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This road system evaluation has been prepared in response to the Surface Transportation Assistance Act of 1982 (Public Law 97-424), which addresses the nationwide need for rehabilitating and upgrading deteriorating roads in the national park system. The funding authorized by this act has enabled the National Park Service to implement a multiyear program – the Federal Lands Highway Program – for phased improvement of individual park road systems. To fulfill the purpose of the act, the National Park Service is conducting servicewide transportation planning.

road system evaluation

may 1990

BRYCE CANYON NATIONAL PARK • UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

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INTRODUCTION

PURPOSE

This document presents the results of a road system evaluation study for Bryce Canyon National Park, including a proposal for road and parking improvements. The study is comprehensive in that all roads in the park are evaluated; however, the primary emphasis is on the major park road – the entrance/Rainbow Point/rim road (route 10) – and associated parking areas.

STUDY BACKGROUND

An "Evaluation of Paved Roads" prepared by the Federal Highway Administration (FHWA, USDOT 1977) concluded that the major roads in the Bryce Canyon needed complete reconstruction. A later study, "Road Inventory and Needs Study" for Bryce Canyon (FHWA 1983), recommended widening the rim road to meet minimum NPS road standards.

A *Transportation/Economic Feasibility Study* (NPS, USDI 1983) prepared by the Denver Service Center evaluated alternatives for the transportation problems at Bryce Canyon. The study concluded that the costs of implementing a full mandatory transit system to serve all park visitors would be prohibitive.

A *General Management Plan* for Bryce Canyon (NPS 1987a) prepared by the Rocky Mountain Regional Office recommends roadway and parking improvements for the park.

A major road project at Bryce Canyon is currently scheduled for construction beginning in 1992, with construction phased over several years.

PROBLEMS AND ISSUES

The roads at Bryce Canyon were constructed in the 1930s. They are in a deteriorated condition, but it may not be readily apparent in all sections because of recent chipsealing, surface patching, and other maintenance resurfacing projects. The roads have corrugated and undulating sections, unequal widths, extensive cracking, potholes, and severe edge failure. Increased intercity tour bus traffic and winter snowplow activities have aggravated the road deterioration problems.

The Rainbow Point/rim road (15 miles) does not meet minimum standards described in the *Park Road Standards* (NPS 1984) for the volume of traffic it carries. Pavement width varies between 18 and 20 feet, and gravel/dirt shoulders range from 0 to 3+ feet. The roadside has numerous steep cuts and fills that lack vegetation and are unsightly or unstable. In the 1930s the road base was 18 feet wide. Shoulders have been widened by maintenance crews with a variety of materials that generally do not meet structural standards, and the widening has contributed to slope stabilization problems. Visually contrasting and inharmonious resurfacing and pothole patches detract from road aesthetics. Surface and subsurface drainage as well as structural support beneath the pavement is inadequate in some areas. Sections resurfaced in the summer of 1986 cracked severely by January 1987.

Several overlook parking areas along the Rainbow Point/rim road have perpendicular parking so that motorists are forced to back into traffic lanes when leaving the overlooks.

This is especially difficult and dangerous for buses and large recreational vehicles (RVs) that comprise about 20 percent of the traffic at Bryce. Several parking areas become congested during the five-month heavy use season. Some parking areas are extremely close to the rim and overlooks, detracting from the visitor experience. An area of particular concern is the Bryce Point overlook, which becomes crowded daily during the peak summer season. Conflicts between bus and automobile parking occur, and traffic flow becomes badly snarled at times.

The rim road primarily provides access to overlooks along the rim, but it also provides, to some degree, a scenic driving experience. Vegetation blocks the limited views of the landscape in some locations along the road. Three connecting trails lack trailhead parking. There are several small unpaved pullouts along the road in areas that have no overlooks.

Issues addressed in this study include the functional classification and physical standards that will guide road improvement and maintenance. The intended use for each road segment is included along with proposed surface type, road width, shoulder width, design volume, and design speed. The study also includes proposals for road relocations, pullouts and overlooks, critical resource concerns, revegetation needs, erosion problems, and potential vista clearing areas.

MANAGEMENT OBJECTIVES

The following management objectives will guide road improvements and maintenance activities:

- Enhance the experience for visitors traveling on the Bryce Canyon road system.
- Encourage leisurely travel through the park.
- Protect critical natural and cultural resources.
- Reduce maintenance needs.
- Maintain and increase safety.
- Facilitate interpretation of park resources.
- Reduce the impacts of facilities next to the canyon rim.
- Protect visitors from vehicular intrusions, both sights and sounds, as part of their viewing experience.
- Minimize adverse impacts of construction activities.
- Protect endangered and threatened species.

- Reduce existing road scars and improve the aesthetics of the road.
- Consider existing and projected visitor use levels and vehicle types.
- Retain the option of implementing a visitor transportation system in the future.



Bryce Amphitheater from Bryce Point



Pink Cliffs from Rainbow Point



Bryce Point parking area



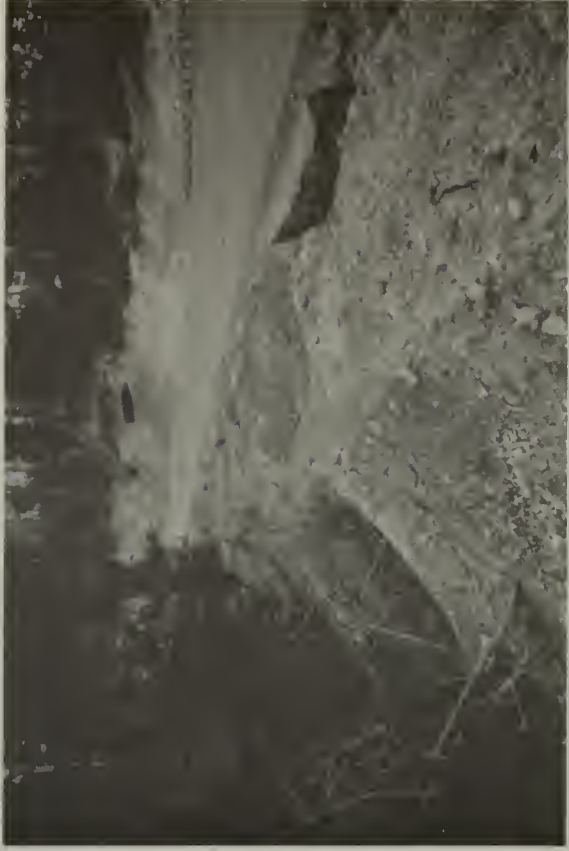
Rim Road in East Creek meadow



Rim Road in Swamp Canyon meadow



Road cut along Rim Road



Shoulder widening on Rim Road



Farview Point overlook



Tour bus on Rim Road



Cracked surface on Rim Road



Informal pullout near Rainbow Point



Natural Bridge



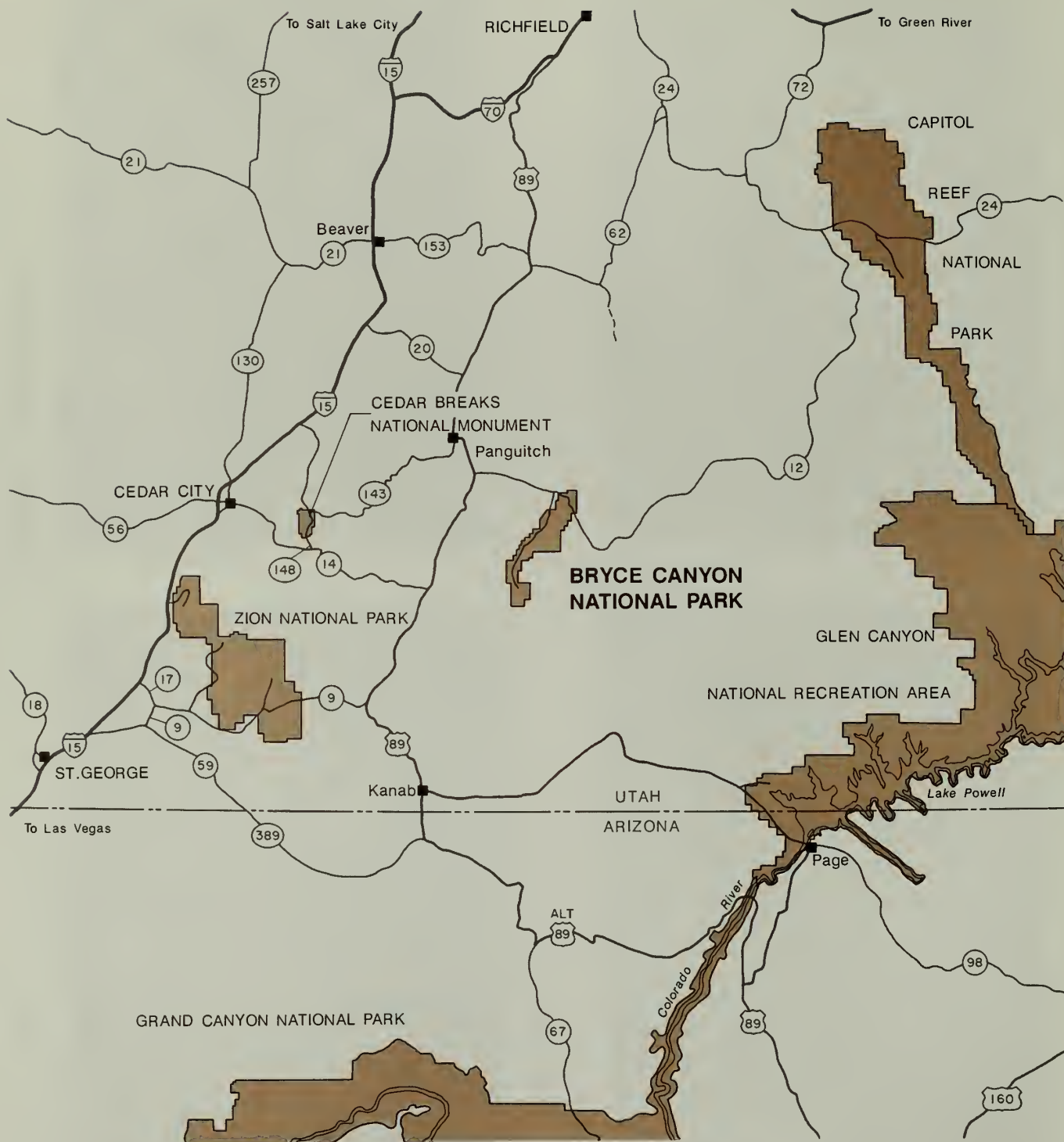
Rim Road at Natural Bridge area



Natural Bridge overlook parking area



Natural Bridge overlook



0 5 10 20 30 Miles

REGION BRYCE CANYON NATIONAL PARK

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DESCRIPTION OF THE AREA

REGIONAL SETTING

Bryce Canyon National Park lies in south-central Utah, a region characterized by high plateaus, mesas, mountains, and canyons. Visitors are afforded spectacular views of distant landscapes and nearby colorful rock formations. Naturally sculpted multicolored amphitheaters and rock "hoodoo" formations may be viewed from the plateau rim.

The park encompasses 35,835 acres extending along the southeastern escarpment of the Paunsaugunt Plateau. The elevation at the park entrance is approximately 7,800 feet, and near the southern boundary it is over 9,000 feet. The park is bordered on the west, south, and southeast by the Dixie National Forest, and the north and northeast by state and private land.

Bryce Canyon National Park is approximately 25 miles southeast of Panguitch, Utah. The northern part of the park lies in Garfield County, and the southern part is in Kane County. Access to the park is from Utah 63, a short spur off Utah 12. Route 12 is accessed from US 89 to the west, 1-70 via Utah 24 to the north, and the Burr trail to the east (see Region map).

NATURAL RESOURCES

Geology and Soils

The predominant rock strata within the park is the colorful Claron formation. This soft calcareous bedrock is composed of clays, silts, and sands cemented by carbonates. These strata contain minerals that provide the rock formation with its various colors of red, pink, yellow, brown, purple, and blue. Many of the soft limey units have been sculpted by wind and water, giving them unusual shapes known as hoodoos. These spires, pinnacles, grottos, arches, and walls have been given such names as the Mormon Temple, Silent City, Hat Shop, and Natural Bridge.

Soils on the plateau surface are generally fine-grained and highly erodible. There is very little topsoil, except in low-lying areas where eroded materials accumulate. The clay/silt soils are poorly drained and tend to hold moisture, generally providing an unstable road foundation. Accumulated moisture causes frost boils and subsequent base and pavement failures. The erosion hazard is high and should be considered in any ground-disturbance activities. The steeper natural slopes and road cuts tend to be unstable, resulting in soil and rock slides.

Vegetation

Two forest types dominate the top of the Paunsaugunt Plateau. In the northern part of the park, between 7,000 and 8,500 feet in elevation, the plateau supports a ponderosa pine forest community. Here ponderosa pine are interspersed with Rocky Mountain junipers. Limber pine grow on the sunny slopes along the plateau rim. The forest generally has an open canopy that provides adequate sunlight and space to support lower-growing shrubs, grasses, and forbs associated with the ponderosa pine community. Examples of the dominant shrubs include greenleaf manzanita, antelope bitterbrush, and mountain lilac.

In the lower depressions along the top of the plateau, the ponderosa pine forest opens into sage meadows. These meadows are of various sizes and support a variety of shrubs, grasses, forbs, and sedges. The dominant plant species in these areas are black sagebrush and rabbitbrush. Other species include gray horsebrush, Colorado rubberweed, and matchbrush.

Above 8,500 feet, the plateau supports a spruce-fir forest community. These stands are rather dense and support a variety of conifers interspersed with stands of aspen. The dominant trees are white fir, Douglas-fir, and quaking aspen. Ravines and other moist areas support blue spruce. The dense tree growth above 8,500 feet reduces the potential for understory vegetation. Shade-tolerant shrub species, such as snowberry, creeping barberry, common juniper, wild rose, and mountain lover, do well in these areas. Some grasses, sedges, and forbs also inhabit this area. Common sedges and grasses throughout the plateau include Indian ricegrass, mutton grass, mountain muhly, and Ross sedge.

Bristlecone pine, thought to be the oldest living plant species on earth, are found at various elevations near the plateau rim. They occupy exposed areas with rocky soils.

Nonnative vegetation has invaded disturbed areas along roadways and may be a potential problem following any ground-disturbance activities. These species include Russian thistle, Russian knapweed, crested wheatgrass, pigweed, cheatgrass, shepherd's purse, bull thistle, bindweed, African mustard, horehound, and English plantain.

Wildlife

Mule deer, gray fox, badger, bobcat, squirrels, chipmunks, and small rodents are found in the forest and meadow communities on the plateau. The previously extirpated elk, through a successful reintroduction program outside the park, have extended their range to include areas within the park, and pronghorn are occasionally seen. Black bear and cougar are known to inhabit the area but are seldom seen.

A variety of songbirds inhabit the park, including the Stellar's jay, Clark's nutcracker, pigmy nuthatch, white-breasted nuthatch, mountain chickadee, hairy woodpecker, red crossbill, gray-headed junco, violet-green swallow, and white-throated swift.

Large common avian predators include the red-tailed hawk, great horned owl, goshawk, Cooper's hawk, sharp-shinned hawk, and raven.

Endangered and Threatened Species

There are no listed threatened or endangered plant species known to occur in the park. Five species are currently under review by the U.S. Fish and Wildlife Service for listing as endangered or threatened. These are Reveal paintbrush (*Castilleja revealii*), yellowish cryptanth (*Cryptantha ochroleuca*), platy penstemon (*Penstemon bracteatus*), Maguire campion (*Silene petersonii*), and paria breadroot (*Pediomelum pariense*). These species are under category 2 which indicates that listing may be appropriate, but additional data is needed. All areas to be disturbed will be surveyed before construction activities begin, and impacts will be avoided or mitigated.

The Utah prairie dog (*Cynomys parvidens*) was reintroduced to the park in 1974. In June 1984, its status was downgraded from endangered to threatened by the U.S. Fish and Wildlife Service. In the park there are several prairie dog colonies adjacent to the road

(see Utah Prairie Dog Colonies map). Occasionally prairie dogs burrow under the road causing maintenance problems. Prairie dogs counted during the spring census in the past three years have averaged 122 animals.

The endangered peregrine falcon (*Falco peregrinus anatum*) nests in the park and is a summer resident. In 1989 active eyries were documented near Paria viewpoint and near Farview viewpoint. The pair near Paria viewpoint produced two young. In addition, a single adult male occupied a territory near Rainbow Point. This location has been an active nesting site in the past and produced young as recently as 1986.

The endangered bald eagle (*Haliaeetus leucocephalus*) occasionally visits the park in the winter, but it does not nest in the park.

Air Quality

The park is designated a class I area under the Clean Air Act. The air quality here is among the best in the nation with occasional periods of regional haze, forest fire smoke, or widely dispersed industrial pollution. Traffic using the road undoubtedly produces some air pollutants, although this has not been monitored.

Water Quality

Water quality is considered good. During periods of heavy rainfall or snowmelt, temporary siltation of waterways results from the highly erodible soils. There are no perennial streams on the plateau in the park; however, there are a number of intermittent streams that generally flow in a westerly direction and drain into the East Fork of the Sevier River. A series of wellheads on the plateau provide groundwater for the park's consumptive uses.

Floodplains and Wetlands

Park roads are excepted from compliance with Executive Order 11988 "Floodplain Management" under NPS procedures for implementation. None of the parking areas addressed in this study are in floodplain areas.

Several palustrine wetlands (wet meadows) occur along the entrance/rim road. These are near the visitor center, the lodge loop road intersection, and in the East Creek and Sheep Creek meadow areas. The areas support a variety of grasses and sedges.

Visual Quality

Views from the narrow two-lane roadway change from generally flat terrain in the northern half of the park, to rolling in the mid-section, to mountainous in the southern half. The open canopy forest and sage meadows in the northern part of the park provide excellent sight distance and a feeling of openness. As the traveler enters the more dense spruce-fir forest community in the southern half of the park, this feeling of openness is diminished and sight distance is reduced. At several locations the road comes close to the plateau rim, providing views. These views are obscured by vegetation in some areas. Pullouts are provided at viewpoints; some have been constructed and others have been created by visitors. Road



UTAH PRAIRIE DOG COLONIES

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cut scars are common along the mid to southern parts of the park. Some of these road cuts have revegetated since construction of the road in the 1930s, but many of the steeper cuts remain barren, unstable, and a continual maintenance problem.

CULTURAL RESOURCES

According to the park's "Cultural Resources Management Plan" (NPS 1982), the cultural resources of Bryce Canyon are represented in the following themes: *Prehistoric Man, Architecture, Tourism, and Civilian Conservation Corps Activity (New Deal Programs)*.

Archeological Resources

Bryce Canyon has not been systematically surveyed for archeological resources; however, reconnaissance and preconstruction surveys of most road corridors and developed areas have been conducted. The headquarters area was surveyed in 1974 by the Midwest Archeological Center (MWAC). Two archeological sites were identified, but no significant artifacts were found. A more extensive MWAC survey in 1979 located approximately 10 sites and isolated finds along sections of the roadway and near Fairyland, Bryce/Paria, and Rainbow/Yovimpa Point overlooks. A preliminary analysis of materials indicates that some sites may be significant; however, further evaluation is necessary to determine if these sites are eligible for listing on the National Register of Historic Places. Further evaluation of these sites is necessary before construction.

Historic Resources

Historic resources at Bryce Canyon include districts and structures related to early development of the park. The Bryce Canyon Lodge Historic District is a national historic landmark. The old residential district has been determined eligible for listing on the National Register. Individual structures determined eligible include the old administration building, the Rainbow Point comfort station, and the Rainbow Point overlook. In May 1987 the Bryce Canyon National Park Road System (including the entrance/rim road and associated overlook spur roads) was determined eligible for the National Register (NPS 1987b). In making the determination, the Keeper of the National Register made the following comments:

The Bryce Canyon National Park Entrance/Rim Road is significant under criterion A for its major role in the development of the park for public recreation and tourism in the period, 1923 to 1935. The road was begun by the Forest Service in 1923 and, from 1930 to 1935, was improved and extended south along the canyon to provide access to scenic vistas and points. It furthermore was influenced by the Utah Parks Company and the Union Pacific Railroad's broader efforts to foster tourism through a tour loop road that was completed in 1930 and connected the national parks and monuments in southwestern Utah and northwestern Arizona.

The placement of the roadway away from the edge of the rim, the design of a main road with spur roads and pullouts to provide access to scenic vistas and points, and the minimal impact that construction had on vegetation and terrain also reflect the distinctive direction and policy of landscape design carried out at Bryce during its early development as a national park. Although sections of the roadway have been widened since the 1930s, the spur road to Sunset Point relocated, and a 1.25 mile segment realigned to bypass the lodge area, the c. 20-mile Entrance/Rim Road overall retains a high degree of historic integrity, particularly of location, setting, design, feeling, and association.

VISITOR USE

The primary visitor experience at Bryce Canyon is viewing the formations from a series of overlooks on the canyon rim. Other visitor activities include photography, hiking, horseback riding, camping, picnicking, and participating in interpretive programs. Bicycling is relatively limited.

Annual park visitation increased slowly between 1972 and 1982 from 338,100 recreational visits to 411,500 recreational visits. As shown below, between 1982 and 1987, recreational visits increased dramatically to 718,300, and in 1988, they rose to 791,300.

Year	Recreation Visits
1982	411,500
1983	472,600
1984	495,100
1985	500,800
1986	578,000
1987	718,300
1988	791,300

Based on visitation growth for the last 15 years; in the year 2000, visitation is projected to be 995,000, or 1.4 times 1987 visitation, and in 2010, it is projected to be 1,121,000, or 1.6 times the 1987 level. This forecast is based on an optimistic economic outlook.

Bryce Canyon is a seasonal park, although as in all rurally located areas, off-season use has been increasing somewhat. Following is a monthly breakdown for 1988, showing percent of annual visitation.

Month	Recreation Visits	Percent
January	4,817	0.6
February	7,277	0.9
March	17,112	2.2
April	42,493	5.5
May	86,275	10.2
June	124,453	15.7
July	160,175	20.3
August	149,395	18.9
September	99,596	12.7
October	73,800	9.4
November	17,300	2.3
December	8,656	1.2

Eighty-one percent of the visits occurred from May through September. From 1972 to 1974, about 85 percent of the visits occurred during this same period. In the year 2000, 80 percent of annual visits are expected in these traditional busy months. As indicated in the data above, the peak season occurs between Memorial Day and Labor Day, although the months of May and September are also very active.

Another important visitor use characteristic for road planning is the type of motor vehicle. A significant proportion of the traffic is tour buses, RVs, and automobiles pulling trailers. Based on a 20-day sample during the heavy use season in 1986, the following sizes of vehicles are entering Bryce Canyon:

Length (in feet)	Percent
1-17 feet	30.1
17-25	56.9
25-49	11.2
49+	1.8

These figures include vehicles pulling trailers. Most vehicles in the 17- to 25-foot range are less than 20 feet (standard size automobiles). From this data and previous surveys (NPS 1983), it is estimated that about 20 percent of vehicles at Bryce Canyon are oversized (RVs or buses more than 20 feet long). Visitors are required to leave their trailers in the main developed area at the campgrounds or visitor center; however, buses and RVs are permitted on all park roads open to visitor traffic.

Between September 1983 and July 1986, 47 vehicular accidents were reported at Bryce Canyon National Park. Most of these occurred in parking areas and were minor in (see Accident Locations map).

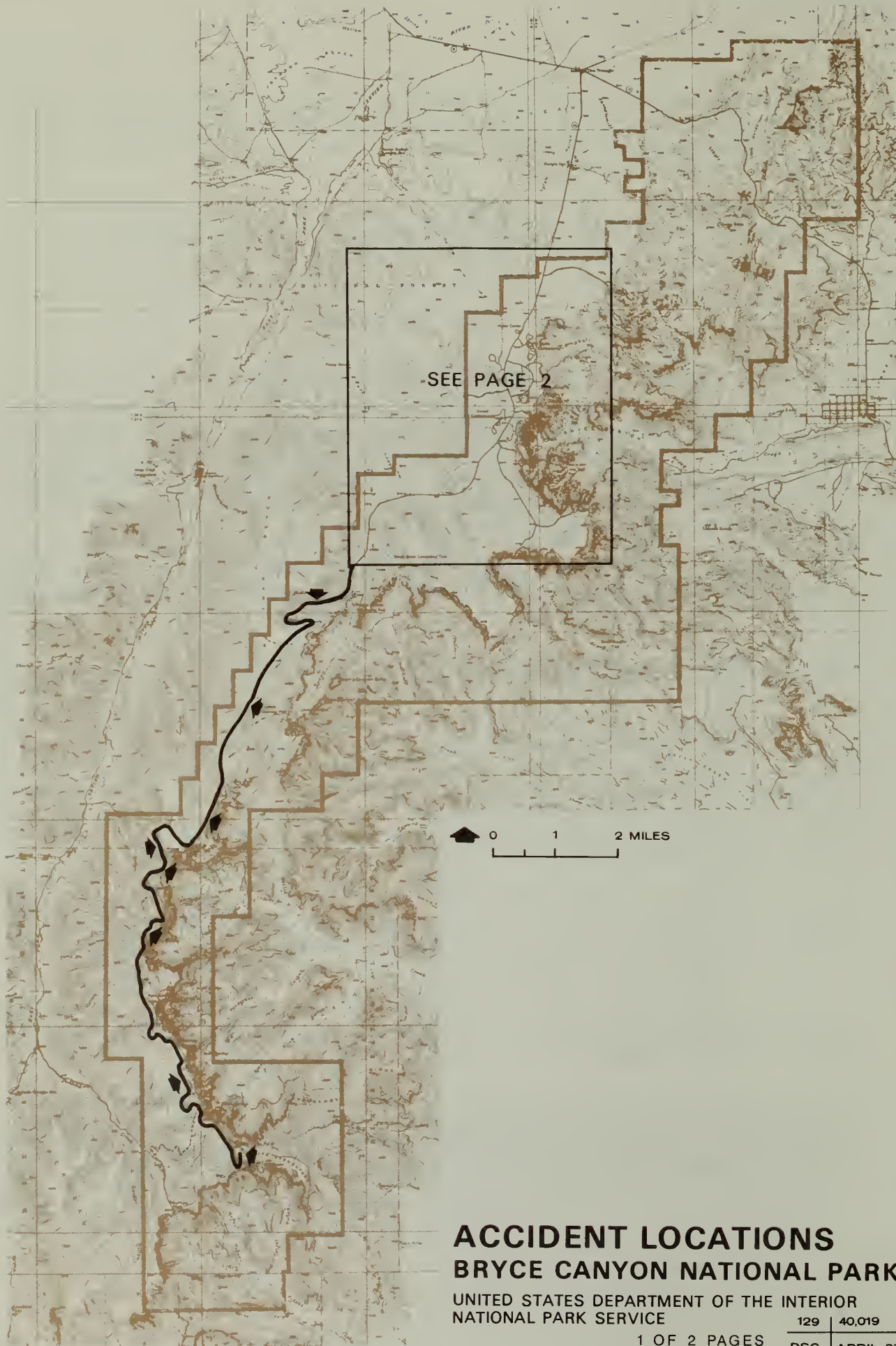
ROAD AND OVERLOOK PARKING INVENTORY

There are 24 roads at Bryce Canyon totaling over 30 miles (see Route Numbers map). The major road, route 10 (18.2 miles), consists of the entrance road (2.8 miles) and the Rainbow Point/rim road (15.4 miles). As shown in table 1, the rim road may be further subdivided into two sections separated at Natural Bridge. Traffic counts show that a significant portion of the visitors do not go all the way to Rainbow Point, and the terrain/road character is substantially different in the two sections. Table 1 summarizes data on length, function, traffic levels, surface type, width, and terrain for each road.

During the summer of 1986, special 48-hour traffic counts were done at 21 selected locations on 11 roads in the park. These data were correlated to the permanent traffic counter at the entrance station to develop seasonal 1988 average daily traffic figures for the major roads (subject to significant visitor use). The results are shown in table 1.

The ADTs are seasonally adjusted, which essentially means they reflect average traffic conditions during the five-month heavy use period. For further information, including annual ADTs, refer to the appendix.

The main visitor center parking area has a capacity of approximately 80 vehicles with little oversize vehicle accommodation. This parking area is heavily used and in recent years has been frequently congested. Most congestion is caused by motorists parking trailers before traveling to Rainbow Point and other overlooks that will not accommodate such vehicles.

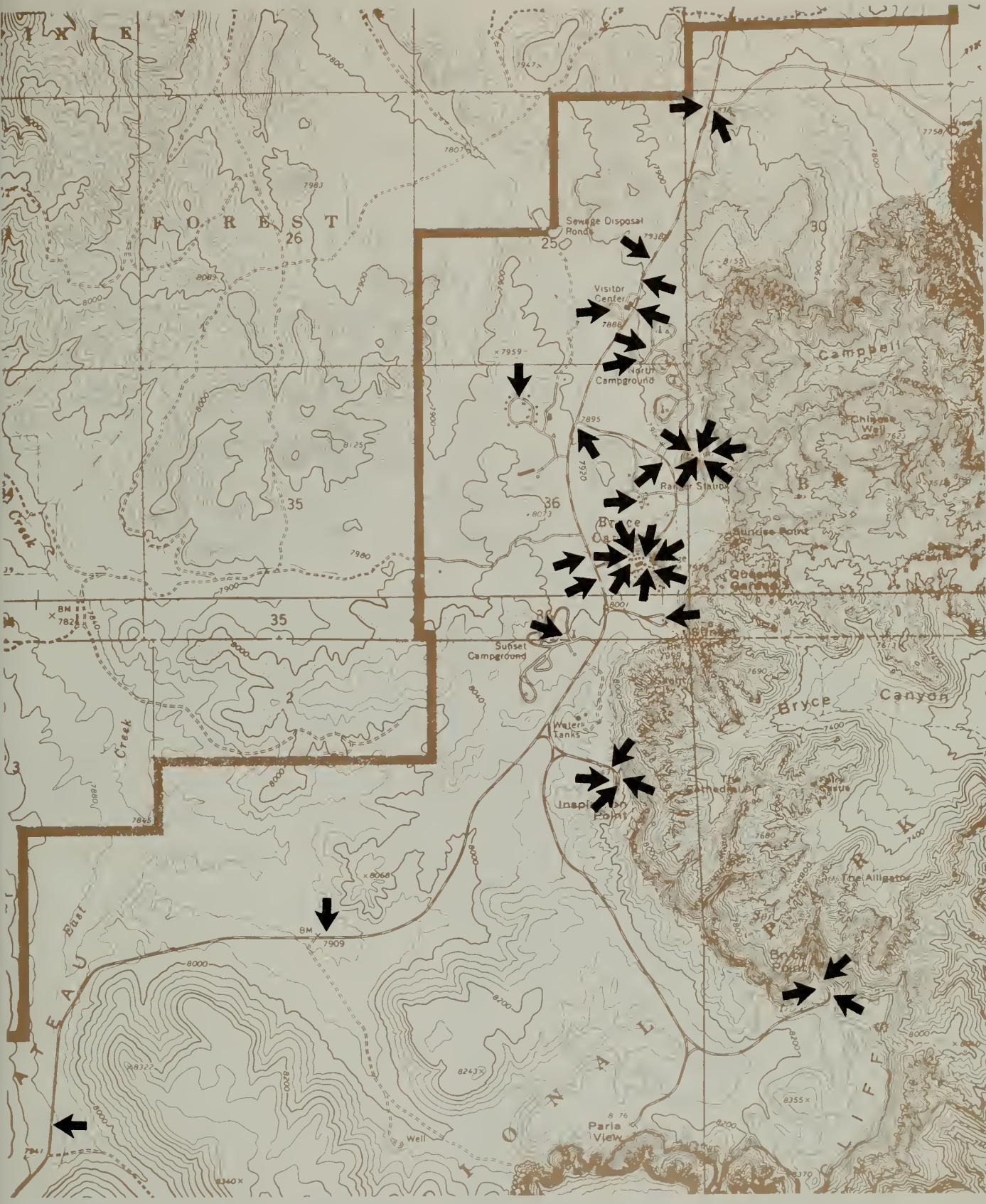


ACCIDENT LOCATIONS BRYCE CANYON NATIONAL PARK

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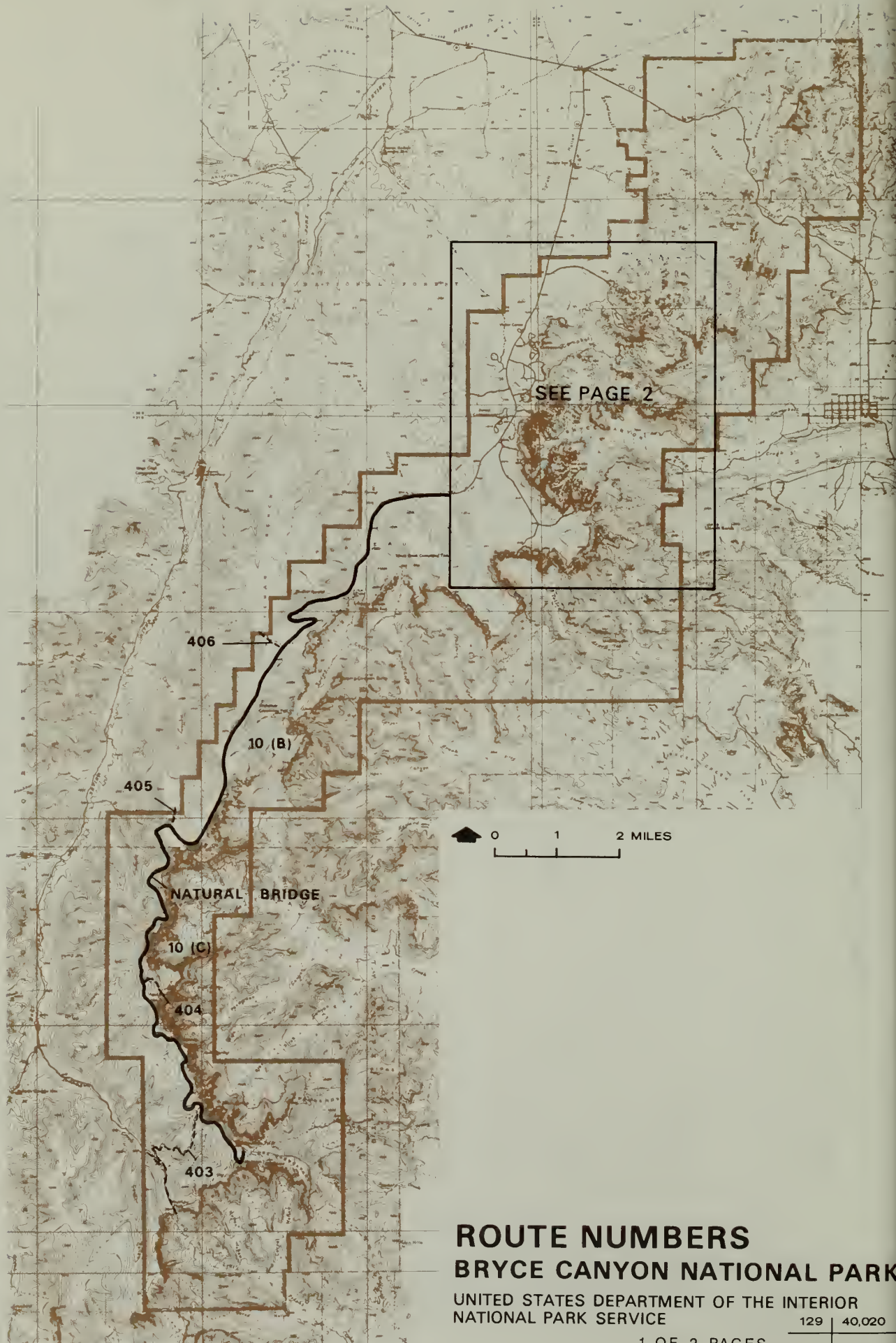
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ACCIDENT LOCATIONS DEVELOPED AREA

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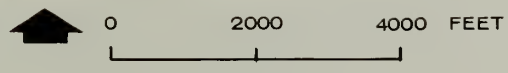
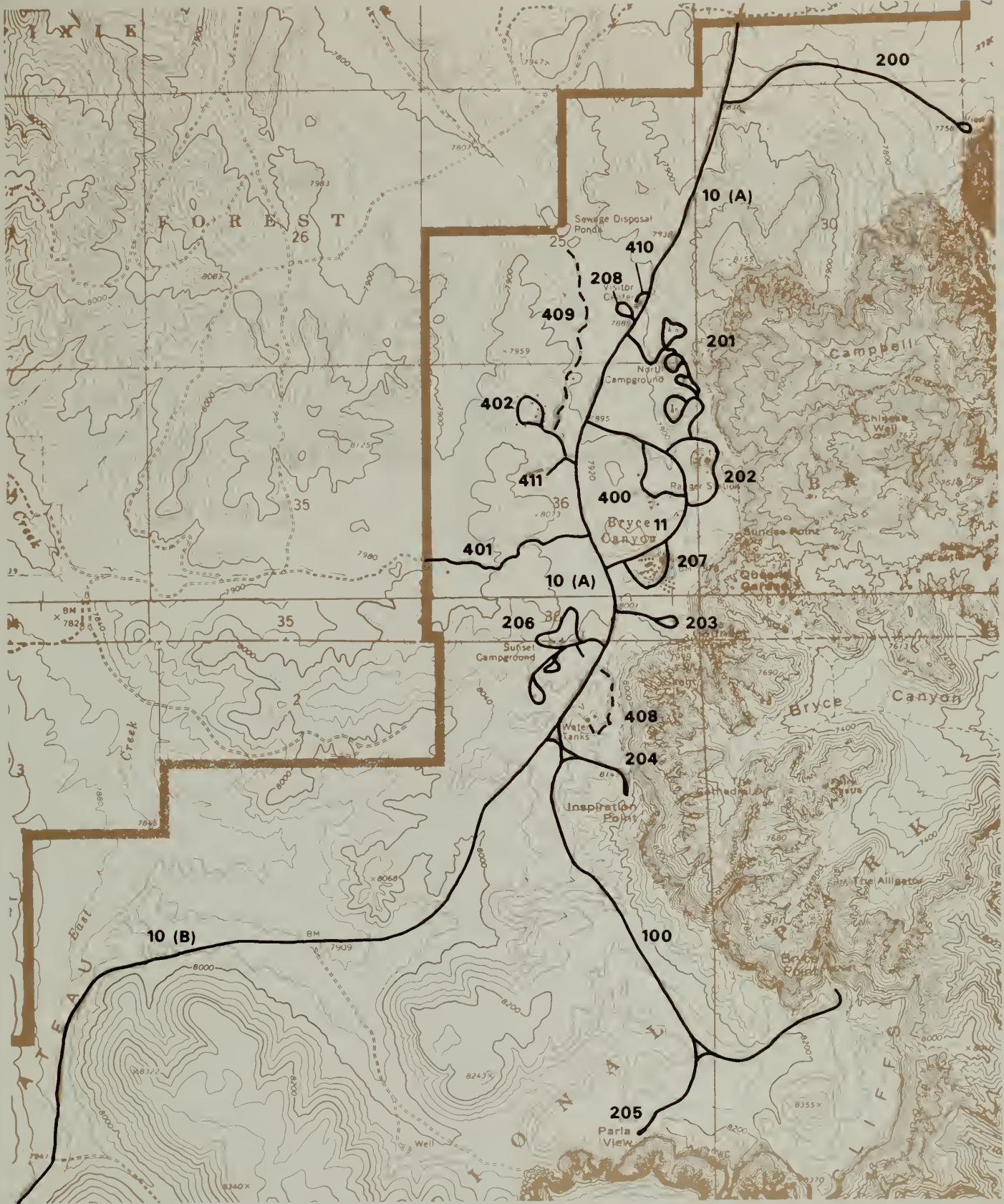


ROUTE NUMBERS BRYCE CANYON NATIONAL PARK

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ROUTE NUMBERS DEVELOPED AREA

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As mentioned previously, most of the overlook parking areas are poorly designed and too small to serve visitors during the peak season. Three of the overlook parking areas – Fairyland, Sunset Point, and Rainbow Point – are well designed, with loop configurations. Near the core area of the park, the Sunrise Point, Bryce Point, and Paria View parking areas have capacity problems and design deficiencies that contribute to congestion. Along the rim road, the most critical overlook parking area problem is at Natural Bridge, which is frequently congested during peak hours. Poor roadway geometrics, including poor sight distances on both approaches, contribute to potential safety problems. The overlooks at Farview Point, Agua Canyon, and Ponderosa Canyon meet current parking size needs because the length of stay is shorter, but they require motorists to back into the roadway. Projected needs will surpass the existing capacities, however. The parking area for Yovimpa Point is used by more long-term visitors than the other rim road overlooks, but if that lot becomes full, adequate parking space is usually available at nearby Rainbow Point. However, there is a shortage of oversize space in this area based on the estimated large vehicle ratio in the park. Table 2 summarizes the current parking space at the viewpoints.

Table 1: Bryce Canyon Road Inventory

<u>ROUTE NO.</u>	<u>ROUTE NAME</u>	<u>MILES</u>	<u>FUNCTION</u>	<u>1988 ADTS</u>	<u>SURFACE TYPE</u>	<u>WIDTH</u>	<u>SHLDR WIDTH</u>	<u>TERRAIN</u>
10(A)	Entrance	2.8	Primary access in park	2890	Paved	23-24'	3'	Flat to Rolling
10(B)	Rainbow Point/Rim (gate to Nat Br)	9.7	Overlook access along rim	1130	Paved	18-20	0-3	Flat to Mountain
10(C)	Rainbow Point/Rim (Nat Br to Point)	5.7	Overlook access along rim	870	Paved	18-20	0-3	Mountain
11	Lodge Loop	1.0	Developed area circulation	820-1570	Paved	22-27	2	Flat
100	Bryce Point	1.9	Overlook access	1300	Paved	22	3	Rolling
200	Fairyland Point	1.1	Overlook access	320	Paved	17-20	1-3	Flat
201	North Campground	1.8	Campground ent. and loops	560	Paved	19 12-20	1-3 0-1	Rolling
202	Sunrise Point Loop	0.5	Developed area circulation	920-1340	Paved	17-23	0-2	Flat
203	Sunset Point	0.2	Overlook access	1560	Paved	21	3	Rolling
204	Inspiration Point	0.2	Overlook access	1010	Paved	21	3	Rolling
205	Paria View	0.4	Overlook access	740	Paved	22	3	Rolling
206	Sunset Campground	1.2	Campground entr and loops	880	Paved	15-18 10	1-2 1	Flat
207	Lodge Parking Loop	0.3	Lodge access and parking	250-2980	Paved	16-26	0-1	Rolling
208	Visitor Center Parking	0.1	Parking	N/A	Paved	N/A	N/A	Flat
400	Concessioner Res Loop	0.4	Housing area	N/A	Paved	16-20	0-2	Flat
401	Utility Area	0.7	NPS and concess utility access	N/A	Paved	21	1	Rolling
402	NPS Residential	0.5	Housing area	N/A	Paved	21-22	0	Rolling
403	Yovimpa Pass	2.8	Patrol and fire management	N/A	Dirt	8	0	Mountain
404	Gravel Pit Spur	0.2	Former gravel pit access	N/A	Gravel	10	0	Mountain
405	Whiteman Cave	0.2	Maint materials storage, patrol	N/A	Gravel	10	0	Flat
406	Whiteman Bench	0.3	Patrol, fire management	N/A	Dirt	8	0	Flat
407	Deep Well	—	Obliterated	—	—	—	—	—
408	Water Tank Spur	0.4	Access to tanks	N/A	Gravel	10	0	Rolling
409	Sewage Pond	0.7	Access to park housing & ponds	N/A	Paved & Gravel	16	2	Flat
410	HQ Administrative Parking	0.1	NPS staff parking	N/A	Paved	21	0-1	Flat
411	Maintenance Area	0.1	Access to NPS maint & housing	N/A	Paved	22-30	1-3	Flat

Table 2: Overlook Parking Inventory

Viewpoint	Auto	Oversize
Fairyland	19	3
Sunrise Point	18	0
Sunset Point	95	20
Inspiration Point	30	6
Bryce Point	21	5
Paria View	13	0
Swamp Canyon	4	0
Farview Point	17	0
Natural Bridge	12	0
Agua Canyon	10	0
Ponderosa Canyon	12	0
Rainbow/Yovimpa Points	49	4

PROPOSAL

This section describes the National Park Service's proposal to solve problems and issues identified in the "Introduction." The road improvements and parking area expansion will fully implement road system concepts identified in the 1987 *General Management Plan* for Bryce Canyon National Park, and no further expansion should occur in the future. If the improved system reaches capacity, the Park Service will implement alternative solutions, such as a visitor transportation system.

FUNCTIONAL CLASSIFICATION

The assignment of a functional classification to a park road is based on its intended use or function, not traffic volumes or design speed (NPS 1984). For purposes of functional classification, the routes that make up the park road system are grouped, based on use, into two categories: public use park roads and administrative park roads.

Public Use Park Roads

This category includes all park roads intended principally for visitor use; i.e., roads that provide access to points of scenic or historic interest, campgrounds, picnic areas, etc. County, state, and U.S. numbered highways maintained by the Park Service are included in this category. Public use park roads are subdivided into the following three classes:

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

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

Class III: Special Purpose Park 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 Park 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. (Note: No roads at Bryce Canyon fit this classification.)

Administrative Park Roads

This category consists of all public and nonpublic roads intended principally for administrative purposes. It includes roads servicing employee residential areas, maintenance areas, and other administrative developments, as well as restricted patrol roads, truck trails, and similar service roads. Administrative park 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 service roads and other similar roads.

Figure 1 illustrates the application of these functional classifications to a hypothetical park road system. Table 3 lists the assigned classification for the roads at Bryce Canyon.

GENERAL DESIGN STANDARDS

The following general guidelines should be considered during the design, reconstruction, and maintenance of Bryce Canyon's road system. To ensure an aesthetically pleasing road, it should lie lightly upon the land, using natural support wherever possible. New heavy cuts and fills should be avoided. In an attempt to avoid extensive cuts and fills, grades may be steeper than typically found on developed roads outside the park. Retaining walls should be used to reduce the height and extent of cut-and-fill slopes. Where visible, walls should be constructed using native-type stone or textured concrete to present a natural appearance. Another option to minimize slope impacts is to use a paved curb and gutter at the toe of the slope. Sometimes the alignment may be shifted slightly to reduce impacts. In certain places, hydraulic scaling might work. These and other slope stabilization options will be applied as appropriate for specific site conditions.

The roadway should be of the highest design quality in terms of blending the traveled surface, shoulders, and ditches into the surrounding environment. Wherever practicable, the color of materials used in road construction should harmonize with the general character of the landscape. Gravel and paving materials used for construction and road repair should blend with the park environment. Therefore, these materials must be reasonably available in the future. Cut-and-fill slopes should be well-rounded and warped at the ends for transition, and properly seeded, fertilized, and mulched for early recovery and to control erosion. Unpaved shoulders on paved roads should be stabilized grass (50 percent aggregate and 50 percent topsoil supporting native grass or other herbaceous plants). Backslopes should be constructed for roads to minimize erosion, slope failure, and ditch blockage, and to maximize revegetation. A maximum maintainable slope in other than bedrock is 2:1 (horizontal to vertical). A 3:1 slope is preferred, where practicable.

Whenever a road is relocated, materials of the old roadbed may be used, providing it is obliterated and revegetated to restore a natural appearance.

To phase out the continuation of backcountry utility line maintenance/access and associated scars, utilities should be buried underground within the road corridors.

Guardrails or guiderails should only be installed at points of unusual danger such as sharp curves or steep embankments. The criteria for installing guardrail on high-speed highways do not apply to the relatively low-speed travel conditions at Bryce Canyon. Guideposts should be used sparingly if at all. Such structures should be constructed with native-type materials and blend with the rustic architectural theme of the park. Structure design and location should recognize snow-removal methods at Bryce Canyon.

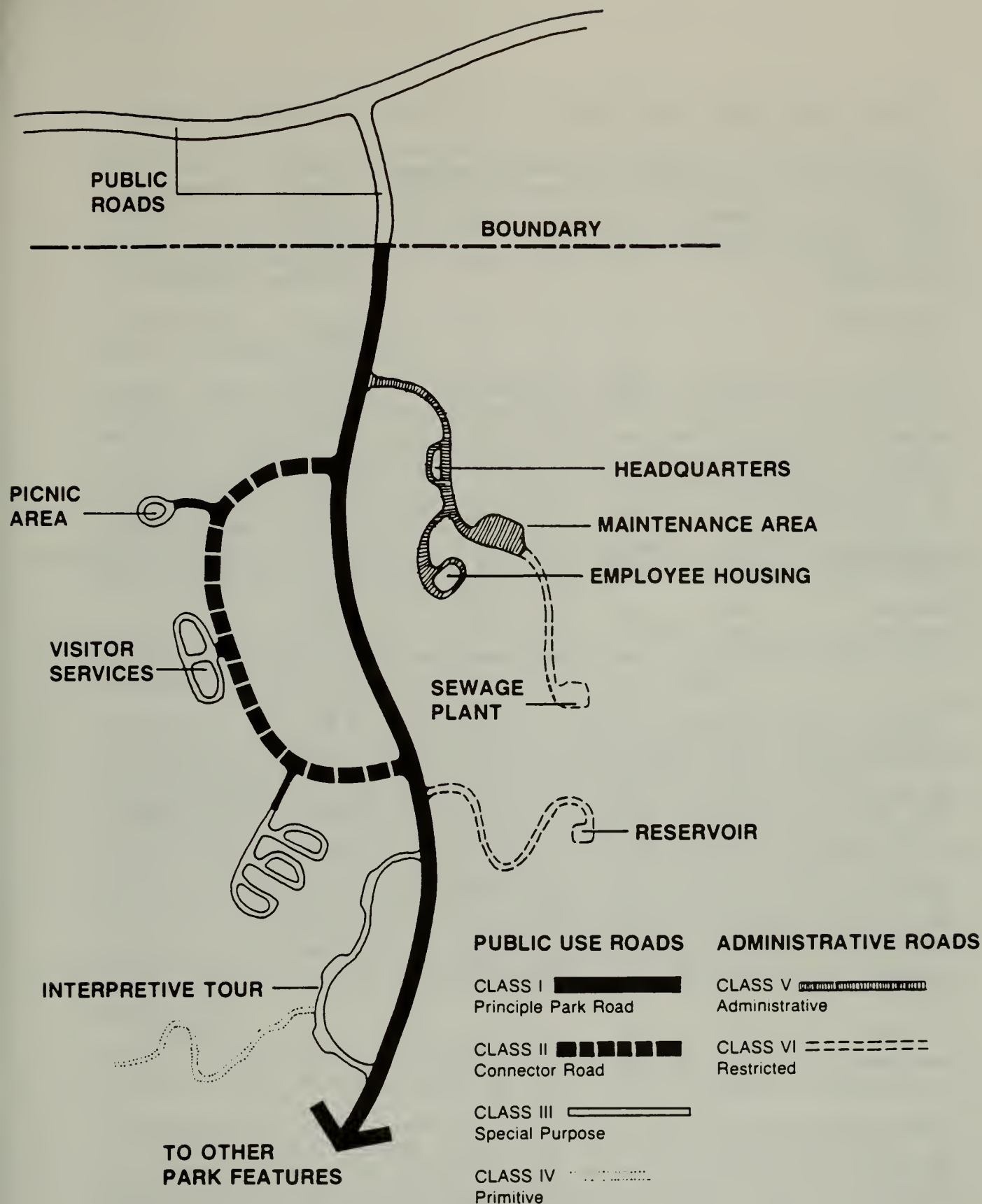


Figure 1
SCHEMATIC SHOWING
FUNCTIONAL
CLASSIFICATION
OF PARK ROADS
NATIONAL PARK SERVICE

Table 3: Bryce Canyon Road Classification and Recommended Design Standard

<u>Route No.</u>	<u>Route Name</u>	<u>Miles</u>	<u>Funct Class</u>	<u>Design Volume</u>	<u>Design Speed</u>	<u>Surface Type</u>	<u>Travel Width</u>	<u>Shoulder Wid/Surf</u>	<u>Comments</u>
10(A)	Entrance (Boundary to gate)	2.8	I	4620	40	Paved	22'	2' Paved & 2' Grass	
10(B)	Rainbow Point/Rim (Gate to Nat Bridge)	9.7	II	1800	35	Paved	22	1 Paved 2 Grass	Portions to be realigned
10(C)	Rainbow Point/Rim (Nat Br to Point)	5.7	II	1390	25	Paved	22	1 Paved 2 Grass	Minor realignment
11	Lodge Loop	1.0	II	1310- 2500	25	Paved	22	1 Paved 2 Grass	
100	Bryce Point	1.9	II	2000	30	Paved	22	1 Paved 2 Grass	
200	Fairyland Point	1.1	II	510	25	Paved	20	2 Paved 1 Grass	
201	North Campground	1.8	III	900	15	Paved	20 12 & 18	3 Grass 0 & 1 Grass	Entrance road 1-way & 2-way loops
202	Sunrise Point Loop	0.5	II	2140	20	Paved	22	3 Grass	Delete sec. between CG and store
203	Sunset Point	0.2	II	2500	25	Paved	22	1 Paved 2 Grass	
204	Inspiration Point	0.2	II	1620	25	Paved	22	1 Paved 2 Grass	
205	Paria View	0.4	II	1180	30	Paved	22	1 Paved 2 Grass	
206	Sunset Campground	1.2	III	1410	15	Paved	20 12 & 18	3 Grass 0 & 1 Gra.	Entrance road 1-way & 2-way loops
207	Lodge Parking Loop	0.3	III	400(W) 4770(E)	15	Paved	20 22	2 Grass 3 Grass	West end of loop East end of loop
208	Visitor Center Parking	0.1	III	N/A	15	Paved	22	1 Grass	To be redesigned
400	Concessioner Res Loop	0.4	V	100	15	Paved	18	1 Grass	
401	Utility Area	0.7	V	100	25	Paved	20	1 Grass	
402	NPS Residential	0.5	V	100	15	Paved	18	1 Grass	
403	Yovimpa Pass	2.8	VI	5	10	Dirt	10	0	Redesign intersection with rim road
404	Gravel Pit Spur	0.2	VI	N/A	-	-	-	-	To be deleted
405	Whiteman Cave	0.2	VI	5	10	Gravel	10	0	
406	Whiteman Bench	0.3	VI	5	10	Dirt	10	0	
407	Deep Well	-	-	-	-	-	-	-	Obliterated
408	Water Tank Spur	0.4	VI	5	10	Gravel	10	0	
409	Sewage Pond	0.7	V VI	25 5	15 10	Paved Gravel	16 10	1 Grass 0	South of res bldg North of res bldg
410	HQ Administrative Parking	0.1	V	N/A	-	-	-	-	To be removed
411	Maintenance Area	0.1	V	100	20	Paved	22	2 Grass	

Roadside signs, whether regulatory, informational, or interpretive, should enhance, rather than detract from, the visitor experience. Information should be clear and unambiguous. Signs should be the minimum necessary and be placed in locations conducive to visitor understanding and decision making. They must conform to the *Manual of Uniform Traffic Control Devices* and the National Park Service *Sign System Specifications*. Graphic symbols should be sized and designed for visual comprehension from moving vehicles but be the minimum size necessary.

SPECIFIC DESIGN STANDARDS

Specific design standards are recommended to provide guidelines for design and maintenance of individual roadways to accommodate the projected level of vehicular traffic but modified by the specific characteristics of the roadway environment. Table 3 lists the recommended design standards for the roads at Bryce. These standards are for typical sections along the road and will vary according to site-specific field conditions identified during design. The width and alignment of much of the park road system will not be changed because the standards are already met. The major exception is the Rainbow Point/Rim road, which will be widened by about 20 percent to meet minimum standards. Most road reconstruction will occur on the existing alignment. Following is more detailed information on the recommended standards.

Design volumes (listed in table 3) were established by increasing the current ADTs (listed in table 1) to reflect the forecasted visitation to the park for the year 2010. (This assumes construction beginning around 1990 and a 20-year design period.)

Design speeds are listed in table 3 to provide a general guideline for setting geometrics during road reconstruction design. The current "design speed" for the entrance road/rim road (route 10) varies between 20 and 50+ mph. The posted speed is 35 mph, with 20 mph warning signs on a few curves. To conform to the existing alignment as much as possible, the proposed design speed will range from 25 to 45 mph for the entrance road (10A) and the rim road to Natural Bridge (10B). The posted speed will continue to be 35 mph with some curves posted at 20-25 mph to maximize safety and avoid major road relocation. The design and posted speed for the rim road from Natural Bridge to Rainbow Point (10C) will be about 25 mph, with some curves posted at 20 mph to conform to the existing alignment where possible. It will be desirable to achieve a consistent design speed; however, this recommendation does not mean that all curves should be straightened to bring them up to the standard regardless of impact. It also does not imply that excessive adverse curvature should be added to bring the straight sections down to the recommended design speed.

Specific road relocations (as discussed below) are proposed to achieve a variety of purposes, including resource protection, an improved visitor experience, and safety.

Traveled way (traffic lanes) surface materials will remain the same as the existing surface on all roads in the park. Shoulder surface materials on paved roads will be a mixture of aggregate and topsoil supporting native grasses or other herbaceous plants (stabilized grass), or a combination of asphalt and stabilized grass as listed in table 3 and described below. Shoulders on gravel or dirt roads will be the same surface as the traveled way.

Road widths will meet, but not exceed, minimum standards from *Park Road Standards* (NPS 1984). Because of significant RV/bus traffic, a portion of the shoulder will be paved.

The recommended width standards will accommodate a transit system if implemented. The entrance road, route 10A (mile 0 to 2.8), will be reconstructed with 11-foot travel lanes and 4-foot shoulders, (2-foot paved, 2-foot grass). This will create a 30-foot road base and 26-foot paved ribbon, but it will not require significant widening. As mentioned above, the design speed will be 40 to 45 mph with a posted speed of 35 mph. The reconstructed road will generally follow the existing alignment. For a graphic illustration of these width standards, see figure 2.

The rim road to Natural Bridge, route 10B (mile 2.8 to 12.5), will be widened to the minimum width recommended in *Park Road Standards*, i.e., 11-foot travel lanes with 3-foot shoulders. The shoulder will be 1-foot paved and 2-foot grass, which will create a 28-foot road base and a 24-foot total pavement width. The design speed will generally be 30 to 40 mph with a posted speed of 35.

The rim road from Natural Bridge to Rainbow Point, route 10C (mile 12.5 to 18.2), will also be widened to 11-foot travel lanes and 3-foot shoulders. Again, 1 foot of the shoulder will be paved, and 2 feet will be grass. The design and posted speed will be about 25 mph.

Proposed modifications to all other roads are outlined in table 3. In a few cases, widening these other roads may be necessary, but most road top widths are adequate. Some of the existing road pavement and shoulder sections are too wide and will be reduced according to the design guidelines when they are repaved or reconstructed.

ROAD RELOCATIONS

Relocations are recommended for four sections near overlooks on the rim road (see Proposed Road Relocation and Parking Concepts map). A road relocation is defined in this document to be any lateral shift in the centerline of more than 15 feet. Anything less than 15 feet is considered a minor realignment. The following proposed road relocations will affect less than 3 percent of the road system and not change the basic layout, access to overlooks, and quality of the driving experience significantly. All abandoned road sections will be obliterated and the sites restored.

At Farview the road will be relocated up to 300 feet west to enhance the visitor experience at the overlook and to improve the parking area's entrance/exit safety.

To reduce impacts on the rim, improve the visitor experience, and enhance safety, the road at Natural Bridge will be shifted about 150 feet to the northwest. Substantial fill will be required in this area.

At the Agua and Ponderosa Canyon overlooks, the road is contiguous with the parking areas atop a narrow ridge. The steep topography precludes a substantial separation between the road and the overlooks; however, the road will be shifted about 40 feet away from the rim to separate it from the parking areas and to improve safety. Some fill will be required because of steep slope conditions, and a retaining structure (up to 500 feet long) might be needed at each location. To reduce the fill, lowering the road and parking area below the grade of the overlook will also be considered during design. Road curvature in the vicinity of the overlooks will also be taken into account.

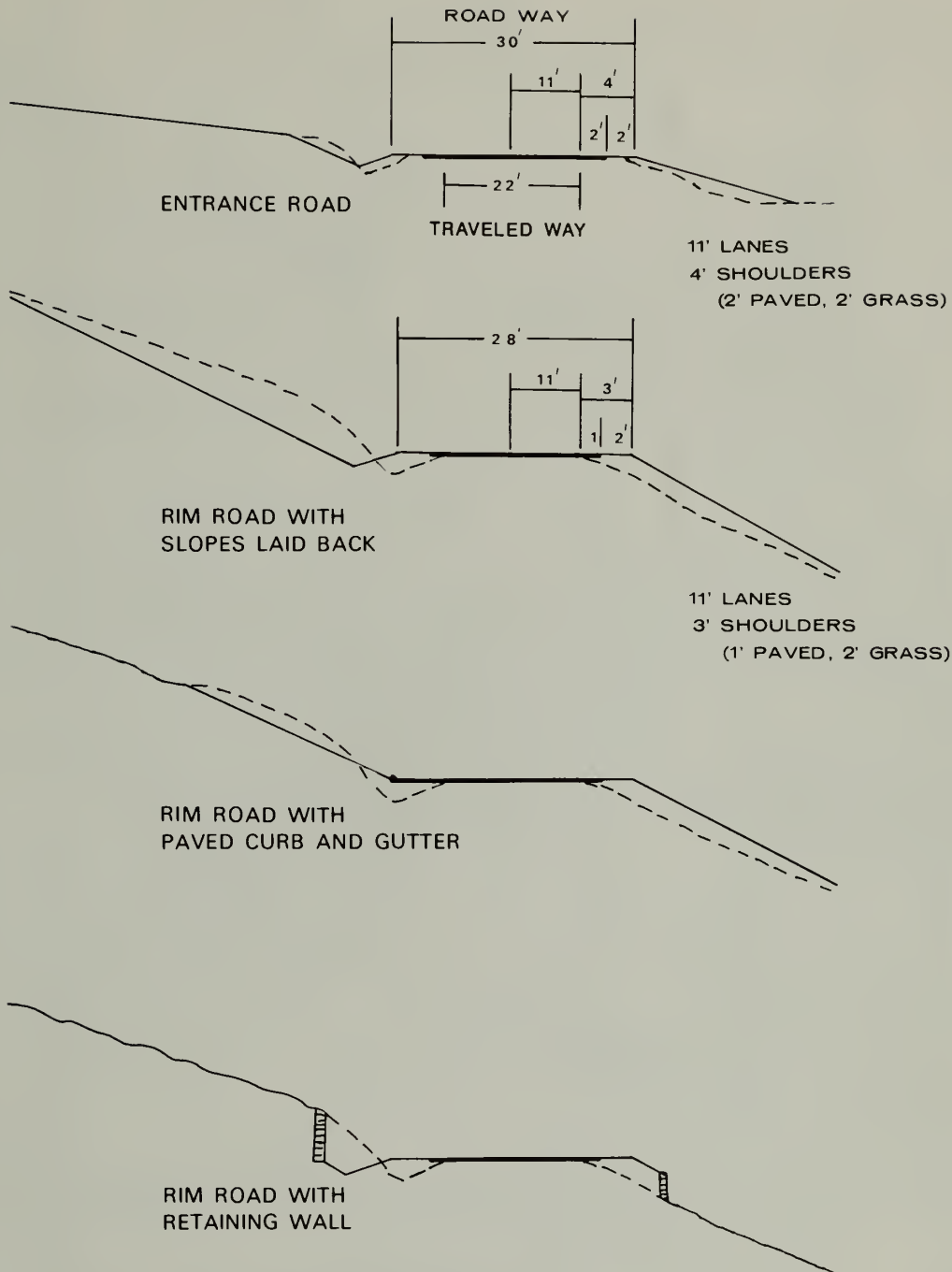
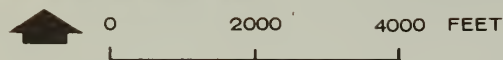
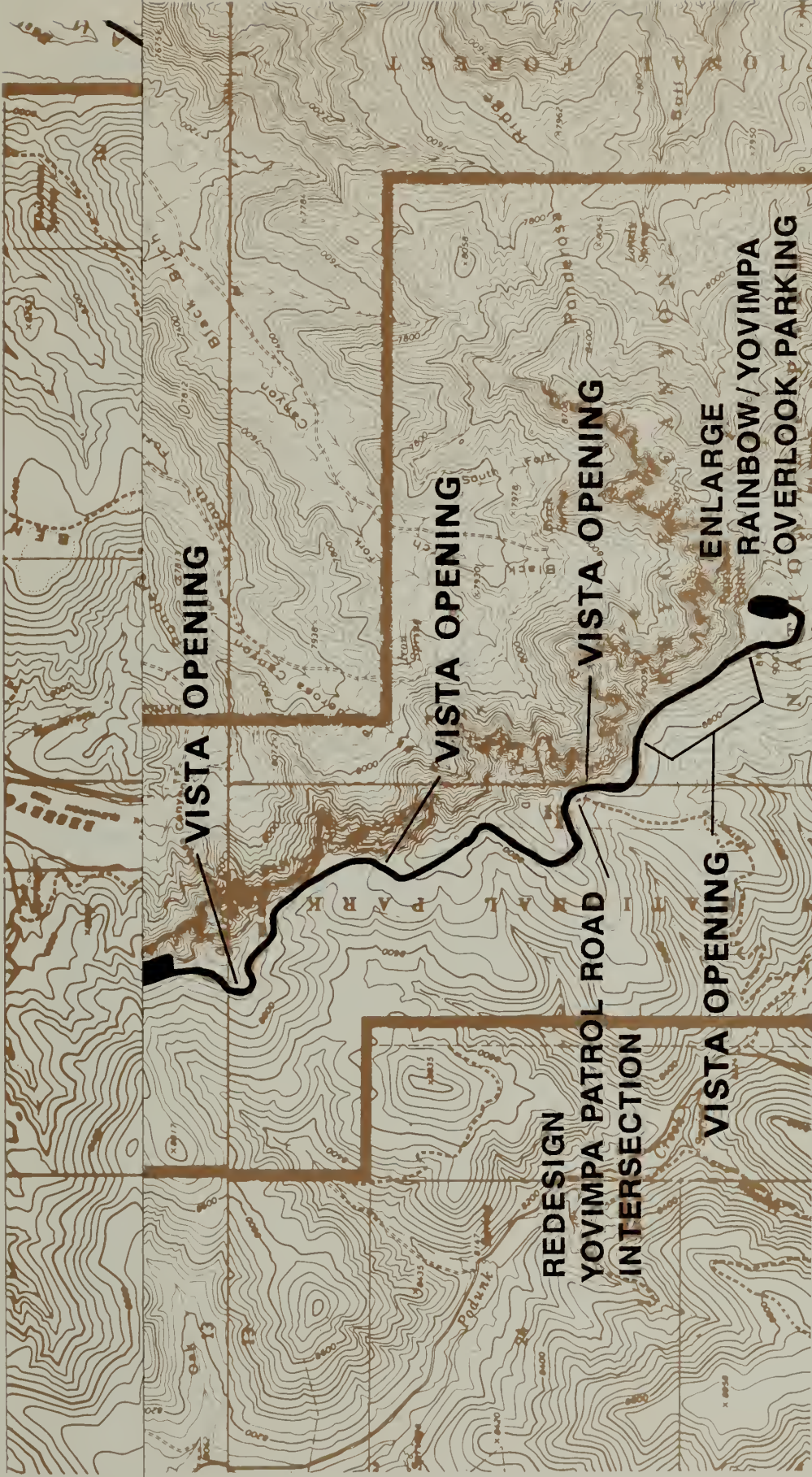


FIGURE 2
PROPOSED ROAD CROSS-SECTIONS
 BRYCE CANYON NATIONAL PARK



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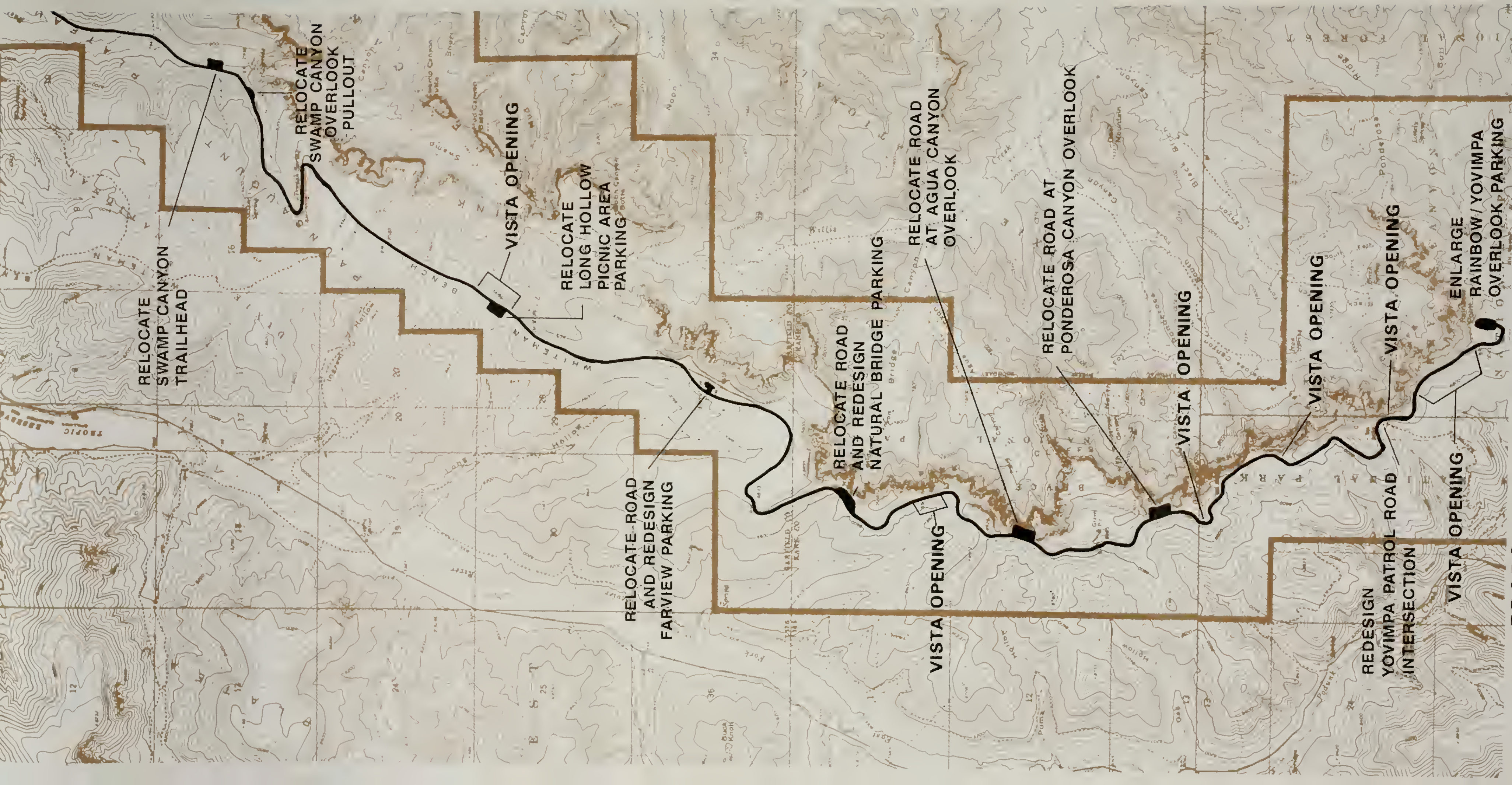
PROPOSED ROAD RELOCATION AND PARKING CONCEPTS

BRYCE CANYON NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

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PROPOSED ROAD RELOCATION AND PARKING CONCEPTS

BRYCE CANYON NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

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INTERSECTION REDESIGN

The Bryce Point/rim road intersection is confusing and a potential safety hazard. It is currently a double Y. The intersection will be redesigned, retaining the rim road as the through-road. Two separate T intersections will provide access to Inspiration Point and Bryce Point/Paria View (see Proposed Road Relocation and Parking Concepts map).

The existing Bryce Point/Paria View road intersection is a single Y and less confusing than the double Y. Therefore, it will be retained to reflect the original character of the road system.

The intersection of the rim road with the Yovimpa patrol road (route 403) near milepost 17 will be redesigned/relocated. The existing intersection is on a blind curve with a steep uphill grade, making it extremely dangerous. The intersection will be redesigned with improved access and sight distance. Abandoned intersection alignments will be obliterated, recontoured, and revegetated.

PULLOUTS AND PARKING AREAS

Several pullouts and parking areas discussed below will be redesigned to enhance the visitor experience, eliminate safety problems, increase parking capacity, and reduce congestion. These parking areas will accommodate a transit system if one is implemented. Existing small and informal pullouts along the rim road, which have been created by motorists, will be paved if there is adequate site distance to provide safe vehicular use. Three informal trailhead parking areas will either be combined with overlook parking areas or eliminated (see Parking Area and Vista Opening Sites map). The discussion below describes more specific recommendations, starting from the park entrance and moving south to Rainbow Point (see figure 3). The graphic illustrations are preliminary concepts only and will be subject to further analysis and refinement during the detailed design phase. Proposed parking capacities were established in the 1987 GMP for the park.

To provide adequate parking for trailers that are not permitted outside the main developed area, the visitor center parking area will be redesigned and expanded as proposed in the GMP to add spaces that will accommodate about 90 additional cars and 40 more oversized vehicles. The employee parking area access (route 410) will be eliminated and combined with the visitor center parking access (route 208). The entrance road will be realigned near the fee collection kiosks to improve the approach alignment. A more functional and visually appropriate entrance station should be considered to replace the kiosks. The headquarters building facade should also be rehabilitated to more clearly identify the visitor center and improve the building aesthetics. It is possible that a new entrance station and visitor center facade improvements could be done with one architectural treatment. These architectural issues will be addressed in a detailed design study and funded separately from the road project, although implementation should be coordinated with road improvements, if possible.

The Sunrise Point parking area will be enlarged to provide space for about 16 additional cars and six oversized vehicles. The general store and laundry parking area will be redesigned to more clearly identify parking spaces and reduce circulation problems in the area. The direct connection to the campground will be eliminated. The Sunset Point parking area will be expanded to accommodate about 20 additional cars. Once improvements are made at Sunrise Point, it will be resigned to direct traffic to that overlook rather than Sunset Point parking as at present.

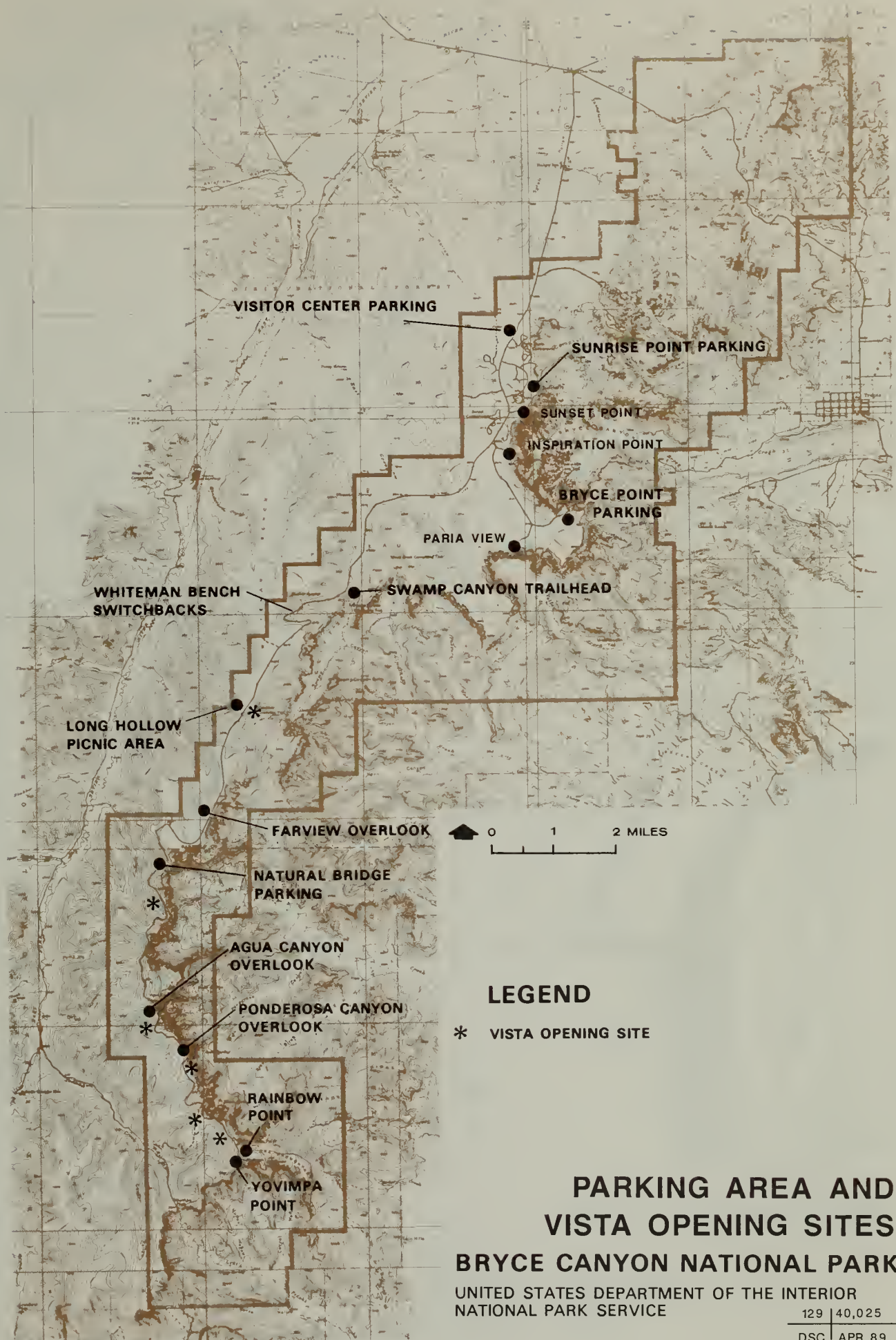
The Inspiration Point parking area will be enlarged and redesigned to provide space for 15 additional cars and two more oversized vehicles.

As discussed above, the Bryce Point parking area becomes extremely congested during the five-month heavy use season, and severe site constraints preclude expansion in its current location on the rim. To address these problems and to offer an improved visitor experience for those willing to take the time to walk, a location change is proposed in this area. The existing Bryce Point parking area and approach road will be abandoned, obliterated, recontoured, and revegetated. A new parking area will be constructed about 500 feet south of the current Bryce Point parking area at a site set back from the canyon rim. Parking will be provided for about 66 cars and 14 oversized vehicles. The GMP did not set a proposed capacity for Bryce Point parking area. The current proposal is based on the need to resolve existing parking demands taking into account the greater setback from the overlook. Access to the overlook will be on an extended connecting trail, increasing the trail distance from about 500 feet to about 1,000 feet long. Steep grades on the existing trail prevent this overlook from being handicap accessible.

The Sheep Creek and Swamp Canyon trailhead parking areas will be removed and a new parking area constructed to accommodate both trailheads. Both trails will need to be extended to join the new parking area. The lot will be constructed for about 10 cars and two oversized vehicles. The existing parking areas (actually pullouts) are poorly located and are close enough to be combined into one facility. The Swamp Canyon overlook pullout will be relocated about 500 feet south to improve the site distance and remove an existing sliver cut. The existing Sheep Creek trailhead parking will be obliterated. The Long Hollow picnic area will be relocated about 1/2 mile north and combined with the Whiteman trailhead. Parking will be provided for about 10 cars and two oversized vehicles. This facility will also serve a proposed west side overlook. The Farview Point parking area will be moved back from the overlook and be designed for about 34 cars and six oversized vehicles. As discussed above, the road will be relocated to separate it from the parking area and to move it back from the rim.

To separate development from a primary resource, improve the visitor experience at the overlook, reduce congestion in the parking area, and increase safety for pedestrians and motorists, the Natural Bridge parking area will be redesigned to remove parking from the area immediately adjacent to the overlook. Space will be provided for up to 42 cars and 8 oversized vehicles. This will more than double the existing parking space, but it is necessary to alleviate existing capacity problems and to accommodate increased visitation. As discussed above, the road will also be shifted away from the Natural Bridge overlook and separated from the parking area. Maximum use will be made of the old roadbed for the proposed parking area.

Because of severe site constraints and anticipated use levels, the Agua and Ponderosa Canyon parking areas will be reconstructed in their current locations to provide parking for up to their present capacity (10 cars at Agua and 12 cars at Ponderosa). The road will be moved away from the rim about 40 feet to separate it from the parking areas, increase safety, and improve the visitor experience. Site constraints, safety concerns, costs, and resource factors may necessitate a reduction in parking capacity during detailed design.



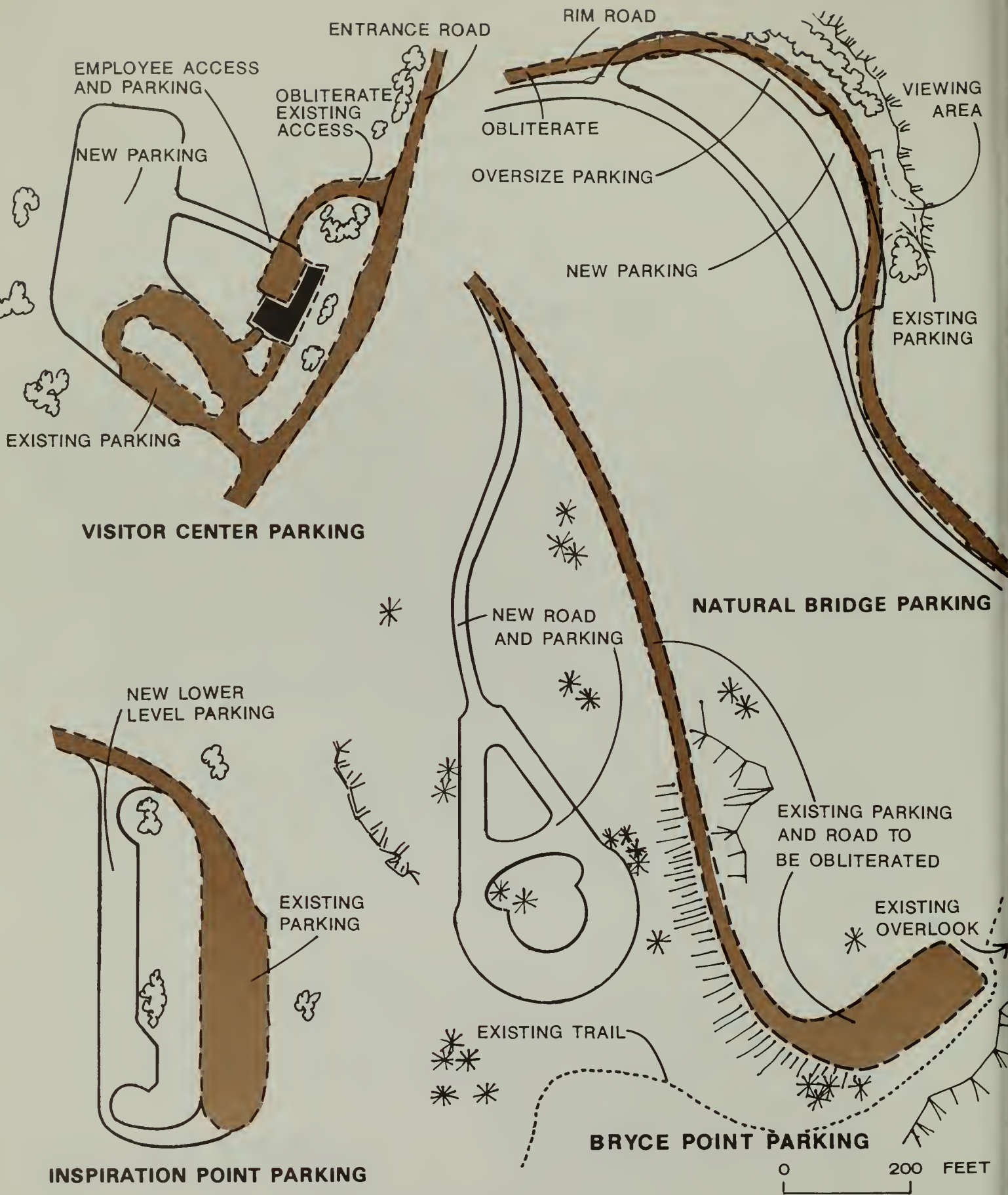


FIGURE 3

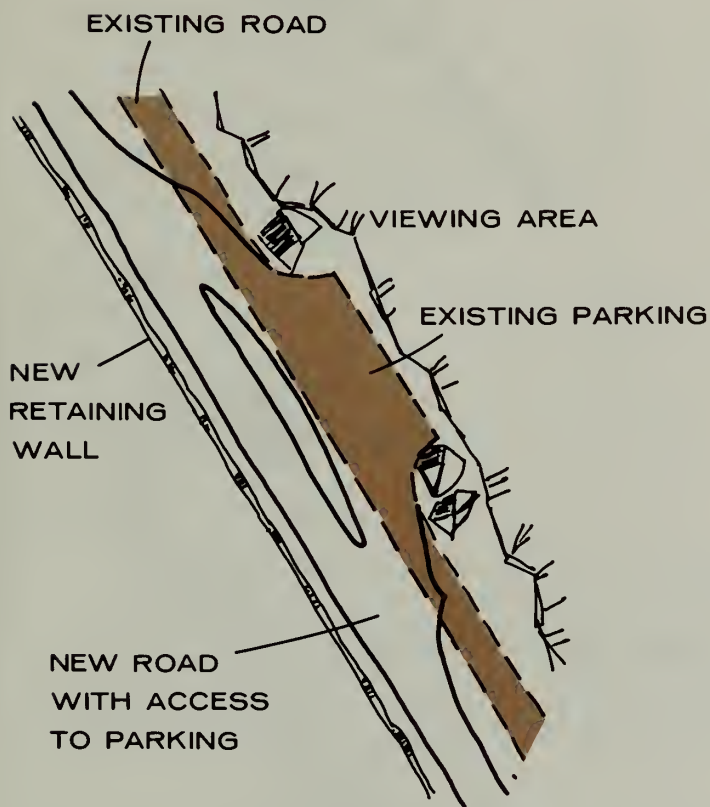
PROPOSED PARKING DESIGN CONCEPTS **BRYCE CANYON NATIONAL PARK**



SWAMP CANYON TRAILHEAD PARKING

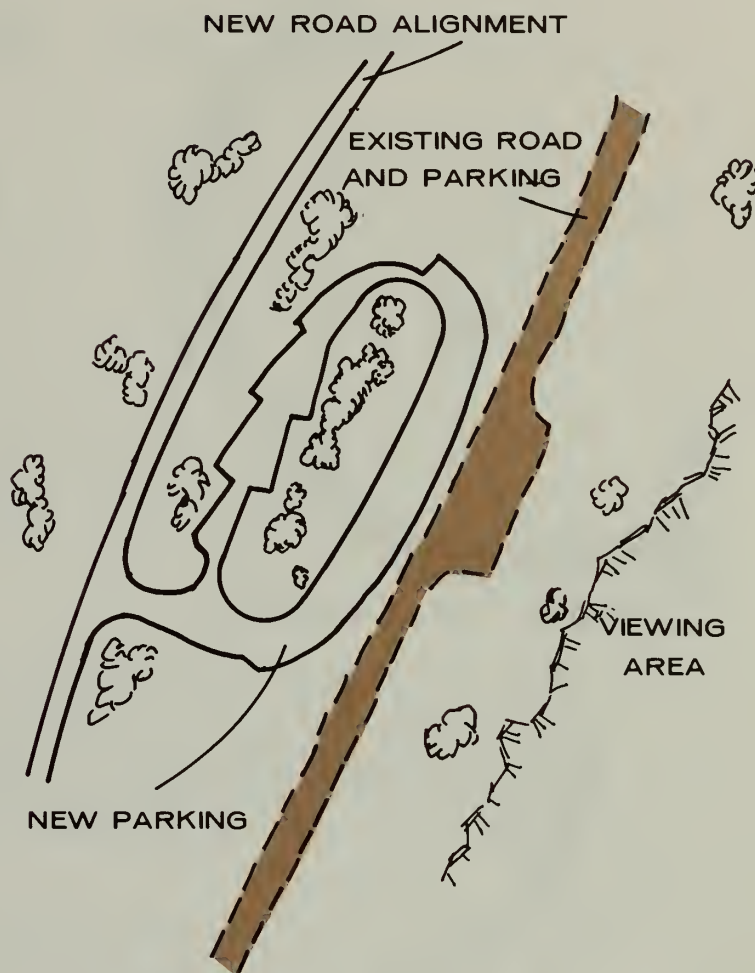


LONG HOLLOW PICNIC AREA PARKING



ROAD REALIGNMENT AT AGUA CANYON AND PONDEROSA CANYON OVERLOOKS

100'



FARVIEW PARKING

0 200 FEET
EXCEPT AS NOTED

FIGURE 3
PROPOSED PARKING DESIGN CONCEPTS
BRYCE CANYON NATIONAL PARK

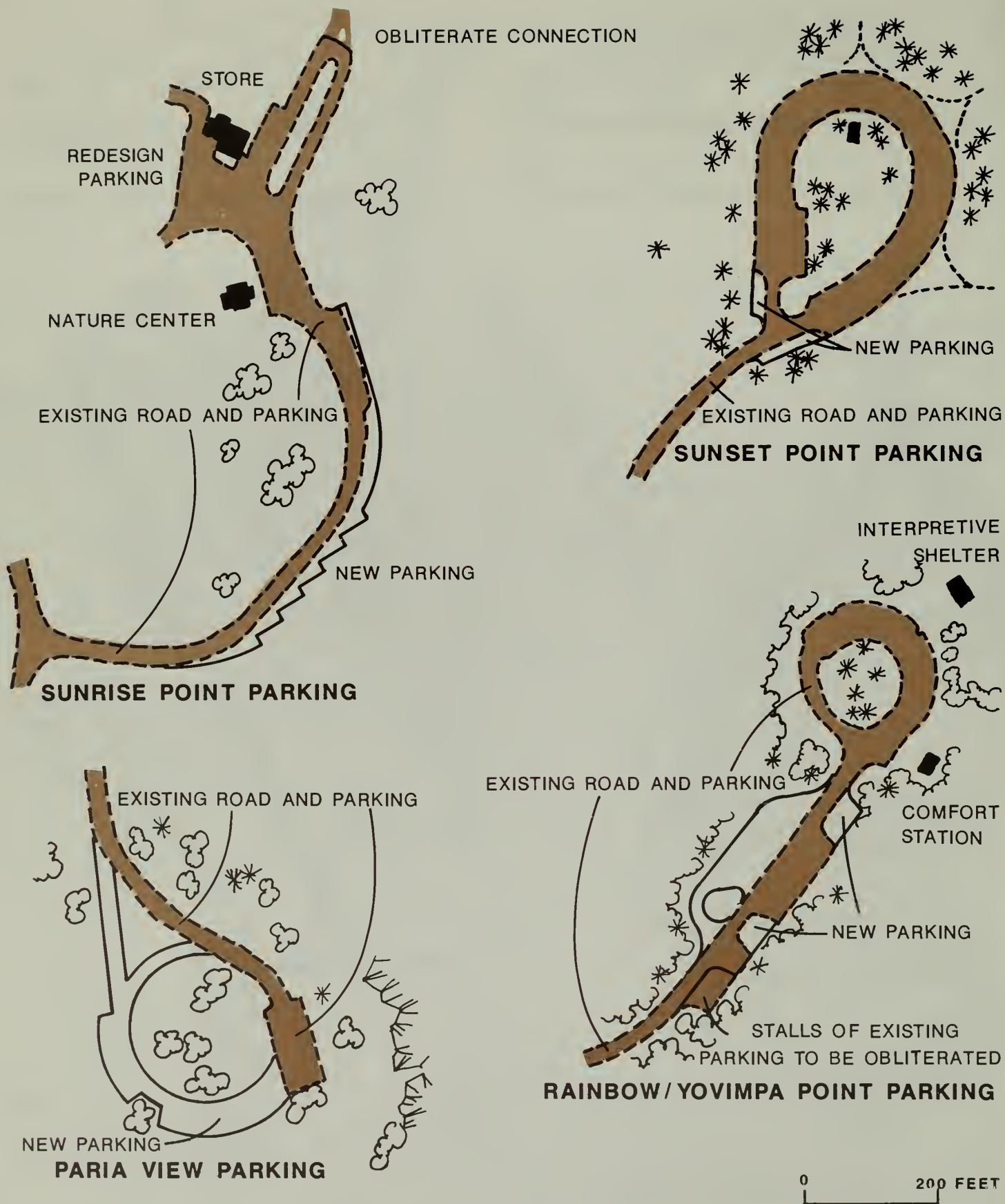


FIGURE 3

PROPOSED PARKING DESIGN CONCEPTS

BRYCE CANYON NATIONAL PARK

At Rainbow/Yovimpa Point, the parking will be enlarged to add 11 cars and 6 oversize vehicles. A few spaces near Yovimpa Point will be relocated to increase safety near the curve approaching the area. This will not affect the historic overlook or comfort station.

Table 4: Summary of Parking Area Capacities

<u>Location</u>	<u>Existing Parking</u>		<u>Proposed Parking</u>		
	<u>Auto</u>	<u>Oversize</u>	<u>Auto</u>	<u>Oversize</u>	
Fairyland	19	3	19	3	
Visitor Center	77	3	170	40	
Sunrise Point	18	0	34	6	
Sunset Point	95	20	113	20	
Inspiration Point	30	6	45	8	
Bryce Point	21	5	66	14	Relocated
Paria View	13	0	30	6	
Swamp Canyon Trailhead	4	0	10	2	Relocated
Long Hollow Picnic Area	4	0	10	2	Relocated
Farview Point	17	0	34	6	
Natural Bridge	12	0	42	8	
Agua Canyon	10	0	10	0	
Ponderosa Canyon	12	0	12	0	
Rainbow/Yovimpa Point	49	4	60	10	

REVEGETATION

Much of the rim road is in rolling to mountainous terrain, with about 5 miles of cut-and-fill slopes, some of which are very steep. A few of these slopes have stabilized and revegetated but most have not. Widening the road will require regrading many of the disturbed slopes and some previously undisturbed areas. Selected steep slopes will be excavated and laid back (slope angle reduced to 2:1). These slopes will also be rounded to create a more natural appearance. Excess materials will be used for fill along the reconstructed roadway.

Upon completion of parkwide road and parking area reconstruction, up to 97 acres of surface disturbance will be left to reclaim. This reclamation will include abandoned road alignments and parking/pullout areas, disturbed cut-and-fill slopes, staging areas, and general construction disturbance along the roadway and near parking areas. Use of walks, paved curb and gutter, and other slope stabilization techniques will reduce this area to the degree they are applied. Detailed revegetation plans will be completed prior to construction. These plans will specify revegetation requirements to be accomplished with each construction project, such as plant species types, topsoil requirements, exotic species control, revegetation timing, and erosion control techniques to be used during construction.

Native plant species will be used to revegetate disturbed areas. The Park Service is currently working with the U.S. Department of Agriculture, Soil Conservation Service, to establish a native seed/plant source, propagated from seed collected in Bryce Canyon. Seed and transplants will be available from this source to revegetate all areas disturbed by road construction activities.

VISTA OPENINGS

As mentioned in the "Introduction," some views along the rim road are currently blocked or partially screened by vegetation. Selected areas are recommended for vista opening to enhance views from the road and to improve the scenic driving experience. Potential sites and areas are shown on the Proposed Road Relocation and Parking Concepts maps. This will not entail extensive vegetation removal, but rather, selective cutting of individual trees leaving a natural looking appearance. Specific trees will be identified during design in consultation with park staff. The size of vista openings will take into account the 35 mph speed limit.

PRIORITIES AND COST ESTIMATES

Table 5 lists the priorities and estimated costs for road reconstruction projects at Bryce Canyon. Actual phasing may differ somewhat due to funding constraints, design needs, construction scheduling considerations, or other factors.

Table 5: Preliminary Road Construction Priorities and Costs

<u>Priority</u>	<u>Route Name</u>	<u>Number</u>	<u>Miles</u>	<u>Gross Cost</u>
1	Rainbow Point/Rim	10C	5.7	\$4,816,000
2	Bryce Point	100	1.9	741,000
3	Rainbow Point/Rim	10B	9.7	5,336,000
4	Paria View	205	0.4	156,000
5	Inspiration Point	204	0.2	78,000
6	Entrance	10A	2.8	1,092,000
7	Fairyland Point	200	1.1	429,000
8	Sunrise Point	202	0.5	195,000
9	Lodge Parking	207	0.3	78,000
10	Lodge Loop	11	1.0	351,000
11	North Campground	201	1.8	468,000
12	Sunset Campground	206	1.2	312,000
13	Sunset Point	203	0.2	78,000
Total				\$14,130,000

Estimated costs include contracted construction, project development, construction engineering, and contingencies (FHWA). These figures are rough preliminary estimates based on average costs for similar work (class C). Better estimates will be developed during project design based on site-specific details, obliteration needs, and revegetation plans.

In addition to road reconstruction costs, there will be parking area redesign and expansion costs. Table 6 indicates preliminary cost estimates for this work, listed in approximate priority order (consistent with road priorities).

Table 6: Parking Area Construction Priorities and Costs

<u>Priority</u>	<u>Parking Area</u>	<u>Spaces</u>	<u>Cost</u>
1	Natural Bridge	42 car/8 oversize	\$ 139,000
2	Agua Canyon	10 car	24,000
3	Ponderosa Canyon	12 car	29,000
4	Rainbow/Yovimpa Point (add.)	11 car/6 oversize	55,000
5	Bryce Point	66 car/14 oversize	226,000
6	Farview Point	34 car/6 oversize	110,000
7	Long Hollow Picnic Area	10 car/2 oversize	34,000
8	Swamp Canyon Trailhead	10 car/2 oversize	34,000
9	Paria View	30 car/6 oversize	101,000
10	Inspiration Point (addition)	15 car/2 oversize	46,000
11	Visitor Center (addition)	93 car/37 oversize	401,000
12	Sunrise Point (addition)	16 car/6 oversize	67,000
13	Sunset Point (addition)	18 car	43,000
Total			\$1,309,000

These figures are preliminary estimates based on average costs for similar facilities. Better cost estimates will be developed during project design based on site-specific details, obliteration needs, and revegetation plans.

CONSULTATION AND LEGAL COMPLIANCE

The National Park Service consulted with the Federal Highway Administration in preparation of this study.

Because Bryce Canyon National Park contains resources listed in or eligible for listing on the National Register of Historic Places, the Park Service consulted with the Advisory Council on Historic Preservation and the state historic preservation officer. The Park Service also consulted with the U.S. Fish and Wildlife Service regarding potential impacts on listed endangered species.

In May 1989 the Park Service printed a draft *Road System Evaluation/Environmental Assessment*, which was placed on public review in July and August. Comments were received from three agencies.

The Utah Division of Wildlife Resources was concerned about facts presented regarding populations of endangered species in the park and mitigation measures needed for the threatened Utah prairie dog. The length of the nesting season for peregrine falcons was also questioned.

The state historic preservation officer concurred with the proposal on August 10, 1989. The Advisory Council on Historic Preservation had no comment on the *Road System Evaluation/Environmental Assessment*.

In August 1989, the National Park Service submitted a request for formal section 7 consultation with the U.S. Fish and Wildlife Service under the Endangered Species Act. The Fish and Wildlife Service issued a biological opinion in March 1990 stating that the proposed action will not affect endangered species in the park subject to the following recommended conservation measures:

Bald eagle – Bald eagle roost trees will be identified by park staff and will be protected from damage or removal during construction.

Peregrine falcon – All construction activities requiring blasting and earth moving equipment within 1 mile of an active eyrie will be scheduled to avoid the critical nesting season of the peregrine falcons. This will extend from courtship, egg-laying, and hatching, to fledging, which is from March 15 to July 15. This will not prohibit hauling materials or movement of equipment on the road through the 1-mile zone, nor light construction activities within the zone not involving blasting or heavy equipment, such as light earthwork or revegetation work. Nesting sites will be monitored annually prior to and during construction to ascertain activity, and the restrictions will be enforced to the extent that the eyries are occupied.

Utah prairie dog – Inactive burrows within 10 feet of the construction limits will be filled to prevent or reduce the number of prairie dogs moving into the construction area. Prior to construction, any remaining prairie dogs within 10 feet of the construction limits will be transplanted into a new colony site.

The Park Service will perform a prescribed burn in East Creek Meadow. This site will be used as a new colony location for the transplanted prairie dogs following the burn. The new site may also attract the prairie dogs from the colony that is

currently adjacent to the road. It appears that prairie dogs prefer newly burned areas probably because of the removal of the brush and the new grasses and forbs that begin to grow after the burn. By moving the colony away from the roadway, losses of prairie dogs to traffic will be reduced or eliminated.

For additional information on legal compliance, please refer to the March 13, 1990, biological opinion from the U.S. Fish and Wildlife Service and the 1989 *Road System Evaluation/Environmental Assessment*.

APPENDIX: BRYCE CANYON SPECIAL COUNTS

CONTROL STATION 1101									

NORTH BOUND *****									

MONTH	MONTH	AWD	ADM	SOUTH BOUND	AWD	ADM	BOTH DIR.	AWD	ADM
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1	SEP 85	913	923	901	908	1814	1831	2647	2647
2	OCT 85	470	480	457	470	927	950	5293	5293
3	NOV 85	129	133	128	132	257	265	7538	7538
4	DEC 85	80	87	80	87	160	174	9369	9369
5	JAN 86	83	87	82	87	165	174	11189	11189
6	FEB 86	85	94	85	93	170	187	12139	12139
7	MAR 86	226	246	226	247	452	493	12932	12932
8	APR 86	394	399	393	394	787	793	13425	13425
9	MAY 86	883	926	870	894	1753	1820	13690	13690
10	JUN 86	1133	1137	1106	1108	2239	2245	13877	13877
11	JUL 86	1321	1346	1280	1300	2601	2646	14051	14051
12	AUG 86	1329	1345	1288	1302	2617	2647	14225	14225
TOTALS		7046	7203	6896	7022	13942	14225	SEASONAL ADT	2238
AVERAGE		587	600	575	585	1162	1185		
80x							11380		

BLANKET STATIONS. - 1986									

STATION LOCATION ROUTE NUMBER									

STATION NUMBER	LOCATION	FWHA	PARK	DATE TAKEN	48 HOUR VOLUME	24 HOUR VOLUME	SEASONAL FACTOR	ANNUAL FACTOR	ANNUAL ADT
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1101	MAIN ROAD @ NORTH ENTRANCE GATE	10	1	ALL YEAR	---	---	---	---	1185
1103	MAIN ROAD @ NORTH PARK BOUNDARY	10	1	JUL 14-16	6090	3045	0.86	0.46	2238
1104	FAIRYLAND POINT ROAD	200	3	JUL 14-16	605	303	0.86	0.46	2619
1105	NORTH CAMPGROUND ENTRANCE	201	5	JUL 15-17	1060	530	0.86	0.46	260
1106	NORTH CAMPGROUND PICNIC AREA	201	5	JUL 16-18	835	418	0.86	0.46	456
1107	LODGE ROAD (NORTH END)	11	4	JUL 16-18	1553	777	0.86	0.46	359
1108	LODGE ROAD (SOUTH END)	11	4	JUL 20-22	2955	1478	0.86	0.46	668
1109	SUNRISE POINT (NORTH OF STORE)	202	4	JUL 20-22	1732	866	0.86	0.46	1271
1110	SUNRISE POINT (SOUTH END)	202	4	AUG 03-05	2525	1263	0.86	0.46	745
1111	LODGE PARKING LOOP (EAST END)	207	4	JUL 20-22	5623	2812	0.86	0.46	1086
1112	LODGE PARKING LOOP (WEST END)	207	4	JUL 22-24	473	237	0.86	0.46	2418
1113	SUNSET POINT ROAD	203	6	JUL 22-24	2943	1472	0.86	0.46	203
1114	SUNSET CAMPGROUND ENTRANCE ROAD	206	7	JUL 22-24	1668	834	0.86	0.46	1265
1115	MAIN RD (BETW TURNAROUND & BRYCE PT. RD)	10	1	JUL 27-29	3658	1829	0.86	0.46	717
1116	INSPIRATION POINT ROAD	204	2A	JUL 27-29	1896	948	0.86	0.46	1573
1117	BRYCE PT. RD (S. OF INSPIRATION PT. RD)	100	2	JUL 27-29	2447	1224	0.86	0.46	815
1118	BRYCE POINT ROAD (EAST OF FARIA VIEW)	100	2	JUL 29-31	2138	1069	0.86	0.46	1052
1119	FARIA VIEW SPUR	205	2B	JUL 29-31	1395	698	0.86	0.46	919
1120	RAINBOW PT. RIM RD (S. OF BRYCE PT. RD)	10	1	JUL 30-31	2139	1069	0.86	0.46	492
1121	RIM ROAD (N. OF NATURAL BRIDGE)	10	1	AUG 03-05	2126	1063	0.86	0.45	321
1122	RIM ROAD (NEAR RAINBOW/YOVIIPA PT.)	10	1	AUG 03-05	1634	817	0.86	0.45	492
									478
									368

CONTROL STATION 1101		BRYCE CANYON SPECIAL COUNTS										COUNT ARRAY		SEASONAL ANNUAL		
*****		*****										*****		*****		
MONTH	NUMBER	NORTH BOUND		SOUTH BOUND		BOTH DIR.		MONTH	ADM	CUM	ADM	%	MONTH	AWD	FCTR	
*****	*****	AWD	ADM	AWD	ADM	AWD	ADM	*****	*****	*****	*****	*****	*****	*****	*****	
1	DEC 87	119	114	116	111	235	225	JUL 88	3323	3323	3323	17	DEC 87	12.28	6.80	
2	JAN 88	90	90	88	89	178	179	AUG 88	3156	6479	6479	34	JAN 88	16.21	8.93	
3	FEB 88	124	139	123	137	247	276	JUN 88	2845	9324	9324	49	FEB 88	11.68	6.47	
4	MAR 88	280	286	277	284	557	570	SEP 88	2808	12132	12132	64	MAR 88	5.18	2.87	
5	APR 88	563	571	560	571	1123	1142	MAY 88	2296	14428	14428	76	APR 88	2.57	1.42	
6	MAY 88	1118	1150	1113	1146	2231	2296	OCT 88	1762	16190	16190	85	MAY 88	1.29	0.72	
7	JUN 88	1425	1441	1383	1404	2808	2845	APR 88	1142	17332	17332	91	JUN 88	1.03	0.57	
8	JUL 88	1663	1692	1599	1631	3262	3323	MAR 88	570	17902	17902	94	JUL 88	0.88	0.49	
9	AUG 88	1587	1608	1523	1548	3110	3156	NOV 88	513	18415	18415	96	AUG 88	0.93	0.51	
10	SEP 88	1375	1433	1317	1375	2692	2808	FEB 88	276	18691	18691	98	SEP 88	1.07	0.59	
11	OCT 88	887	887	871	875	1758	1762	DEC 87	225	18916	18916	99	OCT 88	1.64	0.91	
12	NOV 88	261	258	258	255	519	513	JAN 88	179	19095	19095	100	NOV 88	5.56	3.08	
TOTALS		9492	9669	9228	9426	18720	19095	SEASONAL ADT	2886							
AVERAGE		791	806	769	786	1560	1591	RATIO		88/86 =		2886 / 2238 =		1.234		
80%																

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