tower Arch trailhead, and the park boundary. Road conditions and weather permitting, this route can be driven by two-wheel-drive automobiles. After seeing Klondike Bluffs, visitors typically exit the park and drive the remaining 10 miles to US 191. Only about 2 percent of all park visitors use this road. For about 2 miles, the road follows the channel of Salt Valley Wash. Washouts occur here, and vehicles could be damaged or stranded.

The Grand County Commission has recommended that the National Park Service pave the entire 27-mile route through Salt Valley from the Devils Garden area to I-70 at Thompson Springs. This would alter the basic pattern of access to the park, since the new road, in combination with US 191, would offer a loop drive opportunity between I-70 and Moab. The National Park Service evaluated the proposal in terms of construction and maintenance costs, environmental impacts, potential gains in visitor enjoyment of the park, effects on businesses near the park, changes in fuel consumption and in-park traffic volumes, and the need for additional entrance facilities.

Several other options in addition to paving the entire 27-mile route were also considered:

- Pave the 17.5-mile route along Salt Valley from Devils Garden directly to US 191

- Reroute and pave the 7.5-mile route through Salt Valley from Devils Garden to Klondike Bluffs

- Realign the portion of the road currently in Salt Valley Wash to reduce the potential for motorists being stranded during inclement weather.

The National Park Service evaluated each of the options and weighed monetary costs and resource impacts against added value for visitors. In all cases, it was agreed that while new perspectives of broad scenic resources would be added for visitors, no new

outstanding features would be made accessible compared to the array of such features that can be reached already along the existing park road system. Furthermore, the opportunity to drive a primitive dirt road in the park without special vehicles would be lost in all but the last option.

It was concluded that the cost of implementing any of the options would be more than the benefits realized; therefore, none of the above options was considered further.

Close Four-Wheel-Drive Roads

There are two four-wheel-drive roads in Arches, both starting near the Balanced Rock picnic area. One, the original monument entrance road, leads east 4 miles and exits the park near Willow Spring. The second is the 11-mile Klondike Bluffs road, which leads northwest and joins the Salt Valley road. A 2-mile spur off this road leads to Tower Arch.

The primitive driving experience made possible by these 17 miles of four-wheel-drive roads has been traditional in the park for decades and diversifies the spectrum of visitor access opportunities. These roads also provide an effective way for the park staff to patrol and monitor these sections of the park. The possibility of closing the roads was considered as a way of eliminating resource damage resulting from illegal off-road driving and camping. During planning, a search was conducted for resource damage resulting from illegal off-road use, but it was concluded that there is little or no documentation of significant damage. Many portions of the roadways are in washes that periodically flood and remove signs of disturbance. Rather than consider closing the roads it was decided to monitor use as part of the Visitor Impact Management program and ensure that it does not go beyond the limits of acceptable change. The road boundaries are being more effectively marked in a few critical areas to prevent accidental off-road use.

Close the 2-mile Spur Road Leading to Tower Arch

A major concern about this short section of road was the effect users might have on the raptors nesting in Klondike Bluffs. However, there is no conclusive evidence of effect resulting from the few vehicles using this road. There has been minor and infrequent illegal camping in the Tower Arch area, but not enough to warrant closure of the road. Consequently, the alternative of closing this road was dropped in favor of a long-term program of monitoring and mitigation if it becomes necessary to protect the resources.

Realign Boundaries along Topographic Features

The stair-stepped boundaries near Herdina Park and Eagle Park were field checked to determine whether they could be realigned along topographic barriers (cliffs) that would preclude the need for livestock fencing. The topographic relief was determined to be inadequate to preclude the need for fencing; thus, possible boundary adjustments in these areas were dropped from further consideration.

AFFECTED ENVIRONMENT

NATURAL RESOURCES

Arches National Park is in southeastern Utah. This portion of the state and adjoining areas of Colorado, Arizona, and New Mexico (the Four Corners region) comprise the major portion of a geologic region known as the Colorado Plateau. In striking contrast to the forested mountains that surround it, the plateau is a rugged, deeply eroded desert. Within Arches the plateau is cut by the Colorado River canyon and several smaller streams.

Geology/Terrain/Soils

A large percentage of the park's land surface is exposed bedrock or shallow soil over bedrock with sparse plant cover. Because of these conditions and the region's arid climate and clear days, Arches is an excellent place to study geology.

The colorful Chinle, Wingate, Kayenta, Navajo, Entrada, Summerville, Morrison, Dakota, and Mancos formations of the Colorado Plateau were deposited under a variety of conditions ranging from shallow seas to sandy deserts. The deposits were much later deformed by folding and faulting and uplifted to higher elevations. Surface elevations in the park range from 4,000 to 5,600 feet above sea level. Rock at the surface is gradually shaped by exfoliation (a type of mechanical fracturing), chemical solution, frost wedging, and water and wind erosion. Millions of years ago, a subsurface salt deposit intruded beneath the center of the park and tilted the rock strata into an anticline. Erosion removed the central portion of the anticline and formed Salt Valley. Recent deposits have been deformed, indicating the intrusion of salt may be continuing. Salt Valley is mostly covered by sandy deposits transported by wind and water. The northern portion of the valley and the lower slopes have surface exposures of shale and clay. This material forms soil that expands when moisture is added. Portions of the main park road in Salt Wash and the access road to the Wolfe ranch and Delicate Arch trailhead cross these unstable soils. A high shrink/swell ratio causes heaving of the road surfaces.

During the ancient deformation that formed the anticline, the upwarped strata on both sides of Salt Valley were extensively broken by systems of joints (cracks). These parallel joints in the hard, cliff-forming Entrada sandstone are acted on by the agents of erosion, resulting in the long, free standing walls of rock (fins). Erosion follows weaknesses in the rock, forming alcoves in the fins. When the alcoves are finally enlarged sufficiently to break through the fin wall, an arch results. An arch is a free-standing opening in a wall of rock, formed by collapse of rock in the lower part of the wall. Unlike a natural bridge, an arch does not have a streambed running through the opening. Frost wedging, gravity, and weathering eventually break down the arch. Nearly all of the arches in the park, including those in the scenic Devils Garden, Fiery Furnace, Klondike Bluffs, and Windows sections, are in sandstone of the Entrada formation.

The Moab fault determines the alignment of Moab Canyon, which US 191 follows north from Moab. Rock strata are offset several thousand feet along this fault and can be easily observed from park headquarters and the road switchbacks above headquarters. The fault is local in nature and has not been seismically active in historic times. The

probability of damaging earthquakes in the Arches area is rated low. The sandy alluvial deposits in the headquarters area are well drained and stable, although soil depths to bedrock vary. Percolation rates are excellent for drain fields, but soil depths should be checked before construction to verify sufficient depth for excavation of utility lines. Road construction across the widespread sandy deposits in the park is generally feasible. Geologic hazards to developed areas from rockfalls or landslides are low.

The Colorado River runs 10.7 miles along the southeast boundary of the park. The spectacular canyon upstream and downstream from Moab is bounded by red cliffs of the Wingate, Kayenta, and Navajo formations and is a classic example of the deep, cliff-rimmed, entrenched meandering canyons of the Colorado Plateau that so influence the scenery and human history of the region.

Several peaks of the La Sal Mountains a few miles east of the Colorado River exceed 12,000 feet and form an important scenic backdrop for the park. The conical peaks support forests of aspen and fir and provide year-around streams.

Soils/Vegetation

Geologic substrate and soil type are important factors influencing vegetation type and distribution. Soil depth, particle size, and crack systems in underlying bedrock affect the moisture available to plants. Soils derived from the Morrison and Mancos formations have a high salt content, which only certain plants can tolerate.

Vegetation is not a dominant feature of the park landscape. The arid climate of the area, with only 8 inches of annual precipitation, results in sparse vegetation and poorly developed soils. Large areas of slickrock cover about 11 percent of the park and are largely devoid of soil and plant life. The La Sal Mountains overlook is adjacent to an area of slickrock. Hot summers, cold winters, low precipitation, and isolation by natural barriers have resulted in a limited number of plant species, many with considerable specialization.

Cattle and sheep grazing for nearly a century before the park's establishment has altered plant communities. Perennial grasses have declined, and shrubs and cactus have increased. However, in many areas of the park, including Salt Valley, the native grass communities show signs of returning to pregrazing abundance and vigor. Nonnative plants have also been imported into the area during the past 100 years. Russian thistle, halogeton, cheatgrass, and tamarisk are examples of nonnative plants that have become well established. Disturbed areas that have been cleared or overgrazed are particularly vulnerable to invasion by exotic plants such as Russian thistle and cheatgrass. Cheatgrass and tamarisk often suppress reestablishment of native vegetation. Stands of Russian thistle may succeed to native grasses.

The pinyon/juniper community covers about 40 percent of the park and is common in slickrock areas where cracks in the rock concentrate moisture. Areas with slightly more soil contain blackbrush, cliffrose, squawbush, singleleaf ash, and serviceberry. The Devils Garden amphitheater and campground entrance area support pinyon/juniper with grass and shrub understory. The Balanced Rock picnic area is predominantly pinyon/juniper with some blackbrush.

Sand sage and wavy-leaf oak are found in sand dune areas.

About 20 percent of the park is covered by the blackbrush/shrubland community. This community dominates areas where soils are less than 18 inches deep. Mormon tea (ephedra) and grass may share deeper soils, but in many areas of shallow soil blackbrush occurs in nearly pure stands. Regeneration of blackbrush after disturbance is not well understood and apparently takes decades. Many old scars in blackbrush areas are visible more than 20 years after disturbance. The National Park Service is currently studying blackbrush ecology and methods of revegetation of disturbed sites. The Salt Valley and Fiery Furnace overlooks are predominantly blackbrush mixed with other shrubs and some grass. The proposed Devils Garden walk-in campsites, proposed Double Arch handicap-accessible trail, proposed Windows loop trail, and proposed Balanced Rock picnic area will be developed on sites vegetated predominantly with blackbrush/mixed shrub and some pinyon/juniper.

The grassland plant community covers about 11 percent of the park and occurs where sandy soils are deeper, such as in Salt Valley. Blackbrush and grassland communities intergrade in soils of intermediate depth. Indian ricegrass, needle-and-thread grass, and galleta grass are typical species in the grassland community. These species have been reduced by past livestock grazing, but are now increasing where grazing has ceased. Mormon tea, blackbrush, and nonnative cheatgrass also occur in grassland associations. Revegetation after disturbance by construction is probably more rapid in grassland than in any other plant community. The gas pipeline corridor that was cleared in the 1950s has revegetated where it passes through this plant community, and other revegetation efforts in this community have proven successful. Portions of the loop road at Devils Garden are in grassland with a few shrubs. The Landscape Arch trailhead at Devils Garden, the Sand Dune Arch trailhead, the Delicate Arch viewpoint parking, and the headquarters area are in mixed grass/shrub communities.

The saltbush community is found on saline, alkaline soils eroded from shale slopes. These conditions are common in lower Salt Valley Wash adjacent to the Delicate Arch road. Saltbush, snakeweed, and nonnative Russian thistle and cheatgrass are found on the slopes; seepweed, pickleweed, greasewood, cheatgrass, and nonnative tamarisk are abundant in the floodplain around the Wolfe cabin. Less than 2 percent of the park area supports saltbush species.

A riparian plant community of cottonwood, willow, and tamarisk is found along streamsides and banks. This community dominates in Courthouse Wash, Salt Wash, and isolated moist pockets. Big sagebrush, rabbitbrush, and greasewood occupy nearby alluvial terraces in areas with nonsaline soils and available groundwater. Remnant cottonwoods that are 100 to 300 years old are also found on the alluvial terraces; however, arroyo cutting during the last century has lowered stream grades and the subsurface water table, eliminating reproduction of cottonwood in areas away from streamsides. The floodplain and adjacent benches of Courthouse Wash above the park road bridge are good examples of floodplain and alluvial terrace vegetation. Comparison of a 1942 photograph with current conditions indicates an increase in young cottonwood and willow near the stream, probably due to removal of grazing. Tamarisk has also increased.

"Hanging gardens" occupy seeps and springs in rock alcoves on canyon walls. These perennially wet areas support lush growth of maidenhair fern, monkey flower, columbine, and an endemic death camas. Cattails, willows, and horsetails are common in drainages where water stands for at least part of the year, and nearby slopes are covered with Gambel oak. "Hanging gardens" are not found in or near any of the developed areas.

Steep, unstable slopes support a plant community of snakeweed and saltbush. The talus slopes beneath the cliffs along the Colorado River and in lower Salt Wash Canyon are examples of these conditions. The combination of riparian, seep, and talus slope communities cover about 13 percent of the park.

Cryptogamic soil crusts are common on sandy soils in pinyon/juniper areas and in shrublands. The dark crusts are a complex of lichens, mosses, algae, and fungi and modify their environment by retaining wind-blown dust and soil moisture and by fixing nitrogen. Cryptogamic soil crusts are found elsewhere in the Southwest but are best developed on the Colorado Plateau. The brittle crusts are easily damaged by foot traffic, livestock, and motor vehicles and are very slow to regenerate.

Wildlife

Several species of fish including the fathead chub and killifish inhabit Salt Wash. Little is known about park amphibian and reptile populations, but survey work has begun. Collared lizards are common.

Over 150 bird species have been documented in the park. A variety of perching birds, including ravens and pinyon jays, and various raptors, such as golden eagles, red-tailed hawks, prairie falcons, kestrels, and great horned owls, can be seen. Rock cliffs near foraging areas provide important raptor nesting habitat in the park. Nesting raptors are sensitive to disturbance from hikers from February until July. Nesting raptors may be affected by visitor activities, and further study is needed.

Mammals in the park include antelope ground squirrels, pack rats, jackrabbits, beaver, porcupines, badger, mule deer, ringtails, coyotes, kit fox, gray fox, bobcats, and mountain lions. Bighorn sheep were reintroduced in the early 1980s and can be seen foraging on winter range along the highway near park headquarters. About 20 to 30 bighorns use park habitat at least part of the year. Lambing occurs inside the park between lower Courthouse Wash and lower Salt Wash.

Threatened and Endangered Species

The floral inventory of the park is incomplete, and data on rare plants is insufficient to accurately assess the range of rare plants. The Wright fishhook cactus (*Sclerocactus wrightiae*) occurs in the park and is federally listed as an endangered species. Five plant species have category II federal status (are candidates for listing): the Cutler milkweed (*Asclepias cutleri*), Cottam milkvetch (*Astragalus cottamii*), *Erigeron maguirei*, Canyonlands biscuitroot (*Lomatium latilobum*), and Entrada rushpink (*Lygodesmia entrada*). Three plant species have category III federal status (are suspected to be endangered but data is incomplete for listing): *Cirsium rydbergii*, *Primula specuicola*, and *Zigadenus vaginatus*. The above are also listed by the Utah Native Plant Society as sensitive, and 19 other species are listed as endemic or unusual.

The endangered humpback chub (*Ptycholeilus lucius*), the endangered bonytail chub (*Gila elegans*), and the endangered Colorado River squawfish (*Gila cypha*) have been documented near the park in the Colorado River. It is likely that they spawn in streams discharging from the park adjacent to the boundary at the mouths of Courthouse Wash and Salt Wash.

The endangered bald eagle (*Haliaeetus leucocephalus*) utilizes winter roosting sites inside the park at the mouth of Courthouse Wash. No nests are known inside the park. At least one pair of endangered peregrine falcons (*Falco peregrinus*) nest inside the park.

Water Resources

The high-water level of the Colorado River forms 10.7 miles of the southeast boundary of the park. Salt Wash and lower Courthouse Wash are the only perennially flowing streams in the park, and both have headwaters outside the park. Other washes in the park are intermittent. Several springs and many seeps on canyon walls provide valuable wildlife habitat and water sources for wildlife and human use. Seven water sources are monitored for water quality twice a year. Four are freshwater and two are high in dissolved salts. Coliform counts are high in upper and lower Courthouse Wash and Willow Springs (probably due to livestock), and water from these sources should not be consumed without some form of treatment.

Water Rights

Water used by the National Park Service for irrigation, municipal, domestic, and recreation purposes comes primarily from three wells, one located at the Devils Garden campground and two at the headquarters/park housing area. Water is trucked from the headquarters well to supply the Island in the Sky and Maze areas of Canyonlands National Park. Appropriative water rights for these wells have been filed with the state of Utah.

Four other appropriative water rights for stock and wildlife watering purposes are located in the park. In addition, the Department of Justice has filed for unquantified federal reserved water rights for Arches National Park in the "General Determination of the Right to Use Water, Both Surface and Underground, within the Drainage Area of the Price River and the Drainage Area of the Green River from the Confluence of the Price and Green Rivers to the Confluence of the Green and Colorado Rivers Excluding the Drainage of the San Rafael River, in Utah."

Floodplains

Flooding of park land is generally from flash flooding during thunderstorms in mid to late summer. The Colorado River reaches its highest stage of flooding in early June, although this level varies considerably from year to year. The park boundary is the normal high-water line, and the only park facilities in the Colorado River floodplain are the county-maintained boat launching ramp and parking area near the highway bridge. This area is flooded periodically by high runoff of the Colorado River.

Several of the park's developed areas are in the floodplains of other streams. At the headquarters site, the entrance road, the apartment building, residence 3, and some of the underground utilities are in the 100-year floodplain of Bloody Mary Wash; the library, the well house, the maintenance yard, and other underground utilities are in the 500-year floodplain; and all of the above plus the existing visitor center/administration building and

the CNHA office building are in the probable maximum flood zone. Residences 5, 6, and 10 are above the probable maximum floodplain of Bloody Mary Wash.

Much of the headquarters area is also vulnerable to sheet flooding down the rocky slopes north of the buildings during thundershowers.

The Wolfe ranch area is within the floodplain of Salt Wash. Although no floodplain determination has been completed, the ranch has been flooded several times during the past 50 years. The stream crossings along the access road near the ranch are low-water crossings and periodically wash out. In some years this road has been closed for several weeks during the peak travel season, keeping visitors from driving to the Delicate Arch viewpoint.

Wetlands

Wetland vegetation is found in limited areas adjacent to seeps and springs and along streams. This vegetation is not extensive but provides diverse habitat. Wetland vegetation includes willow, cottonwood, horsetails, cattails, phragmites, rushes, sedges, grasses, and nonnative tamarisk.

Agricultural Lands

There are no prime or unique agricultural lands in the park.

Air Quality

Air quality is an important resource that directly affects the visitor experience. Many of the named features of the park are on high plateaus that command clear views of distant landmarks and panoramas outside of the park, some over 50 miles away. These views include the La Sal Mountains, Book Cliffs, San Rafael Swell, and Henry Mountains. Viewing park features is greatly enhanced by the clarity of the scenic backdrop. Because of the extremely low humidity in the area, clarity is mainly reduced by light scattering from suspended particulate and aerosol matter. Views of park features are diminished by effects of widespread man-caused pollutants, which reduce clarity of background landscapes, contrast, and general visibility.

The park is a mandatory class I clean air area as designated under the 1977 Clean Air Act Amendments (16 USC 7401 et seq.). Under those amendments, the federal land manager (the secretary of the interior) and the park superintendent have an affirmative responsibility to protect the air quality related values (AQRVs—visibility, vegetation, wildlife, soils, water quality, and cultural and historic objects and resources) of the park. Class I designation places the most stringent constraints on the construction and operation of major emitting facilities (stationary sources of air pollution) in the region of the park. One of the park's management objectives is to comply with the Clean Air Act's prevention of significant deterioration requirements for class I areas, including preventing any future and remedying any existing adverse impacts on AQRVs.

Air quality and visibility monitoring at the park has consisted of teleradiometer readings between 1978 and 1982; vista photography from headquarters toward the Atlas Minerals uranium mill until December 1984; current vista photography near Balanced Rock; ongoing air quality sampling by Atlas Minerals at park headquarters; and sampling for ozone, sulfur dioxide, and fine particulates, as well as meteorological parameters of wind speed and direction, temperature, dew point, solar radiation, and precipitation at a station in Devils Garden. Visibility monitoring is also being conducted at nearby Canyonlands National Park. The state of Utah maintains an air quality monitoring station in Moab.

Although air quality and visibility monitoring conducted since 1978 has not detected any significant air quality improvement or degradation, regional air quality has apparently deteriorated in the Southwest, with an increase in the number of hazy days and an increase in the density of haze since 1970. This is probably due to increased industrial development in the region, including construction of four large coal-fired power plants within 150 miles since 1970. There are currently no visible plumes or point sources of air pollution visible from the park. Air quality fluctuates greatly on a daily basis.

In section 169A of the Clean Air Act, Congress declared a national goal of preventing future and remedying existing visibility impairment in class I areas in which the impairment results from man-made air pollution. The federal land manager has certified to the Environmental Protection Agency that there is existing visibility impairment within the park caused by uniform haze. EPA has published regulations that require states to develop programs to make reasonable progress toward the national goal, but the regulations primarily address visibility impairment that is reasonably attributable to a specific source or small group of sources.

The Atlas Minerals uranium mill across the highway from the park has closed permanently, reducing an important local source of air pollution. The cleanup of the mill site and tailings pile has not yet been performed.

Visual Quality

Visual quality of the distant landscapes that form the backdrop for major park features is important to the visitor experience. Air quality affects the clarity of views of distant landscape features as discussed above, but land management practices outside the park also affect the landscape itself. Mining and milling operations, road building, vegetation management practices such as chaining of livestock range or timbering, and construction of roads, communication structures, and power transmission lines outside the park all have the potential to affect the backdrop of prominent park features. Planning can help mitigate the effect on visual quality by careful design or placement of development. For example, rectangular forest clear-cuts with straight edges on distant forested slopes are visible for great distances as unnatural landscape features, whereas clear-cuts designed with curving edges may be indistinguishable from natural meadows when viewed from a distance. Color or placement of constructed features can also greatly affect the visual impacts from a distance. Visual quality of the built environment within the park is largely a function of sensitive design and planning and is an important consideration in any design or construction of park facilities.

CULTURAL RESOURCES

Archeological Resources

The area that is now Arches National Park appears to have been used only on a seasonal or intermittent basis by prehistoric and historic peoples. It has been a region of transit, a place through which people passed, and not a destination. At least three of the four major types of archeological sites found in Arches illustrate this point: caves or rock shelters are invariably places of short-lived usage; open camps are of the same character; and quarries are places where early peoples acquired the materials for their projectile points and other tools. Some rough shaping of these tools may have been done at the quarries, but in most cases they were finished elsewhere. The presence of pictographs and petroglyphs in this environment is hard to understand, especially those in remote, waterless locales.

Archeologists have concluded from the available evidence that there was some human occupancy in Arches during the Basketmaker II period (tentative), the Pueblo II period, and the Numic period (Ute, Paiute, and Shoshoni peoples). There is no unequivocal evidence of Archaic period, Pueblo I, or Pueblo III occupation. Evidence of Fremont habitation is tenuous and sparse. Thus, the readily identifiable artifacts from Arches date mainly from the years A.D. 1 to 500, 800 to 1000, and 1700 to the present. Some of the prehistoric record may have been obscured by early collectors, as local residents claim that Arches was once a good place to collect arrowheads and pottery. Some of these artifacts, especially projectile points, are displayed at the Moab Museum, which is run by the Southwest Utah Society of Art and Science.

A number of archeological investigations have been conducted in the vicinity of the present-day park, beginning as early as 1909; the majority of archeological sites discovered in these surveys are clustered in the northeast and southern sections of the park. In 1975 Michael S. Berry from the Utah State Archeologist's Office produced a summary report that listed 59 sites discovered by earlier investigators. To this, Berry added 30 more sites that he had found. A 1978 NPS Midwest Archeological Center report and base map show the 89 Berry sites plus 20 more. At present, only about a third of Arches National Park has been systematically surveyed for archeological remains. A complete survey is needed, together with further documentation of these resources.

Illegal excavation does not appear to be a major problem, even though infrequent instances have occurred in recent years; however, with the growth in the market for prehistoric artifacts, the sites may be increasingly susceptible to destruction. Vandalism, along with natural deterioration, is evident at most rock art sites, and in time these sites could be diminished in usefulness for study and public appreciation.

The Moab rock art panel has been successively altered by prehistoric peoples – the superimposed figures represent at least three different early cultures. The most conspicuous figures are painted with dark red, blue, and white hues, some of them are 5 feet tall, and the span of all the drawings is nearly 100 yards. The oldest figures resemble those in Barrier Canyon, 35 miles west. Later images – sheep, deer, and snakes – are typical of the Fremont culture (A.D. 1000 to 1200). Still others, such as figures on horseback, are probably the work of Utes and are no older than the 16th century. The Barrier Canyon panel represents the easternmost occurrence of this rock art style. Because the culture that produced this art is so little understood, each locality where Barrier Canyon art occurs is an important cultural resource. The fact that more

recent cultures have painted and pecked figures over the older Barrier Canyon work makes the Moab panel valuable as a site for dating the relative ages of the cultures involved. The Moab panel is listed on the National Register of Historic Places as a nationally significant resource.

Historic Resources

In 1986 Dr. Steven Mehls of Western Historical Studies, Inc., evaluated all aboveground cultural resources in the park, revised the park List of Classified Structures, and proposed nominations and requests for determination of eligibility for the National Register of Historic Places.

The Wolfe Ranch Historic District was added to the National Register of Historic Places in 1975. It contains the home of one of the few pioneers to settle in the present-day park, John Wesley Wolfe from Ohio. Wolfe came west in 1888, and established a small cattle ranch on Salt Wash, one of the few reliable sources of spring water in the area. He built a small cabin and a few outbuildings and lived the life of an isolated rancher from 1888 to 1910. Shortly after 1910, Wolfe's original dwelling was destroyed in a flash flood, but the "new" cabin and dugout cellar built in 1907 were unharmed and survive today in the Wolfe Ranch Historic District. After 1910, the ranch passed through several owners until it became the property of the National Park Service. The cabin, root cellar, and corral were stabilized and designated historic structures in 1965. In 1968 the Wolfe ranch became one of the first environmental study areas in the national park system.

Four other historic sites within the park may be eligible for nomination to the National Register and have been submitted by the NPS regional historic preservation team to the Advisory Council on Historic Preservation. The first of these (ARCH-12) is associated with Alex Ringhoffer, one of the early popularizers of the area that became Arches National Monument; his name is inscribed on a rock face near Tower Arch, which he discovered in 1923. The second site, the Denis Julien inscription (ARCH-19), dates from May 6, 1844, and is one of many small markings at a favored campsite for 19th century fur trappers, cowboys, and shepherds. The third site is a segment of the Old Spanish Trail (ARCH-23) that passed along the Bloody Mary Wash in the southwest corner of the park; in its heyday (1780 to 1840) the trail was the standard route between the nearby Colorado River crossing and the Green River crossing to the northwest. The fourth site is the caretaker's residence (ARCH-31) near the visitor center. Part of the rationale for its nomination is its association with the CCC work of the 1930s and its continued useful service as the headquarters for the Canyonlands Natural History Association. The building and grounds are being appropriately protected.

The regional historic preservation team has transmitted forms concerning nine other sites to the Utah state historic preservation officer for a determination of eligibility for nomination to the National Register. These sites include the Cordova cabin (ARCH-4, BLM management), the Willow Flat Dam (ARCH-5), the old entrance station (ARCH-9), the stone house in Salt Valley (ARCH-14), the Salt Valley Wash dugout (ARCH-17), the Courthouse Wash wall (ARCH-28), and the visitor center stone bridge (ARCH-29). At first it was thought that the stone bridge, which crosses Bloody Mary Wash, had a good chance for inclusion on the register, but further research revealed extensive modifications that have destroyed its historic integrity. Fifteen additional properties on the List of Classified Structures have been deemed ineligible for inclusion. These include troughs, corrals, abandoned roads, sign posts, inscriptions, mine shafts, and berms. There are

other cultural resources in the park, including capped wells, mines, cowboy camps, cabin sites, inscriptions, and old fence lines, that are not of any particular significance. Since there are fewer than 40 of these sites, it is clear that human occupation of Arches was as sparse during the historic period as it was in earlier times.

VISITOR USE

Regional Recreation Resources and Uses

The area containing Arches National Park is known as Utah's canyonlands and is bounded on the west by the Green River, Canyonlands National Park, and Glen Canyon National Recreation Area (see Vicinity map). It is a land of rugged, deeply eroded desert with occasional high, forested mountains providing a verdant contrast. The canyonlands area is a major attraction within the 900-mile Golden Circle of the Southwest that encompasses the Four Corners region of Utah, Arizona, New Mexico, and Colorado, and it offers a rich array of scenery and historic and prehistoric features. Places like Canyonlands National Park, Arches National Park, and Natural Bridges National Monument attest to the spectacular array of geologic features to be seen. Hovenweep National Monument, Newspaper Rock State Historical Monument, Edge of the Cedars State Historical Monument, and numerous other sites preserve the fragile evidence of the ways of the ancient Anasazi. Hole in the Rock Trail, the Spanish Trail, and other sites are reminders of the explorers and settlers of the 1800s.

Recreational opportunities in the canyonlands area include hiking, backpacking, four-wheel driving, snowmobiling, camping, horseback riding, power boating, river running, photography, and sightseeing. A wide variety of attractions satisfy most visitor expectations. Canyonlands, Arches' neighbor to the south, is a vast wilderness park with many miles of four-wheel-drive roads and wild sections of the Colorado and Green rivers available for river rafting. Dead Horse Point State Park, also nearby, offers dramatic scenic overlooks as well as a number of recreational facilities.

Arches National Park is one of the major visitor attractions in the canyonlands area. Its spectacular features – more than 650 stone arches and other unusual rock formations – and relatively easy access make it a destination for half a million people each year.

Park Use Patterns and Trends

Visitor Characteristics and Trip Patterns. Most of the visitors to the southeastern Utah parks are small family groups on vacation. The four most common visitor origins are Colorado, Utah, California, and foreign (primarily Germany). Approximately half of the visitors come from the Mountain and Pacific states, and most of these come from relatively nearby major metropolitan areas like Salt Lake City (235 miles) and Denver (368 miles).

The typical trip averages 20 days (one third take trips of three weeks or more); however, less than a week of this trip is spent in the region. Visitors stop at an average of three national parks while in the region.

Most visitors to Arches are enroute to other destinations on the Colorado Plateau. A visit to Arches National Park is a convenient side trip for people traveling US 191. Most

park visitors have planned their visits to Arches in advance. However, some are stimulated to visit the park because of the highway entrance sign and the adjacent park visitor center.

Almost all visitors travel to the park by private vehicle. A few arrive by tour bus, bicycle, or on foot. Interstate 70, a major east-west route, is 30 miles north of the park entrance. Moab and Green River have charter air service, but the nearest regularly scheduled commercial air service is in Grand Junction. Few park visitors use the passenger rail service available at Thompson Springs. Public bus service is available in several nearby towns, but schedules are inconvenient for park visitors. Visitors who need rental cars typically pick them up in Grand Junction or Salt Lake City.

Most visitors stay in Arches less than half a day, although some stay longer for extended hiking or camping. For reporting purposes, the park estimates the average visitor stay at three hours. A small portion of Arches visitors camp in the 53-unit campground; these visitors are assumed to stay an additional 24 hours for each night that they camp.

A visitor use study was conducted in 1978 by Davidson-Peterson Associates, Inc., at Arches, Canyonlands, and Capitol Reef national parks and Natural Bridges National Monument. Part of the study inventoried the activities of visitors in each of the areas. The principal activities of Arches visitors were viewing the arches and taking pictures. Slightly less than half the visitors hiked for an hour or more to see specific park features. The remaining visitors hiked for less than an hour or stayed near their automobiles. About 80 percent of visitors drove beyond the La Sal Mountains overlook, and 23 percent went to the end of the paved road at Devils Garden.

Use Levels. Arches receives approximately three times as many visitors as neighboring Canyonlands National Park. Following is the 1987 visitation for the five most popular scenic areas in the region:

468,916 visits	Arches National Park (no nonrecreation visits)
105,821 visits	Dead Horse Point State Park
80,104 visits	Island in the Sky (one district in Canyonlands National Park)
85,096 visits	Needles (another district in Canyonlands)
89,043 visits	Natural Bridges National Monument

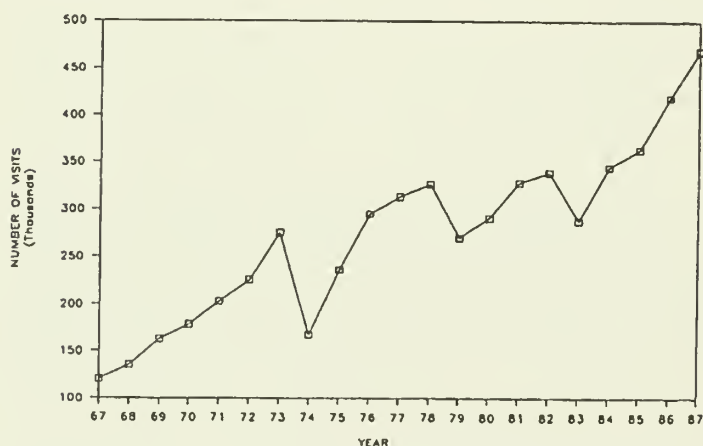
Since 1978, visitation to Arches has increased by 43 percent. This increase does not correlate closely with increases at neighboring parks having similar settings. For example, visitation increases from 1986 to 1987 for the five areas listed above are

12%	Arches National Park
3%	Dead Horse Point State Park
2%	Island in the Sky district of Canyonlands
1%	Needles district of Canyonlands
20%	Natural Bridges National Monument

One explanation for this variation in growth may be the difference in market segments tapped by each park. The increases at Arches and Natural Bridges probably reflect an increase in the number of visitors doing a rapid circuit of parks in southeastern Utah. Many visitors are on extended, but fast-paced visits to national parks in the area, and

they concentrate on parks like Arches and Natural Bridges, which can be seen on quick side trips from the main highways. Because Canyonlands and Dead Horse Point are more remote and farther from the highway, they attract more destination-oriented visitors.

Annual use—The following graph shows annual visitation to Arches during the past 20 years. It indicates four periods of rapid and steady growth. Each of these periods was preceded by a sharp drop, which typically reflects a decline in the economy or in fuel availability. We are now in a fourth growth period, which began in 1983. The present rate of increase is 43,600 visits per year, slightly higher than the growth spurt between 1974 and 1978.



Annual Visits, 1967-87 (In thousands)

This long-term pattern of growth and decline has resulted in a fairly constant growth rate of 13,700 visits per year. This growth is equivalent to 2.9 percent of the visitation actually recorded in 1987. If history repeats, the current rapid rate of growth will decrease within the next decade or so, resulting in a projected 716,000 visits (a 53 percent increase) by 2005.

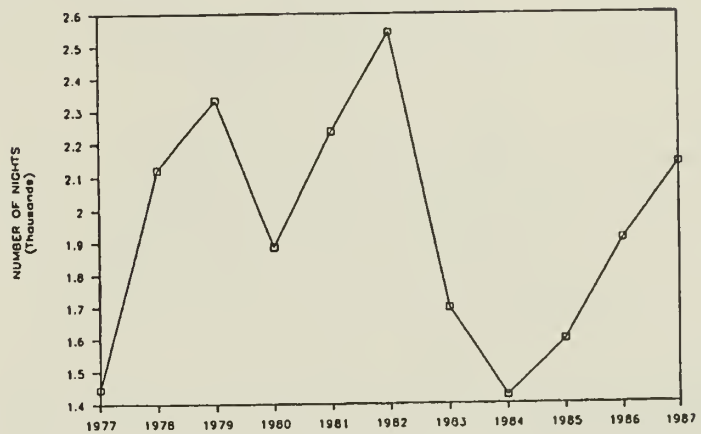
However, in the unlikely event that the present trend continued indefinitely, use would reach 1,254,000 (a 167% increase) by 2005.



Annual Campground Nights, 1977-87 (In thousands)

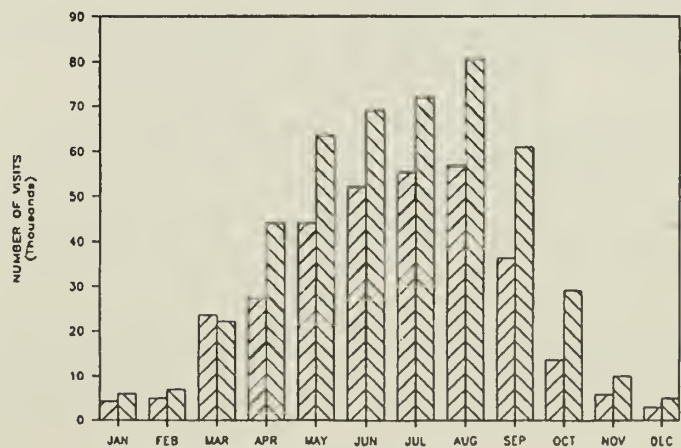
The 53-unit campground in the park has been filled to capacity during the peak season (May-August) in the last 10 years; therefore, summer camping use has not increased. However, overall campground use has increased because of additional camping during the off-season. If off-season increases continue, the campground will soon be at capacity in the spring and fall months.

Backcountry use has varied during the past 10 years, but there is little indication of long-term growth.

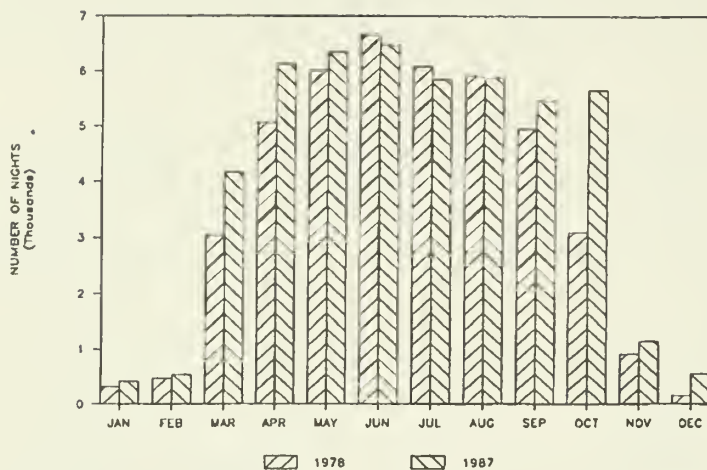


Annual Backcountry Nights, 1977-1987 (In thousands)

Monthly use—The peak visitor season traditionally runs from Easter weekend through Labor Day weekend. August is the peak month, followed closely by June and July. Recreation visits peak in the months of May through August. These four months accounted for 64 percent of the 1978 visitation and 70 percent of the 1987 visitation.



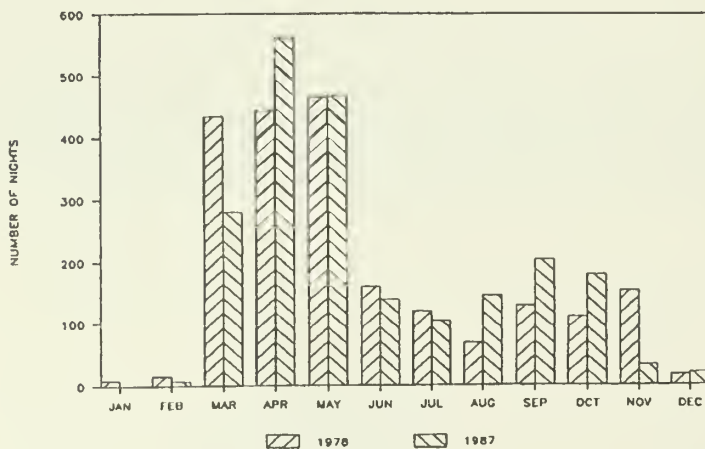
Visits per Month, 1978 and 1987 (In thousands)



Campground Nights per Month, 1978 and 1987 (in thousands)

The campground is filled most nights during the heavy use season from April through mid-October. This data appears to indicate that the peak season for campers is two months longer than the peak season for day users. However, it is more likely that these two groups have very similar seasonal fluctuations and that potential peak camper levels are not reflected because campground capacity limits use during that period.

Campground use has been spreading to the shoulder months. Summer use levels have not changed in 10 years, but off-season use has increased 34 percent. This growth rate should begin to taper off in the next few years as the campground begins to fill even in March and October.



Backcountry Nights per Month, 1978 and 1987 (in thousands)

Backcountry hiking and backpacking peaks in the spring when water sources are more reliable and temperatures are moderate. Summer temperatures in excess of 100 degrees and lack of water cause backcountry use to decrease dramatically during July and August. Use rebounds slightly in the fall, probably because of cooler temperatures.

Weekly and daily use—Visitation is fairly steady throughout the week except during holiday weekends (Easter, Memorial Day, and Labor Day). During the rest of the summer, weekend use is slightly below weekday use. August was the peak month in 1987, with use averaging 2,600 visits per day. The peak day usually occurs during Memorial Day weekend each year. In the summer, daily use is fairly constant from 10:00 a.m. until 6:00 p.m. During that time, approximately 300 vehicles will be in the park at any given time.

Expenditures. During the summer of 1978, visitors to the parks in the region spent an average of \$12 per person per day, primarily on gas and lodging. The Utah Travel Council estimates 1987 expenditures of approximately \$22 per person per day.

Visitor Programs and Services

The visitor center at the park entrance serves as the initial and principal visitor contact point for information and orientation. Within the visitor center is a 30-seat auditorium providing a 12-minute slide program, a museum area with 10 exhibits providing an overview of the origin and significance of park features, an information desk, a children's area, and a cooperating association sales exhibit.

During the peak season of May through August, there is one guided trip per day through Fiery Furnace, one to two other guided walks per day at various sites announced by the interpretive staff, and nightly campfire programs in the amphitheater at the Devils Garden campground.

Wayside exhibits and bulletin boards are located at the Moab fault pullout, South Park Avenue, La Sal Mountain viewpoint, Courthouse Towers, the Windows, Panorama Point, the Wolfe ranch, Fiery Furnace, Devils Garden, and Klondike Bluffs. The exhibits and bulletin boards are in fair to poor condition, and although they interpret site-specific topics, they do not convey a cohesive park story. The messages in some places interpret subjects that have no relationship to visible resources.

There are three self-guiding trail guides (Devils Garden, Desert Nature Trail at the visitor center, and the Wolfe ranch) and one auto tour guide for the features and pullouts along the main park road.

Six concession permittees operate at Arches National Park. Two concessioners provide both day and multiday horseback and pack trips (one conducted business in 1987). Three concessioners offer backcountry vehicle tours (two conducted business in 1987). The sixth concessioner began operating in May 1988 and offers guided car camping and day hiking.

Five commercial use licenses have been issued in Arches. Four of the licensees offer guided mountain bicycle tours (one conducted business in 1987). The fifth licensee offers special emphasis workshops, which include guided tours, backpacking and mountain bicycle tours, and interpretive programs.

No food or beverage services are offered at park headquarters because it is only 5 miles from Moab; and none are offered at Devils Garden campground because it is too small (53 sites) to be profitable to a concessioner.

FACILITY ANALYSIS

Roads

A full inventory and condition description of all park roads can be found in appendix D, "Road System Evaluation." Table 5 below provides a summary.

Trails

The park's trails and officially designated routes (marked by cairns) are generally short and lead to specific features along the road corridor. There are approximately 11 miles of such trails and routes, ranging from very well developed (Landscape Arch trail) to primitive (Fin Canyon). Cross-country hiking also occurs, usually along washes or other topographic features. Table 6 below lists the designated trails and routes and their condition.

Structures

Table 7 lists the park structures by area and rates their condition. Structure locations are shown on the site plan maps for individual areas.

Utilities

The locations, types, capacities, and conditions of utilities are listed in table 8. Most utility system locations are shown on the site plan maps for individual areas.

Table 5: Existing Park Roads

<u>Name and Location</u>	<u>Length In Miles</u>			<u>Condition</u>
	<u>dirt</u>	<u>gravel</u>	<u>paved</u>	
North-south highway				Good-fair
US 191 to Devils Garden			17.5	Pavement cracking and poor drainage in places; shoulders narrow with dirt surface only and breaking off at Whoa Hill area; otherwise in good condition
Windows Road				Good
Main park road to Windows parking area			2.1	Pavement cracking and poor drainage in places; shoulders narrow with dirt surface only; otherwise in good condition
Delicate Arch road				Poor
Main park road to Delicate Arch viewpoint parking area	2.6 (graded)			Road dusty, washboarded, narrow, winding, and poorly drained in places; three wash crossings sometimes muddy or flooded; second crossing impassable to buses and large RVs
Salt Valley road				Poor
Main park road to northwest boundary	9.1 (graded)			2 miles in wash channel; road narrow, washboarded, dusty, winding, poorly drained, and recessed below ground level in places
Klondike road				
Klondike Bluffs to Willow Flats road	11.3 (4WD)			four-wheel-drive road requiring little maintenance; some off-road travel evident
Willow Flats road				
Main park road to west boundary	4.0 (4WD)			four-wheel-drive road requiring little maintenance

Table 6: Existing Trails and Designated Routes

<u>Name and Location</u>	<u>Approximate Length (miles)</u>	<u>Class*</u>	<u>Condition</u>
Park Avenue to Courthouse Towers	1.2	D/E	Treadway erosion at beginning where trail is steep; otherwise good
Windows (includes Double Arch)	1.0	C	Poor—some trails not well defined; considerable shortcutting and overwidening of treadway
Wolfe ranch	0.3	B	Good—trail margin and surface well defined
Petroglyphs (Wolfe ranch)	0.1	--	Random undesignated routes only
Delicate Arch (Wolfe ranch)	1.5	C/D	Good—trail margin and surface well defined
Delicate Arch viewpoint	0.5	B/C/D	First part of trail good; a short portion up a steep clay bank poorly drained, resulting in trail erosion
Sand Dune Arch and Broken Arch to Devils Garden campground	1	C/D	Good
Landscape Arch, Tunnel Arch, Pine Tree Arch (Devils Garden)	1.3	B	Excellent—trail margin and surface well defined
Landscape Arch to Dark Angel (Devils Garden)	1.3	D	Good—in some places drainage runs down the middle of the trail, resulting in erosion
Fin Canyon (Devils Garden)	1.3	E	Good—difficult to find in places
Tower Arch (Klondike Bluffs)	1.5	D	Good
Total	11.0		

*A – all-visitor-accessible trail

B – primary trail

C – secondary trail/designated route

D – semiprimitive designated route

E – primitive designated route

See appendix E for a further description of trail/route classes.

Table 7: Existing Structures

<u>Area</u>	<u>Structure</u>	<u>Function</u>	<u>Condition</u>
Park Headquarters	– visitor center and offices	– visitor use and administration	fair
	– entrance station	– visitor orientation and fee collection	good
	– caretaker's residence ¹	– Canyonlands Natural History Association offices	fair
	– library	– converted residence; houses park library and museum collection	fair
	– apartment building ³	– 4 employee residences	good
	– 4 houses (one house) ³	– employee residences	good
	– maintenance building	– shops, storage, water treatment	good
Balanced Rock	– 1 vault toilet at picnic area		good
Windows	– 2 vault toilets at trailhead; handicap-accessible		excellent
Wolfe Ranch	– Wolfe cabin ^{2,3}	– visitor interpretation; historic preservation	fair
	– root cellar ^{2,3}	– visitor interpretation; historic preservation	fair
	– corrals ^{2,3}	– visitor interpretation; historic preservation	fair
	– 2 vault toilets at trailhead		good
Fiery Furnace	– 2 vault toilets at trailhead		good
Devils Garden	– trailer	– ranger residence and visitor contact station	poor
	– generator building	– houses generators and chlorinator	good
	– 3 vault toilets at trailhead, picnic area, and campground		good
	– 3 comfort stations at campground		fair
	– air quality monitoring station		excellent

¹Structure on park's List of Classified Structure

²Structure within district listed on the National Register of Historic Places

³Structure in 100-year floodplain

Table 8: Existing Utilities

<u>Area</u>	<u>Type</u>	<u>Capacity</u>	<u>Condition</u>
Park headquarters	water	primary and secondary wells; 50,000-gal. storage tank	adequate; lines within 100-year floodplain
Devils Garden	sewer	4 septic tank and leachfield systems	adequate for present use; within 100- or 500-year floodplain
	telephone	commercial	inadequate
	power	commercial	adequate; lines within 100-year floodplain
	water	well; 30,000-gal. storage tank	adequate
	sewer	3 septic tank and leachfield systems for trailer and 3 comfort stations	adequate
	power	on-site generator	adequate

ENVIRONMENTAL CONSEQUENCES

PREFERRED ALTERNATIVE (PROPOSED GENERAL MANAGEMENT PLAN)

The proposal would meet needs for life safety and visitor orientation and would improve public facilities, such as the visitor center, parking areas, trailheads, viewpoints, and picnic areas. Improved facilities would enhance visitors' opportunities to learn about and enjoy park resources while at the same time mitigating natural resource impacts and social effects of crowding. The incremental effects of the proposal and the alternatives are summarized and compared in table 11. The cumulative effects of the proposal would not exceed the incremental effects when added to other past, present, and foreseeable future actions.

Impacts on the Natural Environment

Geology/Soils/Vegetation. Construction of the proposed facilities would result in a total of 160.8 acres of impermeable or heavily compacted surface in Arches National Park, compared to the existing 158.2 acres, a net increase of 2.6 acres. The disturbed area would constitute 0.22 percent of the total park acreage. Temporary surface disturbance caused by installation of utilities would affect an additional 2.6 acres. Removal of facilities and revegetation would restore 2.9 acres of existing impermeable or heavily compacted surfaces. See table 9, "Surface Disturbance Summary" for development disturbance acreages by site. The kinds of impacts that would occur are described below.

Realignment of roads and construction of buildings, parking areas, turnouts, trails, trailheads, and picnic areas would result in permanent removal of vegetation and topsoil, changes in site topography as a result of excavating or adding fill material, and introduction of impermeable surfaces, such as buildings or pavement, or semipermeable surfaces, such as compacted dirt/gravel material. Vegetation would be permanently excluded from these modified sites. No geologic features would be affected, and excavation of bedrock would be avoided where feasible. No blasting would occur (slopes would be filled, rather than cut) in the sensitive area of Balanced Rock. Impermeable and semipermeable surfaces would concentrate and divert precipitation runoff into adjacent drainages, causing local changes in plant species and vegetative growth and productivity.

Excavation for underground utility lines and construction of underground sewage drain fields would temporarily disturb soil and vegetation in developed areas. After construction, the disturbed surface would be restored to its natural grade and seeded with native plant species. Underground sewage drain fields would increase subsurface soil moisture, which might increase the density of plant growth and favor different plant species in localized areas. Removal of some facilities would also temporarily disturb soil and vegetation; eventually, however, the reclaimed sites would be returned to the original contour and native plant composition.

Careful construction supervision and delineation of construction sites would minimize the disturbed area adjacent to new facilities. Reclamation of disturbed areas around construction sites, sites where facilities were removed, and areas of temporary disturbance would be funded as part of the construction. Reclamation would follow a

plan developed by the National Park Service and generally consist of regrading and planting native species, with follow-up treatments of seeding and control of nonnative volunteer plants as necessary. Due to the arid climate and the competitive nature of nonnative vegetation, revegetation by native plants might be difficult to manage and might require follow-up treatments.

Soil and vegetation at Arches are generally very susceptible to damage by trampling from unplanned foot traffic at areas of concentrated visitor use, such as parking areas, scenic overlooks, public buildings, campgrounds, picnic sites, and trails. Under the preferred alternative, parking capacity would generally be used as a means of controlling visitor use and associated impacts. Parking areas would initially be increased to accommodate existing average summer weekend demand, and barriers such as curbing would be built to prevent overflow parking. Subsequent expansion of parking to accommodate additional use would occur only if a monitoring program demonstrated that it could be accomplished without unacceptable impacts on resource values and visitor experiences. Mitigation to reduce vegetation damage would include new and better marked trails, barriers such as low fencing, and educational messages encouraging people to stay on trails. Shortcut trails, which are particularly numerous at Fiery Furnace and the Wolfe ranch petroglyph panel, would be obliterated, and vegetation and soil would be reclaimed.

Impacts on soil and vegetation in remote backcountry areas might increase if cross-country hiking and backcountry camping increased. Impacts at popular sites would be monitored and managed according to the *Backcountry Management Plan* (NPS 1988c).

Impacts on soil and vegetation from recreational use along the Colorado River would be studied and management actions developed if necessary.

A boundary adjustment along US 191 would prevent disturbance of soil and vegetation by potential construction on lands adjacent to the park. Several abandoned portions of the old road would be removed and restored to natural conditions.

Wilderness protection of Lost Spring Canyon under BLM administration would prevent soil and vegetation damage from off-road-vehicle use and oil and gas drilling. Livestock grazing would continue, with some disturbance to soil and palatable vegetation such as grasses. Hiking and backpacking would increase and cause some visible increase in trails and damage to vegetation around campsites. Addition of Lost Spring Canyon to Arches National Park would result in phasing out of grazing and a return to more natural vegetation. Hiking and backpacking would also increase. Backpacking would be managed under the park permit system to avoid unacceptable impacts on soil and vegetation.

Wildlife. Disturbance of soil and vegetation from construction of facilities would result in a loss of 2.3 acres of habitat for ground-dwelling invertebrates and rodents, with no significant effect on parkwide populations. Larger mammals and birds would not be significantly affected because of the dispersed distribution of construction sites and their proximity to existing facilities.

Improved understanding of raptor populations and nesting would provide information necessary to prevent or reduce potential disturbance by hikers at Klondike Bluffs and elsewhere.

Table 9: Surface Disturbance Summary, Preferred Alternative

	Impervious and Compacted Soil/Gravel Surfaces			Temporarily Disturbed Surfaces		
	Existing	New Disturbance	Restoration	Existing	New Disturbance	Total
Park headquarters	5.4	1.1	0.4	4.3	1.4	5.7
Balanced Rock	0.4	0.7	0.3	0	0	0
Windows	3.1	0.5	0.1	0	0	0
Delicate Arch road	9.5	0	0.6	0	0	0
Delicate Arch viewpoint	0.5	0.8	0.3	0	0	0
Wolfe ranch	1.4	0.4	0.3	0	0	0
Sand Dune Arch trailhead	0.5	1.1	0.2	0	0	0
Devils Garden trailhead	4.9	0.5	0.1	0.9	0.6	1.5
Devils Garden campground	3.7	0.3	0	1.4	0.6	2.0
Other (main road, dirt roads, trails, turnouts)	<u>128.8</u>	<u>0.7</u>	<u>1.2</u>	<u>0</u>	<u>0</u>	<u>0</u>
Totals	158.2	5.5	2.9	6.6	2.6	9.2

If Lost Spring Canyon was designated BLM wilderness, the area would remain open to hunting and trapping, with legal taking of deer and possibly coyote, bobcat, and mountain lion under applicable state regulations. If the area was added to Arches National Park, hunting and trapping would be prohibited.

Threatened and Endangered Species. Construction sites would be surveyed prior to disturbance for the presence of threatened, endangered, or sensitive plants. None of these listed plants are known to occupy the proposed sites. If endangered plants were found as a result of preconstruction surveys, mitigation would be undertaken in consultation with the U.S. Fish and Wildlife Service.

No adverse effects on endangered fish or birds would result from facility construction. Effects of increased visitation would be monitored over the life of the plan. Understanding the populations of endangered plants and animals would be improved with additional monitoring and research, as outlined in the resource management program.

Water Resources. Construction of three bridges in the vicinity of the Wolfe ranch, to replace low-water crossings of Salt Valley Wash, Salt Wash, and Cache Valley Wash, would result in temporary increased stream sedimentation during construction. This would not be significant compared to the normal high sediment loads of these streams.

Demand for domestic water from the developed wells would increase with visitation, but no overall adverse environmental effect would be expected. Backcountry springs might be used more by increasing numbers of hikers; however, water quality and surrounding vegetation and wildlife habitat would continue to be monitored, and appropriate mitigation would be implemented to eliminate or avoid adverse effects, as prescribed in the *Backcountry Management Plan* (NPS 1988c). There would be no new impacts on the park's water rights.

None of the streams in the park have been classified by the state of Utah for the purpose of habitat preservation or recreation. However, because of the presence of threatened and endangered fish species at the mouths of Salt and Courthouse washes, there is potential for the state to classify these waters to protect habitat in the future.

Floodplains. Development actions in the headquarters area would comply with NPS final procedures for implementing Executive Order 11988, "Floodplain Management" (NPS 1982). There would be no additional adverse effects on the natural or beneficial values of floodplains or on the natural regime of flooding downstream. The proposed new visitor center site is above the 500-year floodplain.

Existing noncomplying "critical actions" within the 500-year floodplain would be corrected. Fuel storage and toxic material storage in the maintenance area, which is within the 500-year floodplain, would be floodproofed. The storage of display-quality museum collections and library archival materials would be moved to a new building above the 500-year floodplain.

Raising the elevation of the entrance road between the bridge and headquarters would reduce the flooding potential in the development and decrease the chance of isolation of the headquarters and the rest of the park from US 191 in the event of a major flood. Park roads are excepted from Executive Order 11988; however, an Army Corps of Engineers 404 permit might be necessary prior to adding fill material to raise the road. A stream channel alteration permit from the Utah Water Rights Division would also be

necessary. No other state permits would be required. The berming effect of raising the road and increasing the road culvert capacity would decrease the flood hazard to the employee apartment building, residence 3, the administration building, the CNHA offices, and the library. The addition of culverts under the park entrance road would reduce ponding by the existing road fill during flooding and help restore natural streamflow downstream from the road. The proposed action would not significantly affect the natural and beneficial values of the floodplain. No structures downstream would be adversely affected. The proposed action would not support additional floodplain development.

The proposed parking expansion at the Wolfe ranch and diversion of drainage around the parking area by a ditch and berm would not significantly affect the natural or beneficial values of the floodplain. An Army Corps of Engineers 404 permit might be required prior to addition of fill to construct a berm.

Other management actions and boundary adjustments proposed in the preferred alternative would have no effect on park floodplains.

Wetlands. No facility sites or actions would be located in or affect wetlands.

Air Quality. Effects on air quality would be localized and temporary, including dust and equipment exhaust fumes generated during construction of buildings, roads, and parking lots. This would have no significant effect on air quality values of the park. No state or federal air quality standards would be violated.

Motor vehicle emissions would increase with increased vehicle traffic; however, emissions would not be expected to be significant during the next 10-20 years.

Visual Quality. Construction of buildings, roads, and parking areas would have the potential of reducing the visual quality of the park. To mitigate the visual intrusion, the new visitor center and parking area would be designed for architectural compatibility with the natural setting. Existing buildings at headquarters would be modified with new siding to complete a common architectural motif compatible with the visitor center. The expanded parking areas at Balanced Rock, the Devils Garden trailhead, the Sand Dune Arch trailhead, and the Wolfe ranch, and the relocated parking area at the Delicate Arch viewpoint, would be carefully designed to minimize the visual impact of parked cars. Redesign to physically separate the new parking lot at Balanced Rock from the main road would shift the parking lot slightly closer to Balanced Rock than it is at present; however, the additional encroachment would probably not be perceptible to most visitors. Relocation of the Delicate Arch viewpoint parking would remove it from the sight of people hiking up to the arch. The realigned portion of the Cache Valley access road would replace an existing road segment and would have a dirt surface that would be barely visible from Delicate Arch.

Moving the toilet at the Wolfe ranch would reduce a visual intrusion on the historic ranch buildings.

The barriers built to protect the Moab rock art panel and the petroglyphs near the Wolfe ranch would be designed to blend with the surrounding landscape and to allow clear viewing.

Adjusting the boundary along US 191 to coincide with the Utah Department of Transportation right-of-way and obtaining title to the inholdings would prevent potential visual impairment from roadside development on the park side of the highway.

Action to mitigate the visual impacts of oil, gas, or mineral development on BLM-administered land outside the park on Dry Mesa and in Cache Valley would minimize potential intrusions on the distant landscapes viewed from the park. The National Park Service would pursue a memorandum of understanding with the Bureau of Land Management regarding planning and program coordination relating to mineral issues to help mitigate visual impacts.

Wilderness. Modification of the Delicate Arch viewpoint and road would allow for the revegetation of the existing viewpoint spur road and extension of wilderness protection to 55 acres adjacent to the road. This would increase protection of the landscape in the park visible from Delicate Arch.

Twenty-six acres currently recommended for wilderness protection would have to be removed from the wilderness recommendation to allow for implementation of proposals to realign the Cache Valley access road and construct the Double Arch handicap-accessible trail.

The Double Arch handicap-accessible trail would require some additional vegetation disturbance compared to the existing trail and would be of a standard that would require mechanized equipment for construction. The net change to the park wilderness recommendation would be an additional 29 acres.

Impacts on the Cultural Environment

All proposed actions would comply with section 106 of the 1966 National Historic Preservation Act as amended (16 USC 470 et seq.) and implementing federal regulations. This compliance would be accomplished in accordance with the programmatic memorandum of agreement between the Advisory Council on Historic Preservation, the National Conference of State Historic Preservation Officers, and the National Park Service.

Museum Collections. The park museum collection, including objects from Arches, Canyonlands, and Natural Bridges, would be protected and preserved at a higher standard. The new collection storage building at the headquarters area would be outside the probable maximum floodplain and would have security and environmental controls to meet all curatorial standards. In addition to protecting the collections from fire, theft, and flood, such improvements would ensure compliance with the law, increased longevity, better accountability, and orderly retrieval of materials in the various collections.

Archeological Resources. Public use of campgrounds, picnic areas, trails, and interpretive sites would affect nearby archeological resources. Easily accessible resources would be vulnerable to surface disturbance and theft. New trails, such as to lower Courthouse Wash, would increase the likelihood of archeological sites being disturbed. Resources in backcountry areas would be vulnerable to inadvertent or deliberate disturbance, the latter including digging and collecting archeological material and defacing rock art panels. Vandalism of rock art panels would include scratching, chipping, or simply touching them, which adds oil that hastens their deterioration.

Ongoing vandalism and inadvertent damage to known archeological resources would be mitigated by initiating on-site patrols and interpretation by rangers, educating visitors about the value and protection of these resources, and monitoring to detect vandalism, illegal collection, and other deterioration.

The Moab panel and the Ute petroglyphs near the Wolfe ranch would be further protected by the installation of metal barriers in front of these panels. The barriers would be designed to be as unobtrusive as possible; however, they would degrade the integrity of the setting of these cultural resources. The Bureau of Land Management, Forest Service, and National Park Service are currently engaged in a study to identify ways of protecting and interpreting rock art sites throughout Utah. Any additional protective measures resulting from the study would be applied at Arches.

Areas of known concentrations of cultural resources would be avoided as construction sites; however, construction of buildings (including toilets), bridges, campgrounds, picnic areas, dump stations, sewage facilities, leachfields, parking areas, trailheads, trails, and roads could destroy unknown archeological resources. Construction activities would disturb and compact soils, which could alter the horizontal and vertical distribution of buried archeological remains, thereby damaging artifacts and the contextual environment of sites. The vast majority of discovered sites have been in the vicinity of the established roads in Arches. Prior to any proposed earth-disturbing activities, a professional archeologist would inspect the ground surface for prehistoric or historic remains. If any previously unrecorded resources were located, evaluation of significance and additional investigations would be completed and mitigations prescribed before the actions began. Similarly, in areas where subsurface remains are likely, an archeologist would monitor construction activities. Where feasible, trail and road alignments would be shifted to avoid archeological resources; otherwise, sampling/collecting/testing procedures would be followed.

The Cordova cabin ruin in Lost Spring Canyon, a historic archeological site, is currently managed by the Bureau of Land Management in accordance with the provisions of the National Historic Preservation Act. If the cabin was included within the boundaries of Arches National Park, it would be subject to the same legal protection under NPS management as it is under BLM management.

Historic Resources. The Wolfe cabin and root cellar would be protected from further deterioration through a program of preservation maintenance. However, the structures would remain susceptible to flooding, which could result in the irretrievable loss of these resources. The new road bridges would be located and designed so as not to increase the impact of floods on the Wolfe Ranch Historic District.

Expanding the Wolfe ranch/Delicate Arch trailhead parking area to the north would not create a greater visual intrusion on the scene than is already present. Designing the new parking area to blend with the historic scene would minimize the visual impact. Relocating the toilets, installing new interpretive exhibits, and formalizing the trail to the petroglyphs would not create any new visual problems.

Impacts on Visitors

The preferred alternative would enhance existing uses by upgrading roads, trails, signs, and wayside exhibits; by redesigning or constructing facilities to support established activities; and by adding handicap-accessible facilities. Recreation would remain generally the same as it is today, but the problems identified during planning would be solved, and visitors would more efficiently and enjoyably experience the park's features. Road and parking improvements would reduce safety hazards and relieve most traffic congestion and confusion. Improved exhibits, brochures, and information at the new visitor center would assure visitors of the opportunity to choose from a variety of recreational activities to enjoy the park resources.

Interpretation would be vastly improved with a new visitor center, new wayside exhibits, and new publications. While park resources would continue to tell their own story in the sense of beauty and visual impact, the improved interpretive program would provide an interesting and holistic story to answer the "how" and "why" of park resources.

Main Park Road. Retaining the existing road width and standard might eventually result in increased congestion as visitation increased, but not within the life of this general management plan.

Heavy equipment for mineral exploration, such as mobile drill rigs or semitrailers, might continue to use park roads for access to federal mineral leases outside the park. Such access is allowed under special use permits where park roads provide the only access, such as to Cache Valley and Dry Mesa. The potential for conflict with visitor traffic would be reduced by stipulating use periods and other controls in the permits. Heavy equipment traffic would cause short-term noise and visual impacts along the park road.

Headquarters. The redesign of the headquarters area would relieve congestion and confusion and allow visitors to stop at the visitor center and obtain information before having to pay to enter the park. The new visitor center and exhibits would enhance visitor understanding of park resources by presenting a unified view of the park story and its relationship to the region. Exhibits and slide shows would arouse the curiosity of visitors to the extent that they would have to see the park for themselves. The outdoor information exhibits would allow visitors to obtain basic information when the visitor center was closed. Handicapped visitors would have barrier-free access to the restrooms and the visitor center. Establishment of an architectural theme common to all buildings would result in a more pleasing and consistent appearance of all the structures in the headquarters area. Berms and an early warning system would reduce the risk to life and property in the event of flooding at the headquarters area.

Park Avenue. Changing the name of South Park Avenue to Park Avenue would eliminate confusion, since there is no North Park Avenue. New signing and improvement of handicapped access would provide new opportunities for more visitors to enjoy this grandiose view and learn about the geologic processes that shape the Arches landscape.

La Sal Mountain Viewpoint. The La Sal Mountain viewpoint would provide the opportunity for visitors to learn the names of the many skyline features that are of interest to most visitors. Improved handicap accessibility would make the viewpoint available to most visitors. The new marked trail to the canyons of lower Courthouse Wash would provide a new opportunity for visitors to explore canyons typical of the park. Guided walks here would relieve some of the pressure on Fiery Furnace.

Courthouse Towers. A crosswalk at Courthouse Towers would improve safety for visitors crossing the road to or from the Park Avenue trail. Signs and interpretive exhibits would focus visitors' attention on some key stories such as the evolution of arches through the development of tiny holes to the point of total collapse.

Balanced Rock. Parking expansion at Balanced Rock would improve safety and accommodate off-season use, but during the peak season most visitors would not be able to find parking and would have to bypass this stop or come back later. The new handicap-accessible viewpoint trail would provide a new and unique perspective of Balanced Rock that most visitors have been unable to see before. Interpretation would help impress visitors with the dynamic qualities of geologic processes. Relocating the picnic area away from the main road would provide visitors a quieter experience. They would have an excellent view of Balanced Rock as well as the valley to the north from the new picnic area.

Garden of Eden. Dropping the name Garden of Eden in favor of simply labeling this stop a viewpoint might prevent visitors from having unwarranted expectations for this site and thus being disappointed.

The Windows. Providing handicap-accessible facilities and trails at the Windows would give visitors of all abilities the best opportunity possible to see an arch at close range and to be impressed by the immensity of a stone arch in a way that cannot be achieved by viewing from afar. Trails and signs in the Windows area would give visitors the opportunity to see that each arch is unique in its shape, evolution, and setting.

Panorama Point. Through on-site interpretation visitors would gain a clear understanding of the geologic processes that have formed Salt Valley and have led to the formation of fins and arches along the flanks of the Salt Valley anticline. There would be virtually no impact on visitor use as a result of eliminating the existing Salt Valley overlook.

Wolf Ranch/Delicate Arch Trailhead. Bridges and an early warning system would reduce the flood hazard along the Delicate Arch road. Paving the Delicate Arch road would ensure more reliable and dust-free access for all vehicles and probably result in increased traffic and possibly more people on the trails in the vicinity of Delicate Arch and the Wolfe ranch. The experience of driving to the Wolfe ranch and Delicate Arch viewpoint would be changed to a less primitive, lower risk activity with improved safety. The upgraded road might enhance some visitors' enjoyment and detract from others' enjoyment. Once the viewpoint access road and parking were relocated, visitors who hiked to Delicate Arch would no longer see vehicles in their distant view from the arch.

Parking improvements at the Wolfe ranch would relieve congestion and confusion and improve circulation. Defining the trail to the petroglyphs and erecting a protective barrier might make visitors more appreciative of the need to protect the petroglyphs.

Delicate Arch Viewpoint. The relocated Delicate Arch viewpoint would provide visitors with a more distant view of Delicate Arch, but they would be able to see much more sky beneath the span than is possible from the present viewpoint. Visitors would have to walk about 100 feet from the parking area to the first view of the arch instead of being able to see the arch directly from their vehicles. However, visitors who hiked to Delicate Arch would no longer see vehicles from beneath the arch.

Fiery Furnace. Defining the trail and appropriate signing in the vicinity of the Fiery Furnace parking area would encourage visitors to be more aware of resource damage caused by shortcutting and to avoid this activity. The proposal for limiting the number of visitors on larger numbers of guided walks would result in a more pleasant and meaningful experience and would fulfill the purpose of teaching safety and providing a feeling of unrushed exploration in a wilderness of rock. Those who were turned away from a particular walk might feel disappointed; however, this impact would be mitigated by new opportunities for additional walks over the course of the day.

Sand Dune Arch Trailhead. Parking improvements at the Sand Dune Arch trailhead would significantly reduce the safety hazards of vehicles backing out onto the main road. The parking area would be designed to accommodate visitors beginning their hike to Lost Spring Canyon.

Devils Garden. Road and parking improvements at the Devils Garden trailhead would reduce congestion and confusion, especially during times of peak use. However, there could also be increased frustration when visitors found they could no longer park along the side of the road when the parking lot was full. New toilets and a soundproofing structure for the generators would reduce the present intrusion of these facilities.

The clustering of a visitor contact station, dump station, campground host site, and ranger residences at the campground intersection would improve the ability of the National Park Service to serve visitors trying to obtain information or emergency assistance.

The addition of ten walk-in campsites would have little effect on reducing camping demand but would offer increased opportunities to tent campers. Camping at Devils Garden offers a special experience in being able to camp among the rock formations interspersed with pinyons and junipers. Visitors unable to camp here would miss this opportunity and would probably be disappointed at having to go to campgrounds outside the park. The redesigned and reoriented amphitheater would provide an excellent view of Skyline Arch and the La Sal Mountains and lead to more impressive evening programs. There would be adequate seating for all visitors, regardless of physical abilities.

Moab Panel. Providing access and interpretation at the Moab rock art panel would increase the use of this area. Many visitors who previously did not know about this panel would have the opportunity to see this excellent example of Barrier Canyon style rock art. Along with interpretation and a protective barrier, the presence of more visitors might help deter vandalism to this important resource. The protective barrier might detract from the enjoyment of some visitors.

Expanding the boundary in Moab Canyon to follow the road would eliminate any threat of incompatible roadside uses and ensure perpetuation of a relatively undisturbed view into the park by travelers along US 191. Adding Lost Spring Canyon to the park would increase the opportunities for backcountry exploration in a remote and scenic canyon network containing arches and cultural resources.

Impacts on Park Management and Operations

The improvements to the Delicate Arch road would eliminate a considerable part of the maintenance needs including annual grading as well as the frequent patrols necessary for emergency closures.

The parking improvements and roadside barriers would probably result in less "policing" activity because of illegal parking, thus allowing ranger personnel more time for positive visitor services.

Adding new marked routes to Lost Spring Canyon and lower Courthouse Wash would require additional backcountry patrol.

Providing new handicapped accessible facilities throughout the park would require additional maintenance to assure that they remain accessible and safe.

Implementation of the Visitor Impact Management program would require additional staffing to monitor resources and administer contracts to conduct visitor surveys.

Adding a new visitor center, flood protection measures, and a new sewage treatment system at headquarters would require additional maintenance and maintenance staffing. Additional interpretive staffing would be required to operate the new visitor center. Using the existing visitor center for administrative offices would facilitate operations by eliminating the overcrowded condition currently endured.

Adding a marked route to lower Courthouse Wash would require additional interpretive staff for guided trips. Additional interpretive staffing would be required to conduct four Fiery Furnace walks per day.

Relocating maintenance materials storage away from the Balanced Rock area would result in greater driving distances and government cost for maintenance staff between work sites and the new materials/mixing area outside the park.

Additional facilities at the Windows would require additional maintenance work, such as pumping vault toilets and making sure that all handicap facilities remained functional.

Closing the Salt Valley overlook would eliminate the need for maintenance and patrol at this site.

Devils Garden personnel would gain much improved housing including more space and privacy. The well-placed presence of a campground host would free the staff from routine questions and allow more time for interpretation and patrol. The new dump station, flush toilets, and water storage system would require additional maintenance. The new amphitheater facility would provide greater security from vandalism and theft of government audiovisual equipment.

Impacts on BLM Management Operations

Transfer from the Bureau of Land Management to the National Park Service of the two sliver-shaped, approximately 5-acre tracts of land between US 191 and the southwest park boundary would not significantly reduce the multiple-use resource base or increase management costs of the Bureau of Land Management.

Wilderness designation of the Lost Spring Canyon area would eventually reduce the acreage of land open to mineral leasing, with minor loss of revenue to the U.S. government. Grazing could continue under wilderness designation. Hiking use would increase, but most hikers would probably begin in the park, where the National Park Service would provide trailhead parking and trail access to the park boundary at the canyon edge. Trail construction would be unnecessary on BLM land because the open streambed terrain would be suitable for hiking. Recreational use would result in a minimal increase in management costs for the Bureau of Land Management.

If the Lost Spring Canyon wilderness study area was deleted from wilderness consideration, the National Park Service would propose that 2,882 acres be added to Arches National Park. All but a small portion of this land (part of one section owned by the state of Utah) is currently administered by the Bureau of Land Management. If this land was added to the park, the multiple use resource base of the Bureau of Land Management would be reduced by approximately 2,500 acres. There would be a minor reduction in revenue to the U.S. government when grazing and mineral leases expired.

Management to reduce surface disturbance in portions of Cache Valley, Dry Mesa, and other adjacent lands that are visible from viewpoints in the park would require coordination between the Bureau of Land Management and the National Park Service. Surface protection might require more restrictive surface occupancy stipulations in mineral leases on BLM lands to avoid construction of roads, drill pads, or other features that would intrude on the park's scenic vistas.

Impacts on the Socioeconomic Environment

The major impact of the park on the local socioeconomic environment is the expenditures by park visitors. None of the alternatives would affect either the number of visitors or their per capita expenditures. A second impact is the number of people employed by the park and the expenditures they make locally. This alternative projects the equivalent of 31.4 full-time employees, an increase of 14.1 over the no-action alternative. A third economic impact is the expenditure of funds by the park for supplies. This alternative projects annual expenditure for supplies to increase approximately 82 percent over the no-action alternative. However, a significant portion of this expenditure would be made to firms outside the local area. A fourth impact is the expenditure of funds for construction. This alternative proposes \$14,055,700 in construction. Dollar for dollar, construction expenditures benefit the local economy far less than the three categories of expenditures identified above. The low bidder on many of the projects would be from outside the local area. A relatively small portion of the total construction costs would flow through the local economy. The benefit of such funds would be further reduced because these dollars would not have the relatively stable flow of the expenditure types discussed earlier. However, construction would definitely create short-term jobs and benefit local firms.

NO-ACTION ALTERNATIVE

The no-action alternative would continue existing facilities and management, but it would not meet life safety needs or adequately accommodate visitor use at facilities such as the visitor center, parking areas, trailheads, and viewpoints. Crowding, vegetation impacts, and reduction of visitor enjoyment would likely result. The cumulative effects of

the no-action alternative would not exceed the incremental effects when added to other past, present, and foreseeable future actions.

Impacts on the Natural Environment

Geology/Soils/Vegetation. Existing use, maintenance, and management of facilities such as roads, parking areas, picnic and camping areas, buildings, and underground utility systems would result in minor continuing disturbance of adjacent soil and vegetation. Existing facilities consist of 89.1 acres of impermeable surfaces and 69.1 acres of compacted dirt/gravel surfaces.

Overflow parking at trailheads would continue to destroy vegetation and compact soils over increasingly larger areas adjacent to the roads and parking lots. As visitation increased, undirected foot traffic would trample soil and vegetation adjacent to parking lots, buildings, and trails. Multiple trails would remain at the Windows, Fiery Furnace, and the petroglyphs near the Wolfe ranch. Limited use monitoring and impact mitigation work would be continued, depending on year-to-year resource management funding.

Overflow parking at trailheads would continue to destroy vegetation and compact soils over increasingly larger areas adjacent to the roads and parking lots. As visitation increased, undirected foot traffic would trample greater and greater amounts of soil and vegetation adjacent to parking lots, buildings, and trails. Multiple trails would remain at the Windows, Fiery Furnace, the petroglyphs near Wolfe Ranch, and the Moab rock art panel. Limited use monitoring and impact mitigation work would be continued, depending on year-to-year resource management funding.

Existing uses of land between the park boundary and US 191 would not result in any new disturbance of soil or vegetation. However, the potential would exist for development, which would result in the destruction of vegetation and compaction of soil.

The management of Lost Spring Canyon as a BLM wilderness study area or as wilderness would prohibit off-road vehicle use; however grazing would be permitted. Grazing would continue to damage vegetation and reduce water quality. No limitation would be placed on backpacker use in the foreseeable future, and increasing numbers of hikers and backpackers would compact and erode soil and trample vegetation to the extent that these impacts would become visible. If the Lost Spring Canyon area was deleted from the wilderness recommendation and returned to multiple use management, off-road vehicle use would be permitted and would disturb soil and vegetation. Also, oil, gas, or other mineral development might occur, with attendant road and drill-pad construction and loss of vegetation.

Potential development of state-owned land within the park could result in soil and vegetation disturbance from construction of roads and drill pads and vegetation disturbance from livestock grazing.

Wildlife. There would be no new impacts on wildlife or habitat resulting from facility use under the no-action alternative. Hiking would increase with increasing visitation, and hikers would possibly displace and diminish reproduction of raptors and other wildlife. Monitoring would be limited and might not be adequate to assess and mitigate conflicts.

The Lost Spring Canyon area would remain open to hunting and trapping under state regulations, either as interim wilderness or if returned to multiple use management. Some legal taking of deer, coyote, bobcat, and mountain lion would probably occur.

Threatened and Endangered Species. No known or expected impacts on threatened or endangered species would result.

Water Resources. There would be no new impacts on water resources.

Floodplains. Existing "critical actions" would remain in the 500-year floodplain, in nonconformance with NPS final procedures for implementing Executive Order 11988, "Floodplain Management" (NPS 1982). The critical actions would be storage of fuel and toxic substances at the maintenance area, with possible contamination of floodwaters in the event of a 500-year flood.

Park roads at headquarters and the Wolfe ranch would continue to be vulnerable to closure from flooding.

Wetlands. There would be no effect on wetlands.

Air Quality. There would be no new adverse effects on air quality. Motor vehicle emissions would increase, but not to a significant level.

Visual Quality. The existing visual effect of the man-made facilities of the park would be perpetuated. Buildings at the headquarters would intrude on the natural setting. The cars parked at the Delicate Arch viewpoint would continue to be visible to hikers at Delicate Arch.

If oil, gas, or mineral development occurred on BLM land outside the park in Cache Valley or on Dry Mesa without mitigation of visual impacts, roads and drill pads might become long-lasting visual intrusions on the scenic backgrounds important to visitors' views of major park features.

The abandoned asphalt roadway between the park boundary and US 191 and recent stockpiles of road maintenance material would continue to intrude on views of the park from the highway.

Wilderness. There would be no effect on the 1984 park wilderness recommendation.

Impacts on the Cultural Environment

Museum Collections. The no-action alternative would not solve the problems of inadequate safeguards against fire, intrusion, and floods or unsatisfactory controls for access, temperature, humidity, and light. Lack of environmental controls would most likely result in deterioration or destruction of the collections. Storage with poor security could result in the loss of irreplaceable materials.

Archeological Resources. In the absence of a barrier and staffing for adequate patrol and interpretation, a high incidence of vandalism and inadvertent damage to rock art panels would be expected to continue, with the result that the cultural value of these resources would be seriously diminished.

There would be no potential for adverse effects on archeological resources as a result of construction activities, since no new construction would occur under this alternative.

Historic Resources. The Wolfe ranch would be protected from further deterioration but would remain susceptible to flooding described for the preferred alternative. The toilets at the Wolfe ranch/Delicate Arch trailhead would remain more of an intrusion on the historic scene than they would be if relocated as proposed in the preferred alternative.

Impacts on Visitors

Under this alternative the visitor experience would remain substantially unchanged from existing conditions. Existing safety hazards such as poor sight distance at some pullouts, parking areas where drivers back onto the main park road, and uncontrolled pedestrian road crossings would continue unresolved and could eventually contribute to traffic accidents. Without flood warning or protection measures, visitors and property at headquarters and the Wolfe ranch would be at risk in the event of a flood.

Visitors would continue to encounter congestion in certain popular areas due to insufficient parking, which in turn would result in frustration. During the peak season, most visitors would not be able to find parking at Balanced Rock and would have to bypass this stop or come back later.

Lack of appropriate or consistent signing would continue to cause some visitors to miss interesting park features. Garden of Eden and the existing Panorama Point and Salt Valley overlooks have inviting names, yet they do not offer distinctive views or outstanding resource experiences. South Park Avenue offers a grandiose view, yet the sign indicates that this site is nothing more than a trailhead. La Sal Mountain viewpoint is not appropriately named and interpreted, so visitors tend to bypass it. Without a change in signing and interpretation at these sites, visitors would remain unaware of some opportunities and not receive a full understanding and appreciation of park resources.

There would continue to be few opportunities for the physically handicapped to go beyond the parking areas and none to see an arch at close range.

Headquarters. Circulation at headquarters would continue to be confusing and the visitor center very overcrowded at times. Visitors might give up and leave or go into the park without appropriate safety and interpretive information.

Wolfe Ranch/Delicate Arch. The Wolfe ranch/Delicate Arch road would continue to be dusty when dry. A few visitors might risk being stranded as a result of flash floods or muddy roads, and there would continue to be poor draining conditions because of the rutted road. Not all visitors, especially those on buses, would have the opportunity to go to the Delicate Arch viewpoint because of the road limitations. Visitors hiking to Delicate Arch would continue to see vehicles from the arch.

Fiery Furnace. The Fiery Furnace guided walks would continue to be too crowded. Visitors would not be able to experience the leisurely walking that is an important part of the Fiery Furnace experience.

Devils Garden. Congestion at Devils Garden would continue to frustrate visitors trying to park. Many would be forced to park a few hundred yards down the road and walk to the trailhead or choose not to park at all and forego use of the trail. The inadequate toilet facilities would continue to be malodorous and unpleasant, and the sound of the generator motors at the trailhead would continue to be disturbing to some visitors. At the campground there would continue to be conflicts between tent campers and RV campers. The amphitheater would continue to be overcrowded, causing some visitors to have to stand or bring their own chairs, and there would not be adequate space for the physically disabled.

Impacts on Park Management and Operations

The Delicate Arch road would continue to require frequent maintenance, annual grading, and patrols.

Taking no action to protect against flooding at park headquarters would place employees and government property at risk. Road closures and the need to truck in potable water could result from flooding. Leaving the administration function in the visitor center would result in continued crowded office conditions and an inadequate staff to deal effectively with the ever increasing numbers of visitors.

Employees at Devils Garden would continue to have substandard housing with little or no privacy.

Impacts on the Socioeconomic Environment

The no-action alternative would continue to benefit the local economy through visitor expenditures and park expenditures. The equivalent of 17.3 full-time employees are projected, together with a stable annual expenditure for supplies. No construction is proposed for this alternative.

MINIMUM REQUIREMENTS ALTERNATIVE

The minimum requirements alternative would take the minimum actions to meet life safety needs and to mitigate increased vegetation damage and crowding. Parking areas would be delineated to prevent overflow parking at the main parking areas, which would decrease the parking capacity and increase the frustration of visitors trying to find a parking space. The cumulative effects of the minimum requirements alternative would not exceed the incremental effects when added to other past, present, and foreseeable future actions.

Impacts on the Natural Environment

Geology/Soils/Vegetation. Roads, parking areas, buildings, and utility systems would result in 159.0 acres of impermeable or heavily compacted surfaces, an increase of 0.8 acres over the existing condition. Underground utility construction would temporarily disturb 1.5 acres. Removal of facilities would allow restoration of 0.7 acres (see table 10).

Table 10: Surface Disturbance Summary, Minimum Requirements Alternative

	Impervious and Compacted Soil/Gravel Surfaces			Temporarily Disturbed Surfaces		
	Existing	New Disturbance	Restoration	Total	Existing	New Disturbance
Park headquarters	5.4	0	0.2	5.2	4.3	0.3
Balanced Rock	0.4	0.7	0.3	0.8	0	0
Windows	3.1	0	0	3.1	0	0
Delicate Arch road	9.5	0	0	9.5	0	0
Delicate Arch viewpoint	0.5	0.3	0	0.8	0	0
Wolfe ranch	1.4	0	0	1.4	0	0
Sand Dune Arch trailhead	0.5	0	0	0.5	0	0
Devils Garden trailhead	4.9	0.4	0.1	5.2	0.9	0.6
Devils Garden campground	3.7	0	0	3.7	1.4	0.6
Other (main road, dirt roads, trails, turnouts)	128.8	0.1	0.1	128.8	0	0
Totals	158.2	1.5	0.7	159.0	6.6	1.5
						8.1

Barriers such as boulders would be placed to prevent shoulder parking adjacent to trailheads and parking areas. This would protect soil and vegetation from further compaction and crushing by vehicles and allow previously disturbed areas to revegetate. Limited monitoring and mitigation of soil and vegetation damage in areas supporting increasingly heavy foot traffic would occur as described in the no-action alternative. However, in the absence of a formalized visitor impact management program, trampling damage would slowly increase.

The environmental consequences of park boundary adjustments along US 191 and in the Lost Spring Canyon area would be the same as described in the preferred alternative.

Wildlife. Vegetation disturbance from modification of facilities would result in a small reduction (1.6 acre) of habitat for invertebrates and small ground-dwelling mammals. There would be no effects on parkwide wildlife populations.

Threatened and Endangered Species. There would be no anticipated effect on threatened or endangered species.

Water Resources. There would be no new effects on water resources.

Floodplains. Floodplain policies would be complied with by removing the apartments, residence 3, and the museum collection from the floodplain. The library building (without library archival material and museum collections) and maintenance area would remain vulnerable to a 500-year flood, and the visitor center/administration building and the CNHA offices would remain vulnerable to the probable maximum flood; however, this would comply with the floodplain decisions pursuant to this plan that facilities and areas of visitor congregation avoid only the 500-year floodplain. Policy would be complied with regarding critical actions within the 500-year floodplain by floodproofing fuel/toxic substance storage at the maintenance area. This would reduce potential contamination of downstream areas in the event of a 500-year flood. The entrance road and bridge would remain vulnerable to flood damage, with temporary closure of the park road a possible consequence.

A floodplain study of the Wolfe ranch area would be performed as described under the preferred alternative to ensure protection of property and visitors and the beneficial attributes of the floodplain.

Wetlands. There would be no new effects on wetlands.

Air Quality. Minor and temporary effects on park air quality would result from dust and equipment fumes generated during facility construction. Motor vehicle emissions would increase, but not to a significant level.

Visual Quality. Barriers would be placed to protect the Moab panel and the petroglyphs near the Wolfe ranch, with effects as described under the preferred alternative. Parking barriers, such as boulders, would be placed along road shoulders at Devils Garden, Sand Dune Arch, Fiery Furnace, the Wolfe ranch, the Delicate Arch viewpoint, and the Windows. Pedestrian barriers, such as fencing, would be placed at the same trailheads to prevent shortcutting by hikers. These various barriers might be aesthetically objectionable to some visitors.

In other respects the impacts on visual quality would be as described for the no-action alternative.

Wilderness. There would be no effect on the 1984 revision of the park wilderness recommendation.

Impacts on the Cultural Environment

Museum Collections. The collections would be protected and preserved as described in the preferred alternative.

Archeological Resources. Rock art panels would be protected as described in the preferred alternative. There would be some potential for destruction of archeological resources resulting from ground disturbance during construction; however, new construction would be minimal under this alternative.

Historic Resources. The Wolfe ranch would be protected from further deterioration but would remain susceptible to flooding, as described in the preferred alternative. The toilets would remain an intrusion on the historic scene.

Impacts on Visitor Use

The impacts on visitor use in this alternative would be the same as in the no-action alternative with the following exceptions. Signing, minor road improvements, and floodproofing would remove most of the safety hazards previously identified. The addition of some interpretive exhibits and the upgrading of the auto guide would provide visitors with a more interesting and comprehensive understanding of Arches National Park.

Bridging the washes on the Delicate Arch viewpoint road would increase traffic and allow buses to get to the viewpoint, allowing many more visitors the opportunity for this distant view of Delicate Arch. The increase in vehicles in the viewpoint parking area would be highly visible from Delicate Arch and might be intrusive to some visitors who made the effort to hike to the arch.

Increasing the daily number of Fiery Furnace guided walks to two per day and limiting group size to 40 would relieve some of the pressure on this popular area and begin to restore the less crowded, more leisurely potential of this type of walk.

The improvement of trailhead parking and barricading roadsides to prevent illegal parking at Devils Garden would in effect reduce parking from its present levels because roadside parking would be eliminated. The result would be frustration for numerous visitors unable to park.

Impacts on Park Management and Operations

Bridging the washes on the Delicate Arch road would reduce the frequency of patrols needed to monitor visitor safety. Maintenance requirements would remain high, with annual road grading and periodic replacement of gravel.

The parking improvements and road barriers throughout the park would probably result in less need for "policing" activity because of illegal parking, thus allowing ranger personnel more time for positive visitor services.

Adding a new sewage treatment system at headquarters would require additional maintenance. Relocating some administrative offices to Moab would relieve the crowded conditions at the visitor center, but would reduce the efficiency of operations since more driving would be required between Moab and park headquarters. Moving some employee housing out of park headquarters would remove the risk to life and property from flooding but would also increase response time of personnel for emergencies in the park. Employees would have to drive to work from the Moab area, and some might have difficulty finding suitable housing.

Additional interpretive staffing would be required to conduct two Fiery Furnace walks per day.

Devils Garden personnel would gain much improved housing, including more space and privacy. The presence of a campground host would free the staff from routine questions and allow more time for interpretation and patrol. The new dump station would require additional maintenance. The rehabilitated amphitheater facility would provide greater security from vandalism and theft for government audiovisual equipment.

Impacts on the Socioeconomic Environment

Visitor expenditures are projected to be the same as in the other two alternatives. This alternative projects the equivalent of 22.9 full-time park employees, an increase of 5.6 over the no-action alternative. Annual expenditures for supplies are projected to increase approximately 32 percent. This alternative proposes \$8,991,500 in construction. Refer to the impacts of the preferred alternative for general notes on the impact of these expenditures.

Table 11: Summary of Environmental Consequences

	<u>Preferred Alternative</u>	<u>No Action</u>	<u>Minimum Requirements</u>
Land disturbance	+2.6 acres 160.8 acres total	158.2 acres total	+0.8 acres 159.0 acres total
Vegetation and soils	Minor increase in trampling of vegetation in areas of concentrated visitor use	Substantial increase in trampling of vegetation and soils caused by unregulated foot traffic and shoulder parking as visitation increased	Same as preferred alternative
Wildlife	No adverse impacts within existing park boundary; possible protection of wildlife in Lost Spring Canyon through closure to hunting and trapping (if lands were added to park)	No adverse impacts within existing park boundary; wildlife in Lost Spring Canyon would remain subject to hunting and trapping under state regulation	Same as preferred alternative
Threatened or endangered species	No effect	Same as preferred alternative	Same as preferred alternative
Water resources	Reduced risk of water contamination by fuel or toxic substances in the event of flood	Potential for contamination of floodwaters by fuel or toxic substances stored in the 500- year floodplain	Same as preferred alternative
Floodplains and wetlands	Reduced flood hazard at headquarters; all visitor and administrative facilities removed from the 500-year floodplain or adequately floodproofed; some facilities remaining in the probable maximum floodplain	Flood hazard to people and property associated with visitor and administrative facilities in the 100- and 500-year floodplains at headquarters and undetermined hazard at the Wolfe ranch parking area	Same as preferred alternative
Air quality	Minor increases in vehicle emissions	Same as preferred alternative	Same as preferred alternative

	<u>Preferred Alternative</u>	<u>No Action</u>	<u>Minimum Requirements</u>
Visual quality	Improved aesthetics at park facilities; reduced potential for visual intrusions associated with commercial or mineral development adjacent to the boundary	Minor impairment of visual quality associated with some park facilities; potential for visual intrusions associated with commercial or mineral development adjacent to the boundary	Minor impairment of visual quality associated with some park facilities; reduced potential for visual intrusions associated with commercial or mineral development outside the boundary
Wilderness	Possible net increase of 29 acres in designated wilderness	No effect	Same as no action
Archeological resources	Improved protection for rock art	Potential for destruction of rock art through vandalism and inadvertent damage	Same as preferred alternative
Museum collections	Improved protection from flood damage	Potential for damage caused by flooding	Same as preferred alternative
Visitor safety	Improved visitor safety along roads, at parking areas, and in the floodplain	Continued potential for traffic accidents associated with poor sight distances, difficult parking access, and uncontrolled pedestrian crossings; continued potential for injury or property damage resulting from flooding	Same as preferred alternative
Visitor experience	Experience greatly improved by elimination of crowding at the visitor center, expansion of parking, better informational signing, updated interpretive media, and improved access to the Delicate Arch viewpoint; visitors would be more knowledgeable about and sensitive to park resources	Continued moderate degree of visitor confusion and frustration caused by overcrowded facilities, inadequate parking, poor informational signing, outdated interpretive media, and limited access to the Delicate Arch viewpoint	Similar to no action; on the one hand, parking space would be even more inadequate once shoulder parking was prohibited; on the other hand, more visitors would have access to the Delicate Arch viewpoint once the road was made passable to buses

	<u>Preferred Alternative</u>	<u>No Action</u>	<u>Minimum Requirements</u>
Visitor capacity	1,593 persons at one time; 4,779 persons per day; use no longer allowed to exceed individual facility capacities	1,399 persons at one time; 4,197 persons per day; use allowed to exceed individual facility capacities, resulting in congestion and trampling of vegetation and soils	Same as no action; use no longer allowed to exceed individual facility capacities
Mobility, sensory, and mentally impaired visitors	Improved interpretive opportunities, including the chance for mobility-impaired persons to experience an arch a close range	Few interpretive opportunities	Same as no action

AGENCIES CONTACTED

FEDERAL

Advisory Council on Historic Preservation, Washington, D.C.
Army Corps of Engineers, Salt Lake City, UT
Department of Energy
 Federal Energy Regulatory Commission, Salt Lake City, UT
Environmental Protection Agency, Denver, CO
Department of the Interior
 Bureau of Land Management
 Utah State Office, Salt Lake City, UT
 Moab District Office, Moab, UT
 Grand Resource Area Office, Moab, UT
Fish and Wildlife Service

STATE

Department of Agriculture, Salt Lake City, UT
Department of Community and Economic Development, Salt Lake City, UT
 Division of Environmental Health, Salt Lake City, UT
Governor's Office, Salt Lake City, UT
Department of Natural Resources, Salt Lake City, UT
 Division of Energy Conservation and Development
 Division of Lands and Forestry
 Division of Oil, Gas, and Mining
 Division of Parks and Recreation
 Division of Water Resources
 Division of Water Rights
 Division of Wildlife Resources
Utah Energy Office
Utah Geological and Mineral Survey
Division of State History, Salt Lake City, UT
 State Historic Preservation Office
Department of Transportation, Salt Lake City, UT, Price UT
Office of Planning and Budget, Salt Lake City, UT

COUNTY

Grand County Commission, Moab, UT
Southeast Utah Association of Local Governments, Price, UT

APPENDIXES

- A: LEGISLATION
- B: MANAGEMENT OBJECTIVES
- C: VISITOR IMPACT MANAGEMENT PROGRAM
- D: ROAD SYSTEM EVALUATION
- E: TRAIL STANDARDS
- F: VISITOR CENTER FUNCTIONS AND SIZE REQUIREMENTS
- G: COMPARATIVE DEVELOPMENT COSTS
- H: WORK TO BE PERFORMED BY ADDITIONAL STAFF
- I: PUBLIC TRANSPORTATION STUDY

APPENDIX A: LEGISLATION

4. Arches National Monument

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Enlarging the area: Proclamation (No. 2312) of November 25, 1938.....	111

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

[No. 1875—Apr. 12, 1929—46 Stat. 2988]

WHEREAS, there are located in unsurveyed townships twenty-three and twenty-four south, range twenty-one east, and twenty-four south, range twenty-two east of the Salt Lake meridian, in Grand County, Utah, two areas, known locally as the "Devil's Garden" and the "Windows," containing approximately 2,600 acres and 1,920 acres, respectively;

WHEREAS, these areas contain extraordinary examples of wind erosion in the shape of gigantic arches, natural bridges, "windows," spires, balanced rocks, and other unique wind-worn sandstone formations, the preservation of which is desirable because of their educational and scenic value; and

WHEREAS, it appears that the public interest would be promoted by reserving these features as a national monument, together with such land as may be needed for the protection thereof;

NOW, THEREFORE, I, Herbert Hoover, President of the United States of America, by virtue of the power in me vested by section two of the act of Congress entitled, "An Act for the Preservation of American Antiquities," approved June 8, 1906 (34 Stat. 225), do proclaim that there are hereby reserved from all forms of appropriation under the public land laws and set apart as a national monument all those pieces and parcels of land in Grand County, State of Utah, shown as the Arches National Monument upon the diagram hereto annexed and made a part hereof, subject to prior valid claims and pending applications for permits to prospect for potassium under the act of Congress approved October 2, 1917 (40 Stat. 297), provided that they do not involve the ultimate disposition of the title of the United States to any lands within the area hereby reserved.

Warning is hereby expressly given to all unauthorized persons not to appropriate, injure, destroy or remove any feature of this Monument and not to locate or settle upon any of the lands thereof.

The Director of the National Park Service, under the direction of the Secretary of the Interior, shall have the supervision, management, and control of this Monument as provided in the act of Congress entitled, "An Act to establish a National Park Service and for other purposes," approved August 25, 1916 (39 Stat. 535), and acts additional thereto or amendatory thereof.

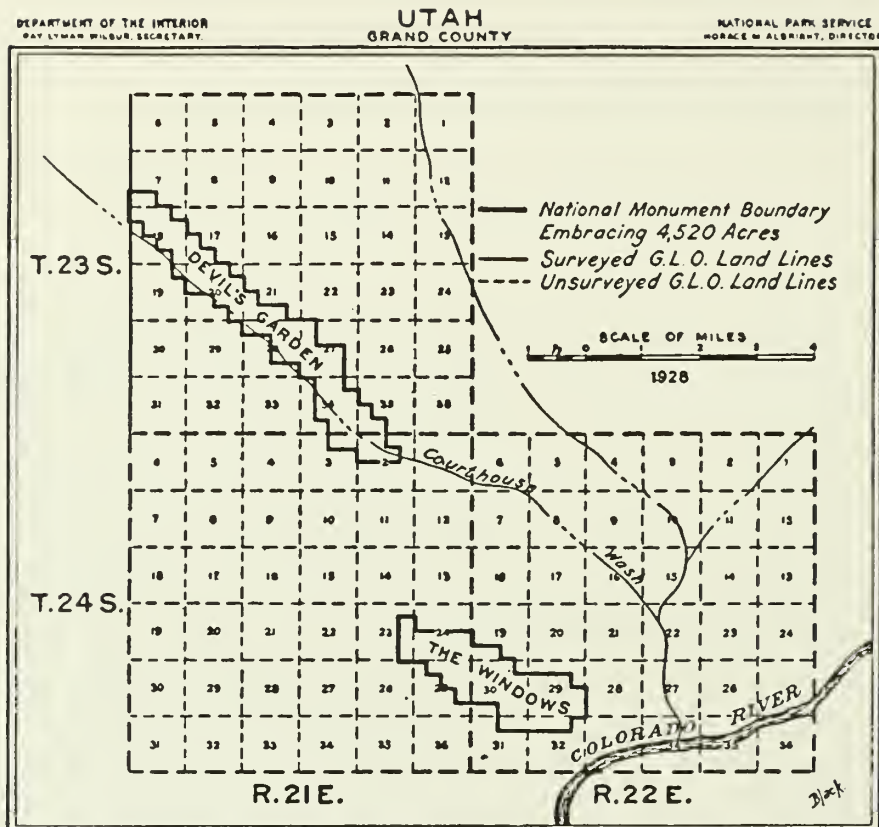
IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE at the City of Washington this 12th day of April in the year of our Lord one thousand nine hundred and twenty-nine and of the
[SEAL] Independence of the United States of America the one hundred and fifty-third.

HERBERT HOOVER.

By the President:
HENRY L. STIMSON,
Secretary of State.

VIII. NATIONAL MONUMENTS—ARCHES



ARCHES NATIONAL MONUMENT

U. S. GOVERNMENT PRINTING OFFICE: 1928

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

[No. 2312—Nov. 25, 1938—53 Stat. 2504]

WHEREAS certain public lands contiguous to the Arches National Monument, in Utah, established by proclamation of April 12, 1929 (46 Stat. 2988), have situated thereon geologic and prehistoric structures of historic and scientific interest; and

WHEREAS there are other public lands contiguous to the said monument which are necessary for the proper care, management, and protection of the objects of scientific interest situated on the lands included in the monument and on the other lands referred to above; and

WHEREAS it appears that it would be in the public interest to reserve such lands as part of the said monument:

NOW, THEREFORE, I, Franklin D. Roosevelt, President of the United States of America, under and by virtue of the authority vested in me by section 2 of the act of June 8, 1906, c. 3060, 34 Stat. 225 (U. S. C., title 16, sec. 431), do proclaim that, subject to all valid existing rights, the following-described lands in Utah are hereby reserved from all forms of

VIII. NATIONAL MONUMENTS—ARCHES

appropriation under the public-land laws and added to and made a part of the said Arches National Monument:

SALT LAKE MERIDIAN—UTAH

- T. 23 S., R. 20 E., sec. 12, S $\frac{1}{2}$,
sec. 13, all,
sec. 22, E $\frac{1}{2}$,
sec. 23, all,
sec. 24, N $\frac{1}{2}$,
T. 23 S., R. 21 E., sec. 7, S $\frac{1}{2}$
secs. 16 to 18, inclusive,
sec. 19, N $\frac{1}{2}$,
sec. 20, N $\frac{1}{2}$ and SE $\frac{1}{4}$,
secs. 21 and 22,
secs. 26 to 28, inclusive,
secs. 34 and 35,
T. 24 S., R. 21 E., sec. 1, all,
sec. 2, N $\frac{1}{2}$,
sec. 3, N $\frac{1}{2}$,
secs. 12 and 13,
secs. 23 to 27 and 33 to 35, inclusive,
sec. 36, N $\frac{1}{2}$ (all unsurveyed),
T. 25 S., R. 21 E., secs. 3 to 5 and 8 to 10, inclusive,
secs. 15 to 17, inclusive,
sec. 22, all
and all those parts of secs. 20, 21, 27 and 28 north of
State Highway No. 450,
T. 24 S., R. 22 E., sec. 4, W $\frac{1}{2}$,
secs. 5 to 8, inclusive,
sec. 9, W $\frac{1}{2}$,
secs. 17 to 20, inclusive,
secs. 29 to 30,
sec. 31, N $\frac{1}{2}$,
sec. 32, N $\frac{1}{2}$,

aggregating approximately 29,160 acres.

Warning is hereby expressly given to all unauthorized persons not to appropriate, injure, destroy, or remove any feature of this monument and not to locate or settle upon any of the lands thereof.

The Director of the National Park Service, under the direction of the Secretary of the Interior, shall have the supervision, management, and control of this monument as provided in the act of Congress entitled "An act to establish a National Park Service, and for other purposes", approved August 25, 1916, 39 Stat. 535 (U. S. C., title 16, secs. 1 and 2), and acts supplementary thereto or amendatory thereof.

IN WITNESS WHEREOF I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE at the City of Washington this 25th day of November in the year of our Lord nineteen hundred and thirty-eight, and of the [SEAL] Independence of the United States of America the one hundred and sixty-third.

FRANKLIN D. ROOSEVELT.

By the President:
CORDELL HULL,
The Secretary of State.

THE PRESIDENT

Proclamation 3887

ENLARGING THE ARCHES NATIONAL MONUMENT, UTAH

WHEREAS, the Arches National Monument in Utah was established by Proclamation No. 1875 of April 12, 1929, and enlarged by Proclamation No. 2312 of November 25, 1938, and its boundary adjusted by Proclamation No. 3360 of July 22, 1960, to reserve and set apart areas containing extraordinary examples of wind-eroded sandstone formations and other features of geological, historic and scientific interest; and

WHEREAS, it would be in the public interest to add to the Arches National Monument certain adjoining lands which encompass a variety of additional features which constitute objects of geological and scientific interest to complete the geologic story presented at the monument; and

WHEREAS, under section 2 of the act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 431), the President is authorized "to declare by public proclamation * * * objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments, and may reserve as a part thereof parcels of land, the limits of which in all cases shall be confined to the smallest area compatible with the proper care and management of the objects to be protected:"

NOW, THEREFORE, I, LYNDON B. JOHNSON, President of the United States, under the authority vested in me by section 2 of the act of June 8, 1906, *supra*, do proclaim that, subject to valid existing rights, (1) the lands owned or controlled by the United States within the exterior boundaries of the following described area are hereby added to and made a part of the Arches National Monument, and (2) the State-owned and privately owned lands within those boundaries shall become and be reserved as parts of that monument upon acquisition of title thereto by the United States:

SALT LAKE MERIDIAN, UTAH

T. 23 S., R. 20 E.,

Sec. 11;

Sec. 12, N $\frac{1}{2}$;

Sec. 14;

Sec. 24, S $\frac{1}{2}$;

Secs. 25 and 26;

Sec. 27, E $\frac{1}{2}$;

Secs. 35 and 36.

T. 24 S., R. 20 E.,

Sec. 1.

T. 23 S., R. 21 E.,

Sec. 7, N $\frac{1}{2}$;

Sec. 8, S $\frac{1}{2}$;

Sec. 15, S $\frac{1}{2}$;

Sec. 19, S $\frac{1}{2}$;

Sec. 20, SW $\frac{1}{4}$;

Sec. 23, S $\frac{1}{2}$;

Secs. 25, 29, 30, 31, 32, 33, and 36.

T. 24 S., R. 21 E.,

Sec. 3, S $\frac{1}{2}$;

Secs. 4, 5, 6, 8, 9, and 10;

Sec. 11, W $\frac{1}{2}$ and SE $\frac{1}{4}$;

Secs. 14, 15, 16, 17, 20, 21, 22, 28, 29, 30, 31, and 32;

Sec. 36, S $\frac{1}{2}$.

T. 25 S., R. 21 E.,

Secs. 1 and 2;

Sec. 6, E $\frac{1}{2}$;

Sec. 7, E $\frac{1}{2}$;

Secs. 11, 12, 13, and 14;

Sec. 18, NE $\frac{1}{4}$;

Sec. 23;

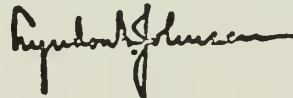
Secs. 24, 25 and 26—those portions lying north of the right bank of the Colorado River.

- T. 23 S., R. 22 E.,
 Sec. 31;
 Sec. 32, W $\frac{1}{2}$ and SE $\frac{1}{4}$;
 Sec. 33, S $\frac{1}{2}$.
- T. 24 S., R. 22 E.,
 Sec. 4, E $\frac{1}{2}$;
 Sec. 9, E $\frac{1}{2}$;
 Secs. 10 and 11;
 Sec. 12, S $\frac{1}{2}$;
 Secs. 13, 14, 15, and 16;
 Sec. 17, E $\frac{1}{2}$ and E $\frac{1}{2}$ NW $\frac{1}{4}$;
 Sec. 20, NE $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$, and SE $\frac{1}{4}$ SE $\frac{1}{4}$;
 Secs. 21, 22, 23, and 24;
 Secs. 25, 26, 27, and 28—those portions lying north of the right bank of the Colorado River;
 Sec. 29, NE $\frac{1}{4}$ NE $\frac{1}{4}$;
 Sec. 31, S $\frac{1}{2}$;
 Sec. 32, that portion of the S $\frac{1}{2}$ lying west and north of the right bank of the Colorado River;
 Sec. 33, that portion lying west and north of the right bank of the Colorado River.
- T. 25 S., R. 22 E.,
 Sec. 5, that portion lying west of the right bank of the Colorado River;
 Secs. 6 and 7;
 Secs. 8, 9, 10, 15, 16, and 17—those portions adjoining the right bank of the Colorado River;
 Sec. 18;
 Secs. 19 and 20—those portions lying north of the right bank of the Colorado River.
- T. 24 S., R. 23 E.,
 Sec. 18, SW $\frac{1}{4}$;
 Sec. 19, W $\frac{1}{2}$;
 Sec. 30, lots 3 to 7, inclusive and lots 11 and 12;
 Containing 48,943 acres, more or less.

Warning is hereby expressly given to all unauthorized persons not to appropriate, injure, destroy, or remove any feature of this monument and not to locate or settle upon any of the lands thereof.

Any reservations or withdrawals heretofore made which affect the lands described above are hereby revoked.

IN WITNESS WHEREOF, I have hereunto set my hand this twentieth day of January in the year of our Lord nineteen hundred and sixty-nine and of the Independence of the United States of America the one hundred and ninety-third.



[F.R. Doc. 60-598; Filed, Jan. 21, 1969; 10:31 a.m.]

Proclamation 3360
MODIFYING THE ARCHES NATIONAL
MONUMENT, UTAH

By the President of the United States
of America
A Proclamation

WHEREAS the Arches National Monument in Grand County, Utah, established by Proclamation No. 1875 of April 12, 1929, and enlarged by Proclamation No. 2312 of November 25, 1938, was reserved and set apart as an area containing extraordinary examples of wind-eroded sandstone formations and other geologic and prehistoric structures of historic and scientific interest; and

WHEREAS it appears that it would be in the public interest to add to the Arches National Monument certain contiguous lands on which outstanding geologic features of great scientific interest are situated, and certain other lands adjacent to the monument which are essential to the proper care, management, and protection of the objects of scientific interest situated on such lands and on lands now comprising a part of the monument; and

WHEREAS it appears that it would also be in the public interest to exclude from the monument certain lands in the southeast section thereof, contiguous to the Salt Wash escarpment, which are used for grazing and which have no known scenic or scientific value;

NOW, THEREFORE, I, DWIGHT D. EISENHOWER, President of the United States of America, by virtue of the authority vested in me by section 2 of the act of June 8, 1906, 34 Stat. 225 (16

U.S.C. 431), and subject to valid existing rights, do proclaim as follows:

The lands now owned by the States within the exterior boundaries of the following-described tracts of land are hereby added to and reserved as a part of the Arches National Monument; and lands owned by the State of Utah within such boundaries shall become and be reserved as a part of that monument upon acquisition of title thereto by the United States:

SALT LAKE MERIDIAN

T. 24 S., R. 21 E.

Sec. 2, S $\frac{1}{2}$;

Sec. 11, NE $\frac{1}{4}$;

comprising 460 acres, more or less.

The following-described lands in the State of Utah are hereby excluded from the Arches National Monument:

SALT LAKE MERIDIAN

T. 24, S., R. 21 E.,

Sec. 17, S $\frac{1}{2}$, E $\frac{1}{2}$ NW $\frac{1}{4}$;

Sec. 20, NE $\frac{1}{4}$, N $\frac{1}{4}$ SE $\frac{1}{4}$, E $\frac{1}{2}$ E $\frac{1}{2}$;

Sec. 20, NE $\frac{1}{4}$ NE $\frac{1}{4}$;

comprising 720 acres, more or less.

The boundaries of the Arches National Monument are modified accordingly.

The public lands hereby excluded from the monument shall not be subject to application, location, settlement, entry, or other forms of appropriation under the public-land laws until further order of an authorized officer of the Department of the Interior.

Warning is hereby expressly given to all unauthorized persons not to appropriate, injure, destroy, or remove any feature of this monument and not to locate or settle upon any of the lands thereof.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the United States of America to be affixed.

DONE at the City of Washington this twenty-second day of July in the year of our Lord nineteen hundred [1960] and sixty, and of the Independence of the United States of America the one hundred and eighty-fifth.

DWAYT D. EISENHOWER

By the President:

CHRISTIAN A. HERTER,
Secretary of State.

[P.R. Doc. 60-7066; Filed, July 26, 1960;
2:20 p.m.]



Public Law 92-155
92nd Congress, S. 30
November 12, 1971

An Act

85 STAT. 422

To establish the Arches National Park in the State of Utah.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That (a) subject to valid existing rights, the lands, waters, and interests therein within the boundary generally depicted on the map entitled "Boundary Map, Proposed Arches National Park, Utah," numbered RPSSC-138-20, 001E and dated September 1969, are hereby established as the Arches National Park (hereinafter referred to as the "park"). Such map shall be on file and available for public inspection in the offices of the National Park Service, Department of the Interior.

Arches National
Park, Utah.
Establishment.

(b) The Arches National Monument is hereby abolished, and any funds available for purposes of the monument shall be available for purposes of the park. Federal lands, waters, and interests therein excluded from the monument by this Act shall be administered by the Secretary of the Interior (hereinafter referred to as the "Secretary") in accordance with the laws applicable to the public lands of the United States.

SEC. 2. The Secretary is authorized to acquire by donation, purchase with donated or appropriated funds, transfer from any Federal agency, exchange or otherwise, the lands and interests in lands described in the first section of this Act, except that lands or interests therein owned by the State of Utah, or any political subdivision thereof, may be acquired only with the approval of such State or political subdivision.

Lands,
acquisition.

SEC. 3. Where any Federal lands included within the park are legally occupied or utilized on the date of approval of this Act for grazing purposes, pursuant to a lease, permit, or license for a fixed term of years issued or authorized by any department, establishment, or agency of the United States, the Secretary of the Interior shall permit the persons holding such grazing privileges or their heirs to continue in the exercise thereof during the term of the lease, permit, or license, and one period of renewal thereafter.

Grazing priv-
ileges.

SEC. 4. Nothing in this Act shall be construed as affecting in any way any rights of owners and operators of cattle and sheep herds, existing on the date immediately prior to the enactment of this Act, to trail their herds on traditional courses used by them prior to such date of enactment, and to water their stock, notwithstanding the fact that the lands involving such trails and watering are situated within the park: *Provided*, That the Secretary may designate driveways and promulgate reasonable regulations providing for the use of such driveways.

Livestock
trails, watering
rights.

SEC. 5. (a) The National Park Service, under the direction of the Secretary, shall administer, protect, and develop the park, subject to the provisions of the Act entitled "An Act to establish a National Park Service, and for other purposes", approved August 25, 1916 (39 Stat. 535).

Administration.

(b) Within three years from the date of enactment of this Act, the Secretary of the Interior shall report to the President, in accordance with subsections 3(c) and 3(d) of the Wilderness Act (78 Stat. 890; 16 U.S.C. 1132 (c) and (d)), his recommendations as the suitability or nonsuitability of any area within the park for preservation as wilderness, and any designation of any such area as a wilderness shall be in accordance with said Wilderness Act.

16 USC 1.
Report to
President.

85 STAT. 423

Road align-
ments, study.

SEC. 6. (a) The Secretary, in consultation with appropriate Federal departments and appropriate agencies of the State and its political subdivisions shall conduct a study of proposed road alignments within and adjacent to the park. Such study shall consider what roads are appropriate and necessary for full utilization of the area for the purpose of this Act as well as to connect with roads of ingress and egress to the area.

Report to
Congress.

(b) A report of the findings and conclusions of the Secretary shall be submitted to the Congress within two years of the date of enactment of this Act, including recommendations for such further legislation as may be necessary to implement the findings and conclusions developed from the study.

Appropriation.

SEC. 7. There are hereby authorized to be appropriated such sums as may be necessary to carry out the purposes of this Act, not to exceed, however, \$125,000 for the acquisition of lands and interests in lands and not to exceed \$1,031,500 (April 1970 prices) for development, plus or minus such amounts, if any, as may be justified by reason of ordinary fluctuations in construction costs as indicated by engineering cost indices applicable to the types of construction involved herein. The sums authorized in this section shall be available for acquisition and development undertaken subsequent to the approval of this Act.

Approved November 12, 1971

LEGISLATIVE HISTORY:

HOUSE REPORT No. 92-535 accompanying H.R. 7136 (Comm. on Interior and Insular Affairs).

SENATE REPORT No. 92-150 (Comm. on Interior and Insular Affairs).

CONGRESSIONAL RECORD, Vol. 117 (1971):

June 21, considered and passed Senate.

Oct. 4, considered and passed House, amended, in lieu of H.R. 7136.

Oct. 29, Senate agreed to House amendments.

APPENDIX B: MANAGEMENT OBJECTIVES

The management objectives are excerpted from the Arches National Park *Statement for Management* (NPS 1988b).

CULTURAL RESOURCES

Complete inventory of park historic structures and nominate eligible structures to the National Register of Historic Places and /or the List of Classified Structures.

Stabilize and maintain Wolfe Ranch as it appeared in 1888-1910.

Complete archeological survey of park and National Register evaluation.

Provide for a professional level of curatorial care for historic and prehistoric artifacts.

Decrease/eliminate vandalism and unintentional destruction of cultural resources.

NATURAL RESOURCES

Reintroduce a viable population of bighorn sheep into the park.

Assess whether a viable population of pronghorn antelope can be transplanted into the park.

Protect and preserve the native vegetation in the park.

Identify listed threatened and endangered species within the park and maintain and enhance habitat for threatened and endangered species.

Protect the park from external threats such as encroachment by oil and gas exploration and energy developments.

Monitor water quality and quantity in natural springs, streams, and aquifers to protect the public and sustain native populations of flora and fauna.

Preserve and protect native wildlife species.

Protect the natural environment from impacts by visitors.

Maintain Class I air quality standards.

Manage fire to act as a natural component in the ecosystem.

VISITOR SERVICES

Minimize threats to the health and safety of visitors.

Provide for visitor education and enjoyment through the interpretation of park resources, values, and primary themes.

Retain the lowest possible level of development to satisfy the needs of a wide diversity of interest.

APPENDIX C: VISITOR IMPACT MANAGEMENT PROGRAM

INTRODUCTION

A major planning and management goal for Arches National Park is to provide for amounts and types of visitor use consistent with management objectives for park resources and visitor experiences. The best way to prevent the degradation of resources or experiences and to avoid costly long-term corrective management is to identify the potential impacts of development before initiating further construction. The Arches VIM program, based on a process developed for the National Parks and Conservation Association (Graefe et. al 1987), will help managers identify and predict impacts and determine visitor carrying capacities for different park resources.

PROCESS OUTLINE AND EXAMPLE

The VIM process is guided by management objectives and standards of acceptable change for key impact indicators. Management strategies are developed to address impacts identified through comparison of existing conditions with the standards of acceptable change. An outline of the VIM process, with an example of how the process can be applied, is shown in the accompanying chart. The description of indicator monitoring has been simplified in the example.

The VIM program will address impact management in backcountry and frontcountry areas. Impact indicator standards and management strategies will be based on the type of resource management and visitor experiences specified by park management objectives. These management objectives may vary for each area of the park. For example, in a backcountry area, where management objectives strive to provide the visitor a sense of remoteness and solitude and where vegetation damage and development are unacceptable, management may opt to redirect visitors to other areas rather than harden or modify the site.

POTENTIAL IMPACT INDICATORS

The VIM program will address three main elements: natural resources (including flora, fauna, soils, and air and water quality); cultural resources (including archeological and historic resources); and visitor use (including distribution, expectations, and preferences).

Impact indicators and acceptable impact standards will vary for different areas depending on established management objectives for those areas. A list of potential resource and visitor experience indicators is provided at the end of this discussion.

IMPLEMENTATION

The VIM program will be initiated at least three years prior to the beginning of comprehensive design for any construction beyond that proposed by this *General Management Plan*. Park staff and consultants will be used to implement the VIM program.

Because of the proximity between Arches and Canyonlands National Parks and the interrelated nature of resources and visitor experience opportunities at the two parks, implementation of a VIM program is also recommended for Canyonlands.

Visitor Impact Management Program Process
(Adapted from Graefe et. al. 1987, p. 12)

PROCESS

EXAMPLE

Review Management Objectives

Review park management objectives and revise as appropriate as part of updating the park's "Statement for Management"
Product: up-to-date statements of resource and visitor experience objectives for specific park areas

At the Windows area, accommodate as much as possible of the increasing demand for visitor use in a relatively structured environment while preserving park resources and a desirable visitor experience

Review Existing Data Base

Identify information required to address management objectives when implementing the VIM program
Product: list of research inventory and data collection needs

Initiate vegetation study and visitor survey

Select Key Impact Indicators

Identify measurable ecological and social variables relevant to management objectives
Product: impact indicator list with units of measurement

Percent vegetation cover (this is one of several impact indicators that would be used)

Develop Standards for Key Impact Indicators

Based on management objectives, describe minimum acceptable conditions for each impact indicator
Product: quantitative statements of minimum acceptable degradation limits that can be monitored

No more than 10% reduction in vegetation cover due to trampling from visitor use

Compare Standards with Existing Conditions

Field assessment of impact indicators
Product: determination of consistency or discrepancy of existing conditions with impact indicator standards

Existing--15% reduction
Standard--10% reduction

DISCREPANCY

Identify probable causes of Impacts

Examine visitor use patterns and other potential causes of impacts
Product: description of causes of discrepancies

Visitors not staying on trails because of inadequate trail definition

Identify alternative management strategies

Examine the full range of direct and indirect management strategies which could be used to correct discrepancies
Product: description of potential management strategies

- (a) improve trail definition through control structures or hardening
- (b) encourage visitors to stay on trails through interpretation
- (c) revegetate damaged areas
- (d) redirect visitors to other areas
- (e) close trail to use

Management decision and Implementation

Implement, and monitor the effectiveness of, management strategies meeting management objectives
Product: action plans and implementation

Combination of (a), (b), and (c) (improve trail definition, use interpretation to encourage staying on trails, and revegetate damaged areas)

MONITOR

Potential Impact Indicators

Natural Resource Indicators

Water quality (e.g. fecal coliform/strep, chemistry, turbidity/sediment load)
Soil compaction, infiltration, bulk density
Erosion (e.g., pedestalling)
Cryptogamic cover
Presence of pest faunal species (e.g., rodents, beggars, bird, ants/insects)
Presence and vigor of small mammals, reptiles, ungulates, and predators (e.g., number of species, number of individuals, population structure)
Percent vegetation cover
Vegetation vigor (e.g., reproductive structures, disease, breakage, age structure)
Vegetation species composition (e.g., exotics, resistant species, woody vs. herbaceous species)
Presence and vigor of sensitive resources (e.g., raptors, threatened and endangered species, unique and rare plants)

Cultural Resource Indicators

Presence of significant undisturbed cultural deposits
Presence of sites possessing sensitive artifacts and/or features
Evidence of illegal surface collection, excavation, or malicious vandalism
Evidence of trailing or trampling through sites
Evidence of graffiti at rock art sites
Degree of structural stability (of historic structures)

Visitor Experience Indicators

Number of encounters with others visitors (e.g. per day, per hour, by location, by size of group)
Amount of conflict caused by encounters with different visitor types (e.g. involved in different activities, using different modes of transportation)
Perception of crowding
Perception of impact on environment (e.g. litter, erosion, graffiti)
Perception of level of development
Perception of noise level
Number of visitor complaints
Number of visitors not returning to an area because of dissatisfaction with changes in management or level of development

APPENDIX D: ROAD SYSTEM EVALUATION

PURPOSE

The purpose of this road system evaluation is to document existing road conditions and uses, and to establish a framework for systematic improvements to the park's roads under the Federal Lands Highway Program (FLHP) and line item funding. This will be accomplished by identifying issues, inventorying the existing road system, classifying all park roads according to their function and use, and proposing solutions to the issues.

The *General Management Plan* (GMP) provides the planning framework and direction upon which this road system evaluation is based. The GMP is being prepared to help fulfill management objectives; resolve a number of parkwide issues; and guide management, use, and development of Arches National Park for the next 10 to 15 years. The primary objectives of the GMP are to protect and preserve the natural and cultural environments; to permit biological, geological, and other natural processes to continue with a minimum of human disturbance; and to provide opportunities for visitors to enjoy and understand the significance of park resources.

FUNCTIONAL CLASSIFICATION

For purpose of functional classification, the routes that make up the park's road system are grouped into two categories: public use roads and administrative roads.

The assignment of a functional classification is not based on traffic volumes or design speed but on the intended use of that particular road or route (refer to the Road System Route Numbers map).

Public Use Roads

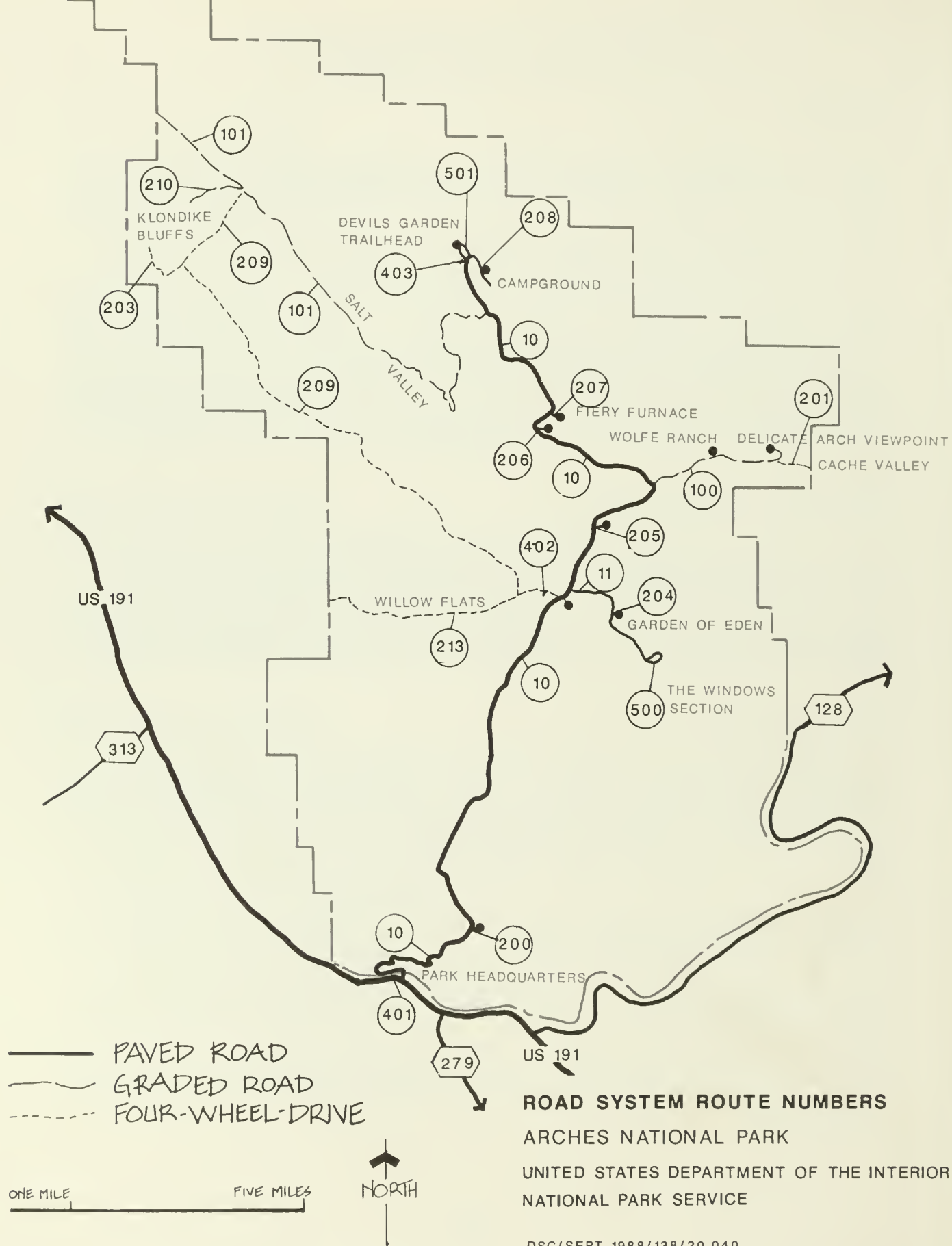
All roads that are intended principally for the use of visitors for access into and within the monument are classified as public use roads. This includes all roads that provide vehicular passage for visitors or access to such representative areas as points of scenic or historic interest, campgrounds, and picnic areas.

Public use roads are subdivided into the following four classes:

Class I: Principal Road/Rural Parkway. Roads that constitute the main access route, circulatory tour, or thoroughfare for visitors.

Class II: Connector Road. Roads that provide access within the park to areas of scenic, scientific, recreational, or cultural interest, such as overlooks, and campgrounds.

Class III: Special Purpose Road. Roads that provide circulation within public use areas, such as campgrounds, picnic areas, visitor center complexes, and concessioner facilities. These roads generally serve low-speed traffic and are often designed for one-way circulation.



Class IV: Primitive Road. Roads that provide circulation through remote areas and/or access to primitive campgrounds and undeveloped areas. These roads frequently have no minimum design standards and their use may be limited to specially equipped vehicles.

Administrative Roads

The administrative road category consists of all public and nonpublic roads used principally for administrative purposes. It includes roads serving employee residential areas, maintenance areas, and other administrative developments, as well as restricted patrol roads, truck trails, and similar service roads.

Administrative roads are subdivided into two classes:

Class V: Administrative Access Road. All public roads intended for access to administrative developments or structures such as park offices, employee quarters, or utility areas.

Class VI: Restricted Road. All roads normally closed to the public, including patrol roads, fire roads, truck trails, and other similar roads.

INVENTORY AND ANALYSIS

This section inventories the existing road system and proposes a functional classification for each road in the park based on information provided by the *General Management Plan*. It also points out environmental considerations, and discusses other items that should be considered during further road planning, design, and construction.

Table D-1 displays the monthly and annual visitation for 1987 as well as the seasonally adjusted average daily traffic volumes for the park's major roads. This data will be shown in table D-3: Road System Evaluation, which should be used for any future road design at Arches National Park.

Table D-2 indicates that during 1987 bus volumes were relatively low. However, it should be noted that the buses primarily travel on the north-south main road, the Windows road, and the first half of the Delicate Arch road. Bus volumes are concentrated during five months of the year, which could lead to periodic conflicts between bus, vehicular, bicycle, and pedestrian traffic.

Table D-3 displays each road's functional classification and the information necessary to make the determination. In addition, other categories are displayed on the table that are to be used during the future planning, design, and construction of park roads. They include design volumes as expressed by average daily traffic, existing road components (terrain, road surface type and width, and speed limit) and any other considerations such as safety and environmentally sensitive resources.

**Table D-1: 1987 Visitation and Seasonally Adjusted
Average Daily Traffic (ADT)
Arches National Park**

<u>Month</u>	<u>North-South Main Road</u>	<u>Windows Road</u>	<u>Delicate Arch Road</u>	<u>Salt Valley Road</u>	<u>Tower Arch Trailhead Road</u>	<u>Willow Springs Road</u>
January	6,015					
February	6,957					
March	22,167					
April	43,965					
May	63,510	26,147	22,039	522	88	344
June	69,019	23,179	25,021	140	63	343
July	71,987	25,647	26,047	180	50	327
August	80,492	30,472	31,298	220	70	317
September	60,969	27,989	25,324	450	102	400
October	28,961					
November	9,904					
December	4,970					
Total	468,916					
Subtotal ¹	345,977	133,434	129,729	1,512	373	1,731
No.1+No.2	2,261	872	847	10	3	11
Above+No.3	700	270	262	3	1	3
Above X 2	1,398 ²	540	525	6 ³	2	6
(Two-way travel)						
Seasonally Adjusted ADT	1,398	540	525	6	2	6

¹Subtotal = peak season visitation (approximately 80% of visitation occurs in May through September)

²No. of days for five month peak season = 153

³Avg. no. of persons/vehicle = 3.23. This assumes that two vehicles/day will exit park via Salt Valley Road. This figure may be high since some vehicles may exit park while others may travel four-wheel-drive road.

**Table D-2: Bus Traffic Volumes
Arches National Park**

<u>MONTH</u>	<u>NUMBER OF BUSES</u>
January	1
February	0
March	2
April	12
May	35
June	28
July	26
August	40
September	39
October	14
November	1
December	0
Total	198
Subtotal ¹	168
No.1 No.2	1
Above X 2	2
(Two-way direction)	

¹SubTotal = peak season visitation (approximately 80% of visitation occurs in May through September)

²No. of days for five month peak season = 153

**Table D-3: Road System Evaluation
Arches National Park**

<u>Rte. No.</u>	<u>Name & Description</u>	<u>Road Segment</u>	<u>Total Length (Miles)</u>	<u>Purpose & Functional Classification</u>	<u>ADT¹</u>	<u>Road Width (ft)/Surf. Type</u>	<u>Cond.</u>	<u>Terrain²</u>	<u>Speed Limit (mph)</u>	<u>Notes</u>
10	North-South Main Road	From US 191 to Devils Garden	17.5	Main park entrance, access to primary park features & developed areas	I 1,398	20 paved	Good to fair	M-R	45	20 MPH for some sections, shoulders breaking off at Whoa Hill
11	Windows Rd	From N-S main road to parking area	2.1	Access to Windows section sightseeing & hiking	II 540	20 paved	Good	R		Dangerous pulloffs through Cove of Caves section
100	Delicate Arch Rd	N-S main road to parking area	2.5	Access to Wolfe Ranch & Delicate Arch, sightseeing	II 525	18 dirt/gravel	Poor	R	20	3 wash crossings subject to flooding at Wolfe Ranch
101	Salt Valley Rd	From N-S main road to west boundary	9.1	Primary access to Tower Arch, part of loop for 4WD travel & primitive entrance/exit to/from park	II 6	10-16 dirt	Poor	R-F	25	Blackbrush along first 3 miles of road, portion of road located in Salt Valley wash, part of road visible from portions of N-S main road
200	Panorama Viewpoint	From N-S main road to parking area	0.2	Viewpoint	III 200	20 paved	Good to Fair	R		
201	Cache Valley Rd	From Delicate Arch Road to E boundary	0.7	Access to roads outside park	3	8 dirt	Very Poor	R		
203	Tower Arch Trailhead Rd	From Rt. 101 to end of loop	1.0	Access to trailhead	2	9 dirt	Poor	R		Raptor nesting area
204	Viewpoint	From Windows Rd to end of loop	0.2	Viewpoint & walking area	III 160	20 paved	Good	R		
205	Salt Valley Overlook	From N-S main road to end of loop	0.3	Viewpoint	III 200	20 paved	Good	R		

<u>Rte. No.</u>	<u>Name and Description</u>	<u>Road Segment</u>	<u>Total Length (Miles)</u>	<u>Purpose & Functional Classification</u>	<u>ADT¹</u>	<u>Road Width (Ft) Surf. Type</u>	<u>Cond.</u>	<u>Terrain²</u>	<u>Limit (mph)</u>	<u>Speed Notes</u>
206	Overlook	From N-S main road to end of loop	0.3	Viewpoint	160	20 paved	Good	R		Proposed closure (GMP)
207	Fiery Furnace Parking Access	From N-S main road to end of loop	0.3	Viewpoint & walking areas	III 160	20 paved	Good	R		
208	Devils Garden Campground	From Devils Garden loop rd through campground	0.8	Camping	III 120	20 paved	Fair	R	15	Rehabilitation to be completed soon
209	Klondike Bluffs 4WD Road	N. access rd to Willow Spring Rd	11.3	Primitive driving experience, access to Eye of the Whale & Tower arches	IV 3	8 dirt	Poor-Very Poor	M-R		
210	Tower Arch Rd	Rt. 209 to Tower Arch Parking	1.5	Primitive driving experience, access to Tower Arch	IV 3	8 dirt	Very Poor	R		
213	Willow Springs Rd	N-S main road to west boundary	4.0	Primitive driving experience, access to Klondike Bluffs 4WD road & very primitive entrance/exit to/from park	IV 6	14 dirt				Original entrance road to park
401	Arches Res. Area	Off N-S main road	0.4	Administrative	V 25	20 paved	Fair	F		15
402	Mixing Table Spur Road	Off Willow Springs Rd	0.1	Administrative	V 5	15 paved	Poor	R		
403	Generator Rd	Rt. 501 to generator	0.2	Administrative	V 5	10 gravel	Fair	F		
500	Windows Loop		0.6	Access to Windows trailhead & parking & parking	III 208	15 paved	Fair	R		One-way road
501	Devils Garden Loop		0.8	Access to campground, trailhead & parking	IV 200	15 paved	Fair	F		One-way road

¹ADT = Average daily traffic (seasonally adjusted)

²M = Mountainous, R = Rolling, F = Flat

ISSUES AND SOLUTIONS

Route No. 10 North-South Main Road

Description. This 17.5 mile paved road is the park's main entrance road and provides primary access to the park's major resources and developed areas. The two travel lanes are 10 feet wide for a total paved top width of 20 feet. The shoulders are dirt and range in width from 0 to 3 feet. The first 4.60 miles of road is in mountains terrain while the remaining 12.87 miles is rolling.

There are a number of connector roads and overlooks off this main road. The sub-base and base are generally in good condition on Route 10, however there is substantial surface cracking and, in a few places, the road has poor drainage, resulting either in slumping or sediment washing onto the roadway. There is a one-mile section at Whoa Hill where total sub-base and base failure has occurred. The shoulders in many places do not really function as such because they are dirt and provide little support. a chip-and-seal project was completed in August 1986.

There are several sections, particularly in the Courthouse Towers, Whoa Hill (between the Panorama Point Road and the Delicate Arch Road intersections) and Fiery Furnace areas where pullouts and connector road sections do not have proper sight distance from the main park road. In addition, the capacity, siting or design of some pullouts are not appropriate to the volumes and types of vehicles using them. Some of the trails and viewpoints served by pullouts and parking areas are not accessible to handicapped visitors.

Solution. It is recommended that the park's 10-238 Package No. 145 be implemented. The entire length of North-South Main Road as well as connector roads and overlooks including Routes 200, 205, 207, 208, 501, and 401 would be rehabilitated and a final 2-inch bituminous surface would be applied. Rehabilitation would correct surface cracking, drainage, and unstable shoulders. Existing and projected traffic volumes and the types of traffic do not warrant widening the roadway. However, as a part of the rehabilitation package, the shoulders should be formalized using a gravel surface. An approximately one mile section of Whoa Hill would be reconstructed by scarifying the surface, replacing the sub-base and base, treating the sub-base with lime, adding drainage structures and fill, and applying a 2-inch bituminous surface. The entire road should also be striped and signing updated where necessary. In addition to this package, all pullouts and intersections would be evaluated to determine where improvements would be evaluated to determine where improvements are needed and appropriate design/construction completed. Route 206 (Salt Valley Overlook) would be closed. Finally, Route 208 (Devil's Campground road) requires intensive drainage work and some camper pad redesign before a 2" final surfacing is applied.

Route No. 11 Windows Road

Description. This 2.1 mile paved road provides access to the Windows section of the park. It is constructed to the same standard (10 ft. travel lanes, 0-3 ft. shoulders) as the North-South Main Road. This popular area is used for sightseeing and hiking due to the concentration of arches. In addition, the Viewpoint (Rt. 204) and the Windows Loop (Rt. 500) connect to this road. The sub-base and base are in good condition, however there is substantial surface cracking and, in a few places, there is poor drainage. The

shoulders in many places do not really function as such, they are dirt and provide little support. This road was chipped-and-sealed in August 1986.

The section of road near Cove of Caves has a steep uphill/downhill grade and numerous informal pullouts. These informal pullouts are dangerous not only because they are on steep grades, but also because they have no taper into and out of the pullout, and damage to roadside vegetation is occurring.

It is recommended that the park's 10-238, package No. 145 be implemented. This road along with Routes 204 and 500 are a part of the North-South Main Road package. Improvements would be the same: rehabilitate at same roadway width, overlay with 2" bituminous final surface, formalize gravel shoulders, and stripe. In addition, should parking and informal pullouts would no longer be allowed; disturbed areas would be revegetated.

Route No. 100 Delicate Arch Road

Description. This 2.6 mile unpaved (partially graveled) road provides access to the Wolfe Ranch and Delicate Arch trailhead, and the Delicate Arch Viewpoint. Traffic on this road had grown proportionately with overall increases in travel at Arches and, in fact, carries as much traffic as the Windows Road which is paved. The route is dusty, "wash-boarded, "narrow, winding, and, in some places, poorly drained. Frequent maintenance is required. Delicate Arch Viewpoint at the end of the road is the only opportunity to see Delicate Arch for visitors who do not or cannot hike. Buses cannot drive farther than Wolfe Ranch because of the stream level crossing at Salt Valley Wash. This precludes most people on tours, including many senior citizens, from seeing the most publicized arch in the park. Once visitors in standard vehicles enter the parking area at the viewpoint, their cars can be seen by hikers who have reached Delicate Arch, thereby detracting from the impressive natural scene.

Another issue is flooding. Near Wolfe Ranch, the road crosses three washes--Salt Valley, Salt, and Winter Camp. All drain large areas, converge just below the ranch, and have flash floods. For six weeks in the summer of 1984, the road was closed because of washouts and mud. Visitors have been stranded in their vehicles. A new road crossing for Salt Valley Wash to be to be designed by the Federal Highway Administration (FHWA) has been deferred from 1986 to 1988. However, FHWA has recently completed a hydraulics study which will precede the design/construction project. A floodplain determination is necessary before any design and construction of bridges can begin at the Salt and Winter Camp washes.

Solution. Delicate Arch Road would be paved to the proposed new Delicate Arch Viewpoint parking area, and three bridges would be constructed across the washes to facilitate access to Wolfe Ranch and Delicate Arch Viewpoint. These actions would prevent road closures due to flooding, and reduce maintenance. The existing alignment would be maintained as much as possible and built to the same width standard as the North-South Main road and Windows Road. It would be designed at a 25 mph standard, thereby minimizing cut and fill and retaining a quality driving experience.

Route No. 101 Salt Valley Road and Route No. 203

Description. This grade road, beginning near Devils Garden and exiting the park 9.1 miles northwest at the head of Salt Valley leads to Klondike Bluffs and the tower Arch trailhead. It provides the only unpaved two-wheel-driving experience in the park other than the Delicate Arch road. Route 203, the Tower Arch trailhead road, leads from the Salt Valley Road one mile to the trailhead. Road conditions and weather permitting, these routes are accessible by automobile. A few visitors may leave the park via the Salt Valley Road and drive the remaining 10 miles to highway 191, and others with four-wheel-drive vehicles use this as part of a loop drive. Relatively few visitors--perhaps only one percent--travel here compared to other sections of the park. For about 2 miles, Route 101 is in the channel of Salt Valley wash. Washouts occur here, and vehicles could be damaged and/or stranded. Overall the road is narrow, "wash-boarded" in ares, dusty, poorly drained and recessed well below ground level in many places.

Solution. It is recommended that both roads be maintained at their existing standard. Established use patterns show that this level of maintenance is appropriate and no major improvements are necessary.

Four-Wheel-Drive-Roads--Route Nos. 209, 210, and 213

Description. There are three primitive roads n Arches, two starting near Balanced Rock picnic area. One, the original monument entrance road, leads east 4 miles where it exits the park near Willow Spring. The second is the 11.3 mile Klondike Bluffs four-wheel-drive road which leads northwest and ends at the Salt Valley road. The third road is a spur on the Klondike Bluffs four-wheel-drive road which proceeds 1.5 miles to a trailhead near Tower Arch.

These roads provide the only true primitive driving experiences in the park.

Solution. It is recommended that these roads be managed a primitive four-wheel-drive roads with little or no maintenance required.

Administrative Roads--Route Nos. 402 and 403

Description and Solution. The Generator Road (Route 403) should be maintained as needed and continue to function as an administrative road. The Mixing Table Road would be re located outside the park.

Unless there is another use for the road, it should be eliminated.

APPENDIX E: TRAIL STANDARDS

Class A Trails (All-visitor accessible)

These trails have the highest maintenance standards and first maintenance priority. Class A trails are constructed and maintained for highly concentrated visitor use by visitors of all abilities, including those restricted to wheelchairs. These trails normally provide access to major visitor attractions. The surfaces are of smooth cement, asphalt, or soil cement, and they contain major structural elements such as bridges, wooden walkways, metal culverts, puncheons, drainage aids, railings, steps, mortared or dry rock retaining walls, etc. No cross-trail drainage structures except broad channel dips are allowed. Minimum tread width for this class of trail is 5 feet to accommodate wheelchairs; maximum width will be as visitor use dictates. Vegetation is cleared 1-1/2 feet beyond the tread margin.

Class B Trails (Primary)

Class B trails are improved and maintained for heavy visitor use by visitors of average physical abilities. These trails normally provide access to major visitor attractions. They are highly developed and contain some structural elements such as bridges, metal culverts, puncheons, drainage aids, railings, steps, mortared or dry rock retaining walls, etc., to maintain uniformly high trail standards. Trail tread is maintained at a high standard for convenience and comfort, utilizing nonnative aggregate wherever native soils prove inadequate to sustain heavy visitor use. The tread is uniformly smooth and free of variations and rock and root protrusions, and composed of fines no larger than 1 inch in diameter. Slickrock tread may have natural variations. Minimum tread width is 24 inches; maximum width will be as visitor use dictates. Vegetation is cleared 1 foot beyond the tread margin.

Class C Trails (Secondary)

Class C trails are maintained for heavy to moderate use by inexperienced visitors of intermediate ability. These trails reach important visitor attractions and provide access to other trails. The trail tread and structural elements such as water bars, rock culverts, rock steps, retaining walls, etc. are made with native materials as a general rule, although such structures as ladders and handrails may be made of other material where deemed necessary for visitor safety. The trail tread is relatively smooth and free of extreme variations and abrupt rock and root protrusions higher than 2 inches. Slickrock tread may have natural variations. Minimum tread width is 18 inches; maximum width is 24 inches, except for short sections along a precipice, steep hillside, or other hazardous areas where wider treads may be necessary to provide for user safety. Short sections of the trail may be cairns over slickrock or along wash bottoms, etc. Vegetation is cleared 6 inches beyond the tread margin.

Class D Trails (Semiprimitive)

Class D trails are maintained for moderate to light use by visitors of intermediate to high ability and experience. Trail development is limited to the minimum necessary to maintain trail tread and visitor safety. The tread may have moderate variations and abrupt rock or root protrusions higher than 2 inches but lower than 8 inches. The tread is composed of native materials only. As a general rule, structural work such as water bars and short retaining walls are constructed of local native material, although ladders may be made of other materials where deemed necessary for visitor safety. The trail tread width is maintained at an 18-inch minimum/maximum width, except for sections along precipices, steep hillsides, and other hazardous areas where wider treads may be necessary to provide for visitor safety. Long sections of the trail may be cairns over slickrock or along wash bottoms, etc. Vegetation is cleared to the edge of the tread margin.

Class E Trails (Primitive)

Class E trails are maintained as primitive marked routes for light use by visitors with wilderness experience ability. No tread is established or maintained and no structural work is attempted. These trails require minimal maintenance such as minor brushing and rock cairns where necessary to establish the route and provide for visitor safety.

APPENDIX F: VISITOR CENTER FUNCTIONS AND SIZE REQUIREMENTS

FUNCTIONS

The primary function of the proposed visitor center will be information and orientation. In-depth interpretation will be on site. The visitor center will contain the following:

Entryway panels: Panel accessible on a 24-hour basis will provide basic information, orientation, park brochures, emergency instructions, and regulations.

Lobby:

Information desk—NPS personnel will provide information and assistance.

Trip planning—The objective will be to make very clear the options and amount of time and effort needed to see each combination of features, and the different standards and modes of access involved. Travel selection exhibits will cover primarily Arches National Park. Canyonlands National Park will be covered to the extent of letting visitors know what the park has to offer, how that contrasts with Arches, and where to go to receive in-depth trip planning assistance.

Geographic orientation—A fairly large single-relief model of Arches National Park will orient visitors to the park's geographic features.

Regional orientation (optional)—A graphic covering either the Colorado Plateau or the Four Corners area will show the other recreational opportunities in the region.

Safety/survival exhibit—A highly visible exhibit will introduce visitors to the principles of safe and resource-conscious backcountry travel in desert country. The exhibit will deal with water, heat/cold, walking and climbing on slickrock, using maps, discomforts and hazards, etc.

Cooperating association sales: The cooperating association will occupy a separate area with its own sales desk and personnel. The sales area will be located where it does not interfere with the information desk functions but close enough that the information desk/sales functions can be jointly operated in the off season. Storage will be limited to immediate sales stock needs.

Exhibit room: The visitor center is not intended to be an object-rich or in-depth museum. Exhibits will be designed to give visitors an overview of park resources and to motivate them to explore the resources first-hand. The two most important topics to cover are regional geology and erosional landforms.

Interpretation of regional geology will deal with rock layers, uplift, collapse, and erosion along folds, faults, and collapsed salt intrusions. This might be handled using a combination of exhibits and audiovisual media, possibly utilizing computer-generated or animated images.

Interpretation of erosional landforms will deal specifically with the geomorphic varieties and examples of different surface features—five kinds of arches, fins, needles, etc. This topic could be handled by artwork.

If space and funding permit, the ecosystem theme could be covered. This theme is interpreted in several plateau parks and the literature covers it well, so it is an optional topic.

Audiovisual/auditorium: The program could take a mood-setting approach using visual imagery and minimal narrative, or it could take an informative approach and describe the regional geology--or both might be developed and shown on an alternating basis. The auditorium will seat 120 people.

Restrooms: Restrooms will be accessible from outside the building on a 24-hour basis.

Offices (including storage space): Office and related operational space will be provided for visitor center staff.

SIZE

The estimated space required for the proposed visitor center is 9,000 square feet. This estimate is based on a projection of visitor use derived from the following assumptions (the same rationale used to determine parking needs):

The average one-time capacity in the existing visitor center for 1987 was 220 visitors (based on observations of a an average of 22 vehicles, 7 RVs, and 2 buses in the visitor center parking lot at any one time).

There will be a 36% increase in visitation by the year 2006.

Therefore, the average one-time capacity in 2006 will be 300 visitors.

The building size was determined by using the following general NPS minimal space allowance standards:

Lobby (includes sales area)	20 square feet per person
Exhibit room	20 square feet per person
Auditorium	11 square feet per person

The above visitor spaces averaged 17 square feet per person; therefore, 5,100 square feet were estimated for 300 people. In addition, 700 square feet were allocated for restrooms and 1,100 square feet to provide offices and workspace for a staff of ten. This totaled 6,800 square feet. To provide for mechanical space, walls, etc., another 33 percent was added, resulting in 9,000 square feet.

APPENDIX G: COMPARATIVE DEVELOPMENT COSTS

Table G-1 outlines the gross construction costs of the minimum requirements and preferred alternatives. Development proposed in the preferred alternative will only be possible if Congress raises the development ceiling by \$5,880,800 to cover the costs not eligible for FLPHP funding. Development included in the minimum requirements alternative would only be possible if Congress raised the development ceiling by \$2,015,620. No recurring services or contracts in addition to or at a larger scale than those already occurring within the park, such as removal of sewage from vault toilets, are anticipated in the alternatives. None of the actions are anticipated to result in increased revenues for the park.

Table G-1: Construction Costs

Location	Preferred Alternative	Minimum Requirements
Headquarters —roads and parking	install 2 culverts in entrance road	\$37,500*
	elevate sections of main road for flood protection; remove existing spur road between main and service roads	153,800 70,000*
	construct visitor center access road and spurs to CNHA building and library; develop parking for new visitor center and administration building and parking for apartments	319,000
	add second entrance lane and turnaround	25,000
—facilities	construct new 9,000 sq ft visitor center	2,823,600
		lease space for some administrative functions and museum collection outside park (15-year lease)
	construct new entrance station	42,200
		remove apartments and residence 3 from flood-hazard area
—visitor contact/ interpretation	remodel existing visitor center to accommodate all Arches administrative offices	29,700
	add stone facing to some existing buildings	237,200
	add fire protection to library and CNHA building; construct building out of floodplain to house museum collection; ship nondisplay items to Western Archeological Center	100,000
		same as preferred alternative
		100,000

Location	Preferred Alternative		Minimum Requirements
--utilities/flood protection	floodproof potentially hazardous materials at maintenance area	46,800	same as preferred alternative 46,800
	develop new sewage treatment system for new visitor center; modify existing system to accommodate new road	383,000	
	extend water, power, and telephone lines to new visitor center; rehab/replace telephone and radio systems	102,000	rehab/replace telephone and radio systems 73,400
	develop emergency flood warning system and response plan	46,800	same as preferred alternative 46,800
	enlarge and stabilize tributary channel	285,500	
--subtotals		4,702,100	935,200
Main Road (including section to Windows)			
--roads and parking	redesign/relocate pullouts, parking, and signs where necessary for safety; rehab road	5,489,700*	same as preferred alternative 5,489,700*
--natural resources	add barriers to prevent shoulder parking	18,800*	same as preferred alternative 18,800*
--subtotals		5,508,500	5,508,500
Park Avenue			
--trails	reconstruct trail segment to reduce grade near viewpoint	5,000	
--visitor contact/interpretation	replace interpretive signs	4,000	
--subtotals		9,000	0
La Sal Mountain viewpoint			
--roads and parking	add road sign	1,000*	same as preferred alternative 1,000*
	restripe parking area; include handicap-accessible parking spaces	4,000*	

Location	Preferred Alternative	Minimum Requirements
– trails	make trail to viewpoint handicap accessible	4,000
– visitor contact/interpretation	develop primitive route to Courthouse Canyon	15,600
	replace interpretive signs	4,000
	add trailhead for primitive route to Courthouse Canyon	2,500
– subtotals		31,000
Courthouse Towers – roads and parking		
	add crosswalk and pedestrian signs	2,500*
– visitor contact/interpretation	replace interpretive signs	5,000
– subtotals		7,500
Balanced Rock – roads and parking		
	expand and redesign parking, restore existing parking pullout, realign Willow Flats road intersection	80,300*
	add crosswalk and pedestrian signs	2,500*
– natural resources	add barriers to prevent shoulder parking	23,400*
– trails	develop handicap accessible trail to new viewpoint, realign connection to existing trail	13,000
– facilities	relocate picnic sites and toilets, revegetate existing picnic area	18,500
– visitor contact/interpretation	add exhibit	2,500
– administration	reduce size and limit uses of maintenance area	7,500
– subtotals		147,700
		1,000
	same as preferred alternative	2,500*
		2,500
	same as preferred alternative	80,300*
	same as preferred alternative	2,500*
	same as preferred alternative	23,400*
	same as preferred alternative	13,000
	same as preferred alternative	18,500
	same as preferred alternative	7,500
		145,200

Location	Preferred Alternative	Minimum Requirements
Garden of Eden		
--visitor contact/interpretation	replace interpretive sign	1,500
--subtotals		1,500
Windows		
--roads and parking	add crosswalk and road sign	1,800*
	develop handicap-accessible parking spaces	4,600*
--trails	develop handicap-accessible trail to Double Arch	113,900
	add primitive trail around perimeter of Windows area	17,600
--facilities	construct handicap-accessible picnic area and vault toilets	59,600
--visitor contact/interpretation	replace exhibits at both trailheads	5,000
--natural resources	add barriers to prevent trailhead shortcutting	4,300*
--subtotals		209,800
Panorama Point		
--roads and parking	restripe parking area; include handicap-accessible spaces	6,700*
--trails	construct handicap-accessible trail to new viewpoint	3,900
--visitor contact/interpretation	replace interpretive signs	4,000
--natural resources	install barrier to prevent trailhead shortcutting	2,200*
--subtotals		16,800
Delicate Arch Road		
--roads and parking	pave road and construct bridges over 3 washes	1,476,000*
--subtotals		1,476,000
		1,057,000
		1,057,000

Location	Preferred Alternative	Minimum Requirements
Wolfe Ranch --roads and parking	expand, redesign, and pave parking area	gravel existing parking area 21,700*
--trails	define trail to petroglyphs; revegetate secondary trails	8,400
--facilities	relocate and replace vault toilets	50,000
--visitor contact/interpretation	replace trailhead sign and exhibit; add exhibits at ranch and petroglyphs	7,500
--cultural resources	provide physical protection for petroglyphs	1,400
--natural resources	add barriers to prevent shoulder parking and trailhead shortcutting	11,700* 2,900
--flood protection	determine floodplains and prepare emergency flood response plan	45,000
--subtotals		132,700
Delicate Arch Viewpoint --roads and parking	develop new paved parking area; restore section of existing dirt road	enlarge, redesign, and gravel existing parking area 56,200*
--trails	reroute four-wheel-drive road	34,400*
	develop handicap-accessible trail to new viewpoint	17,200
--visitor contact/interpretation	add trailhead exhibit	2,500
--subtotals		56,200
Salt Valley Overlook --roads and parking	remove road and parking area; restore site	37,400*
--subtotals		37,400
		0

Location	Preferred Alternative	Minimum Requirements
Flery Furnace		
—visitor contact/interpretation	replace trailhead exhibits	2,500
—natural resources	add barriers to prevent road shoulder parking and trailhead shortcutting	11,700* 4,300
—subtotals		16,000
Sand Dune Arch trailhead		
—roads and parking	construct new parking; restore existing parking	57,400*
—trails	construct trail to parking; restore section of existing trail	1,600
—visitor contact/interpretation	add trailhead exhibit	2,500
—natural resources	add barriers to prevent shoulder parking and trailhead shortcutting	7,000* 2,300
—subtotals		8,200
Devils Garden loop road and trailhead		
—roads and parking	add turnaround lane on south end of loop road	17,700*
	redesign campground road intersection to accommodate new uses and vehicle turnaround	62,400*
	expand trailhead parking	28,100*
	develop dirt/gravel spur road to new employee residences	12,500
—facilities	construct 2 new employee residences	193,500
	construct visitor contact station	164,700

Location	Preferred Alternative	Minimum Requirements
--visitor contact/ interpretation	provide site for campground host	900
	replace signs	2,500
	relocate campground fee station	1,500
--natural resources	add barriers to prevent shoulder parking	74,900*
--utilities	add sanitary dump station	54,600
	add comfort station at trailhead	235,000
	develop new sewage treatment system	82,400
--administration	improve water storage system	101,000
	soundproof generator housing	3,200
	restrict size of temporary materials storage area	7,800
--subtotals		1,042,700
Devils Garden campground		
--roads and parking	develop parking pullout for added tent sites	9,800*
--facilities	add 10 walk-in tent sites	14,400
	redesign amphitheater	149,800
--utilities	rehab comfort stations	41,200
	improve water distribution system	50,500
--subtotals		265,700
		1,008,900
		17,200
		41,200
		50,500
		108,900

Location	Preferred Alternative	Minimum Requirements
Moab rock art panel		
–trails	construct trail and trailhead (contingent upon development of formal parking)	24,500
–visitor contact/interpretation	add interpretive exhibit	2,500
–cultural resources	add physical protection for petroglyphs	2,400
–subtotals		29,400
Totals		8,991,500
–FLHP ineligible		2,066,700
–FLHP eligible*		6,924,800

APPENDIX H: WORK TO BE PERFORMED BY ADDITIONAL STAFF

Preferred Alternative

Division of Management and Administration

Superintendent GS 12 FTE 1.0 (Grade Increase Only)	To provide supervision and management for Arches National Park, which had over 460,000 visits in 1987. Arches has experienced an average annual increase in FTE visitation of 11% over the five years ending in 1987. This alternative anticipates a budget of 668,100 (1988 dollars) in personnel expenditures, and a FTE of 31.4. This position provides direct supervision to two GS-11s, one GS 05, and one GS 04.
Clerk Typist GS 04 FTE 1.0	To provide clerical assistance for fee collection (Arches National Park collected 386,000 in 1987) time keeping, and the Maintenance Management System.

Division of Interpretation

Chief of Interpretation GS 11 FTE 1.0 (Grade Increase Only)	To provide management for the public information program, which includes 11 presentations per day plus visitor center services for Arches National Park, Canyonlands National Park, and Natural Bridges National Monument. In the preferred alternative, this position would provide direct supervision to 8.6 FTEs and be responsible for a budget of about 170,000.
Park Ranger GS 05/07/09 FTE 1.0 (Grade Increase Only)	The proposed change in grading of this position is intended to allow for upward mobility. The position is designed to allow for the assumption of increased responsibility in assisting with the management of the division. At the full performance level, this individual will assume responsibility for the supervision of most of the field interpretive operation.
Park Ranger (Lead Seasonal) GS 06 FTE 0.7	This position would have a lead roll in the presentation and organization of the summer program. Assistance would be provided to permanent staff in several areas, including the auditing of programs, training of other staff, evaluation of the needs and content of interpretive programs, scheduling, and presentation of guided walks and evening programs.
Park Ranger (Perm. Part-Time) GS 05 FTE 0.8	Position would be responsible for the management of various park collections and archives including all museum storage/collection facilities, library, historical files, photo files, and herbarium. Duties would also include curatorial services for the above collections.

Park Ranger (Seasonal) GS 05 FTE 2.1	Personnel to be used to lead additional tours and increase visitor center desk operations. These positions would eliminate the need to depend on the assistance of Student Conservation Aid program for key operations.
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Park Ranger (Seasonal) GS 05 FTE 0.7	This additional position would allow a visitor center operation of 8:00 a.m. to 6:00 p.m. (March-October). The position would also allow an increase in the frequency and length of guided walks, and a decrease in the dependence on student conservation aids for key interpretive services.
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Division of Resource Management and Visitor Protection

Park Ranger (Perm. Part-Time) GS 05 FTE 0.8	Position would allow for increased patrols in the front and back countries with coverage from 6:00 a.m. to 12 midnight. Increased coverage for search and rescue and other emergency situations would also be facilitated. Resource management duties would include revegetation, tamarisk eradication, raptor monitoring, breeding bird surveys, banding eagles and hawks, and graffiti removal.
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Park Ranger (Seasonal) GS 05 FTE 1.1	Duties for these positions would be identical to those listed above for park ranger GS 05 (permanent part-time).
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Park Ranger (Seasonal) GS 05 FTE 0.7	Position is required for resource management tasks. Responsibilities would include revegetation, tamarisk eradication, breeding bird surveys, raptor monitoring, banding eagles and hawks, and graffiti removal.
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Park Ranger (Seasonal) GS 03 FTE 1.4	Positions are required to perform fee collection duties. Responsibilities include working as a cashier at entrance station and completing shift, deposit, and remittance reports. Increased hours for fee collection would be facilitated.
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Division of Maintenance

Maintenance Mechanic (Seasonal) WG 09 FTE 1.5	Journeyman plumber/carpenters are needed to perform scheduled and emergency, maintenance on park water systems, including all septic systems, plumbing fixtures, and reservoirs, plus systems in personnel quarters, visitor center, and Devils Garden campground. Other plumbing responsibilities include the winterization and dewatering of seasonal buildings, collection of water samples, and maintenance of the chlorination system. Carpentry duties will include the construction of traffic control devices and routed wood trail and road signs, as well as general building maintenance.
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Maintenance Worker WG 06 FTE 1.0	Position would implement a preventative maintenance program on park septic systems, (including operation of the park's sewage pumper), make minor repairs to personnel quarters and other facilities, and assist with more technical repairs. Other duties would include the collection and disposal of solid waste from quarters and visitor center; the maintenance of grounds around park buildings; and the collection of data from and monitoring of the park air quality station.
Maintenance Worker Leader (Seasonal) WG 05 FTE 0.5	Position would be responsible for scheduled trail maintenance at La Sal Viewpoint, Courthouse Towers, Moab rock art panel, Windows, Balanced Rock, Delicate Arch, Fiery Furnace, and Sand Dune Arch.
Maintenance Worker (Seasonal) WG 05 FTE 0.5	Position would to assist WG-05 with trail duties.
Maintenance Worker (Seasonal) WG 03 FTE 0.5	Position would assist with grounds care and solid waste removal from quarters and administrative areas. Assistance would also be provided in pumping vault toilets, trail maintenance, and other related work.
Maintenance Worker (Seasonal) WG 03 FTE 0.5	Position would perform custodial duties at the visitor center and surrounding grounds, and assist with trail maintenance.
Maintenance Worker (Seasonal) WG 03 FTE 0.3	Position would assist with litter removal and custodial duties at the Devils Garden campground, the Wolfe ranch, Balanced Rock, Sand Dune Arch, and the Devils Garden trailhead. Assistance would also be provided to trail maintenance.

APPENDIX I: TRANSPORTATION STUDY

The following study was undertaken to determine the feasibility of implementing a public transportation system at Arches National Park.

PASSENGER LOADING ASSUMPTION

All visitors except those that are handicapped or those staying at the campground would ride a shuttle vehicle from a staging area near Balanced Rock to all points of interest north and east of Balanced Rock for 120 days of the year (mid May to mid September). Seventy percent of total visitation occurs over that four-month period.

Annual park visitation is expected to increase by 30 percent by the year 2000 (from 468,916 in 1987 to 609,600 in 2000).

Annual round-trip passenger loading would amount to approximately 340,000 ($609,600 \times 70 \text{ percent} = 426,720 - 85,344$ or 20 percent who might not choose to ride a bus).

Passenger loading per high use hour (not peak hour) based on August 1987 traffic counts would amount to 270 persons per hour (317 total visitors - 18 campers, - 4 handicapped persons, - 15 or 10 percent who would not take time to ride a bus = 270 persons per hour).

Passenger loading per high use hour in the year 2000 would total 350 (270 plus 30 percent increase).

VEHICLES USED FOR FORECASTING

Rebuilt full size transit bus, capacity 60 persons seated/standing, service life 12 years: capital costs estimated at 90,000

New full size transit bus, capacity 60 persons seated/standing, service life 20 years: capital costs estimated at 160,000

New power unit and trailer transit vehicle, capacity 80 persons seated/standing, service life 20 years: capital costs estimated at 220,000

12 percent interest rate and 10 percent salvage value used for annualized costs

PASSENGER SERVICE ASSUMPTIONS

120 days for 12 hours each day

staging area near Balanced Rock with stops at

Balanced Rock
Fiery Furnace
the Sand Dunes Arch trailhead

the Devils Garden trailhead
the Wolfe ranch
the Delicate Arch viewpoint
the Windows

ROUTING AND VEHICLE TYPE ASSUMPTIONS

Three different routes were analyzed:

a total route from a staging area near Balanced Rock to the Devils Garden trailhead, the Delicate Arch viewpoint, the Windows and return using both 60-passenger buses and an 80-passenger power unit and trail

a route from the staging area to the Devils Garden trailhead and the Delicate Arch viewpoint and return using a 60-passenger bus

a route from the staging area to the Windows and return using a 60-passenger bus

The average operating speed of the vehicles would be 25 miles per hour.

ESTIMATED SYSTEM COSTS - SEE ATTACHED TABLE

Operation and maintenance costs were estimated at 3.20 and 3.40 per mile for the 60 and 80 passenger vehicles, respectively, including labor costs.

The cost per passenger would increase if the estimated passenger loading was less than shown in the table.

The level of passenger loading assumes that costs to operate the system would not deter the amount of ridership.

Separate loops from the staging area to the Devils Garden trailhead and to the Windows would result in lower annual costs than one route serving all destinations (663,862 to 844,874 for separate loops and 821,340 to 1,002,352 for one route using the 60 passenger bus).

The costs do not include support facilities for bus maintenance, bus stops/shelters, comfort stations, driver dormitories, parking at the staging area, and rebuilding the park road system to accommodate anticipated volume of passenger bus use.

PARKING DEMANDS AT STAGING AREA

350 passengers per hour at high use time = 101 vehicles per hour

101 vehicles per hour for 4.0 hours (length of stay estimated by park staff) = 404 parking spaces

Table I-1: Visitor Transportation Service Characteristics

Route	Total Round Trip Capacity/ Season	Headways (Minutes)	Number of Trips Day Season	No. of Miles per Season	Number of Buses Regular Standby	Annual O&M Costs ¹	Total Annualized Costs	Cost/Mile	Estimated Round Trip Passenger Loading per Season ²	Cost Passenger ²
Total loop – 60 passenger bus	468,000	10 ³	65 7,800	226,200	11 2	723,840	907,829 used (DS) ⁴	4.01	340,000	2.67
						723,840	1,002,352 new (DS)	4.43	340,000	2.95
						723,840	821,340 used (SL) ⁵	3.63	340,000	2.42
						723,840	827,840 new (SL)	3.66	340,000	2.43
Total loop – 80 passenger vehicle	547,200	12 ⁶	57 6,840	198,360	9 2	674,424	998,462 (DS)	5.03	340,000	2.94
						674,424	795,424 (SL)	4.01	340,000	2.34
Staging area to Devils Garden – 60 passenger bus	352,800	15	49 5,880	135,240	7 2	432,768	560,145 used (DS)	4.14	175,000	3.20
						432,768	625,584 new (DS)	4.63	175,000	3.57
						432,768	500,268 used (SL)	3.70	175,000	2.86
						432,768	504,768 new (SL)	3.73	175,000	2.88
Staging area to the Windows – 60 passenger bus	352,800	15	49 5,880	41,748	3 1	133,594	190,206 used (DS)	4.56	205,000 ⁷	0.93
						133,594	219,290 new (DS)	5.25	205,000	1.07
						133,594	163,584 used (SL)	3.92	205,000	0.80
						133,594	165,594 new (SL)	3.97	205,000	0.81

¹O&M = operation and maintenance

²Assumes that costs to the user do not deter ridership

<u>Route</u>	<u>Total Round Trip Capacity/Season</u>	<u>Headways (Minutes)</u>	<u>Number of Trips Day Season</u>	<u>No. of Miles per Season</u>	<u>Number of Buses Regular Standby</u>	<u>Annual O&M Costs¹</u>	<u>Total Annualized Costs</u>	<u>Cost/Mile</u>	<u>Estimated Round Trip Passenger Loading per Season²</u>	<u>Cost Passenger²</u>
Staging area to Devils Garden and staging area to the Windows combined – 60 passenger bus	705,600	15	98 11,760	176,988	10 3	566,362	750,351 used (DS)	4.24	380,000 ⁶	1.97
						566,362	844,874 new (DS)	4.77	380,000	2.22
						566,362	663,862 used (SL)	3.75	380,000	1.75
						566,362	670,362 new (SL)	3.79	380,000	1.76

¹10 minutes for 8 hours, 15 minutes for 4 hours

²DS = debt service included; used = rebuilt bus; new = new bus

³SL = straight line depreciation

⁴12 minutes for eight hours, 15 minutes for 4 hours

⁵Assumes that approximately 60 percent or 205,000 will ride to the Windows and that approximately 20 percent of these passengers will also go to Devils Garden.

⁶205,000 to the Windows + 175,000 to Devils Garden

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