

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

BIG BEND NATIONAL PARK

TEXAS

(Area)

FILE CODE:

SOUTHWEST REGION

MASTER PLAN NARRATIVE

Volumes I and III

IMPORTANT

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FROM:

TO:

MASTER PLAN

BIG BEND NATIONAL PARK

MISSION 66 Edition

Volume I

Master Plan Narrative

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Foreword

THE PARK

Big Bend National Park is situated in southwest Texas along the Rio Grande where the river swings deeply to the southeast and then turns abruptly to the northeast carving out the pocket called the "Big Bend". Within this area there are rugged mountains, foothills, gravel-covered slopes, deserts, canyons, and river bottoms. In addition to the spectacular scenery characterized by vast distances, the great variation in elevations has resulted in a complex plant and animal association. There is also an unusual manifestation of geology along with the intriguing folklore and history of the area.

Big Bend
July '62

MASTER PLAN
FOR THE PRESERVATION AND USE
OF
BIG BEND NATIONAL PARK
MISSION 66 EDITION
* * *

The Service thus established shall

- . Promote and regulate the use of
- . The Federal areas known as national parks, monuments and reservations hereinafter specified
- . By such means and measures as conform to the fundamental purpose of the said parks, monuments and reservations

Which purpose is

- . To conserve the scenery and the natural and historic objects and the wildlife therein, and
- . To provide for the enjoyment of the same in such manner and by such means as shall
- . Leave them unimpaired for the enjoyment of future generations.

From an Act to Establish a National
Park Service. Approved August 24, 1916

Foreword

THE MISSION

Big Bend National Park - its Mission is to provide the opportunity for the visitor to gain inspiration, knowledge, insight, and appreciation of the scenic, scientific, and historic values of the area.

The National Park Service - its Mission at Big Bend National Park is to make areas accessible and provide facilities for the visitor and so manage this Park that its Mission will be effectively and perpetually maintained.

APPROVED: A. CLARK STRATTON Date 7/14/62
Asst. Director, DVC

Big Bend
July '62

MASTER PLAN
OF
BIG BEND NATIONAL PARK

* * * * *

Chapter 1, Basic Information

The Land

The Visitor

Prepared by: Arthur C. Allen Date 9/4/64
Douglas B. Evans, Chief Park Naturalist

Certify Accuracy: Coleman C. Newman Date 9/11/64
Coleman C. Newman,
Acting Superintendent

BOOK COPY

THE LAND

LOCATION

Big Bend National Park is located in the State of Texas, Brewster County, along 107 miles of the Rio Grande in the southernmost portion of the area of Texas known as the Big Bend Country.

ACCESS

Existing major highways leading to the area are U.S. Route 90 from the East and Northwest, U.S. Route 385 from the North, Texas State Route 118 from the North, and Secondary State Route 170 from the Southwest. U.S. 90 comes to a point forty miles from the Park, where it joins U.S. 385 which enters the Park. Secondary State Route 170 comes to a point three miles from the Park, where it joins State Route 118 which enters the Park. Mexico plans construction of a highway from Muzquiz, entering the Park at Boquillas.

Lesser roads used primarily for ranching purposes come to or within the boundary on the East from the Black Gap Wildlife Refuge and the Adams ranch. Access is provided through the Park from Park Route 1 for two roads leading to ranches on the Northwest boundary. Special Use Permits and one reservation or right provide access from Park roads to ranches along the western boundary.

Bus and rail transportation are available to Marathon and Alpine, Texas, 69 and 103 miles from Park headquarters. Air transportation is available to Alpine. El Paso, Texas is the nearest major center for public transportation and is 319 miles distant.

Transportation from terminals to the area is limited to taxi or rental cars.

SURROUNDINGS

Population Centers: Alpine, Texas, with a population of 5,200 in 1963, is 103 miles from Park headquarters. The

population has changed from 4,780 to 5,400 in the last five years, for an average annual gain of 3%.

Characteristics: The major difference in terrain, climate and vegetation between the surrounding country and the Park is to the northwest of the Park. In this area there is a rapid change from the Chihuahuan Desert type country of rugged peaks, extreme heat, and cactus, yucca, creosote vegetation to high plateau with rolling hills, moderate temperatures, and grasslands.

Land Use: Most of the lands adjacent to the Park boundary are in private ownership. They are used for raising cattle and goats and for hunting on a lease or fee basis. The State of Texas maintains a wildlife refuge along portions of the northeast boundary, with hunting permits issued in season for deer, quail, and javelina.

Features of Interest: Special attractions in the vicinity of the Park are: McDonald Observatory, 16 miles north of Fort Davis on State Route 118; Big Bend Museum, Sul Ross State College, Alpine, Texas; Boquillas, Mexico is a small village of interest as a primitive community; Santa Elena, Mexico is a progressive agricultural village; State Route 170 from the Park to Presidio, Texas passes through desert terrain of exceptional beauty and points of historical interest; Ojinaga, Mexico is a city of historical and scenic interest.

Fort Davis National Historic Site is located 130 miles North of Big Bend National Park.

Black Gap Wildlife Refuge, administered by the State of Texas, is adjacent to the Northeast boundary of the Park.

Davis Mountains State Park is located near Fort Davis, Texas.

LEGAL FACTORS

Establishment: Authority to establish Big Bend National Park and for administration by the National Park Service is provided by the Congress of the United States in

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September 1964

Title 16 United States Code, Section 156 (June 20, 1935, chapter 283, Sec. 1, 49 Stat. 393.)

Physical establishment of Big Bend National Park dates from the acceptance of title to the lands from the State of Texas on June 12, 1944.

Legal Provisions: The State of Texas reserves by deed of land title, the right of Park residents to vote in State elections; to tax private individuals and operations; and to serve legal processes for civil and criminal offenses committed outside the Park.

CLIMATE

Temperature: Graphs showing average maximum and minimum temperatures and average monthly day-night temperature differential follow this page (Figures 1 and 2).

Maximum temperatures recorded are as follows:

Chisos Basin - 100° in June 1959
Boquillas - 118° on June 6, 1960

Minimum temperatures recorded are as follows:

Chisos Basin - -2° in January 1962
Boquillas - 8° on January 12, 1962

Precipitation: A graph showing the monthly average precipitation follows as Figure 3. Individual statistics for the two weather stations are as follows:

Chisos Basin:

Average annual rainfall - 15.72 inches
Average annual snowfall - 2.00 inches
Maximum snowfall in 24 hours - 7 inches
Maximum precipitation in 24 hour period - 1.97 inches

Boquillas:

Average annual rainfall - 10.13 inches
No snowfall
Maximum precipitation in 24 hour period - 1.94 inches

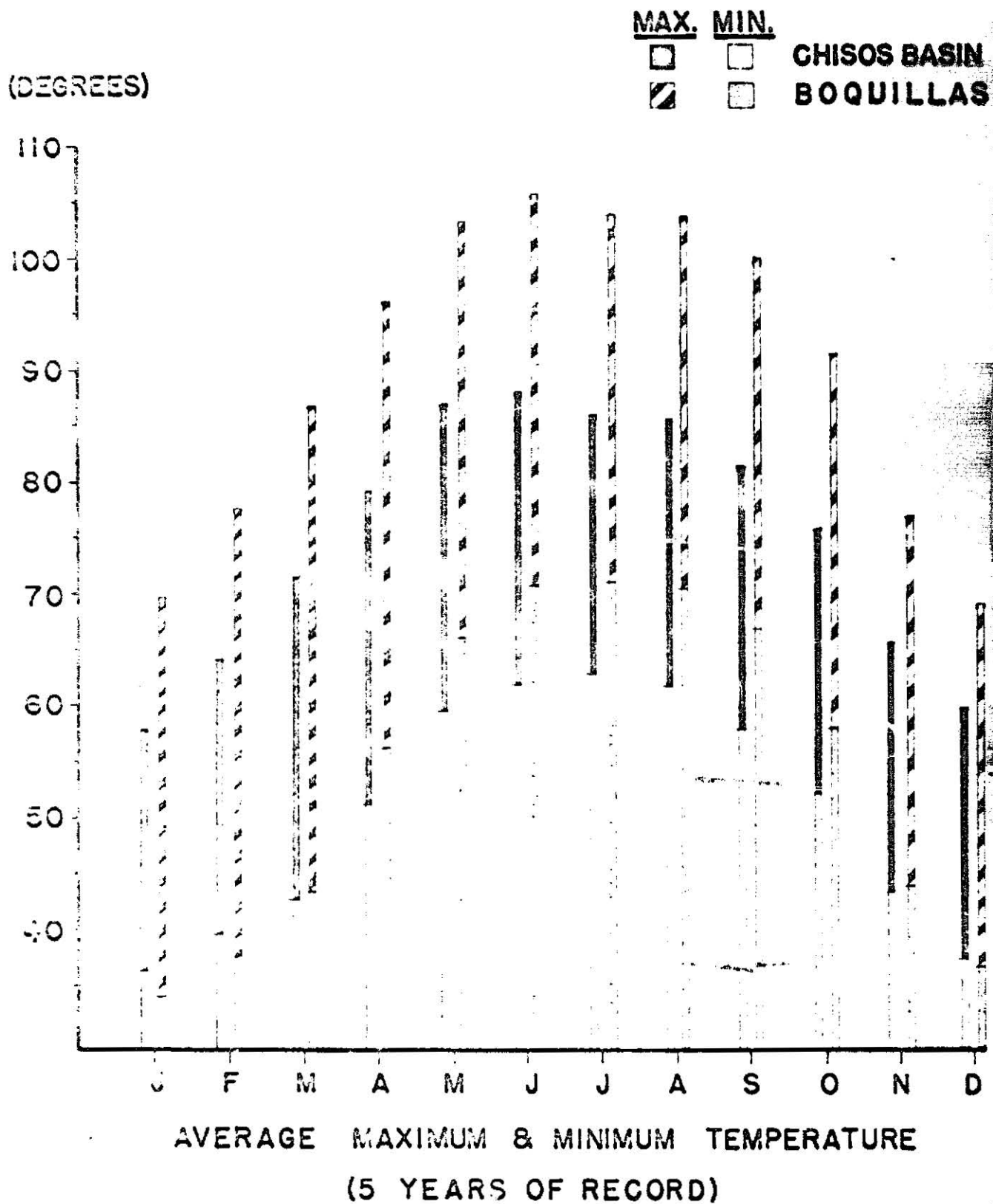
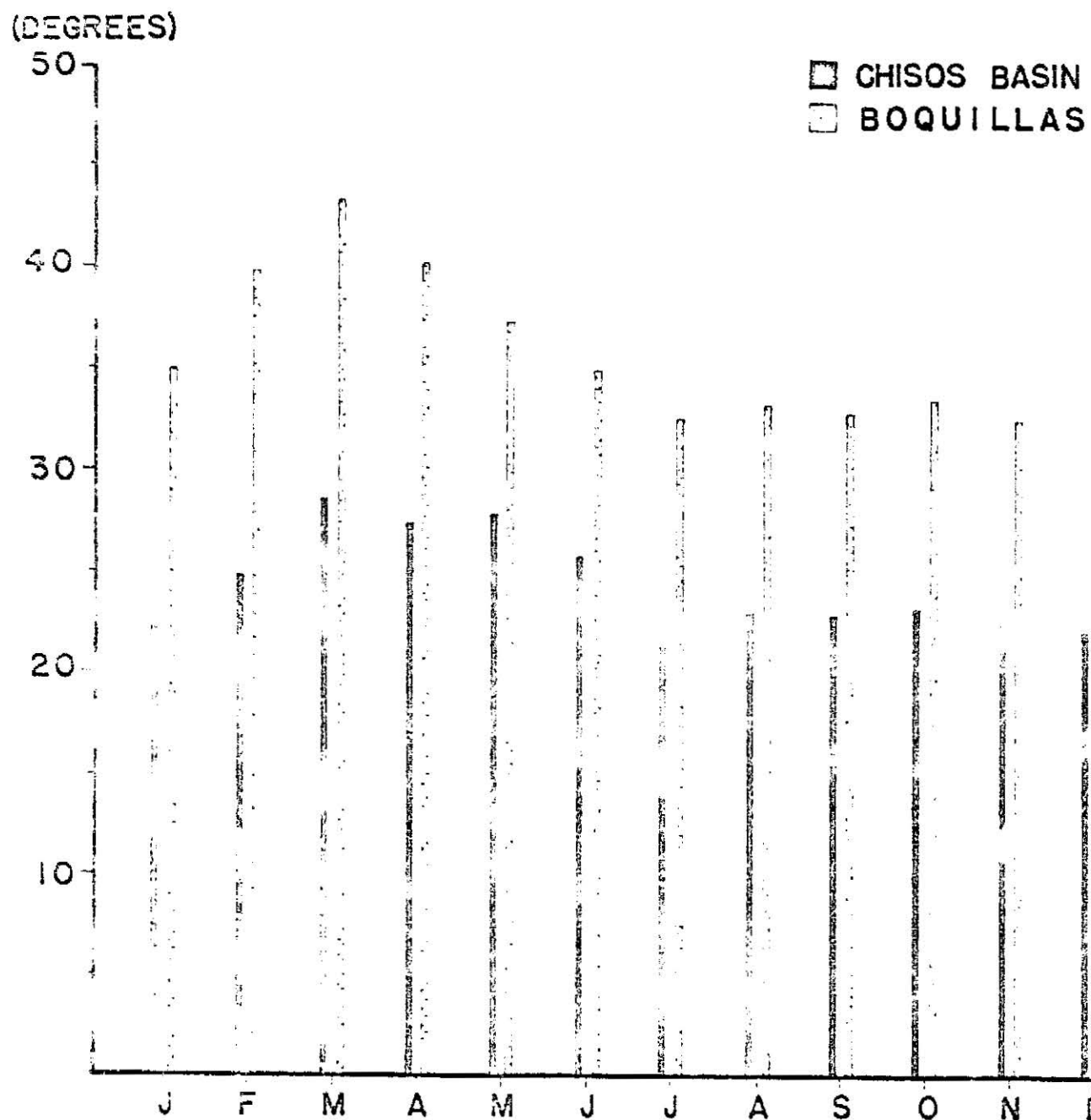


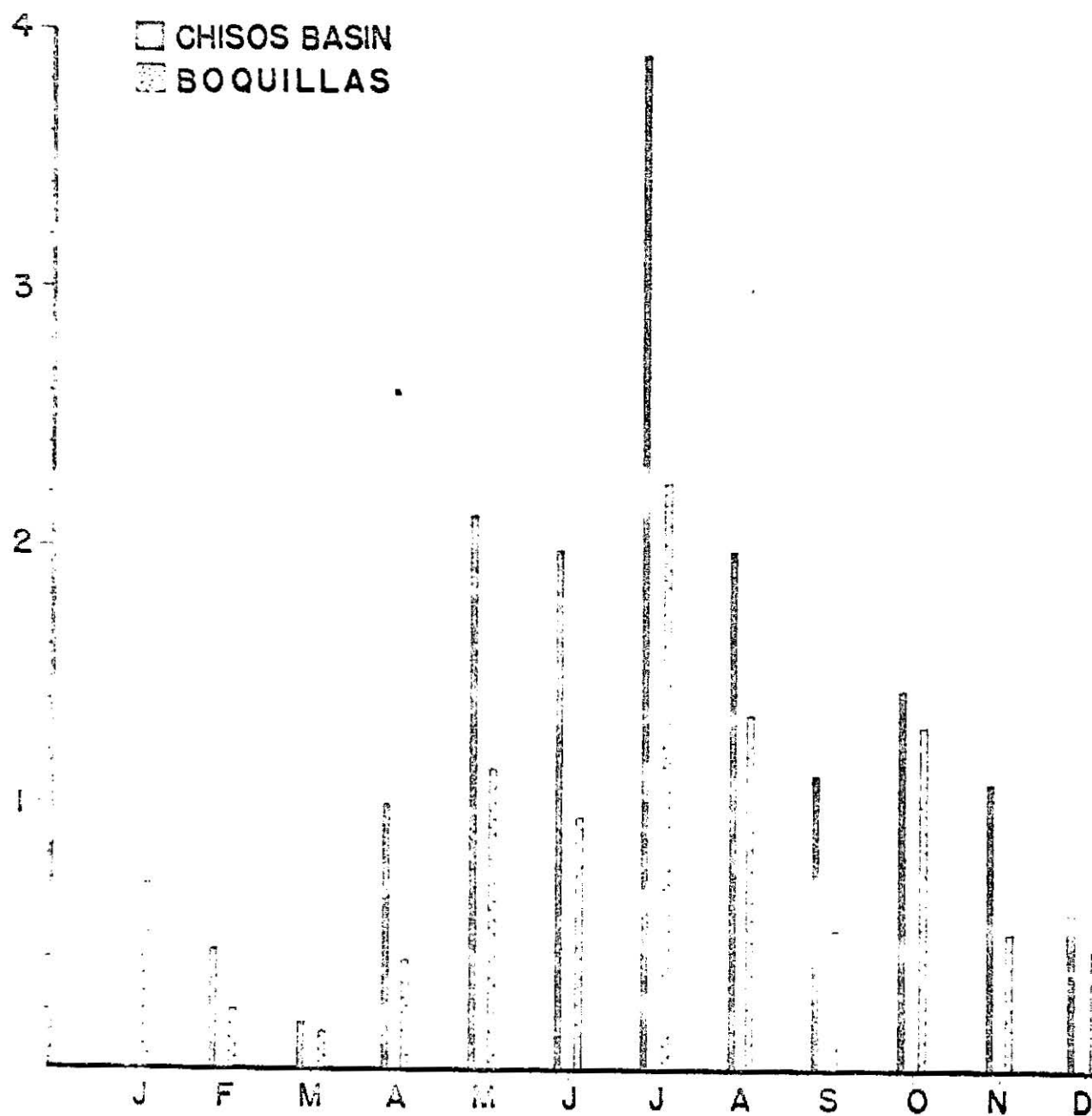
Fig. 1



AVERAGE MONTHLY DAY-NIGHT TEMPERATURE DIFFERENTIAL
(5 YEARS OF RECORD)

Fig. 2

(INCHES)



MONTHLY AVERAGE PRECIPITATION
(5 YEARS OF RECORD)

Fig. 3

Wind: The prevailing wind direction is from the Southeast, with extremely variable velocity throughout the year. The maximum velocity is estimated at 60 to 70 mph.

Special Conditions: Violent local wind, rain, and lightning storms occur frequently from April through August, with the greatest activity in June and July.

FIRE HISTORY

The Park averages 3.3 fires per year, caused almost equally by man and lightning; an average of 14.6 acres of Park lands are burned each year. Eighty-five percent of the fires occur from March through December and twelve percent during December and January. February, October and November show relatively few fires. The primary fire season is March through September.

TERRAIN

Big Bend National Park is situated on a rugged lowland plain broken by several mountain groups, isolated peaks, mesas, and canyons. This plain is surrounded by conspicuous highlands: the Sierra del Carmen and the Santiago Mountains on the East, Mesa de Ponce and Mesa de Anguila on the West, and the Christmas and Rosillos Mountains on the North. To the South, the plain extends across the Rio Grande where it terminates in highland areas in Mexico.

The central part of the Park is dominated by the Chisos Mountains, a compact range of rounded rock masses, vertical cliffs, and a radial system of deep canyons. Elevations in the Chisos exceed 7,000 feet.

The Chisos are surrounded by a vast alluvial plain which slopes away from the mountains in all directions. Its uniform slope is locally interrupted by isolated mountain masses with their own alluvial plains which grade into the major plain.

Ephemeral streams, which are dry gravel beds most of the year, discharge from the mountains and flow across the plains, and eventually into the Rio Grande, the master stream of the area.

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The Rio Grande, in its course along the southern boundary of the Park, passes through a succession of desert lowlands and passes from one to the next through separating mountain barriers in which it has cut narrow and imposing canyons.

SOILS

Big Bend is an area formerly abused by severe overgrazing. As a result, sheet erosion has removed much of the original topsoil from the area.

Being largely a desert and semi-desert region, the soils are generally coarse. A major portion of the Park is covered with gravelly outwash plains composed of materials both igneous and calcareous in origin.

The land in the mountainous sections is rough and stony. The soil that has developed is in pockets and between large rocks. Generally, soils in the mountains are very shallow, open, and well drained, supporting semi-desert types of vegetation. Pockets of forest humus develop locally in the Chisos Mountains.

Broad areas of exposed clay and gravel and clay loam flats occur at lower elevations. In open sites, the Rio Grande forms broad floodplains of sandy river silt.

RESOURCES

Vegetation and Wildlife: There are over 1,000 species of plants, 60 species of mammals, 242 species of birds, 6 species of amphibians, and 46 species of reptiles presently known to occur in Big Bend National Park. Many factors control the distribution of these plants and animals into five rather distinct communities (biomes): Forest, Woodland, Sotol-grass, Desert Scrub, and River Floodplain.

Forest Biome: The forest, represented in the high, cool, east-facing canyons of the Chisos Mountains, is a mere fragment of the montane coniferous forest. It is considered a relic of a formerly more extensive forest

which has decreased in extent with increasing aridity since Pleistocene age. The common plants of this biome include:

Arizona cypress (Cupressus arizonica)
Douglas fir (Pseudotsuga taxifolia)
Ponderosa pine (Pinus ponderosa)
Graves oak (Quercus gravesi)
Bigtooth maple (Acer grandidentatum)

Animals common to this biome include:

Carmen Mountains white-tailed deer (Odocoileus virginianus carminis)
Couch's Mexican jay (Aphelocoma ultramarina couchi)
White-breasted nuthatch (Sitta carolinensis)
Colima warbler (Vermivora crissalis)

Woodland Biome: This community occupies most of the Chisos Mountains above 4,000 feet except the areas occupied by the Forest Biome. The principal components of the Woodland Biome are:

Mexican pinyon pine (Pinus cembroides)
Alligator juniper (Juniperus pachyphloea)
Mexican drooping juniper (Juniperus flaccida)
Oneseed juniper (Juniperus monosperma)
Emory oak (Quercus emoryi)
Texas madrone (Arbutus texana)
Mountainmahogany (Cercocarpus eximius)

Animals of the Woodland Biome include:

Mountain cottontail (Sylvilagus floridanus)
Gray fox (Urocyon cinereoargenteus)
Carmen Mountains white-tailed deer (Odocoileus virginianus carminis)
Couch's Mexican jay (Aphelocoma ultramarina couchi)
Whip-poor-will (Caprimulgus vociferus)
Rufous-sided towhee (Pipilo erythrophthalmus)
Alligator lizard (Gerrhonotus lioccephalus)
Mottled rock rattlesnake (Crotalus lepidus lepidus)

Sotol-grass Biome: Possibly the entire Park, aside from the Forest and Woodland Biomes, was formerly occupied by this association. This biome occupies the intermediate elevations, generally between about 3,500 feet and 5,000 feet in elevation. Common plants of the Sotol-grass Biome include:

Threeawn (Aristida spp.)
Grama (Bouteloua spp.)
Bluestem wheatgrass (Agropyron smithi)
Falsegrama (Cathestecum erectum)
Sotol (Dasyllirion leiophyllum)

Animals typical of this biome are:

Fulvous harvest mouse (Reithrodontomys fulvescens)
Texas antelope squirrel (Citellus interpres)
Desert Mule deer (Odocoileus hemionus crooki)
Meadowlark (Sturnella neglecta)
Brown towhee (Pipilo fuscus)
Big Bend patch-nosed snake (Salvadora hexalepis deserticola)
Texas glossy snake (Arizona elegans elegans)
Northern black-tailed rattlesnake (Crotalus molossus molossus)

Desert Scrub Biome: The Desert Scrub Biome in Big Bend National Park represents an outstanding example of the vast Chihuahuan Desert. This community is the most extensive, covering nearly all of the elevations below 3,500 feet at Big Bend. The most common plants are:

Creosotebush (Larrea divaricata)
Lechuguilla (Agave lechuguilla)
Tarbush (Flourensia cernua)
Cocotillo (Fouquieria splendens)
Leatherplant (Jatropha spathulata)
Torrey yucca (Yucca torreyi)
Giant-logger yucca (Yucca carnerosana)
Hechtia (Hechtia scariosa)
Candelilla (Euphorbia antisiphilitica)
Various cacti (Cactaceae spp.)

Animals of the Desert Scrub Biome include:

Spotted ground squirrel (Citellus spilosoma)
Black-tailed jackrabbit (Lepus californicus)
Desert mule deer (Odocoileus hemionus crooki)
Collared peccary (Tayassu tajacu)
Roadrunner (Geococcyx californianus)
Western coachwhip snake (Masticophis flagellum
testaceus)
Western diamondback rattlesnake (Crotalus atrox)

River Floodplain Biome: This community occurs on the Rio Grande floodplain and in large sandy washes. Common plants in this community include:

Mesquite (Prosopis glandulosa)
Seepwillow baccharis (Baccharis glutinosa)
Burrobrush (Hydnoclea monogyne)
Willows (Salix spp.)
Common reed (Phragmites communis)
Palmer cottonwood (Populus palmeri)

Animals of the River Floodplain include:

Beaver (Castor canadensis)
Yellow-faced pocket gopher (Cratogeomys castaneus)
Ord kangaroo rat (Dipodomys ordii)
Great blue heron (Ardea herodias)
Green-winged teal (Anas carolinensis)
Vermilion flycatcher (Pyrocephalus rubinus)
Texas softshell turtle (Trionyx ferox emoryi)
Western checkered garter snake (Thamnophis marcianus
nigrolateris)

Plants of Unusual Interest: Drooping juniper (Juniperus flaccida). This tree is fairly common in the Chisos, but occurs nowhere else in the United States.

Giant dagger yucca (Yucca carnerosana). Within the United States, this indicator plant of the Chihuahuan Desert is restricted to the Big Bend Country. It is the largest yucca in the Park.

Havard's agave (Azave scabra). This handsome agave is known only from the Big Bend Country.

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Chisos agave (Agave chisosensis). This rare plant occurs only in the Chisos Mountains and one small area in the Glass Mountains north of the Park.

Hechtia (Hechtia scariosa). Although not especially rare in the Park, the plant is not known to exist anywhere in the United States outside of Big Bend National Park.

Quaking aspen (Populus tremuloides). This is a widely distributed species, but in Big Bend it occurs only in a limited area on Mt. Emory. It is of considerable ecologic interest here.

Animals of Unusual Interest: Long-nosed bat (Leptonycteris nivalis). This nectar and pollen feeding bat occurs in a cave on Mt. Emory. Within the United States, this Mexican species is known only from Big Bend National Park and Santa Cruz County in Southern Arizona.

Yellow-nosed cottonrat (Sigmodon ochrognathus). The known range of this species is limited to the higher elevations of the Big Bend Country.

Colima warbler (Vermivora crissalis). This rare bird breeds in the Chisos Mountains, and does not occur elsewhere in the United States.

Davis Mountains king snake (Lampropeltis alterna). This rare snake is known only from the Chisos and Davis Mountains.

Extirpated Animals: Black bear (Euarctos americanus umbyceps). The black bear was found in the mountainous sections of Big Bend until the early 1940's.

Bighorn sheep (Ovis canadensis mexicana). Bighorn sheep were known in Big Bend prior to 1900.

Pronghorn (Antilocapra americana). Pronghorn formerly ranged over much of the area now in the Park. At the time the Park was established, they did not occur in the Park.

The National Park Service planted pronghorn unsuccessfully in Green Gulch. A few are seen occasionally on Tornillo Flat.

Gray wolf (Canis lupus). The gray wolf has been rare since settlers arrived. A few may have occurred here possibly as late as 1933.

Harlequin quail (Cyrtonyx montezumae). Observed occasionally in the Chisos prior to the establishment of the Park, this bird is now considered extinct in Big Bend.

Exotic Plants: Plants introduced into Big Bend by man include:

Bermuda grass (Cynodon dactylon)
Foxtail millet (Setaria italica)
Lehman lovegrass (Eragrostis lehmanniana)
Johnson grass (Sorghum halepense)
Fivestamen tamarisk (Tamarix pentandra)
Athel tamarisk (Tamarix aphylla)
Tree tobacco (Nicotiana glauca)
Eastern cottonwood (Populus deltoides)
Smooth sycamore (Platanus occidentalis var. glabrata)
Live oak (Quercus virginiana)
Thornless honeylocust (Gleditsia triacanthos var. inermis)
Cowstongue pricklypear (Opuntia linguiformis)

A few miscellaneous fruit and shade trees can still be found around some of the old ranch home sites.

Plant Pests and Diseases: Plant diseases have been a relatively minor but continuing problem at Big Bend. No major epidemics have been experienced. Plant diseases known in the area include:

Arizona five-spined engraver (Ips lecontei). This beetle occurs in the Chisos, where it has done limited and localized damage to ponderosa and piñon pine.

A cedar bark beetle (Phloeosinus sp.). An undetermined species of this genus killed several Arizona cypress in Boot Canyon prior to 1960.

Southwestern pine beetle (Dendroctonus barberi). This bark beetle has damaged ponderosa pine in Pine Canyon.

Mesquite twig borer (Oncideres sp.) and Mesquite flatheaded wood borer (Chrysobothris octocola). These two boring beetles occur in mesquite stands along the Rio Grande.

Aphids are conspicuous on cottonwoods around developed areas at times.

A fungus (Fusarium sp.) has caused some damage and mortality in cottonwoods at Rio Grande Village.

Water: The principal stream in Big Bend is the Rio Grande, which forms 107 miles of Park boundary. The jurisdiction of the United States extends only to the center of the main channel.

Terlingua Creek, in the western section of the Park, is generally just a trickle but can become a torrent during the summer thundershowers.

Tornillo Creek, in the eastern section of the Park, is similar to Terlingua but produces less runoff.

All other streams are intermittent and are usually dry.

A number of springs and constructed earthen ponds provide water for human needs and wildlife.

Fish: The fish bearing waters of Big Bend are limited to the Rio Grande, Terlingua Creek, and lower Tornillo Creek. A few earthen ponds, constructed for livestock watering, still contain relic populations of fish planted by early ranchers and others.

The List of Fishes Known or Expected to Belong to the Fauna of The Big Bend National Park, by Dr. Clark Hubbs,

lists 25 species known to occur in the Park and 13 others which may. Noteworthy species occur as follows:

(Known occurrence: A-Abundant; O-Occasional)

Species	Rio Grande	Terlingua	Tornillo
Longnose gar (<u>Lepisosteus osseus</u>)	A	-	-
Gizzard shad (<u>Dorosoma cepedianum</u>)	A	-	-
Banded Tetra (<u>Astyanax fasciatus</u>)	O	A	A
River carpsucker (<u>Carpionodes carpio</u>)	A	A	A
Carp (exotic) (<u>Cyprinus carpio</u>)	A	O	O
Speckled chub (<u>Hybopsis aestivalis</u>)	A	-	-
Rio Grande Shiner (<u>Notropis jemezianus</u>)	A	-	-
Chihuahua shiner (rare) (<u>Notropis chihuahua</u>)	-	O	O
Tamaulipas shiner (<u>Notropis braytoni</u>)	A	A	A
Redhorse shiner (<u>Notropis lutrensis</u>)	O	A	A
Mexican stoneroller (<u>Campostoma ornatum</u>)	-	O	O
Blue catfish (<u>Ictalurus furcatus</u>)	A	A	A
Zebra killifish (<u>Fundulus zebrinus</u>)	-	O	O
Big Bend mosquitofish* (<u>Gambusia gaigei</u>)	-	-	-
Common mosquitofish (<u>Gambusia affinis</u>)	A	A	A
Warmouth (probably exotic) (<u>Chaenobryttus gulosus</u>)	-	-	O
Recear sunfish (exotic) (<u>Lepomis microlophus</u>)	-	-	O

Bluegill			
(<u>Lepomis macrochirus</u>)	-	0	0
Freshwater drum			
(<u>Aplodinotus grunniens</u>)	0	-	-

*The Big Bend Mosquitofish was described from a spring near Rio Grande Village in 1928. Its total range was restricted to two warm springs in that area. The population was nearly eliminated by development and the introduction of exotic species. Two populations survive in artificial ponds: one at Rio Grande Village and at Croton Springs. None survive in their original environment. Special steps have been taken to insure the survival of this species.

History and Archeology: Very little archeological work has been done in Big Bend National Park. Dr. Erik Reed conducted a survey of the area during the summers of 1936-37, but most of the materials collected were destroyed when a small temporary museum burned in 1941.

The prehistoric inhabitants of this area are known as the Big Bend Basketmakers or Big Bend Cave-dwellers. They lived in caves and probably also crude brush shelters, but left no structural remains.

The history of Big Bend is colorful and turbulent. Significant happenings include Spanish exploration and military occupation, conflicts between Apaches, Comanches, Mexicans, and the westward expanding Americans, Army camel expeditions, development of West Texas cattle empires, Texas Ranger activities, mining, border disputes with Mexican revolutionaries, bandits, and smugglers, and the candelilla wax industry.

Most of the historic remains in the Park serve to illustrate the interesting ways of life in this harsh environment. The following is a list of significant historic sites and structures in Big Bend. Buildings which have regular Park building numbers are given the same historic site numbers here to avoid the confusion of two numbering systems.

Big Bend National Park Historic Sites

Site
No.

- BBH-1 Ore Tramway; six mile cable tramway carried ore from the Puerto Rico Mine in Mexico, across the Rio Grande, to truck loading terminal in Ernst Basin.
- BBH-2 Daniel's Farm Hand's Casita; a small Mexican adobe house adjacent to the Daniel's Farm House.
- BBH-443 Daniel's Farm House; a typical Mexican style adobe farm house, stabilized and prominently located at Rio Grande Village.
- BBH-417 Senator Berkeley's House; small stone house near the Rio Grande, built as a vacation cabin by the State Senator.
- BBH-110 Barker House; excellent example of early Mexican adobe architecture. Now in use as a Park residence.
- BBH-131 Boquillas Ranger Station; excellent example of Mexican architecture. Now in use as ranger station.
- BBH-80 Hot Springs Cabins; guest rooms for invalid bathers, vacationers, etc. Built about 1927.
- BBH-81 Hot Springs Stone Residence; small stone house west of Hot Springs Store.
- BBH-82 Hot Springs Store and Post Office; historic resort served Mexicans and guests for many years. Resort started about 1910; Store built about 1927.
- BBH-3 Comanche War Trail; Comanche raiding route through Persimmon Gap to Tornillo Creek, and thence to various crossings into Mexico.

- BBH-4 Glenn Spring; site of candelilla wax processing and ranching community, store, and U.S. Cavalry camp; raided by Mexican bandits in 1916. No buildings remain; only rock outlines of army camp.
- BBH-10 Mariscal Mine; early 1900's cinnabar mining "ghost town." Mine structures and seventeen adobe and stone building ruins remain.
- BBH-168 Luna Residence; example of Mexican peon home built of stone, mud, posts, and ocotillo.
- BBH-12 Sublett Farm House; stabilized ruin of interesting adobe farm house.
- BBH-13 Sublett Farm Hand's Casita; small stabilized ruin of Mexican farm worker's adobe home on Sublett Farm.
- BBH-14 Sublett Adobe Shed; ruin of adobe utility building on Sublett Farm; now adjacent to Park road, Route 9.
- BBH-15 Stone Farm House; ruin of stone farm house on river floodplain near Sublett Farm. History of this structure is not yet known.
- BBH-139 Dorgan Residence; interesting stabilized ruin of adobe farm house with central fireplace built of petrified wood.
- BBH-501 Army Utility Building; one of Castolon buildings built by Army in 1919.
- BBH-605 Magdalena House; Castolon building used as residence by storekeeper's cook, Magdalena Silvas; as a Texas Ranger Station, and now as a Park Ranger Station.
- BBH-606 Garlic House; excellent example of Mexican adobe architecture; located in the historic compound at Castolon; has excellent example of split log ceiling.

- BBH-607 Alvino Residence; good example of Mexican adobe home; believed to be one of the oldest buildings at Castolon.
- BBH-609 Cotton Gin; ruin of cotton gin adjacent to Castolon cotton field; contains two large engines and pumps used to pump irrigation water.
- BBH-617 Old Castolon Residence; small house adjacent to Old Castolon Store; Spanish menu painted on wall indicates use as cafe.
- BBH-618 Old Castolon Store; was Castolon store prior to moving into the abandoned army barracks in 1921; has excellent example of reed ceiling.
- BBH-600 Castolon Store; long adobe building built by Army in 1919 as barracks; in continual use as store from 1921 to present.
- BBH-602 Army Latrine; 1919 adobe army latrine; now modernized inside as public rest rooms.
- BBH-603 Army Officer's Residence; army officer's quarters; adobe; now used as Park Service residence.
- BBH-604 Army Officer's Residence; (same)
- BBH-16 Wilson Ranch House; located in Blue Creek adjacent to new Route 5; stone structure; excellent example of Chisos Mountains ranch headquarters.
- BBH-129 K-Bar Ranch House; excellent example of adobe ranch house; still in use by National Park Service.
- BBH-112 Grapevine Ranch House; old adobe ranch headquarters at end of Grapevine Hills Road.
- BBH-111 Castolon Adobe Farmhouse; old adobe home on floodplain east of Castolon.
- BBH-612 Castolon Farm Hand's House; adobe house on floodplain west of Castolon.

Geological: The geological features of Big Bend include impressive examples of faulting, folding, erosion, and igneous activity. In the field of paleontology the highly fossiliferous clay and sand beds of the Upper Tornillo represent an unbroken record of deposition through the transition period of Mesozoic to Cenozoic Eras.

Most of the Park is in a downfaulted basin or graben-like structure, bordered on the east by the Sierra del Carmen and on the west by the Mesa de Ponce and Mesa de Anguila. The 1500 foot high escarpment of Mesa de Ponce and Mesa de Anguila is an obviously recent one, since the scarp is so abrupt and has not retreated from the trace of the fault. The Sierra del Carmen represents a system of parallel and en echelon faults, geologically older than Mesa de Anguila. The Burro Mesa Fault scarp, located within the graben and just east of the Chisos, is a rare example of an obsequent fault-line scarp. The down-thrown side of the Burro Mesa fault now stands as a topographical high due to differential erosion along the fault-line. Extensive thrust faulting occurs near the Park entrance at Persimmon Gap in the Santiago Mountains, where Upper Paleozoic rocks of Carboniferous age have been thrust over rocks of Lower Cretaceous age.

Folded and tilted rock strata are commonly seen from along the Park roads. Mariscal and Dagger Mountains and Sierra San Vicente are obvious anticlinal structures. Drag folding is common along the many fault zones of the Park. The lavas and tuffs of the Chisos beds are tilted and deformed in many places where they have been intruded by igneous rocks. The sedimentary rocks have been uplifted and form domes where intruded by laccoliths and stocks.

The agents of erosion have been responsible for some of the most spectacular scenery of the Park. Sheer-walled canyons a quarter of a mile deep have been carved through limestone by the Rio Grande through the escarpments of the Sierra del Carmen, forming twenty-seven mile-long Boquillas Canyon, and through the Mesa de Anguila, forming a seven mile-long Santa Elena Canyon. The Mariscal Anticline has been divided across its long axis by the

Rio Grande, thus forming Mariscal Canyon. The lofty, rugged peaks and the deeply carved canyons of the volcanic rocks of the Chisos Mountains represent the effects of extensive erosion. The unique outcropping of rounded boulders in the Grapevine Hills displays a splendid example of spheroidal weathering and erosion. Erosion along the drainages of Tornillo, Blue, and Alamo creeks in the colorful bentonitic clays of the Late Cretaceous rocks has produced excellent examples of badlands topography.

Both intrusive and extrusive igneous rocks are present in the Park in abundance. The Chisos Mountains represent an erosional remnant of a complex series of interbedded lavas, tuffs, and fluvial deposits, which have been further complicated by later intrusives. Throughout the Park isolated discordant plutons of various types are found. Nugent Peak, the McKinney Hills, and The Grapevine Hills were formed by laccolithic intrusion. Rattlesnake Mountain, Sierra Quemada, and Elephant Tusk represent small stock-like intrusives. Dikes and sills abound throughout the Park. Some of the dikes stand like walls above the host rock and are traceable for as much as five miles.

The paleontology of the Park is receiving a great deal of study, because the rock record seems to show no hiatus between strata of late Cretaceous and early Paleocene time. Fossil dinosaur bones of Cretaceous age have been found in close proximity to early mammals of Paleocene age. It is hoped that continued study in the Park will help to explain the tremendous evolution of life forms that occurred at the end of Cretaceous time.

Fossil finds of particular significance include the skull of the giant crocodile-like reptile Phobosuchus riograndensis which is now on display at the American Museum of Natural History in New York City. A complete pelvic section of the sauropod dinosaur, Alamosaurus, has recently been discovered which is the best fossil of this dinosaur yet discovered in North America. Fossil mammals such as Coryphodon, Hyracotherium, and Phenacodus have been discovered and some of these are on display in the Park.

Recreational: The Rio Grande is the only body of water in the Park suitable for recreational purposes. It is used by Park visitors for canyon float trips and fishing. Swimming is discouraged because of river currents. Recreational use of the Rio Grande is controlled by the river level, which fluctuates considerably.

Special Scenic Features: Throughout the Park, the pristine Chihuahuan Desert wilderness offers an unexcelled example of desert beauty. Vast panoramas are common from Park roads. There are, however, other spectacular natural features and scenic views noteworthy of particular mention.

Dog Canyon	The water gap that separates the Sierra del Carmen and Santiago Mountains, this narrow canyon vividly demonstrates the terrific erosive force of the water of an intermittent desert creek.
Chisos Mountains	The rugged quality of this compact group of mountains attracts attention from anywhere in the Park.
Boquillas Canyon	Three great canyons, two of which are accessible by passenger car, have been cut through limestone mountains by the Rio Grande and offer an awe-inspiring experience to the visitor. The walls of these canyons tower more than 1,000 feet above the river. Interior views are possible by float trips through the canyons.
Santa Elena Canyon	
Mariscal Canyon	
Desert in Bloom	The Desert Scrub Biome of the Chihuahuan Desert becomes a mass of color when the various wildflowers bloom during the spring months and after summer thundershowers.
Maverick Badlands	The Upper Cretaceous shale and marl beds, in the vicinity of Maverick Mountain, have been eroded into

Maverick Badlands (continued) rugged badlands. Trace elements in these formations produce vivid hues of red, ochre, brown, purple, and white.

Chisos Basin Nestled in the Chisos Mountains, the Basin affords spectacular views of the surrounding peaks, and through the Window to the desert lowlands beyond.

South Rim At an elevation of 7,500 feet, the view from the South Rim affords a panoramic view of more than half the Park's 1,100 square miles, as well as many miles south into Mexico.

Chisos in Winter Frequently, during freezing weather, moisture collects on the slopes and plants of the Chisos in the form of hoarfrost, resulting in a beautiful winter scene.

Castolon Peak This isolated rust colored peak near Castolon, stands 1,100 feet above the surrounding desert lowlands.

LAND STATUS

Status of land within the existing boundaries is as follows:

Federal	700,240.70	Municipal	None
State	None	Private	920.00
County	None	Scenic Easement	None
		Other	7060.50

The 7060.50 acres of land listed under "Other" has been purchased and/or donated to Big Bend National Park and the deeds are so recorded in Brewster County. Acceptance of these deeds by the Department of Justice is still pending.

Big Bend
September 1964

THE VISITOR

VISITOR CHARACTERISTICS

Number: Projections for 1964 through 1973, Figures 1 and 3, are from Branch of Statistics Analysis, Washington Office.

Visitors Per Month--1963: Statistics are not available on average number of visitors per day of the week for the heaviest three months of the year.

Peak loads occur annually over the Easter week end. In 1964 this period was from March 26 through March 29.

March 26	700
March 27	1,407
March 28	1,357
March 29	<u>896</u>
Total	4,360

Origin: Twenty-one percent, local Texas; 79 percent, remainder of United States; less than 1 percent from foreign countries. There are no significant variations by seasons or entrances.

Types: Visitation by families is estimated at 96 percent; by organizational groups, three percent; by other special tours, etc., about one percent of the total visitation. There are no significant variations.

Frequency and Duration of Visits: Big Bend National Park does not have a permit system; therefore, data is not available on single entry and re-entry visitation. Since 21 percent of our travel is estimated as local, this figure would be the best available for re-entry visitation. The estimated average length of visits for those staying in concessions' overnight facilities is two and one-half days; for campgrounds, three days; for those not staying overnight, six hours.

(1,000's)

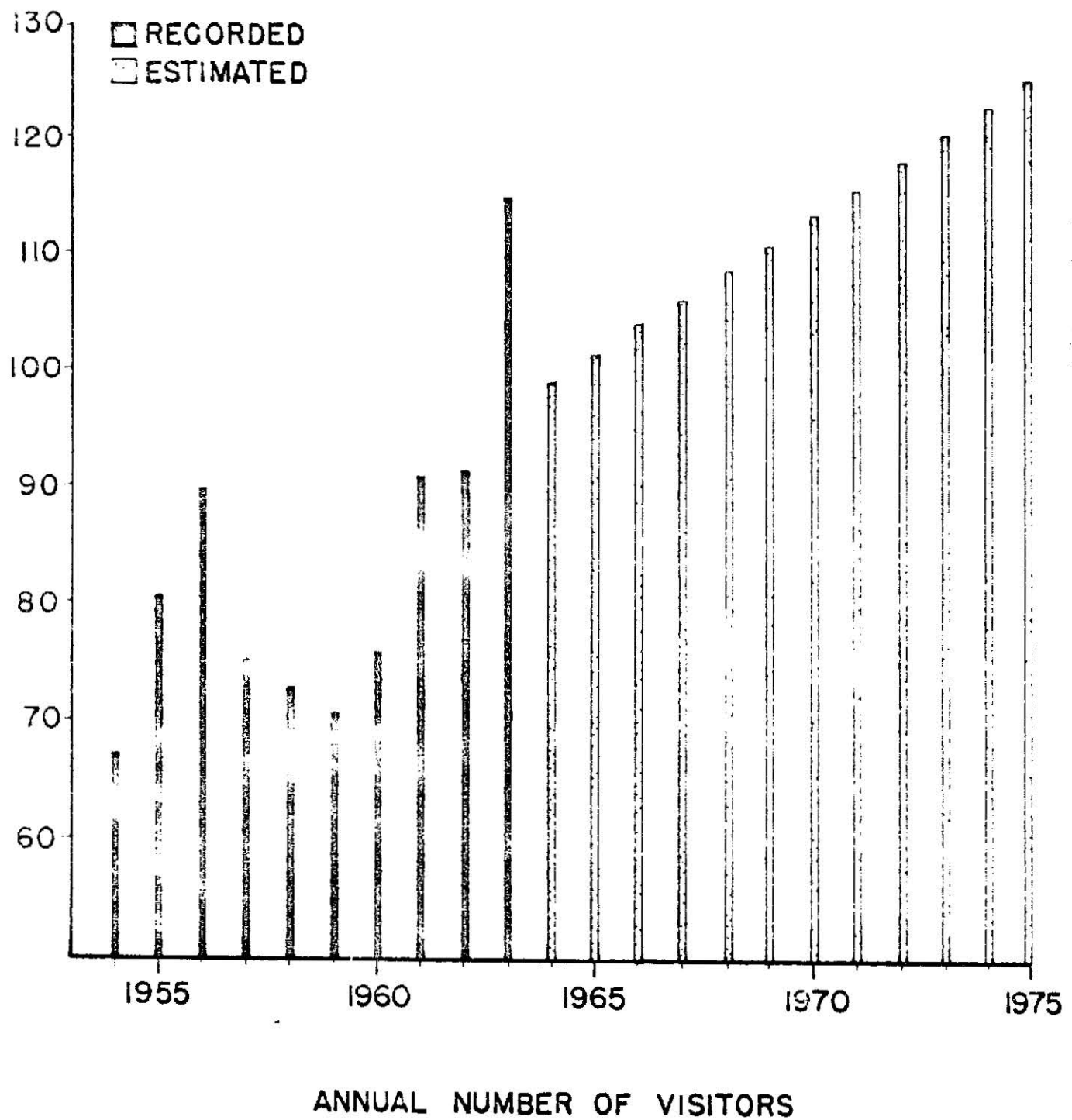
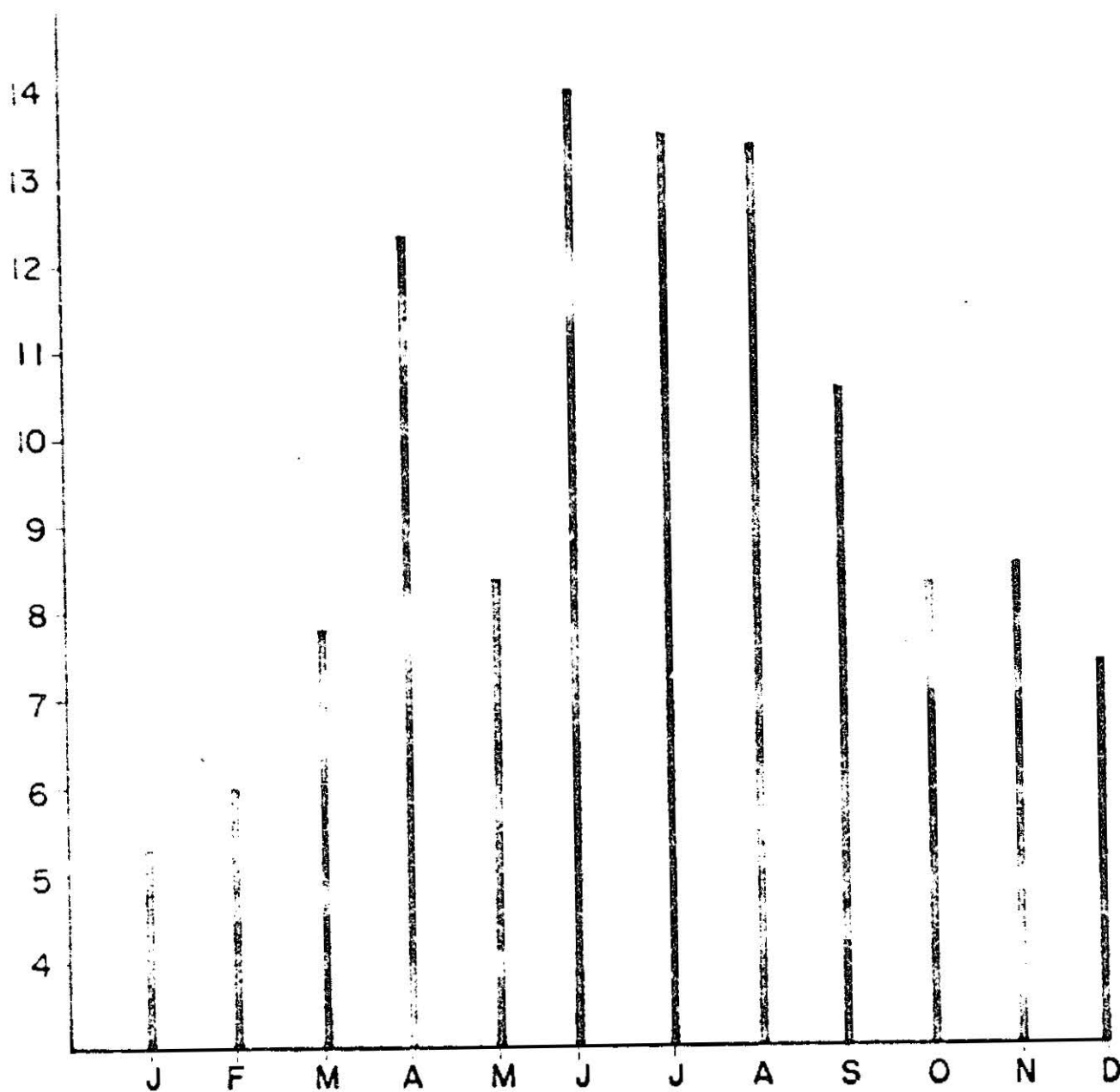


Fig. 1

(1,000's)



MONTHLY NUMBER OF VISITORS

1963

Fig. 2

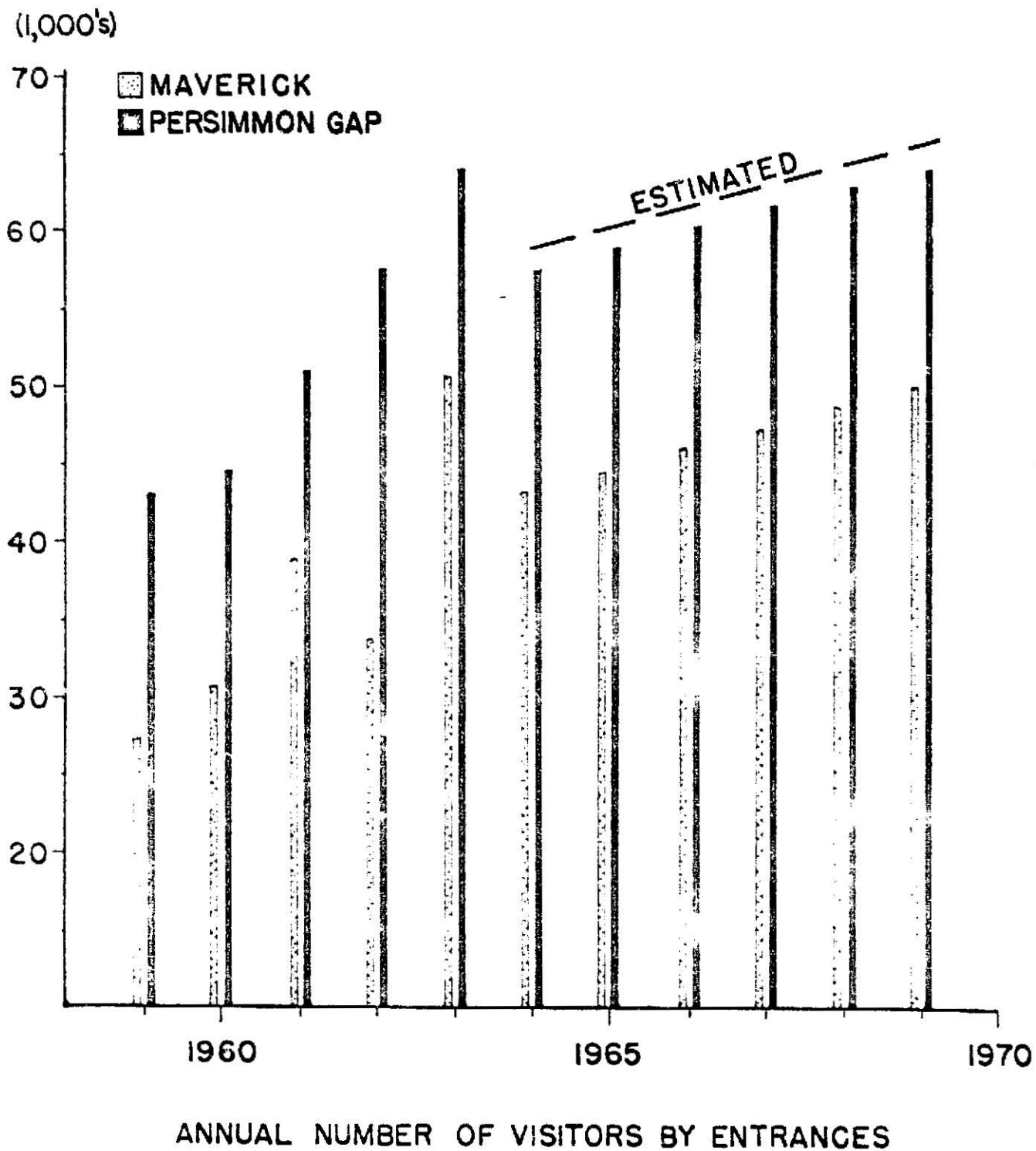


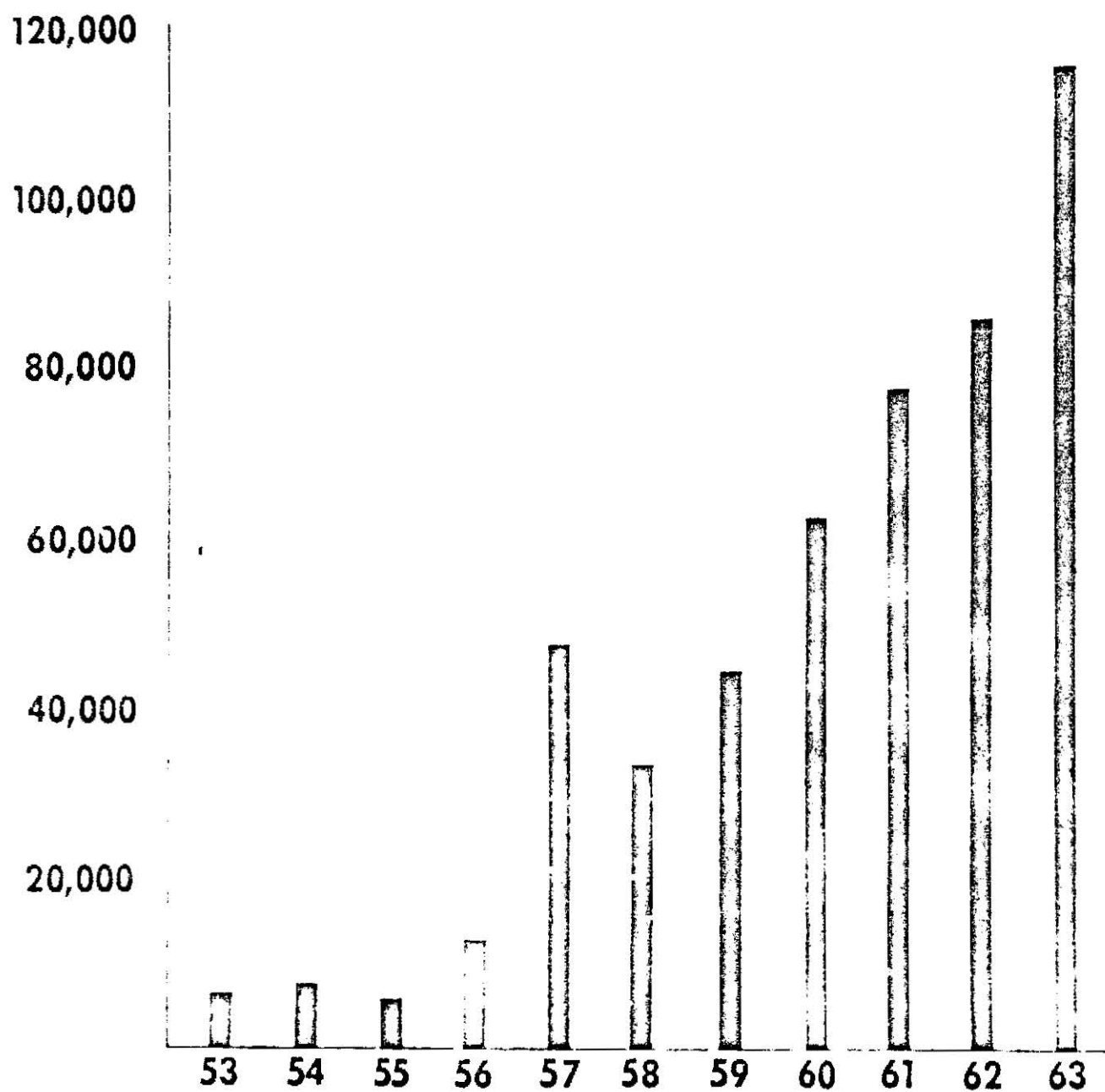
Fig. 3

VISITOR ACTIVITIES

ACTIVITIES	PARTICIPANTS		
	1958	1963	Max. 24-hr. per.
Automobile sightseeing	72,630A	114,232A	1407A 3/27/64
Conducted Trips (Nature Walks)	-	714A	50A 6/20/64
Attend. Interp. Talks	10,592A	20,732A	329A 6/2/64
Attended Stations	10,000E	33,294A	1000E 4/14/63
Self-guiding	14,943E	31,087E	1200E 4/14/63
Wilderness Use:			
Hiking	1,000E	1,500E	Not available
Camping	200E	450E	Not available
Horseback	*827A	1,772A	40A 3/27/64
Boating	150E	302E	56E 3/27/64
Overnight Use:			
Camping (developed)	7,270A	34,750A	1538A 3/27/64
Camping (prim. auto)	3,151A	4,257A	168A 3/26/64
Camping (group)	218E	1,042E	Not available
Cabins-Motel	16,066A	23,690A	174A 8/11/64
Trailer Villages	434A	3,508A	74A 3/27/64
Water Uses:			
Swimming	N.A.	1,140E	Not Available
Fishing	N.A.	3,420E	150E 3/26/64
Horseback Riding (developed areas)	*1,550A	3,351A	20E 3/27/64
Picnicking (developed areas)	4,910E	7,773E	Not Available
*1959			

Figure 4

Big Bend
September 1964



Annual Interpretive and Informational Contacts

Fig. 5

MASTER PLAN
FOR THE PRESERVATION AND USE
OF
BIG BEND NATIONAL PARK

* * *

Chapter 1, Objectives and Policies
Significant Resources
Significant Values
Preservation and Use Policies
Guidelines

Prepared by: /s/ Henry C. Schmidt Date 11/29/60
Henry C. Schmidt, Assistant Supt.

/s/ Harold L. Brodrick Date 11/29/60
Harold L. Brodrick, Chief Park Nat.

/s/ Harry L. Smith Date 11/29/60
Harry L. Smith, Park Landscape Architect

Recommended: /s/ Stanley C. Joseph Date 11/30/60
Stanley C. Joseph, Superintendent

Concurred: _____ Date _____
Chief, Western Office, Design and Construction

Concurred: _____ Date _____
Regional Director, Southwest Region

APPROVED: A. CLARK STRATTON Date 11/14/62
ASSISTANT Director, DVC
* * *

ROUND 6217

Big Bend
July '62

MASTER PLAN
FOR THE PRESERVATION AND USE OF
BIG BEND NATIONAL PARK

VOLUME I

Chapter 1. Objectives and Policies

Big Bend National Park contains significant resources of scenic, scientific and historic values for the enjoyment of present and future generations.

This area, part mountain and part desert, contains a fine example of the environment that is typical of the Chihuahuan Desert. Within this vast region are forested mountains, semi-arid plains and riverside jungles. All of these varied features give the Park a wild kind of scenery that is more typical of Mexico than the United States. Elevations ranging from 1000 feet to 7835 feet reveal outstanding geological features. This contrasting topography contains a wide variety of plants and animals whose habits have been profoundly modified by the arid environment.

Some of the most spectacular geological features in the Big Bend region have been the result of crustal movements. Displacements have been as much as 6000 feet and it was into and through such a "thrust block" that the Chisos Mountains were intruded. In other places the topography is interrupted by several conspicuous mountain belts through which the Rio Grande has cut deep canyons. Erosion has sculptured the terrain into many weird forms and at the same time revealed an abundance of fossils ranging from microscopic organisms to dinosaur and early mammal skeletons.

Ecologically the park contains a wide variety of plants, mammals, birds, insects, reptiles, and amphibians. Within this large group, there are many species that are not to be found in any other location north of Mexico.

The first inhabitants of this area were the Indians who left only their campsites, artifacts, pictographs, petroglyphs, and burials to tell the story about how they lived. Next the early Spanish explorers touched the area briefly or passed nearby, leaving ruins in nearby Mexico. Following exploration and mapping parties, the early ranchers came and wrote the intriguing story about how they survived and made a living from the land.

These resources when transmuted into human values have the capacity to instill within the visitor a feeling of oneness with nature and

at the same time provide the opportunity and stimulus for reflection and self-evaluation.

Through participating in the recreational aspects such as hiking, horseback riding, fishing, camping, exploration, boat trips through canyons, etc., the visitor gains inspiration and enjoyment of the immensity of sky and land, and savors the solitude, quietness, and remoteness of the area. Some of the elements that are appreciated through insight and knowledge are: The ecological relationships of plants and animals, the complex geology, the rare and unusual species of flora and fauna, the facts of archeological and historical significance and struggle of the early settlers to make a home and life in a remote and rather inhospitable land. To gain the preatest enjoyment from the subtleties of the Park, the visitor must enter into the experiences emotionally, intellectually and spiritually.

The full justification for this National Park is to accomplish its Mission and for the Service to preserve, manage, develop and interpret the resources.

The National Park Service is responsible for the preservation and development of the resources for optimum use.

Preservation of the wilderness character of the park will be paramount and facilities and improvements will be carefully limited and controlled to attain this objective.

The major visitor concentration will center around the Chisos Mountains, La Grande Village, and Castolon. Overnight accommodations and related services within the park, as well as adequate campground and picnic areas will be developed. These needs will be provided for through Service and Concession developments.

Panther Junction will remain essentially for administrative use. Also subordinate administrative space will be provided at the three major visitor-use areas as well as at the two entrance stations. The interpretive and protection programs will be carried out so that visitors will receive the general information which will enable them to use the park safely and wisely, and basic knowledge necessary to permit them to derive the greatest benefits from its inspirational and educational resources.

No extensive expansion of the present road and trail system will be permitted. However, improvement and relocation of some portions of the existing roads and the construction of a scenic and interpretive road to Castolon and Santa Elena Canyon, shall be carried out.

Existing trails will be improved with additions particularly in the Rio Grande and Castolon areas. No development will be carried out in the designated wilderness area of Pine Canyon.

All of the broad Service policies and special policies apply to this park and the following list enumerates specific policies that are pertinent to local situations, relationships and conditions:

1. Complete the authorized acquisition of properties at or near the north entrance.
2. Develop adequate overnight visitor facilities in Chisos Basin, Rio Grande Village and Castolon.
3. Provide complete development of picnic sites and campground facilities in the Chisos Basin, Rio Grande Village and Castolon Areas.
4. Develop complete trailer area at the Rio Grande Village, Castolon and K-Bar.
5. Develop entrance stations at the north and west entrances.
6. Furnish housing for all permanent and seasonal employees to be stationed in the park.
7. Take the major interpretive theme from natural phenomena.
8. Interpretation will employ self-guidance and will rely upon visitor center exhibits and audio-visual programs to stimulate use, understanding and appreciation of the park. Contact-interpretation at Visitor Centers, Museums, etc., is equally important.
9. Take positive steps to protect and maintain wildlife, vegetation, natural objects and wilderness areas in an unmodified condition.
10. Formulate plans to protect visitors from hazards and all property from fire, theft or human-caused damage.
11. Cooperate with civic, historical, scientific and other organizations in matters that are within or

related to the park.

12. Maintain contacts to foster good relations with nationals of Mexico.
13. Take cognizance of visitor travel habits and make feasibility studies to determine if additional visitor camping sites are necessary at cooler elevations.
14. To ensure National Park will function within the framework of this approved Master Plan and under published regulations of authority of a Group "B" organization as defined in the Administrative Manual.

*Supersedes Chap. 2
Without Reg. 1.1 Signature*

MASTER PLAN
OF
BIG BEND NATIONAL PARK

* * * * *

Chapter 2, Area Objectives

Purpose

Management Category

Management Objectives

Prepared by: *Douglas B. Evans* Date August 6, 1964
Douglas B. Evans,
Chief Park Naturalist

Recommended: *Larry E. Brown* Date 8-7-1964
(Superintendent)

Recommended: *Samuel B. Hall* Date 8/28/64
Regional Director

Approved: *JOSEPH E. TEBBEN* Date 9-26-64
Asst. Dir.

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PURPOSE

The purpose of Big Bend National Park is to preserve, unimpaired, an outstanding example of rugged Chihuahuan Desert Wilderness, the bordering Rio Grande with its spectacular canyons, and the associated desert mountains with their disjunct ecologic communities.

The mission of the National Park Service is to provide opportunities for all generations of visitors to gain knowledge, enjoyment, and inspiration from the scenic, scientific, and historic values of Big Bend National Park.

MANAGEMENT CATEGORY

Big Bend National Park is a Natural Area, dedicated and set apart to preserve outstanding natural settings for use and enjoyment by people.

MANAGEMENT OBJECTIVES

OBJECTIVE ONE: TO PROVIDE FOR THE HIGHEST QUALITY OF USE AND ENJOYMENT OF THE NATIONAL PARK SYSTEM BY INCREASED MILLIONS OF VISITORS IN YEARS TO COME.

To insure, through intense supervisory, training, and cooperative activities, that all services to Big Bend National Park visitors--those supplied by the concessioners, as well as those supplied by the National Park Service--adhere to standards which will provide the highest quality park experience.

To encourage proper visitor use and enjoyment of Big Bend's natural and historic resources by constantly seeking ways of improving stimulating informational services and facilities, and the development and maintenance of necessary access facilities.

To maintain high standards of visitor protection programs through active training projects, cooperation with other park organizations--including the concessioners--and coordination with interpretation and visitor services programs.

To provide necessary public facilities, properly located, to help visitors better enjoy Big Bend National Park, and to develop plans for the systematic disposal of substandard and obsolete facilities.

To improve publicity activities aimed at increasing visitor use during fall and winter months.

To encourage use of Big Bend National Park for qualified research purposes, and to provide appropriate assistance to such programs.

Big Bend
August 1964

To seek ways of obtaining data on visitor use of, and reaction to, facilities and services in Big Bend National Park, as a guide to anticipating future trends and providing better public service.

To conduct studies to determine potential capacity of Big Bend National Park, and set limits of use in unique and fragile areas determined by research to require special protective attention.

To join with park concessioners and with local private and public organizations, in both the United States and Mexico, in programs of comprehensive land planning which will provide for the optimum man-land ratio and will result in the highest and best use of Big Bend National Park and adjacent areas.

To insure that the primary pattern of use will enable the visitor to enjoy freely the natural beauty, to appreciate the significance of the natural features, and to make optimum use of the recreational opportunities they afford.

To provide maximum preservation of the primitive wilderness, encourage safe and compatible use, and maintain minimal access facilities for those visitors willing to use the wilderness on its own terms.

To provide easily recognizable opportunities for access to the wilderness threshold by development of walking paths, and stimulate the wilderness threshold experience through well planned informational services.

To define limits for all development, and establish acreage and capacity limits for each developed area, with particular concern for preserving the natural and historic settings.

To provide for the enjoyment and interpretation of Big Bend's historical and archeological features.

OBJECTIVE TWO: TO CONSERVE AND MANAGE FOR THEIR HIGHEST
PURPOSE THE NATURAL, HISTORICAL AND RECREATIONAL
RESOURCES OF THE NATIONAL PARK SYSTEM.

To base conservation and protection of the resources of Big Bend National Park upon more effective management programs determined by research findings.

To expand the National Park Service's capability to carry out a sustained, comprehensive research effort in support of all management programs by establishing the Chihuahuan Desert Research Center in Big Bend National Park, and by obtaining an adequate research staff to encourage, coordinate, and assist research by scientific, educational, and historical institutions.

To develop a land use plan, as part of the Master Plan, which will assure a balanced relationship between preservation of Big Bend National Park resources and visitor needs.

To emphasize design excellence by establishing an architectural theme, for all construction, in harmony with the Chihuahuan Desert-Mexican border atmosphere of Big Bend National Park.

To assure dependability, efficiency, and long life for all Park facilities through proper design, construction, maintenance, and protection.

To contribute to the conservation of the total West Texas-North Mexico environment through the example of Big Bend National Park as a radiating influence upon the surrounding community.

To establish explicit resource management guidelines for Big Bend National Park which are in harmony with the concepts of the Secretary's Advisory Board on Wildlife Management, and the report of the National Academy of Sciences.

To provide for the conservation of important historical and archeological resources in Big Bend National Park.

OBJECTIVE THREE: TO DEVELOP THE NATIONAL PARK SYSTEM
THROUGH INCLUSION OF ADDITIONAL AREAS OF SCENIC, SCIENTIFIC,
HISTORICAL AND RECREATIONAL VALUE TO THE NATION.

To conduct and encourage studies of natural environments and historical areas of the Big Bend Country to identify significant entities, and assist with programs for their proper registration and preservation.

To conduct studies of the boundary of Big Bend National Park to determine if revisions would improve the management and protection of Park resources.

OBJECTIVE FOUR: TO PARTICIPATE ACTIVELY WITH ORGANIZATIONS OF THIS AND OTHER NATIONS IN CONSERVING, IMPROVING, AND RENEWING THE TOTAL ENVIRONMENT.

To cooperate with other Federal agencies in programs for natural and historical resource conservation and outdoor recreation.

To assist the State of Texas, its political subdivisions, and other organizations by making available service experience in the fields of land planning, design, management, interpretation, and operation of parks, and exchanging information on techniques of mutual value, when requested.

To exchange park knowledge with the Republic of Mexico, assist in planning for the establishment, development, interpretation, and management of a Mexican national park adjacent to Big Bend National Park, and to assist in meeting the fundamental challenges of pollution and species extinction, when such assistance is requested.

To provide for the interpretation of natural and historic features, and the management and protection programs of Big Bend National Park in fluent Spanish.

OBJECTIVE FIVE: TO COMMUNICATE THE CULTURAL, INSPIRATIONAL AND RECREATIONAL SIGNIFICANCE OF THE AMERICAN HERITAGE AS REPRESENTED IN THE NATIONAL PARK SYSTEM.

To give highest priority to strengthening visitor information services as a necessary element of better interpretation.

To achieve the highest quality of interpretation based on standards of professional interpretation, through critical and systematic appraisal by the Park Superintendent.

To insure high quality interpretive services through conduct of programs by professional interpreters qualified in their subject fields and with full-time responsibility for planning and executing interpretive programs.

To maintain as fully as possible in the face of increasing park use, informal personal interpretation, including the strengthening of speaking skills.

To reach a wider representation of park visitors through special interpretive programs and facilities for families, young people, and for visitors from Mexico, as well as from other nations.

To improve the design and quality of museum, wayside and audio presentations, graphic and visual arts, and other creative media of interpretation and information, developing new methods and tools based on current advances in technology.

To expand interpretive and preservation programs in the fields of music, art, handicrafts, folklore, and other aspects of culture of the Big Bend Country, and encourage participation by arts and craftsmen of the region.

Pig Bend
August 1964

To communicate to the public at large the significance of the nation's heritage as represented in parks, through talks, publications, graphic arts and other extension services, with increased emphasis on the use of television and motion pictures.

To work closely with schools, colleges, educational associations, publishers, and other institutions engaged in educational processes in order to teach the relationships between man and his heritage as represented in the National Park System, especially in Big Bend National Park.

To strengthen mutual understanding and cooperation between the staff of Big Bend National Park and the people of neighboring communities.

To communicate park policies and philosophy to the public through informational and interpretive media at all levels of operation.

OBJECTIVE SIX: TO INCREASE THE EFFECTIVENESS OF THE NATIONAL PARK SERVICE AS A "PEOPLE SERVING" ORGANIZATION DEDICATED TO PARK CONSERVATION, HISTORICAL PRESERVATION, AND OUTDOOR RECREATION.

To assure full and efficient development and use of manpower, with a high degree of employee morale.

To assure maximum efficiency, group closely related functions together in each organizational unit.

To achieve maximum results through improved operational procedures.

To improve the effectiveness of park operations through establishment of a systematic program sequence which translates the long range objectives of the National Park Service into Park objectives and develops coordinated Park programs to achieve these objectives.

To provide safe practices, safe working conditions, and a high level of safety consciousness on the part of all employees--National Park Service, concessioner, and contractors--and to motivate the Park staff to keep Big Bend National Park safe for the public.

MASTER PLAN
FOR THE PRESERVATION AND USE
OF
BIG BEND NATIONAL PARK

* * *

Chapter 2, Visitor Use Brief

- A. The Park General
- B. Preservation and Use of the Chisos Mountains and Vicinity
- C. Preservation and Use of the Rio Grande Village and Vicinity
- D. Preservation and Use of the Castolon Area and Vicinity
- E. Preservation and Use of the Back Country

* * *

Prepared by:	(SGD) HENRY G. SCHMIDT	DEC 29 1960
	<u>Henry G. Schmidt, Assistant Superintendent</u>	<u>Date</u>
	(SGD) HAROLD J. BRODRICK	DEC 29 1960
	<u>Harold J. Brodrick, Chief Park Naturalist</u>	<u>Date</u>
	(SGD) HARRY L. SMITH	JAN 1 1961
	<u>Harry L. Smith, Park Landscape Architect</u>	<u>Date</u>

* * * * *

Reviewed by:	(SGD) STANLEY C. JOSEPH	JAN 5 1961
	<u>Stanley C. Joseph, Superintendent</u>	<u>Date</u>

* * * * *

Chief, Western Office, Design and Construction	<u>Date</u>
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* * * * *

Regional Director, Region Three	<u>Date</u>
---------------------------------	-------------

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VOLUME I

Chapter 2. The Visitor Use Brief

the period since the park was established the general trend of visitors' movements has become evident. Even though visitors may be concentrated at the entrances, they still tend to come to park headquarters to secure necessary information before proceeding further on their park tour. As of now, the park is lacking in the facilities to provide adequate visitor services, and anticipates that the completion of the proposed facilities will contribute toward a fuller enjoyment and appreciation of his visit, providing the answer to questions, what to see and what to do, but not creating any marked change in the pattern of the visitors' movements while in the park.

(a) Park General

Each visitor approaches from either of two entrances, State Highway 118 and or U. S. 305 from Marathon. The present trend is approximately 60% and 50% respectively entering these points. However, it is anticipated that the trend will be toward a 50-50 percentage until the Lajitas-Presidio

road is completed and then a reversal of the present percentage ^{may} ~~will~~ take

At either park entrance the visitor will receive a greeting and park literature at the entrance station and will be told where accommodations are available and about the orientation exhibits at Panther Junction. From the west entrance he may go direct to the Chisoe Basin or to the Castolon Development. After entering from the north his ~~next stop~~ will be at Panther Junction. In the Park Administration Building, at this site, he will find orientation exhibits designed to present him a comprehensive picture of where to go what to do and see. At this point guides and other informative literature, not available in free form, will be made available for him to purchase.

The visitor either entering or exiting at the north entrance will have the opportunity to follow the self-guiding road to Dagger Flat to see the various forms of desert vegetation and view the wayside exhibit on Yucca at the terminus. Informational signs giving names of features, and

Information and interpretive signs and exhibits are included along all park

the interpretive road to Castolon and Santa Elena Canyon will contain

especially informative interpretive signs and exhibits on park geology and

history. All park roadside interpretation is designed to explain specific

parts of the park story as covered in the general exhibits or the visitor

guide. It is designed to coordinate and amplify these exhibits.

A series of numbered posts are placed along all routes to supplement roadside

signs and exhibits. These posts identify features which are explained in a

guide. This guide is available for purchase by those visitors who are interested

in more detail than that imparted by roadside signs or exhibits alone.

A visitor may choose to go direct to the place where he wishes to stay,

then visit the other parts of the park later while the day visitor with

limited time will see what he can, then leave by either entrance.

Every park visitor will derive the greatest assistance and benefit if he visits

the orientation center at Park Headquarters, Panther Junction soon after his

However, it is not essential that the other sections be viewed in special order.

Reservation and Use of the Chisos Mountains and Vicinity.

On arrival in the Chisos Basin the park visitor who plans to remain

overnight will register for one of the 76 motel or cottage type rooms

or one of the 75 campsites in the improved campground.

At his leisure he may then go to the Visitor Center to learn about the

entire country from the story told in the geological and biological

exhibits in the exhibit room supplemented by the day and evening programs

presented in the auditorium of the center or in the campfire circle on summer

evenings.

He may participate in the conducted nature walks or follow the self-guiding

trails to Lost Mine Ridge, $2\frac{1}{2}$ mile, and the Window, $2\frac{1}{2}$ mile, or the shorter

trails, in the Basin. He may take the longer hike to the South Rim,

12 miles, or avail himself of the opportunity to go on a conducted trip to

the Window by horseback, South Rim, or even longer special rides to other

may also like the self-guiding part of the South Rim Trail, a
about 1 1/2 mile.

Views in the Basin provide an experience and knowledge of the
country as contrasted to the lower elevations with desert associa-

any visitor or one asking his headquarters in another part of the park

first to the visitor center and then choose such other activities

as time and inclinations permit. He finds the activities of the mountain

especially attractive during the summer period due to the cooler tempera-

ture has further opportunity of extending his knowledge of the park

mountain country through the free literature, and the trail guides

and literature which are sold at the Visitor Center.

may elect to use the Grand Canyon facilities as his center from

to make sight-seeing excursions to the other parts of the park or he

may go to either the Rio Grande Village or Castolon developments

stay for part or all of his visit.

Preservation and Use of the Rio Grande and Vicinity.

From either entrance or the Basin the visitor may go to the Rio Grande Village.

If he desires to remain overnight there he may register for one of the 160

multiple unit rooms, select one of the 200 campsites in the improved campground,

use one of the 50 picnic sites, or park his house trailer in one of the 100

sites available at the concession operated trailer court. He will find the

Visitor Center conveniently located where he will see the geology and biology

of the lower elevations of the park portrayed in the exhibit room with an

added feature consisting of aquariums of the fish of the Rio Grande includ-

ing the rare Big Bend mosquitoe fish found only in the warm spring area of

our park. He will attend the evening programs presented in the Campfire

Circle or the auditorium of the Visitor Center and may also attend the daytime

programs presented in the auditorium as well.

Our park visitor may choose to go on a conducted nature walk with a ranger-

naturalist or follow the self-guiding nature trail along the river each way

from the village area and receive an explanation of the effect of this

moment upon the flora and fauna of the area. He may also choose to go on a selected horseback ride along the river, to the village of Papillas, or, about two miles downstream, or the higher mountain country strutting the Grand Canyon.

As to this section of the park will all drive on the park road to the Grand Canyon overlook to view the orientation exhibit and the exhibits describing the geology of the Canyon and history of the mining activities in the area. From the overlook visitors will travel to the end of the road and follow the $\frac{1}{2}$ mile long self-guiding nature trail into the entrance of Papillas Canyon or take the longer horseback ride or hike into the Sierra del Camacho on the eastern edge of the Park over improved trails. Also available at the Papillas parking area are 10 picnic sites.

As in the Rio Grande as a recreational sport, may be indulged in by all aged visitors; no license is required.

If the proposed National Park in Mexico should materialize, at some future date, the roads in the Mexican State of Coahuila be developed, the addition of a

any required international crossing may become necessary; this would

may affect the protection and operations of this portion of the park,

the visitor use pattern.

Observation and Use of Castolon and Vicinity

Desiring to see the spectacular Santa Elena Canyon will follow the

scenic road along the east side of Burro Mesa and along a scenic portion

the lower Chisos Mountains with turnouts and view points to provide an

opportunity to view unusual and interesting geological features. When they

reach Castolon they will continue on the interpretive road along the Rio Grande

where evidence of early ranching activity is evident, and explained. Reaching

Santa Elena Canyon overlook visitors will find interpretive exhibits

regarding the geology of the canyon, a road to the picnic ground of 30 picnic

sites to the south of the canyon where a self-guiding nature trail provides

access into the canyon with walls towering 1500 feet above them.

Recreation development offers a third site where visitors may obtain accommo-

dation in one of the 20 multiple unit rooms or camping in the improved camp-

ground of 100 sites, use one of the 10 picnic sites, or park their trailer

of the 100 sites provided in this location. This area, like the Rio

will be most popular during the winter months.

For the I period any post building has been retained to serve as a

and a ranch style atmosphere prevails. The visitor will receive

an interpretation of the park when he examines the historical and

archaeological exhibits of the Visitor Center at this location. Here also

may attend the day and evening programs presented in the auditorium of

center or in the outdoor amphitheatre. Guided nature walks along

the river are provided as part of the interpretive program and saddle horses

are available, either along the river or into the mountain area.

One may also fish in the Rio Grande in this portion of the park.

Interesting village of Santa Klaus, Mexico, directly across the river,

gives visitor an opportunity for contact with the residents of our

bordering country either in their village or when they come to the

border town to trade.

Back Country Areas

mission to becoming familiar with the park and its story from the road.

In regularly developed areas, numerous visitors with longer periods to

will have the opportunity to explore some of the back country roads to

remote parts of the park. The accessibility of these is variable and

subject to seasonally changing conditions. To protect both visitors and

park, the use of the back country areas is controlled. The park visitor

may gain permission to try certain back country roads and the "river road"

when it is known they are in usable condition. Checking in and out with the

park ranger provides the visitor with accurate information, the Service with

knowledge of who is using the road and where to look if they fail to return.

visitors may also secure permits to make float trips on the Rio Grande

with the major canyon if they show that they have the proper equipment and

experience to make the trips in safety.

A pack trip by horseback into the back country may be taken by visitors

on trips from Cortez to the basin.

Interpretation

Interpretive Program

see Volume III Sec. D

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
BIG BEND NATIONAL PARK
TEXAS

Hill 4
Fruega

FOR IMMEDIATE RELEASE

April 2, 1962

TRAVEL INCREASES IN BIG BEND
NATIONAL PARK.

Volume I, Chapter 2
Visitor Use

Big Bend National Park, Texas. The monthly travel report for Big Bend continues to show a consistently increasing travel pattern this year, Superintendent Stanley C. Joseph reported. Total number of visitors to Big Bend since January 1 has been 17,482 compared with 13,061 for the first three months of 1961. This travel represents an increase of 29%.

campground use has increased 10% over last year and use of cottages and other concession facilities has increased substantially over last year.

MASTER PLAN
FOR THE PRESERVATION AND USE
OF
BIG BEND NATIONAL PARK

- Chapter 3, Park Organization Brief
- A. The Park Organization, General
 - B. Office of the Superintendent
 - C. Administrative Services Division
 - D. Ranger Activities Division
 - E. Interpretation Division
 - F. Maintenance and Engineering Division
 - G. Summaries
 - AA. National Park Concessions, Inc.
 - BB. Chisos Mounds

Prepared by: (SGD) HENRY G. SCHMIDT Date APR 14 1961
Henry G. Schmidt, Asst. Superintendent

(SGD) HARRY L. SMITH Date APR 14 1961
Harry L. Smith, Landscape Arch.

(SGD) R. GORDON FINNEY, JR. Date APR 14 1961
R. Gordon Finney, Admin. Assistant

(SGD) HAROLD G. EDWARDS Date APR 14 1961
Harold G. Edwards, Chief Park Ranger

(SGD) HAROLD J. BRODRICK Date APR 14 1961
Harold J. Brodrick, Chief Park Naturalist

(SGD) MCCUNE C. OTT Date APR 14 1961
McCune C. Ott, Maintenance Supervisor

Reviewed: (SGD) STANLEY C. JOSEPH Date APR 14 1961
Stanley C. Joseph, Superintendent

Approved: Chief, Western Office, Design and Construction Date

Approved: Regional Director, Region Three Date

ADDED COPY

VOLUME I

Chapter 3 Park Organization Brief

A. Park Organization, General.

Big Bend National Park functions within the framework of this approved master plan and under stated delegations of authority, as defined in the paragraph on specialized assistance, in the National Park Service Administration Manual, Organization Volume, Part 7. The Park Staff is so organized to carry out the responsibilities within the limits of defined authority. The organization and functions are described below.

(See next page continuation of this part.)

Office of SUPERINTENDENT
Direct all operations in the park
to accomplish the Park Mission

LANDSCAPE ARCHITECT
Provide staff service for
the park in the fields of
landscape architecture and
development planning.

ADMINISTRATIVE DIVISION
Perform administrative
services in accordance with
established procedure and
in the interest of the
efficient operation of
the park organization.

PARKER ACTIVITIES DIVISION
Protect park resources and
facilities and the welfare
of the park visitors.

INTERPRETATION DIVISION
Acquire, assemble and
present knowledge about the
park for guidance in pro-
tecting park resources and
enriching visitor knowledge.

MAINTENANCE AND ENGINEERING DIV.
Operate and maintain the physical
plant in a manner contributing
to the efficient functioning of
park staff, to the welfare of
visitors and to preservation of
park resources.

D. Office of the Superintendent

Function: Direct all operations in the park to accomplish the Park Mission in the best way possible.

Task: Plan, direct, supervise, coordinate, and evaluate all activities performed by the park staff as follows:

Fiscal Management

Property Management

Personnel Management

Operation and Maintenance of Facilities

Protection of resources

Public Services

Construction Projects

Training

The Superintendent, in accordance with procedures described in the

Administrative Manual and within well defined authority, participates

in long range management and development planning, with preparation

of Master Plan Narrative, and in the progressing and supervision of construction projects. He maintains or provides membership in or liaison with boards, commissions and other governmental agencies, of which the following are most important:

Bureaus of U. S. Department of Justice

U. S. Public Health Service

U. S. International Boundary and Water Commission

U. S. Forest Service

U. S. Soil Conservation Service

State of Texas Agencies

Brewster, Presidio, Jeff Davis, Terrell and Reeves County officials.

International Good Neighbor Council

Colleges and Universities

West Texas Chamber of Commerce

Big Bend Trail Association, and various civic and public

organizations

Provide staff service for the park in the fields of landscape architecture and development planning.

Organization and Operation: The Park Superintendent is the officer responsible for all activities within the park. Park headquarters is in the Administration-Orientation Center at Panther Junction, and this is the base of operations for the Superintendent and his staff.

Staff Required:

<u>Permanent</u>	<u>Total Existing</u>	<u>Total Long Range</u>
Superintendent	1	1
Assistant Superintendent	1	1
Landscape Architect	1	1
Management Assistant	-	1
Secretary (Steno)	<u>1</u>	<u>1</u>
Total Permanent	4	5

VOLUME I, Chapter 3
Park Organization Brief
Page 7

	<u>Total Existing</u>	<u>Total Long Range</u>
Personnel	-	1
Equipment	-	1
Total Personnel	-	1

<u>As Required:</u>	<u>Existing</u>	<u>Add. Proposed</u>
Police Bureau at Panther Junction	5	-
Volunteers (203, 205, 205)	3	2
Seasonal Apartment 215A & 217A	2	-
Equipment Storage	-	4 (Stalls)

Administration Division

Function: To perform the common administrative services, in accordance with established policies, procedures, and standards for the interests of the efficient operation of the entire park organization.

Proposed Tasks:

Supervise personnel of the division in administrative service procedures and standards.

Perform procedures relating to recruitment, classification, and

separation of personnel, and maintain personnel records.

Effect the proper utilization and maintain records and controls of funds allocated to the Park.

Effect the acquisition, and disposal, and maintain records of accountability for all equipment and property.

Provide information and advice to the Superintendent and other Divisions on fiscal and personnel matters.

Assume financial accountability for all funds appropriated to the Park.

Consolidate and prepare the Park's budget estimates for submission.

Maintain mails and files.

Effect time and payroll procedures.

Organization and Operation: The Administrative Officer, reporting to the Assistant Park Superintendent, directs and coordinates the work of the Division. Staff is headquartered in the Administration-Orientation building at Panther Junction with the exception of a warehouseman stationed in the Utility building in the maintenance area of the Panther Junction

headquarters.

Seasonal fluctuations in work load are not pronounced except at terminations of calendar and fiscal years when fiscal, inventory and numerous other reports are required.

Staff Required:

<u>Permanent</u>	<u>Total Existing</u>	<u>Total Long Range</u>
Administrative Officer	-	1
Administrative Assistant	1	-
Personnel Officer	-	1
Personnel Assistant	1	-
Procurement and Property Asst.	-	1
General Supply Clerk	1	-
Warehouseman	-	1
Clerk-General	1	2
Clerk-Stenographer	2	1
Clerk (Mails and Files)	-	1
Clerk-Typist	-	2
Janitor	1	1

Staff Required (Cont'd)

<u>Permanent</u>	<u>Total Existing</u>	<u>Total Long Range</u>
Laborer	<u>1</u>	<u>1</u>
Total Permanent	7	12
Seasonal	0	0

Facilities Required:

<u>Panther Junction</u>	<u>Existing</u>	<u>Additional Proposed</u>
Offices - Admin. Orientation Bldg.	3	0
Storage Bldg. & Yard #274	1 (oblit.)	9
Warehouse & Storage Yard #264	0	1
Paint Storage #273	1 (oblit.)	1
Oil Storage #272	1 (oblit.)	1
Explosive Storage	1	0
Explosive Cap Storage	1	0
Gas & Oil Storage & Dist. Bldg. #278	1	0
Equipment Storage	0	1 (stall)

Facilities Required (Cont'd)

<u>Panther Junction</u>	<u>Existing</u>	<u>Additional Proposed</u>
Residences #238 & #235	2	10
<u>Rio Grande Village</u>		
Gas & Oil Storage & Dist. Bldg.	0	1
Supply & Storage Bldg.	0	1
<u>Castolon</u>		
Supplies and Materials Bldg.	0	1
Gas & Oil Storage & Dist. Bldg.	0	1

Division of Ranger Activities:

Responsibility: To assist park visitors in understanding and enjoyment of the park and to protect human life, property and basic park values.

Assigned Functions:

Provide information and assistance to Park Visitors and residents.

Operate north and west entrance stations.

Supervise and regulate the use of the park and park facilities, including roads, campgrounds, picnic areas and the Rio Grande.

Maintain good relations with residents of surrounding communities in the United States and Mexico. Cooperate with local, county, state and federal administrative and law enforcement agencies of both countries.

Plan and carry out measures for the prevention and control of damage to Park lands, forests and waters by fire, insects, disease, erosion, or other causes.

Plan and execute measures to provide for the protection and welfare of park wildlife.

Plan and provide for protection of all property within the park.

Secure conformance to park regulations and take initial action in case of their violation.

Train division personnel in ranger activities, procedures and skills.

Train other available personnel in fire control and other emergency skills.

Act as technical advisor to the Superintendent and other park personnel on matters pertaining to the protection of park resources, laws and regulations.

Organization and Operations: The Chief Ranger, under the supervision of the Assistant Superintendent, coordinates and supervises the activities of the ranger staff. The park is divided into two ranger districts - Headquarters District and River District.

Visitation is year around with heaviest use in April, May, June, July and August, requiring extra patrol and attention to roads, campgrounds and other facilities.

Texas hunting season during November and December requires intensive patrol on the 118 miles of boundary adjacent to hunting areas.

The Rio Grande, international as well as park boundary, requires year around patrol.

The fire season occurs April 1 to August 31. However, conditions are favorable for wild fires during every month of the year.

Staffing Requirements:

<u>Permanent</u>	<u>Total Existing</u>	<u>Total Long Range</u>
Chief Park Ranger	1	1
Assistant Chief Park Ranger	1	1

Staffing Requirements (Cont'd)

<u>Permanent</u>	<u>Total Existing</u>	<u>Total Long Range</u>
District Park Rangers	2	2
Park Rangers	6	22
Clerk-Stenographer	0	1
<u>Seasonal</u>		
Rangers (3 months)	2	15
Fire Control Aids (5 months)	3	5

Facilities Required

<u>Peahter Junction</u>	<u>Existing</u>	<u>Additional Proposed</u>
Office space (rooms)	3	-
Radio Room	1	-
Fire Truck Storage	1	-
Fire Cache	1	-
Residence	5	2
Apartments (Three Units)	3 (Units)	0
Equipment Storage	-	6 (Stalls)

Facilities Required (Cont'd)

<u>North Entrance</u>	<u>Existing</u>	<u>Additional Proposed</u>
Office	1 (Oblit.)	1
Entrance Station	-	1
Fire Cache	-	1
Residences	1 (Oblit.)	3
Apartments	-	4 (units)
Equipment Room	-	4 (stalls)
<u>West Entrance</u>		
Trailer	1 (Remove)	
Office	-	1
Entrance Station	-	1
Fire Cache	-	1
Residence	-	1
Apartment	-	4 (units)
Equipment Room	-	2 (stalls)

Facilities Required (cont'd)

<u>Catalon</u>	<u>Existing</u>	<u>Additional Proposed</u>
Office	1	-
Fire Cache	-	1
Fire Truck Storage	-	1
Residence	1	3
Apartments	-	4 (units)
Equipment Remuda	-	5 (stalls)
<u>Rio Grande Village</u>		
Office (Boquillas)	1 (Relocate)	1
Fire Cache	-	1
Fire Truck Storage	-	1
Residence	-	3
Residence (Boquillas)	1	3
Apartments	-	4 (units)
Equipment Remuda	-	5 (stalls)

Facilities Required (Cont'd)

Chisos Mountains

Office	1 (Oblit.)	1
Fire Cache	-	1
Fire Truck Storage	-	1
Residences	1 (Oblit.)	3
Apartments	-	3 (units)
Equipment Garages	-	4 (stalls)

Doct Springs

Shack	1 (Oblit.)	-
Apartments	-	2 (units)
Barn	-	1
Fire Cache	-	1

Mount Emory

Fire Lookout	-	1
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Interpretation Division

Responsibilities: To determine, assemble, and present the facts about the park and its resources in order to enrich visitor experience and guide the protecting of the park values.

Functions:

Plan, supervise, and operate park interpretive program, including operation and curatorial service of orientation exhibits and lobby at park headquarters and three visitor centers, self-guiding roads and trails, audio-visual programs, conducted trips, wayside and roadside exhibits, and exhibits in place.

Plan, supervise, conduct and coordinate research in the fields of geology, biology, archeology, history, and place names.

Purnish technical advice to the Superintendent of the park and his staff.

Preserve natural history, historical, and archeological materials, maintain records, and scientific study collections.

Maintain park library and visual-aids materials, photographic file, place name file, and other records.

Direct the business of the Big Bend Natural History Association.

Prepare technical, popular, and informational material for publication or other distribution.

Train personnel in the procedures and skills utilized in the Division.

Inform other personnel on the resources of the park.

Organization and Operation: The Chief Park Naturalist, reporting to the Superintendent, directs and coordinates the activities of the interpretive staff. The Chief and Assistant Chief Park Naturalist, Park Biologist, clerk-stenographer, and limited number of seasonals are based at park headquarters. One permanent naturalist and portion of seasonal staff is based at each of the developed areas of the Basin, Rio Grande Village, and Marfa, to operate the visitor centers and interpretive activities at those areas of visitor concentration. The park library and scientific study collection of specimens will be housed at park headquarters.

Seasonal variations are pronounced at present with the summer season being the period of heaviest travel. However, it is a year around park and it is anticipated that the winter visitation will increase in the future and tend toward leveling the travel total to a more nearly constant figure for the entire year. This leveling tendency will require winter as well as summer seasonals in order to provide maximum services to visitors. Eventually additional permanents, instead of seasonals, may become necessary to provide visitor services for the all year operation.

Staff Requirements:

<u>Position</u>	<u>Total Existing</u>	<u>Total Long Range</u>
Chief Park Naturalist	1	1
Asst. Chief Park Naturalist	-	1
Park Biologist	-	1
Park Naturalists	-	4
Clerk-Stenographer	<u>-</u>	<u>1</u>
Total Permanent	1	8

Staff Requirements (Cont'd)

<u>Seasonal</u>	<u>Total Existing</u>	<u>Total Long Range</u>
Seasonal Naturalists (.5 yr. ea.)	2	22
Seasonal Clerk-Stenographer	-	2
Total Seasonal	2	24

Facilities Required:

<u>Panther Junction</u>	<u>Existing</u>	<u>Additional Proposed</u>
Office rooms in Admin. Bldg.	2	-
Library " " "	1	-
Storage (museum) and workroom	1	-
Darkroom (in Admin. Bldg.)	1	-
Employee residences	1	4
Apartment (Seasonal)	2 (units)	2 (units)
Equipment storage	-	3 (stalls)

Chisos Basin

Office room - visitor center	-	1
Storage and workroom (small)	-	1

Facilities Required (Cont'd)

	<u>Existing</u>	<u>Additional Proposed</u>
<u>Chisos Basin (Cont'd)</u>		
Employee residence	-	1
Apartment (seasonal)	-	4 (units)
Equipment storage	-	1 (stall)
<u>Rio Grande Village</u>		
Office room - Visitor Center	-	1
Storage and workroom (small)	-	1
Employee residence	-	1
Apartments (seasonal)	-	4 (units)
Equipment storage	-	1 (stall)
<u>Castolon</u>		
Office room - Visitor Center	-	1
Storage and workroom (small)	-	1
Employee residence	-	1
Apartments (seasonal)	-	4
Equipment Storage	-	1 (stall)

Maintenance Division

Function: To operate and maintain the physical plant so that it will contribute to the preservation of park resources, welfare of the visitor and the efficient functioning of the park staff.

Assigned Task:

Operate utility systems, building equipment and other facilities of the physical plant.

Maintain roads buildings, grounds, equipment, utility and irrigation systems (except radio, telephone and power systems which are maintained either by contract or by public utility companies).

Supervise maintenance contracts on roads, buildings, grounds, equipment and utilities.

Perform or supervise minor construction projects.

Assist in preparation of Project Construction Program proposal forms.

Review construction drawings.

Coordinate maintenance activities with other divisions.

Organization and Operation: The Park Engineer, reporting to the Assistant Superintendent, directs and coordinates the work of the maintenance division through the Maintenance Supervisor, Foreman IV. Maintenance personnel operate from four stations: (1) Panther Junction utility area which is the main base, will serve the entire park for roads, trails, and specialists such as electricians, mechanics, plumbers, etc. (2) Chisos Mountain Basin utility area serves the Basin campground. (3) Rio Grande Village utility area serves the entire Rio Grande Village area but mainly the campground and irrigation system. (4) Castolon utility area serves Castolon and Santa Elena Canyon with emphasis on the campground and irrigation system.

A permanent staff is required for the all year operation of the park and seasonal employees are required to assist in the maintenance of roads and trails and the operating of the irrigation systems.

The existing radio equipment is owned by the government but eventually all radio service will be by leased equipment maintained by the lessee.

Staff Required:

<u>Permanent</u>	Total Existing	Total Long Range
Park Engineer	1	1
Engineer, Trainee	1	1
Foreman IV, Maintenance	1	0
Foreman IV, R&F	0	1
Foreman IV, B&J	0	1
Foreman III, R&F	1	1
Foreman III, B&J	1	1
Foreman II Shop	1	1
Foreman II Trails	0	1
Foreman I Laborer	1	1
Mechanic, H. D.	1	1
Mechanic, Automotive	0	1
Mechanic, Helper	1	1
Operator, General	4	4

Staff Required: (Cont'd)

<u>Permanent (Cont'd)</u>	<u>Total Existing</u>	<u>Total Long Range</u>
Truck Driver, H. D.	1	1
Truck Driver, Med.	5	7
Building Repairman	1	0
Maintenanceman	1	2
Carpenter	0	1
Plumber	0	1
Electrician	0	1
Painter	0	1
Caretaker	1	3
Laborer	4	13
Clerk-Stenographer	<u>0</u>	<u>1</u>
Total Permanent	26	47
<u>Seasonal</u>		
Clerk-Stenographer ($\frac{1}{2}$ yr. ea.)	1	2
Truck Drivers, Med. ($\frac{1}{2}$ yr. ea.)	0	2

Staff Required (Cont'd)

<u>Seasonal (WAE) (Cont'd)</u>	<u>Total Existing</u>	<u>Total Long Range</u>
Caretakers ($\frac{1}{2}$ yr. ea.)	0	2
Painter ($\frac{1}{2}$ yr. ea.)	0	1
Laborer ($\frac{1}{2}$ yr. ea.)	6	24
Maintenanceman ($\frac{1}{2}$ yr. ea.)	<u>1</u>	<u>0</u>
Total Seasonal	8	31

Facilities Required

<u>Panther Junction</u>	<u>Existing</u>	<u>Additional Proposed</u>
Repair Shop (Automotive) #242 (Por.)	1	0
Carpenter Shop #242 (Por.)	0	1
Plumbing Shop #242 (Por.)	0	1
Paint Shop #242 (Por.)	0	1
Electrical Shop #242 (Por.)	0	1
Equipment Storage #243, 245, 246, 247	0	30 (Stalls)
Office in Utility Area #242 (Por.)	1	0
Office in Admin. Building	1	0

Facilities Required (Cont'd)

<u>Panther Junction (Cont'd)</u>	<u>Existing</u>	<u>Additional Proposed</u>
Drafting room in Admin. Building	1	0
Residences	13	17
Apartments	3 (units)	3 (units)
Tenthouses	8 (oblit.)	-
Road & Trail Crew Tool Storage #274 (Por.)	1 (oblit.)	1 (stall)
<u>Chisos Mt. Basin</u>		
Equipment and Storage Bldg.	0	2 (stalls)
Residence	0	2
Apartment	0	1 (unit)
Tenthouses	2 (oblit.)	-
<u>Rio Grande Village</u>		
Equipment Storage Bldg.	0	8 (stalls)
Residences	1	7
Tenthouses	4 (oblit.)	-
Apartments	0	4 (unit)

Facilities Required (Cont'd)

<u>Crestlon</u>	<u>Existing</u>	<u>Additional Proposed</u>
Equipment Storage Bldg.	1 (oblit.)	7 (stalls)
Residences	1	6
Apartments	0	4 (units)

A. Recapitulation

Summary of Park Staff

<u>Superintendent's Office</u>	<u>Total Existing</u>	<u>Total Long Range</u>
Permanent	4	5
Seasonal	0	1
<u>Administration Division</u>		
Permanent	7	12
Seasonal	0	0
<u>Ranger Activities Division</u>		
Permanent	10	27
Seasonal ($\frac{1}{4}$ yr. ea.)	2	15
Seasonal ($\frac{1}{2}$ yr. ea.)	3	5

Summary of Park Staff (Cont'd)

<u>Interpretation Division</u>	<u>Total Existing</u>	<u>Total Long Range</u>
Permanent	1	8
Seasonal	1	24
<u>Maintenance Division</u>		
Permanent	26	47
Seasonal	<u>8</u>	<u>31</u>
Total permanent	48	99
Total seasonal	<u>14</u>	<u>76</u>
Grand Total	62	175

The National Park Concessions, Inc. operates facilities in the Chisos Basin and at Castolon under contract with the United States government as described

Chisos Basin. The accommodations include modern cabins, motel type units, guest cabins with central bath, kitchen, dining room, stove and service station.

The existing accommodations with exception of the modern cabins and motel type units will be replaced with modern guest rooms, motel type, a main lodge

Building including dining room, coffee shop, lobby and curio shop, a store, service station, storage room and a dormitory.

Castolon. Facilities operated at present include a general store and gas and oil service. The present operation is located in the old Castolon army barracks. This building was used subsequent to army use by the La Harmonia company as a store and trading post. Future use is proposed as an on-site exhibit of early ranching and trading activity.

Future concession developments include a main lodge, kitchen and dining room, ranch type motel units, a store, service station and small storage unit and concession employee quarters. A trailer court to be operated by the concessioner is proposed in the general campground area. The general theme of Castolon will be the early ranch-type which existed along the border from the turn of the century to the late 1930's.

Rio Grande Village. There are no concessions operated facilities in the Rio Grande Village area. This site will be developed to include motel type guest accommodations; main lodge, kitchen and dining room; store; service station;

trailer court; storage building; concessions employees quarters and a swimming pool.

Panther Junction: The concessioner operates a service station and small trailer court at Panther Junction. It is proposed the trailer court be scheduled for obliteration and a more adequate trailer court be constructed on a site in the vicinity of the old K-Bar Ranch headquarters. A central warehouse for concessions operations is proposed at Panther Junction.

There is no existing public transportation to or within the park. Such services will be established as a concession operation at the earliest possible date.

The proposals concerning concessioners facilities and staffing is the result of staff consideration. Direct information was not obtained from the concessioner.

Staff Required:

<u>Chisos Mountains Basin</u>	<u>Existing</u>	<u>Proposed</u>
Manager	1	1
Assistant Manager	1	1

Staff Required: (Cont'd)

Chisos Mts. Basin (Cont'd)

	<u>Existing</u>	<u>Proposed</u>
Maintenance Men	2	2
Cooks	4	6
Cook Helpers	1	4
Waitresses	3	10
Dishwashers	1	3
Hostess (Dining Room)	0	2
Registration Clerks	2	3
Housekeepers	3	6
Sales Clerks	2	4
Service Station Operators	2	4
Sanitation	1	2
Steno-Bookkeepers	1	2
<u>Seasonal</u>		
Sales Clerks	3	6
Waitresses	6	12

Staff Required: (Cont'd)

<u>Rio Grande Village</u>	<u>Existing</u>	<u>Proposed</u>
Supervisor	0	1
Maintenance Man	0	1
Cooks	0	3
Cook Helpers	0	4
Waitresses	0	6
Dishwashers	0	3
Registration Clerks	0	2
Housekeepers	0	4
Sales Clerks	0	3
Service Station Operators	0	2
Sanitation	0	2
<u>Seasonal</u>		
Sales Clerks	0	6
Waitresses	0	10

Staff Required; (Cont'd)

<u>Castolon</u>	<u>Existing</u>	<u>Proposed</u>
Supervisor	1	1
Maintenance Man	0	1
Cooks	0	3
Cook Helpers	0	2
Waitresses	0	6
Dishwashers	0	2
Registration Clerk	0	2
Housekeepers	0	3
Sales Clerk	0	2
Service Station Operators	0	2
Sanitation	0	2
<u>Seasonal</u>		
Waitresses	0	6

Facilities Required:

<u>Chisos Mts. Basin</u>	<u>Existing</u>	<u>Additional Proposed</u>
Sales room - Lodge	1(Obl.)	0
Main Lodge & Dining Room	0	1
Store	1 (Obl.)	1
Service Station	1 (Obl.)	1
Warehouse	1 (Obl.)	0
Residences	1 (Obl.)	1
Cabins	5 (Obl.)	0
Dormitories	1 (Obl.)	66 (units)
Dining room	1 (Obl.)	0
Storage	0	1
<u>Panther Junction</u>		
Warehouse (central)	0	1
Service Station	1	0

Facilities Required: (Cont'd)

<u>Rio Grande Village</u>	<u>Existing</u>	<u>Additional Proposed</u>
Salesroom, Lodge and Dining	0	1
Store	0	1
Service Station	0	1
Storage	0	1
Residences	0	1
Dormitories	0	47 (units)
<u>Castolon</u>		
Salesroom and Dining	0	1
Store	1	1
Service Station	1	1
Storage	1	1
Apartment	1	0
Residence	0	1
Dormitories	0	32 (units)

The Chisos Remuda operates a horse concession, under contract, from a base in the Lower Basin of the Chisos Mountains. Services provided include saddle horse guided trips to the South and East Rim, the Window and special points of interest. Saddle horse trips by the hour and also of two to five days duration are provided by the concessioner. Expansion of the operation is proposed as the need for additional stock and services is justified.

Saddle horse operations are proposed for both the Castalon and Rio Grande Village sites. These will be provided by a concessioner as soon as the demand can justify this type of an operation.

Staff Required:

<u>Chisos Mountains Basin</u>	<u>Existing</u>	<u>Proposed</u>
Manager	1	1
Wranglers	1	4
Seasonal Wranglers	2	4
<u>Rio Grande Village</u>		
Supervisor	0	1
Wranglers	0	2

Staff Required: (Cont'd)

<u>Rio Grande Village (Cont'd)</u>	<u>Existing</u>	<u>Proposed</u>
Seasonal Wranglers	0	2
<u>Castolon</u>		
Supervisor	0	1
Wranglers	0	2
Seasonal Wranglers	0	3

Facilities Required:

<u>Chisos Mts. Basin</u>	<u>Existing</u>	<u>Additional Proposed</u>
Hay Barn	0	1
Corral	1	0
Saddle Room	1	0
Residence	0	1
Apartments	1	8 (units)
<u>Rio Grande Village</u>		
Hay Barn	0	1
Corral	0	1

Facilities Required: (Cont'd)

<u>Rio Grande Village (Cont'd)</u>	<u>Existing</u>	<u>Additional Proposed</u>
Saddle Room	0	1
Residence	0	1
Apartment	0	4 (units)
<u>Castolon</u>		
Hay Barn	0	1
Corral	0	1
Saddle Room	0	1
Residence	0	1
Apartment	0	5 (units)

Forestry

See Volume III Sec. E

Soil & Moisture Conservation

See Volume III Sec. E

Master Plan Development Outline

Big Bend National Park, Texas

GENERAL DEVELOPMENT

a. GENERAL DEVELOPMENT (Ref. Master Plan Drawing No. NP-33-2106 A)

(1) Developed Areas

Panther Junction Park Headquarters
The Basin
Rio Grande Area
Santa Elena Developed Area

(2) Distribution of Development

Panther Junction Park Headquarters is situated on the north foothills of the Chisos Mountains at the junction of the North Entrance Road and the Santa Elena Canyon-Boquillas roads, the two principal arteries of circulation within the park. Thus the park headquarters is ideally located at the crossroads, which is certain to become the hub of all public circulation. With the improvement of the Santa Elena Canyon and Boquillas roads and the development of public facilities on the Rio Grande at these two termini, this junction will gain in importance.

The Basin, an area relatively high in elevation, basin-like in character and located among the peaks of the Chisos Mountains, is the only developed area proposed at high altitude. The area is now and will continue to be the most popular spot for the vacation spot within the park.

The Rio Grande Area, consisting of the Hacienda Rio Grande and Mexican Village areas (Daniel's Ranch and Brannan's Ranch) is located on the Rio Grande near the Mexican village of Boquillas. This proposed development with its scenic beauty, low altitude and desirable winter climate is expected to become the primary winter use area in the park.

Development possibilities of this area are especially increased because of the natural tree growth, the abundance of water available for irrigation and development of additional shade.

If a companion park area is established south of the border, a point near this area will probably be the major point-of-entry.

Santa Elena Canyon Area of the Rio Grande is a major point of visitor interest and will increase in visitation upon completion of the entrance road via Alpine which will pass near this point.

(3) Circulation System

The principal park entrance is approached via State Highway 227 from Marathon which becomes our Route 1 at the park boundary. From this point the entrance road passes through Persimmon Gap, a natural gateway, from which point the park visitor obtains his first view of the Big Bend country. Route 1 intersects the important Santa Elena-Boquillas roads, Routes 2 & 3, at Panther Junction. A public contact station is proposed at this point.

The west park entrance is certain to increase in importance because State Highway 118 leading from Alpine to this entrance is now being paved by the State Highway Department. This improvement is scheduled for completion in 1953.

Future construction will improve grades and alignments on the following routes: North Entrance Road, Dagger Flat Spur, Rio Grande Road, Santa Elena Road, Mariscal Canyon Spur, Grapevine Hills Spur. The Basin Road is to be extended to the proposed campground.

(4) Primitive and Research Areas

Development is to be excluded from the Chisos Mountains Area except for the existing Chisos Mountains Camp Area with possible expansion to the Juniper Flats portion. The Window, Laguna, South Rim Area, Boot Spring will remain inaccessible except for foot or horse trails. Campsites to be reached only by horseback are proposed for Boot and Upper Juniper Springs.

Prepared by Carl W. Alleman Date Mar. 28, 1952
Carl W. Alleman, Landscape Architect
REVIEWED

Regional Office

Washington Office

Architect s/ L. E. Bennett 5-2-52

Landscape

Architect s/ Miller 5-6-52

Engineer s/ Richardson 5-2-52

Forestry s/ H. M. Ratcliff 8-2-52

History s/ A. H. Schmeder 5-5-52

Natural

History s/ Natt N. Dodge 5-5-52

Concessions

Management s/ A. M. Koehler 5-5-52

Maps s/ S. McColm 5-2-52

Safety

Recreation

Planning

RECOMMENDED

Ross A. Maxwell
Superintendent

Date 5-5-52

Regional Superintendent

Date

s/ Jerome C. Miller

Date 5-14-52

Actg. Assistant Regional Director

(Design and Construction)

s/ M. R. Tillotson

Date 5-16-52

Regional Director

Chief of Design and Construction

APPROVED

Director

Date

Volume I, Chapter 5
Design Analysis
Castolon-Santa Elena Vicinity
Page 1

MASTER PLAN
FOR THE PRESERVATION AND USE
OF
BIG BEND NATIONAL PARK

Chapter 5, Design Analysis, Castolon-Santa Elena Vicinity
NP-BB-3132, Big Bend National Park

George B. Medlicott
Prepared by: Landscape Architect Date February 1961

Drawing Approved _____ Date _____

February 1961

ROUND COPY

Volume 1, Chapter 5
Design Analysis
Castolon-Santa Elena Vicinity
Page 2

pond; second, scarring is reduced to a minimum by using an existing road location; third, this location is on the highest ground in the area, an important consideration in floodtime; fourth, this road follows along a topographic barrier which separates the flat land from the rugged rocky bluff area. The flat, recently under irrigated cultivation, thus remains an undivided tract and is well-suited for use as an irrigated campground.

The campground, group campground, and trailer village circulatory roads are reached via a spur road passing from the Canyon road to the boat concession on the river. The intersection with the Canyon road is located to give good sight distance and to permit the Trailer Village development adequate space without intruding on the scene between the River and Castolon Village.

The Horse Concession access road is located about 3/4 of a mile north of the main parking area. Equestrians will be able to park here or to walk from the Visitor Center to the nearby hitching rail where the concessioner will tether his animals preparatory to leaving on a trip. Proposed horse trails relating to the main concession location are shown leading to Santa Elena Canyon, Castolon Mountain, or the River road.

Visitor Use Facilities: Old Castolon Village will be the nucleus about which all development is planned. The purpose of this is to perpetuate Castolon's role as the hub of the area's activity and to present one of the few remaining historic sites which was a witness to the raids of Pancho Villa.

Fundamental to the efficient operation of the Castolon development is the orientation facility located in the Visitor Center adjacent to the parking area. The general store, about 50 yards southwest of the Visitor Center, would continue to operate under a concessioner who would carry an inventory and present a display similar to that which now exists. The nature of this store having changed almost imperceptible since the turn of the century, it would remain a living example of history to be enjoyed by the visiting public. The section of the store now used for storage would serve well as a craft center and historical museum.

Within 250 yards of the Visitor Center is located the lodge development. Essentially, visitors will be staying at Castolon Village while actually this concessioner-operated lodge development will be located to avoid intrusion upon the historic village area.

The lodge development will consist of dining and multiple overnight accommodations. The horse concession is proposed to make available back country areas not otherwise accessible to the general public. Trips up Santa Elena Canyon, down along the banks of the Rio Grande River to the Johnson Ranch, or back towards Castolon Peak will be possible.

The campground areas, located on the alluvial plain just northwest of Castolon Village will soon be of considerable attraction to visitors if the tree planting program can be carried out at an early date. The existing irrigation system formerly used to water these cotton fields may well be utilized to support the trees and shrubs that are to be planted here. Ample space is available to the east for future expansion and it is proposed that this area be planted now at least in part, for future use.

The campfire circle is located adjacent to the campground and somewhat central to most of the campsites. A parking loop off the campground access road is available for the convenience of those living in the lodge area or Trailer Village.

The Trailer Village is located in an area where possibility for expansion will remain after the initial development. The undesirability of permitting this development to encroach upon the foreground view as seen from Castolon Village is self-evident.

Management Facilities

The Campground Ranger Station is located for the best control of all camping activities. The manager station controlling the Trailer Village also includes a public laundry facility.

Administrative facilities for the Castolon-Santa Elena vicinity are proposed to be located in a wing of the Visitor Center Building. This will include the District Ranger Office, and radio equipment. This location is in the main interest area where most visitors will arrive first.

The Maintenance area is about $\frac{1}{4}$ mile north of the main parking area and well-removed from the visitor use area. It is placed next to the main access road to prevent truck traffic moving by the residences. An existing adobe warehouse near the irrigation pumphouse will be used temporarily as a maintenance building. However, this location is not favored as a permanent Maintenance area as it is poorly related to the various use areas of this development.

The residences for Park and concession personnel are located on a narrow ridge where good orientation and drainage are possible.

Although well separated from the Visitor activities, personnel are still within easy walking distance of Old Castolon Village and the Visitor Center.

Utilities: The irrigation pump house has been located on the banks of the Rio Grande River at the same point where pumps were formerly located to discharge river water into the existing irrigation system.

It is proposed that the existing irrigation distribution system be utilized and augmented to provide sufficient water for the proposed planting program. Two settling ponds have been shown, one on each main branch. These will significantly reduce the ditch maintenance problem.

If field studies show sufficient flow, two existing wells located at the base of the Castolon Village bluff will serve as the potable water supply. Submersible pumps at each well will pump thru three miles of 6" line to a 500,000-gallon holding reservoir located north of the Village. This gravity system will supply the entire development.

Sewage will be disposed of in a non-overflowing lagoon to be located south of the Village and just east of the patrol road. Gravity flow will occur from the residential and maintenance area, the concession and the Village area. Comfort stations in the campgrounds and horse concession area will have their own septic tanks and leaching fields. Grades are to flat to connect comfort stations with central system.

The Rural Electrification Administration has constructed an overhead line from the power source to the Village. It is proposed that terminal poles be installed in the draw near the larger settling pond. From here, underground cable will service the entire area. Underground distribution is proposed throughout in order to protect the Old Village and to preserve landscape values.

The Southwestern Bell Telephone Company will run trunk lines and furnish service in the area. It is proposed that the Bell Telephone Company furnish cable for an underground system to be laid in government-excavated and filled trenches. This cable will service the lodge, concession and Village areas.

February 1961

If a radio communication system is installed, it will be on a lease-rental basis.

In the event that L.P. Gas is used in this area, the bulk tank can be located in any of a number of draws adjacent to the use area to meet safety regulations and to hide it from view.

Garbage and debris will be disposed of in a small incinerator located north of and across the road from the maintenance area.

Miscellaneous: Because of space limitations and in order to minimize the intrusion on this barren landscape and on Old Castolon, the theme of design for future development of this operating base should propose a layout of compact, desert type, architectural units.

February 1961

Developed Areas
Maverick
Page 1
December 1958

Master Plan Development Outline

Big Bend National Park, Texas

DEVELOPED AREAS - MAVERICK

- (1) Name and Location.--Maverick is located near the west entrance, 21.1 miles from Headquarters-Panther Junction.
- (2) Drawing Number of Corresponding Plan.--NP-BB-3114, Entrance Developments.
- (3) Principal Features of Interest.--None.
- (4) The Development Problem.--A study was made locating the employee residences on a ridge some 600 feet south of the entrance road. Another study was made grouping all of the entrance facilities near the road. The second arrangement was chosen because it requires less road, sewer and water construction. The inter-court arrangement provides privacy for the living quarters. Another desirable feature is that the Ranger-in-Charge will have positive control of the Park entrance at all times.
- (5) Principal Facilities
 - (a) Circulation.--Public circulation will consist of 10' widening strip for entrance station and parking for 6 or 8 cars. Service roads will consist of a small paved court furnishing access for utility and residential buildings.
 - (b) Visitor Use.--The entrance station will provide information for visitors, rest room facilities and also be the point for collecting fees.
 - (c) Service.--It is proposed to construct an entrance station with office and rest rooms, two 3-bedroom employee residences, one seasonal employee residence, three quarters, and a 4-stall equipment and material storage building.
 - (d) Utilities.--Water, power and sewer will be provided at the site.
 - (e) Miscellaneous Development.--None.

Developed Areas
Maverick
Page 2
December 1958

Big Bend National Park, Texas
Name of Park

Prepared by Harry Smith, Park Landscape Architect Date 12-18-58
Name and Title

REVIEWED

WESTERN OFFICE, DIVISION OF DESIGN AND CONSTRUCTION

Architect /s/ Lyle E. Bennett Date 12-29-58
Engineer /s/ Paul J. Garber, Acting Date 12-23-58
Landscape Architect /s/ Alfred C. Kuehl, Acting Date 12-24-58
Safety /s/ V. J. Stalsberg, Acting Date 12-23-58

REGIONAL OFFICE

Recreation Resource
Planning _____ Date _____
Interpretation _____ Date _____
Operations _____ Date _____

RECOMMENDED

Superintendent _____ Date _____
/s/ P. E. Smith, Acting Date 12-29-58
Chief, Western Office, Division of Design and Construction

Regional Director _____ Date _____

Chief Landscape Architect _____ Date _____

APPROVED

Per the Director _____ Date _____

Volume I, Chapter 5
Design Analysis
Panther Junction-Park Hdqtrs.
Big Bend National Park, Texas
Page 1

MASTER PLAN
FOR PRESERVATION AND USE
OF
BIG BEND NATIONAL PARK, TEXAS

Chapter 5, Design Analysis
Drawing No. NP-BB-2108-H
Panther Junction - Park Headquarters

Prepared by: George B. Medlicott Date: August 7, 1963

Drawing approved: Conrad L. Wirth, Director Date: August 6, 1958

August, 1963

Volume I, Chapter 5
Design Analysis
Panther Junction Park Hdgtrs.
Big Bend National Park, Texas
Page 2

General Considerations. The area is centrally located within the park on the north bench of the Chisos Mountains from which point outstanding views of this range are obtained, as well as distant views of the

Developed Areas
Persimmon Gap Entrance
Page 1
December, 1958

Master Plan Development Outline

Big Bend National Park, Texas

DEVELOPED AREAS - PERSIMMON GAP ENTRANCE

- (1) Name and Location.--Persimmon Gap Entrance is located near the north boundary of the Park, 21.8 miles from Headquarters-Panther Junction.
- (2) Drawing Number of Corresponding Plan.--NP-EB-3114. Entrance Developments.
- (3) Principal Features of Interest.--None.
- (4) The Development Problem.--Two schemes were considered for the Persimmon Gap Entrance. The first was with the entrance station and related facilities at the road and the residences located about 500 feet from the road. Since this scheme increased the amount of road and utilities, it was abandoned in favor of a more compact grouping near the road. Privacy is insured for the living quarters by developing an inter-court. This arrangement also gives wind protection, economy of construction and positive control of the Park entrance.
- (5) Principal Facilities
 - (a) Circulation.--Public circulation will consist of 10' widening strip for entrance station and parking for 6 or 8 cars. Service roads will consist of a small paved court furnishing access for utility and residential buildings.
 - (b) Visitor Use.--The entrance station will provide information for visitors, rest room facilities and also be the point for collecting fees.
 - (c) Service.--It is proposed to construct an entrance station with office and rest rooms, three 3-bedroom residences, one seasonal employee residence, three quarters and a 4-stall equipment and material storage building.

Developed Areas
Persimmon Gap Entrance
Page 3
December 1958

Big Bend National Park, Texas
Name of Park

Prepared by Harry Smith, Park Landscape Architect Date 12-18-58
Name and Title

REVIEWED

WESTERN OFFICE, DIVISION OF DESIGN AND CONSTRUCTION

Architect /s/ Lyle E. Bennett Date 12-29-58
Engineer /s/ Paul J. Garber, Acting Date 12-23-58
Landscape Architect /s/ Alfred C. Kuehl, Acting Date 12-24-58
Safety /s/ V. J. Stalsberg, Acting Date 12-23-58

REGIONAL OFFICE

Recreation Resource
Planning _____ Date _____
Interpretation _____ Date _____
Operations _____ Date _____

RECOMMENDED

Superintendent Date _____
/s/ P. E. Smith, Acting Date 12-29-58
Chief, Western Office, Division of Design and Construction

Regional Director Date _____

Chief Landscape Architect Date _____

APPROVED

Per the Director Date _____

Master Plan Development Outline

Big Bend National Park, Texas

DEVELOPED AREAS - RIO GRANDE VILLAGE

- (1) Name and Location.--The proposed Rio Grande Village is located on the Rio Grande 24 miles by road from Panther Junction, location of Park Headquarters.
- (2) Drawing Number of Corresponding Plan.--NP-BB-2113-A.
- (3) Principal Features of Interest.--The major attractions of this area are its proximity to Mexico, its favorable winter climate, the relative abundance of water in the nearby river and hot springs, the fine views of the Del Carmen mountains to the east and the Chisos Mountains to the west.
- (4) The Development Problem.--The purpose of this development is to create a green oasis in an otherwise harsh landscape to attract people down from the fragile Chisos Mountains and to meet the demand for winter use facilities. This will relieve over-crowding and human erosion in the Chisos Basin; it will also provide for a more stable year-round staffing of the organization. The areas under consideration can provide for unlimited expansion without creating aggravating problems of water supply and destruction of area values.

The name of the area has been changed from "Mexican Village-Hacienda Tio Grande" to "Rio Grande Village." The objective is to leave to the Mexicans a development theme they can handle with integrity and authenticity, and to us the "Last Frontier - Big Bend" theme which we can handle in a like fashion.

The objective of the revision of this plan is to present a more realistic approach to a river development which will provide year-round opportunities for camping, trailer parking, picnicking, swimming, fishing and overnight lodging.

The one natural feature that has been most important in influencing the overall design in this desert situation is live water. Because of the several productive springs, an old impoundment which is proposed for rehabilitation to store surplus spring and surface water; and, most important, the Rio Grande, an effort has been made to exploit these water features to maximum advantage. Pending engineering feasibility it is planned that water be pumped from the springs and/or river during the night or other periods of the day, when there is less incidence of visitor movement, to the old impoundment west of the proposed concession development.

From this impoundment, which must be provided with a suitable spillway, releases would be made during the day through irrigation ditches to furnish water to a proposed cottonwood plantation as well as interest to visitors.

The area proposed for trailer parking, camping and picnicking was selected for development because of the topographic configuration which seems to give natural boundaries to a relatively small development located in a seemingly boundless situation.

(5) Principal Facilities

- (a) Circulation.--The entrance road is proposed for location on the existing dike that forms the southwest shore of the proposed lake. The road, approximately $1\frac{1}{2}$ miles in length, serves the camping and trailer area, the concession development and the swimming pool parking area west of the pool.

Approximately 1,500 yards of trail are proposed, most of which would make available views from higher ground of the Rio Grande and Mexico.

Walks serving parking areas and buildings are proposed of bituminous material and total about 550 linear yards.

- (b) Visitor Use.--The camping and trailer parking area is designed to accommodate both trailer and tent types of usage. A total of 40 sites are proposed. All units would include fireplace and talbe and bench facilities.

A two-story motel comprising some 20 units is proposed to operate in connection with a dining room. Space for shops, stores and native crafts is proposed on the ground floor of another two-story building, the top story of which would be used as living quarters for concession employees. A swimming pool of approximately 3,000 square feet is indicated near the concession area.

- (c) Service.--An existing former ranch house is located in the camping area.
- (d) Utilities.--A small domestic water supply system has been constructed in the area. Electric power is provided through REA facilities.
- (e) Miscellaneous Development.--In addition to concrete spillway, pumps and lump lines, approximately 1,300 yards of irrigation ditch with necessary control structures are proposed.

Developed Areas
Rio Grande Village
Page 4
August 1955

Big Bend National Park, Texas
Name of Park

Prepared by John J. Moseley, Landscape Architect Date August, 1955
Name and Title

REVIEWED

WESTERN OFFICE, DIVISION OF DESIGN AND CONSTRUCTION

Architect /s/ C. M. Barnhart, Acting Date 9-23-55
Engineer /s/ Homer L. Browley, Acting Date 9-23-55
Landscape Architect /s/ Alfred C. Kuehl, Acting Date 9-23-55
Safety /s/ William H. Richardson Date 9-26-55

REGIONAL OFFICE

Recreation Resource
Planning _____ Date _____
Interpretation _____ Date _____
Operations _____ Date _____

RECOMMENDED

/s/ George W. Miller Date 9-12-55
Superintendent

Date _____
Chief, Western Office, Division of Design and Construction

Date _____
Regional Director

Date _____
Chief Landscape Architect

APPROVED

Date _____
Per the Director

Master Plan Development Outline
Big Bend National Park, Texas

DEVELOPED AREAS - SANTA ELENA DEVELOPED AREA

- (1) Name.--Santa Elena Developed Area.
- (2) Drawing Number of Corresponding Plan.--NP-BB-2114.
- (3) Principal Features of Interest.--Santa Elena Canyon of the Rio Grande and the Rio Grande.
- (4) The Development Problem.--Except for a small picnic area, no public facilities are existing and planning thus far has been only of a preliminary nature.
- (5) Principal Facilities
 - (a) Circulation.--Will consist of access roads, service roads within the area, parking areas, a parking overlook, and trails to the Canyon and River.
 - (b) Visitor Use.--Campground, comfort stations, campers' supplies store, and cabins.
 - (c) Service.--Checking station and possibly a district ranger headquarters.
 - (d) Utilities.--Water supply from wells. Other utilities to be similar in type to those proposed for Panther Junction Headquarters.
 - (e) Miscellaneous Development.--None.

Developed Areas
Santa Elena Developed Area
Page 2
March 1952

El Bend National Park, Texas
Name of Park

Prepared by Carl W. Alleman, Landscape Architect Date 3-14-52
Name and Title

RECOMMENDED

/s/ Boss A. Maxwell Date 5-5-52
Superintendent

/s/ W. L. Barnes Date 9-6-54
Assistant Chief, Division of Design and Construction

APPROVED

/s/ Thos. C. Vint Date 9-8-54
Per the Director

Master Plan Development Outline

Big Bend National Park, Texas

DEVELOPED AREAS - UPPER BASIN

- (1) Name and Location.--Upper Basin is located in Chisos Basin, 10 miles west of Park Headquarters.
- (2) Drawing Number of Corresponding Plan.--WP-BE-3047-A.
- (3) Principal Features of Interest.--The Basin is the geological resultant of erosion, the transported material scouring an outlet recognized as "The Window." The periphery of the Basin rises 2,000 feet in a nearly complete rim around the proposed development.
- (4) The Development Problem

Scheme "A".--As early as 1934, studies had been prepared for a "lodge" to be built on the site shown on Scheme "A." The latest plan was that prepared by Carl Allen in 1955. Scheme "A" was disapproved in August, 1956 at the time of the Director's personal inspection of the site. The Director's instructions at that time were to prepare and submit several schemes, utilizing "the Bench" east of the existing temporary guest cottages. Al Kuehl prepared a study based on the Director's concept, providing accommodations for seventy-five overnight units, and moving the Lodge to the east.

Scheme "B".--This plan was field-checked by Paul Thomas, Wayne Iverson and Ben Howland in November, 1957. Al Kuehl prepared Scheme "B" in line with the November, 1957 inspection. It was reviewed with Superintendent Miller, Assistant Superintendent Schmidt, Regional Landscape Architect Jerry Miller, Park Engineer Emrich and Ben Howland on June 13, 1958.

Preferred Scheme.--Scheme "B" was retained except for the location of the visitor center, store, and the adjacent parking area. The axis to "The Window" (the principal view from the Lodge) was interrupted by the visitor center and store.

New sites were selected for these buildings. The "Preferred Scheme" is a field interpretation agreed to on June 13, 1958.

(5) Principal Facilities

- (a) Circulation.--The Upper Basin is the terminus of the 10-mile long road from Park Headquarters. The proposed circulation requires obliteration of 80% of existing road system within the development area.
- (b) Visitor Use.--Lodge Building of approximately 8,000 square feet, 75 overnight units (including 14 existing units), gas station and store - all by concessioner. Visitor center, roads, parking areas and utilities by National Park Service.
- (c) Service.--None.
- (d) Utilities.--Power, sewer and water are adjacent to proposed site.
- (e) Miscellaneous Development.--Overnight units are multiple, two-story structures, intended to be placed well into the existing topography.

Developed Areas
Upper Basin
Page 3
July 1958

Big Bend National Park, Texas
Name of Park

Prepared by Benjamin C. Howland, Jr., Landscape Architect Date 7-1-58
Name and Title

REVIEWED

WESTERN OFFICE, DIVISION OF DESIGN AND CONSTRUCTION

Architect /s/ Lyle E. Bennett Date 7-9-58
Engineer /s/ Homer L. Crowley Date 7-8-58
Landscape Architect /s/ Robert G. Hall Date 7-8-58
Safety /s/ William H. Richardson Date 7-8-58

REGIONAL OFFICE

Recreation Resource Planning /s/ Jim S. Bowen Date 7-21-58
Interpretation /s/ Matt N. Dodge Acting Date 7-21-58
Operations /s/ Jerome C. Miller Acting Date 7-23-58

RECOMMENDED

/s/ George W. Miller Date 7/18/58
Superintendent

/s/ Sanford Hill Date 7-10-58
Chief, Western Office, Division of Design and Construction

/s/ Hugh M. Miller Date 7/23/58
Regional Director

/s/ John A. Reshoff (Acting) Date 8-6-58
Chief Landscape Architect

APPROVED

/s/ Thomas C. Vint Date 8-6-58
Per the Director

BIG BEND NATIONAL PARK

TEXAS

Developed Area Narrative

To Accompany Drawing No. NP-BB-3139-D

Castolon

Prepared by George B. Medlicott Date August 1964
Landscape Architect

Revised by Perry W. Savage Date January 1966
Landscape Architect

Drawing Approved Charles E. Krueger Date June 28, 1966
Acting Assistant Director, D&C

B&C

BASIC INFORMATION

The Castolon store and the two nearby residences were constructed as garrison buildings atop the bluff by the Army during the border troubles of 1916. These formed the nucleus of what later became a ranching operation with cotton the principal product. The location adjacent to the Rio Grande provided ideal conditions for irrigation. Later, a cotton gin and storehouse were developed. (The large irrigation pumps and old internal combustion engines remain on their original foundations.) Still later, the store was operated as a trading post for park visitors and Mexican nationals living in the neighboring Mexican border town of Santa Elena.

In 1961, the National Park Service acquired the Castolon Ranch and annexed it to Big Bend National Park. The store operation was taken over by "National Park Concessions" and today offers food, supplies, gasoline, clothing and curios to its customers. Park visitors are provided with the unique opportunity of visiting these two small isolated border communities related to each other by their proximity, but separated by an international boundary.

FUNCTIONS OF DEVELOPED AREA

Castolon will be a major development site for visitor use. Services will include:

- Information-Interpretation.
- Lodging - 100 guest rooms with related food services, including restaurant and coffee shop.
- Store (existing trading post).
- Automobile servicing.
- Campground - 100 units.
- Saddle horse concession.

CHARACTER OF DEVELOPMENT

Due to the extreme temperatures reached here in the summer, it will be necessary to create an oasis-type development so that the visitor can travel from place to place without being subjected constantly to the direct rays of the sun.

It is important also to create spaces within each unit to give an added feeling of openness and airiness. This will be carried throughout the architectural theme which will be a retention of the southwestern style of architecture.

DEVELOPMENT ANALYSIS

The main development which lies in the open field between the old cotton gin and the old road to Mexico is compact and takes advantage of the more level terrain.

The compact nature of this development is predicated on the availability of water for consumption and waste carriage, as well as for irrigation. Water lines have already been constructed and are located adjacent to the proposed development site. The compactness of the area will also facilitate maintenance and movement between facilities.

The average daily temperatures during the summer months often reach and exceed 100° F., which indicates a need for mass planting of shade trees in the development area. This planting should be native plants, which will be sustained by a network of irrigation ditches.

The unit is divided by an access road into two functional areas. The first is a visitor-oriented area on the south, and the second is a Park Service area located on the north. A frontage road divorces all development from the main access road, Route 5. Roads provide access from the visitor-use area to Santa Elena, Canyon viewpoint, Panther Junction, the Mariscal Canyon area, and to the "legal crossing" to Mexico.

Master Plan Development Outline

BI - Bend National Park, Texas

1. Development (Continued)

b. DEVELOPED AREAS

(1a) Panther Junction Headquarters (Drawing No. NP-BB-21089)

(2a) Principal Features of Interest

The area is situated on the north bench of the Chisos Mountains from which point outstanding views of this range are obtained, as well as distant views of the Sierra del Carmen, Dagger Flat, and the Christmas Mountains.

(3a) Principal Facilities

(a) Circulation

Headquarters Spur Road, Route 30, serves the utility area and residential area. This route will be extended as additional residences are built.

The concession area with parking area at the junction of the north entrance road and the Rio Grande and Santa Elena Roads, Route 1, 2, and 3, respectively, will be served by Route 17.

Twenty car parking with provision for expansion will be required adjacent to the public contact station.

(b) Visitor Use

No visitor facilities exist; however, the concession area will provide a public contact station with comfort stations and an automobile service station. A store and overnight facilities may be added if there is public demand.

Not Approved

(c) Service

Five employee residences and a utility building exist at present. The park administrative office is to occupy a portion of the utility building until permanent office space is provided.

Ample space has been reserved for all necessary expansion of these facilities.

(d) Utilities

Existing - All are available. Adequate water supply and storage, gravity flow from reservoir; a central power generating plant in use at present (plans are under way to bring in commercial power from Alpine); bulk liquefied petroleum for cooking and refrigeration, possibly to be converted to electricity when commercial power becomes available; fuel oil for heating; individual septic tanks and disposal field for each residence. For communication system, see Utilities Section of Outline (Sec. 4-a).

Proposed - These facilities are to be enlarged as development is expanded.

(e) Miscellaneous Development

The construction plans provide for an enclosed patio at each residence; however, funds were not sufficient to complete this part of the work at the time of the original construction. This type of facility is strongly justified by the extremely warm and dry summer climate which makes outdoor living an important part of the employee's home life.

A deer-proof fence with cattle-guard is proposed to enclose the entire residential and utility area. This is essential to carrying out a tree and shrub planting program in the vicinity of the residences.

(1b) The Basin

(2b) Principal Features of Interest

The Basin is situated in the heart of the Chisos Mountains surrounded by the outstanding geologic features of this range. The Window, Pulliam Peak, Casa Grande, Emory Peak (the highest point in the park), Juniper Canyon, Pine Canyon, Laguna, and South Rim are a few of these features. Of interest also are the plants and animals of the area which are characteristic of a mountain island surrounded by Chihuahuan-type desert.

(3b) Principal Facilities

(a) Circulation

Vehicular

The area is reached by route 4 and route 10 serves the concession area, which includes a 50-car parking area. Steep grades on route 4 is a basic problem which

must be taken into consideration in connection with expansion of this area and particularly public camping. As expansion becomes necessary, route 11 will extend circulation to the new developed area. Route 31 serves the saddle horse concessioner's area, temporary park headquarters, and the proposed sewage disposal plant.

Horse and Foot Trails

The remainder of the Chisos Mountains Area will be inaccessible except by horse and foot trails. For these existing and proposed trails, refer to NP-BB-2105C.

(b) Visitor Use

Existing Permanent - 1 store building, 5 cabins (one a double), 1 service station, 1 saddle and feed house and corral.

Existing Temporary - 1 lunchroom, 1 comfort station with shower, 14 over-night cabins (Dallas hut type), 10 unit campground (no opportunity for expansion - to be abandoned). The temporary campfire circle is to be replaced with a permanent facility.

Proposed - The above mentioned temporary facilities are to be replaced by a centrally located lodge and multiple guest units. The campground will be restored to its natural character to become a part of the lodge setting. A new and larger campground is proposed to the south. This is to be limited to tent and light trailer usage because of steep grades on the access road. A district ranger's station will be provided to furnish information and interpretation.

(c) Service

No permanent residential, utility or administrative facilities exist. The old CCC buildings are serving temporarily as NPS employee residences and utility buildings. Residences and utility facilities are to be provided at Panther Junction.

The concessioner's employees are housed in Dallas huts. Concessioner's office and utility area are also of temporary nature to be replaced by permanent construction.

(d) Utilities

Water - The present water supply from shallow wells is inadequate and will be replaced by developing Oak Spring below the Window.

Sewer - Existing sewerage systems are inadequate to meet present needs. A central plant is proposed to serve the entire Chisos Mountains camp area with the exception of individual septic tank systems for the 5 deluxe cabins and an independent system for the proposed campground comfort station.

Power - Existing - Small generators, one for the concession area and one for the temporary headquarters.

Proposed - Commercial power to be brought in from Alpine.

Fuel System - Existing - L-P gas for cooking and refrigeration, fuel oil for heating. These types are to be used with the enlarged development with the possible exception of use of electricity for cooking, refrigeration and water heating when commercial power becomes available.

Communication - See Utilities (Section 4-e).

(e) Miscellaneous Development

Walls are proposed for enclosing service courts and utility areas in conjunction with the proposed public use area.

(1c) Rio Grande Area (Drawing No. NP-BB-2111)

Hacienda Rio Grande (Drawing No. NP-BB-2112)

Mexican Village (Drawing No. NP-BB-2113)

(2c) Principal Features of Interest

These two proposed developments are located at the sites of two earlier ranches, known as Daniel's and Graham's Ranches.

The Rio Grande, the International Boundary, is the principal natural feature in the area. The native village of Boquillas across the river in Mexico and the warm springs in the proposed Mexican Village Area are also of interest. Views of distant mountains, particularly the Sierra del Carmen range across the border as seen from Hacienda Rio Grande area, add to value of this site for a proposed development.

Abundance of available water for irrigation in these two areas makes the prospects for this development encouraging.

(3c) Principal Facilities

No public facilities exist at this time, and planning thus far has been only of a preliminary nature.

(a) Circulation

In general the circulation will consist of access roads and service roads within the area, parking areas, trails along the river and to high points overlooking this border country and the Mexican village across the river.

(b) Visitor Use

Proposed facilities - lodges, overnight guest accommodations, campgrounds, comfort stations, store, interpretive and informational facilities.

(c) Service

Employees' quarters, both concessioner and Park Service, district ranger headquarters, and service areas are to be included in this development.

(d) Utilities

Springs at the Mexican Village Area will serve as domestic water supply. Other utilities similar in type to those proposed for Panther Junction Headquarters.

(e) Miscellaneous Development

Trees and shrubs have been planted along the tanks and irrigation ditches in this area. The benefit of this planting will be realized in the future when development is started.

(14) Santa Elena Developed Area (Drawing No. NP-BB-2114)

(2d) Principal Features of Interest

Santa Elena Canyon of the Rio Grande and the Rio Grande.

(3d) Principal Facilities

Except for a small picnic area, no public facilities are existing and planning thus far has been only of a preliminary nature.

(a) Circulation - Will consist of access roads, service roads within the area, parking areas, a parking overlook, and trails to the Canyon and river.

(b) Visitor Use

Campground, comfort stations, campers' supplies store, and cabins.

(c) Service

Checking station and possibly a district ranger headquarters.

(d) Utilities

Water supply from wells. Other utilities to be similar in type to those proposed for Panther Junction Headquarters.

Prepared by Carl W. Allenman Date 3-11-52
Landscape Architect

REVIEWED

Regional Office

Washington Office

Architect	_____
Landscape	_____
Architect	_____
Engineer	_____
Forestry	_____
History	_____
Natural	_____
History	_____
Concessions	_____
Management	_____
Lands	_____
Safety	_____
Recreation	_____
Planning	_____

RECOMMENDED

Ross A. Maxwell Date 5-5-52
Superintendent

_____ Date _____
General Superintendent

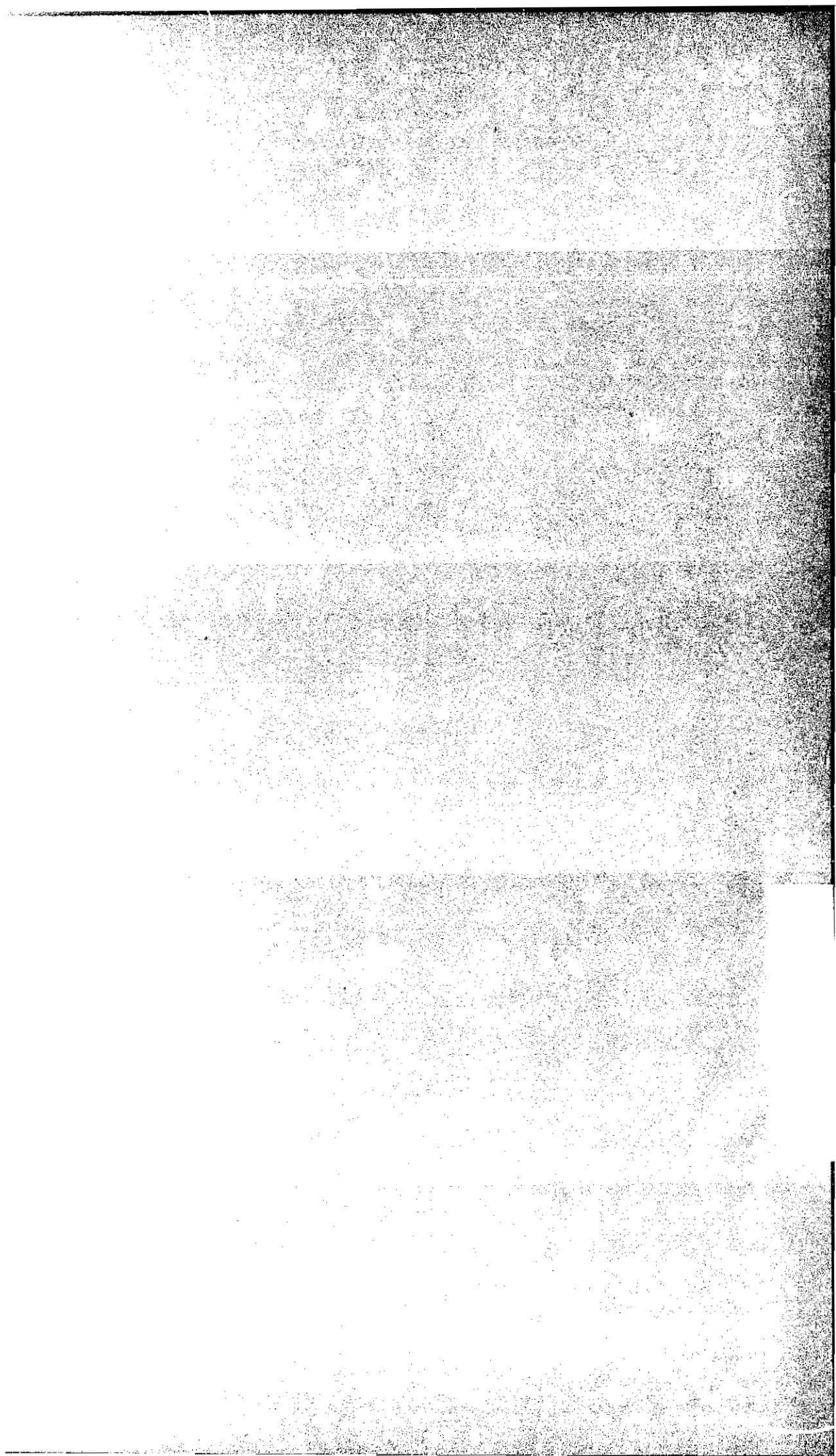
_____ Date _____
Asst. Regional Director (Design & Construction)

_____ Date _____
Regional Director

H. G. Carnes (Per memo 9-17-54) Date 9-8-54
Asst. Chief of Design and Construction

APPROVED

Thos. C. Vint (Per memo 9-17-54) Date 9-8-54
Per Director



MASTER PLAN DEVELOPMENT OUTLINE

Big Bend National Park, Texas

2. GENERAL INFORMATION

a. Park Origin

Big Bend National Park was authorized by act of the 74th Congress, approved June 20, 1935. The Secretary of the Interior formally established Big Bend National Park June 12, 1944. The establishment was made possible by action of the Texas State Legislature in appropriating \$1,500,000 for the purchase of necessary lands, and formally deeded these tracts to the Federal Government on September 5, 1943. Following this, the State of Texas, as required by act of June 20, 1935, ceded to the United States exclusive jurisdiction over the area.

b. Vicinity Data

(1) Relation to Other Parks

San Jose Mission National Historic Site is located near San Antonio, approximately 400 miles east. Carlsbad Caverns National Park is approximately 300 miles north.

(2) Accessibility

Big Bend National Park is in one of the most isolated sections of the United States. No railroads or through highways traverse the area. There is regular bus service from Alpine and Marathon on Monday and Friday to Park Headquarters.

Highways

The nearest major highway is US 90 which passes through Marathon and Alpine, Texas. One approach road leaves US 90 at Alpine, 220 miles east of El Paso and 330 miles west of San Antonio. Over this route park headquarters is reached at a distance of 104 miles. Another approach road from Marathon, 30 miles east of Alpine, reaches the park headquarters at a distance of 70 miles.

Railways

The Southern Pacific lines also serve Marathon and Alpine, Texas.

Airlines

The nearest regular route of airline travel may be reached at Marfa Army Air Field, 17 miles west of Alpine. This flight of the Trans-Texas Lines connects with airline routes at El Paso, San Antonio, and Big Springs, Texas, as well as other points east and west. There are, however, emergency landing fields at Marfa, Alpine, Marathon, Pecos and Sanderson.

Waterways
None.

(3) Climatic Conditions

The climate in the Big Bend might well be described as one of "extremes", yet the periods of extreme temperature, wind velocity, and rainfall are relatively short, and in general, the climate is favorable throughout the year. There is constant wind which is predominantly from a southeasterly direction. During December, January, and February, however, the wind may ~~be~~ come from the north and the so-called "norther" results.

(4) Topographic Features

The Rio Grande and Emory Peak in the Chisos Mountains constitute the extremes in elevation within the park. The Rio Grande at the east boundary is approximately 1800' elevation, at Santa Elena Canyon where it enters the park, it is approximately 2200' elevation, while Emory Peak reaches 7835'.

The Rio Grande which forms the south boundary has cut three spectacular canyons—Santa Elena, Mariscal, and Boquillas Canyons. Terlingua Creek and Tornillo Creek drain a large portion of the park and meet the Rio within the boundary.

In addition to the Chisos Mountains, the Sierra del Carmen and Sierra del Caballo Muerto ranges are prominent features within the area.

c. Visitation

(1) Period of Use

Big Bend is a year-round park with July and August the busy months. The Chisos Mountains area receives heavy summer use, and it is believed that the river development area will get the heavy winter use when facilities become available. It is known that the mid-day temperatures from June 15 to September 15 along the river are uncomfortable unless one is in the shade. In any case, the two widely contrasting locations, taken together, justify year-round activity. For yearly attendance records, see Section 3a of the Interpretation Section of this outline.

(2) Trends of Use

A large percentage of Big Bend visitors take side trips from the Basin to Santa Elena Canyon, Hot Springs and Boquillas. As facilities are developed along the Rio Grande, usage, primarily winter usage, of this part of the park is certain to increase.

d. Legislation

Big Bend National Park was authorized by the Act of June 20, 1935, which provided "That the United States shall not purchase by appropriation of public moneys, any land within the aforesaid area but such lands shall be secured by the United States only by public and private donations", provided, also "That no land for said park shall be accepted until exclusive jurisdiction over the entire area, in form satisfactory to the Secretary of the Interior, shall have been ceded by the State of Texas to the United States (16USC Sec. 157). Also provided "That the provisions of the Act of June 10, 1920, known as the Federal Water Power Act shall not apply to this park." (16 USC, Sec. 158).

An Act of the Legislature of Texas approved May 12, 1939, authorizing the cession to the United States of exclusive jurisdiction over lands conveyed to the United States for the Big Bend National Park (Art. 6077e, Vernon's Annotated Revised Civil Statutes of the State of Texas). Reserving, however, to the State of Texas, the right to retain concurrent jurisdiction with the United States over every portion of the lands so ceded, so far, that all process, civil or criminal, issuing under the authority of this state or any of the courts or judicial officer thereof, may be executed by the proper officers of the State, upon any person amenable to the same within the limits of the land so ceded as the area for the Big Bend National Park, in like manner and like effect as if no such cession had taken place; and reserving further, to the State the right to levy and collect taxes on sales of products or commodities upon which a sales tax is levied in this State, and to tax persons and corporations, their franchises and properties, on land or lands deeded and conveyed under the terms of this act; and reserving also to persons residing in or on any of the land or lands deeded or conveyed under the terms of this Act to the United States Government the right to vote at all elections within the counties in which said land or lands are located upon like terms and conditions and to the same extent as they would be entitled to vote in such counties had not such lands been deeded or conveyed as aforesaid to the United States in America.

Public Law 52 - 80th Congress, Chapter 55 - first session (H.R. 490)
An Act, Providing for the Appointment of a U. S. Commissioner for the Big Bend National Park in the State of Texas, and for other purposes.
Approved May 15, 1947.

e. Master Plan Status

The master plan is complete insofar as it shows the general theme of development. Types and locations of all proposed development are definitely indicated; however, the development plans for the Rio Grande Areas are as yet only in preliminary stage.

Prepared by Ross A. Maxwell
Superintendent
REVIEWED

Date 3-26-52

Regional Office

Washington Office

Architect

Landscape

Architect /S/C. D. Carter 3-19-52

Engineer

Forestry

History

Natural

History

Concessions

Management

Lands

Safety

Recreation

Planning

RECOMMENDED

(Signed) Ross A. Maxwell
Superintendent

Date 3-26-52

General Superintendent

Date

/s/ H. Cornell
Assistant Regional Director

Date 4-30-52

(Design and Construction)

/s/ H. M. Miller
Actg. Regional Director

Date 4-30-52

JUL 21 1952

(SGD.) W. G. CARNES
Acting Chief of Design and Construction

APPROVED

OCT 14 1952

Acting Director

Date

General Information

Vicinity Data

See Volume III Sec. A

Interpretation

Patterns of Public Use
See Volume III Sec. D

General Information

Visitation

See Volume III Sec. A

Master Plan Development Outline

Big Bend National Park, Texas

INTERPRETATION

- (1) Principal Features.--Due to its geographical location, its rugged topography, historical background, colorful neighbors, and the variety and significance of its geological and biological manifestations, Big Bend National Park offers a wide range of inspirational and recreational attractions. The low humidity, mild winter climate, high percentage of sunny days, together with the atmosphere of Old Mexico and the interesting setting of mountains, desert, and river make its southern and southeastern portions ideal as a winter resort.
- (a) Natural History.--Much of the Park and the portions of Mexico adjacent to it are semi-arid plains characteristic of the Chihuahuan Desert and made up of gravel-covered slopes, arroyos, and wide washes. This topography is interrupted by several conspicuous mountain belts through three of which, in addition to other lesser highlands, the Rio Grande has cut spectacular canyons. Thus, Big Bend National Park, with elevations ranging from 1,800' to 7,835' contains, on a grand scale, scenery typical of the arid Chihuahuan Desert, forested mountains, and winding river with zones where contrasting types of topography and vegetative cover meet and intermingle.

Geologically the Big Bend region is one in which there are spectacular examples of physiographic features developed under semi-arid conditions. Crustal movements are impressive and extensive. The Mesa de Anguila on the west and the Santiago and Sierra del Carmen ranges on the east are the approximate boundaries of an elongate, structurally low area called the "sunken block." Displacements range up to 4,000' to 6,000'. Into and through this broken surface the Chisos Mountains were extruded. Lavas up to 2,000' in thickness at the South Rim suggest the distances that lava flowed out over the land, even diverting the Rio Grande, according to some geologists. The river forms the southern boundary of the park for 107 miles. Three spectacular canyons in great mountain uplifts have been cut by this

meandering and historic stream. Ancient earth movements followed by eons of erosion have laid bare whole pages of geological history ranging from those readily interpreted by the layman to others challenging the best geologically trained minds. Many of the rock layers now exposed were deposited as sediments in the bottom of ancient seas and contain, as fossils, the remains of various forms of plants and animals that lived in those waters.

There is an abundance and an unusual variety of fossil remains, particularly of Cretaceous vertebrate fauna . . . scales of garfish, teeth of rays and sharks, bones of marine turtles, giant alligators and dinosaurs. Ceratopsian and hadrosaurian dinosaurs and, tentatively at least, sauropod remains have been identified. The bones of fossil mammals in association with those of reptiles such as have been found here are rare. Little is known of this aspect of the park.

Erosion has been the most recently active agent in altering the topography and creating the scenery of the Big Bend. It has excavated canyons and formed cliffs, columns, spires and buttresses. It has exposed rock layers with a wide variety of color tones. Chemical changes taking place in the breakdown of rocks has resulted in the formation of soil of various characteristics which together with climatic influences and the factors of elevation, slope and exposure have developed a variety of habitats where a wide range of plant life and a corresponding variety of animal forms have become established.

The park is a complete biotic unit, taking in not only the lowlands along the Rio Grande and the immediate elevations but also the woodland and the forests of the higher altitudes. It affords a complete biological picture. There is plenty of opportunity for the seasonal ebb and flow of migratory species within the park and for the development of an unusual variety of plant and animal life under the influence of widely varying conditions of soil and climate. The mammals, insects and the reptiles are characteristically out of sight, many of them nocturnal. The game species are self-effacing and cautious, wanting to see you before you see them.

Even the birds are not easy to see and follow. One is sure to be impressed with the barrenness and lifelessness of the area until he begins to get somewhat better acquainted with it, but the resources are there even if they are so largely hidden.

Almost any of the 1,000 or more species of plants in the park are of special interest: the drooping juniper, occurring nowhere in the United States except in the Chisos Mountains; the tobosa grass, once marking the range of the antelope; hechtia, found only in the Big Bend country; the long-spurred Columbine, a species from Mexico, restricted to three springs in the park; the giant dagger, king of all the yucca tribe in the United States, as impressive as the giant saguaro of southern Arizona or the giant tree yucca of the Mojave Desert. Its annual flowering produces a spectacle which, once seen, cannot be forgotten.

Some of the plants are rare; some are relict - survivors of another age. Others are unusual for the adaptations they have made to a harsh environment. To the casual visitor the abundance, the variety, the color and perhaps the strangeness of the plants is always a source of interest. To the specialist, however, they are indicators of changes in the development of a dominating type, elevation and climatic factors are the most influential with exposure, soil, drainage, and other conditions sometimes tipping the balance to determine the line of demarcation between plant communities.

No less than 240 kinds of birds have been recorded in the park, including a number of rare forms, such as the blue-throated hummingbird, dwarf red-shafted flicker, Mexican phainopepla, Colima warbler and the hooded oriole. The varieties of mammals total 57, among the most interesting of them being the ringtail cat, the mountain lion, the beaver and the peccary. The white tail deer are found in the high mountain section and the mule deer in the lower parts of the park.

Distribution of animal life is, of course, regulated by the presence of water, food, cover and other primary requirements. Because of the elevational variations and the consequent differences in precipitation (eight inches along the Rio Grande to eighteen

inches in the Chisos Mountains), and other climatic phenomena, there is a wide range of habitat within the park.

Thus there are the animals of the moist lowlands and the river valley, others of the arid plains and desert flats, still others of the foothills, and a different group in the mountains and canyons. The Rio Grande itself contains a number of species of fish and attracts numerous waterfowl and shore birds. The former Graham Ranch warm springs are the original habitat of a new species of mosquito fish (*Gambusia gaigei*) never found elsewhere. Six species of amphibians have been recorded from the Big Bend area, and the park together with the adjoining portions of Mexico is rich in reptilian life. Twenty-two identified with additional ones on the probable or possible list.

Harsh, generally physically inhospitable, arid, hot in summer, the region instantly attracts and fascinates the visitor or repels him utterly. There are no dashing mountain trout streams, no grassy glades nor towering trees, but instead, the bleak drab desert lowlands and stark bare mountains which simmer in the summer heat, apparently devoid of life. The observing visitor, however, soon learns that the higher mountains are a treasure house of plant and animal life as strange as unexpected and that even the drab lowlands come to life at sundown with birds, mammals and reptiles in surprising numbers. Thus it is the time of day, season of the year, type of weather which has much to do with one's impression of Big Bend. Appreciation comes to the perceptive, the unhurried and to those who watch it from day to day.

- (b) History.--People interest people; the folklore rather than history is significant in Big Bend. The quality of human use - how people made a living off the land - their problems - their quarrels - their successes - their failures - the toll levied on them by their mode of living - this interests visitors. The border incidents of the past, dramatized in terms of individuals, provide insight into today's strife along the frontiers of the world. Basketmaker Indians, the Apache and Comanche were here before them, but the focal points of human history center around the Texans and the Mexicans of today and the recent past.

- (c) Archeology.--Within the park there are numerous archeological sites both in the open along stream valleys and in caves. The open camps generally consist only of rock hearths or sotol pits (burnt-rock mounds) and stone artifacts. The dry caves often yield, in addition, a variety of perishable materials such as wooden implements, basketry, matting, cordage and netting, and objects made of plant fibers. Bedrock mortars, pictographs and petroglyphs are additional archeological features of interest. Burials are occasionally found.
- (2) Status of Research.--Basic scientific data are needed in order to accomplish the objectives for Big Bend National Park. A wealth of accurate data regarding scenic scientific and historical resources are already available from studies made by various scientists in past years. However, in order to assist in the management, protection and interpretation of park resources additional knowledge is needed in the fields of natural history, history and archeology as a continuation of past research, to fill in the gaps and in some cases to bring data up to date.
- (a) Research Accomplished.--Major contributions in the field of biology have been as follows: Borrell and Bryant "Mammals of the Big Bend Area of Texas," University of California Press, 1942; Hubbs, "Fishes from the Big Bend Region of Texas," Trans-Texas Academy of Science, 1940; Sutton and Van Tyne "Birds of Brewster County," University of Michigan Press, 1937; Schmidt and Smith "Amphibians and Reptiles of the Big Bend of Texas," Field Museum, 1944; several papers on botanical subjects by Omer E. Sperry and the Government publication "Plants of Big Bend National Park" by McDougall and Sperry; R. A. Maxwell and John T. Lonsdale, "Guidebook Field Trip No. 1, 1949" and "Guidebook, Spring Field Trip, 1955"; West Texas Geological Society give the principal geological coverage published to date.

The field of archeology has been partially covered by Dr. E. K. Reed's "Report of an Archeological Survey in Big Bend," 1936; and articles by C. J. Kelly and others in the Sul Ross Teachers College Bulletins.

"The Romance of Davis Mountains and Big Bend Country" by C. G. Raht and "The Big Bend Country" by Virginia Madison carry principal published data on the historical subjects.

Other more minor articles on all of the above subjects have also been published from time to time.

The following research projects are now under way, which when completed will contribute considerable basic knowledge and will be very valuable in providing the basis for our future development plans.

"Geological Mapping of Park Area." Being carried on by Drs. Lonsdale and Maxwell, University of Texas. This is a comprehensive Geological Survey, including mapping, interpretation of structure, stratigraphy and petrology of the area, with special studies of Paleocene and Eocene vertebrate fossils. The project has been carried on for several years' period and is practically complete except for final report.

"Five Year Ecological Survey of Park Area." Determination of vegetation types, their extent. Prepare control maps in terms of dominance, elevation, soil and geologic character, exposure, etc. Observation of animal distribution and record all observations as to numbers, geographic location and plant associations. Design methods for census and begin specimen collections. Plan coordination of plant and animal techniques. Organize weather recording program and make literature research and reports. This is a five year project from 1955 to 1960. Project by Wildlife Management Division of Texas A. & M. College and State Fish and Game Department under the supervision of Dr. W. B. Davis assisted by Drs. Dixon and Wallmo of the college and Dr. Barton Warnock of Sul Ross College.

- (b) Research Needed.--Both of the foregoing projects cover broad fields and it is difficult to select additional specific projects in these fields until their reports have been made, the coverage determined and the subjects upon which more detailed information is needed are disclosed.

It is probable that research on the following specific geologic subjects will be needed in addition to the project now under way. Investigations of vertebrate and invertebrate paleontology, especially reptilian and mammalian vertebrate. Hot Springs investigations, distribution, stratigraphy, flow, etc. Possibly other subjects to be determined after appearance of geological survey report.

Research on the following biological subjects either in addition to, or continuation of, the ecological survey: Research now being carried on by Dr. H. L. Stahnke on scorpions; study of predator distribution and relationships, peccary distribution and status; study fish - food and habitat studies of the Rio Grande as a basis for stocking and management programs for maintained recreational fishing use. Continuation of such ecological studies as may seem advisable after the current five-year study has been completed.

Research projects in history and archeology: Comprehensive archeological survey of the park as a basis for interpretation and exhibits. Comprehensive study of history of this locality, early explorations, early settling, early mining and early ranch history and development.

Continued study, as travel increases, of visitor habits and needs as basis for future developments and expansion of visitor facilities and interpretive program.

- (3) Patterns of Public Use.--The annual travel for 1955 was an estimated 80,990. The estimate for 1966 is a half million. The graph below shows the seasonal travel pattern typical of the present time. The major difference between this and the one for 1966 will be a vast increase in winter travel. This gain will start in 1957 and move rapidly as better accommodations are developed. Summer travel will not have a proportionate increase during the next ten years due to the fact that there is a limited amount of space in the mountain country for this type of use.

Of the 80,990 visitors in 1955, an estimated five percent participated in the interpretive program. A total of 2,283 visitors attended the summer campfire talks; and estimated 2,376 visitors used the self-guiding Lost Mine Trail. No accounting is made for those attending the evening programs offered by the concessioner.

A mild climate and two widely contrasting locations make this park an ideal one for year-round activity. Although nearly all visitors will go to the Chisos Mountains Basin for at least a brief visit, at any time of the year, it will receive its heaviest use in the summer due to its cooler climate. The river area, little used at present, will receive heavy visitation as soon as facilities become available. The summer travel peaks in the month of August. The low is reached in the winter, with those months from November to March running approximately the same. Approximately 40 percent of the annual visitation occurs during

the months of June, July and August. This group is largely composed of persons from Texas and adjoining states. It contains numerous organized groups from schools, clubs and churches. They are predominantly campers seeking a wilderness experience.

Winter visitors usually are people on a winter vacation without children, many of them coming from the east and midwest. No reliable information on point of origin is available. Use by people from Texas during the winter is confined principally to weekends.

Although many visitors enter and leave the park the same day, visiting the Basin and usually one or the other of the two canyons of Santa Elena or Boquillas, the trend is for a greater number to remain overnight; at least they desire to do so if accommodations are available.

A satisfactory picture of the overnight use cannot be developed on a year-long basis because the demand for accommodations during the heavy travel period far exceeds the number available, and those visitors going outside to stay do not re-enter due to the distance involved. The trend, however, seems to indicate a travel pattern with a low at mid-week, building up progressively to a Saturday peak and remains high over the fore part of the week. These observations are taken from the following chart of overnight cabin use furnished by the concessioner for 1955.

	<u>Sun.</u>	<u>Mon.</u>	<u>Tues.</u>	<u>Wed.</u>	<u>Thurs.</u>	<u>Fri.</u>	<u>Sat.</u>
Overnight Guests	64	66	76	92	70	92	105
Total in July	362	303	303	283	284	332	418
Total for Year	2113	2327	2294	2075	2144	2170	2324

Overnight use is also discouraged during the summer months by inadequate campground facilities. Notwithstanding, 45% of the visitors entering the park in 1955 did remain overnight; 50% of this overnight use took place in June, July and August. It was evenly divided between the campground use and cabin rental occurred in August, as shown on the tabulation below. This is a recurring pattern of use.

Note: The travel total for 1956 was 89,709 visitors and 121 evening and special programs were given to 2,345 visitors. No particular change in travel pattern noted.

1955

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>
Total visitors in month	3,417	3,256	5,926	6,854	6,387	11,064	11,252
Number using cabins overnight	551	751	920	1,203	1,222	2,446	2,425
Number using all campgrounds overnight	454	702	1,125	1,425	2,208	3,240	3,562

	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Total</u>
Total visitors in month	12,456	6,424	5,364	5,376	3,214	80,990
Number using cabins overnight	3,041	1,209	846	814	664	10,092
Number using all campgrounds overnight	4,381	1,581	737	610	242	20,461

Big Bend essentially is a horseback and a hiking park. The amount of trail used by hikers is difficult to determine, but it needs definite studies. The estimate for the Lost Mine Trail was 2,377 persons. In this same year of 1955 only 2,202 visitors out of 80,990 rode horseback. Almost 70% of the horse concessioner's business occurred in June, July and August. A sample study of the last quarter of 1955 shows that only 0.4 of one percent took the trip to the Window; and that only 0.2 of one percent went to the South Rim. The need for better promotion is obvious.

(4) Interpretive Program

- (a) Initial Visitor Reception Facilities.--Because of the fact that Big Bend is relatively new as a national park and because of the phenomenal increase in visitation with demands for such physical facilities as roads, overnight accommodations, and an administrative and residential development for Service personnel, and prior to October 1955 the lack of a naturalist on the staff, very little has been accomplished toward the establishment of an interpretive program.

A ranger station is located near each of the two entrances to the park. However, each is manned by a district ranger responsible for extensive sections of the park and available to visitors at the station for only very limited periods, if any, during the week. The district ranger responsible for the headquarters and Chisos Basin has maintained an office in the Lower Basin but here again it was not readily found by visitors and was unattended most of the time due to his multitude of duties. The Administration offices at Panther Junction have been serving as an information office for visitor contacts, but since they are temporarily located in a building designed for use as maintenance shop and placed back a half mile from the main highway, it has not been readily accessible to visitors and only a few find their way to it and make use of this service. It has been the practice each summer to operate an information station in an open ramada beside the store in the Chisos Basin. A man was on duty there during the rush periods each day and evening to contact and assist the visitors.

To assist in remedying this situation (as of December, 1956) a temporary prefab building has been erected beside the parking area in the Upper Basin which will serve as a ranger station and information office and attended daily as much as time, duties and personnel permit throughout the year. This will replace the outdoor information counter for summer use also. An information exhibit containing a map, photographs and directional material has been installed in front of the building for supplemental use by visitors. As a temporary measure similar exhibits have also just been erected on the highway at each of the two park entrances to serve as initial self-operating information stations. Each device is equipped with a box containing the park information leaflets with instructions for visitors to take one per car. Appropriate signs will be used to encourage visitors to stop and avail themselves of this assistance.

During the summer of 1948 popular demand for explanations of the various obvious features of the park increased to such an extent that occasional

evening campfire programs of an orientational and interpretive nature were presented when large numbers of overnight visitors were present and personnel capable of presenting authentic material were available. That practice has been continued each summer since. For the summer of 1956 this program of campfire programs was expanded to one each night, except Sunday, in the Chisos Basin campfire circle. This nightly program is being continued on a trial basis throughout the winter. The evening talk is being given in the recently reconstructed ranger station during the period when it is too cold outside. If the trial this winter proves successful and the travel warrants, it will doubtless become a permanent part of the program.

Proposed.--Regular entrance stations (1-12, 3-6) are proposed for construction at each of the two existing highway entrances of the park, with sufficient personnel made available to operate them. Here the visitor will be met by a uniformed employee to which he will doubtless pay an entrance fee, receive a copy of the park information leaflet and such other brief information as he may desire as he enters the park.

It is also proposed that each entrance have, at a suitable location, a master marker (1-13, 3-7) which will contain a brief statement of the significance of the park and its relationship with the other national parks and monuments.

An initial visitor orientation-information facility is also proposed for the lobby of the new Administration Building which will be constructed at Panther Junction. This will be located on the main park highway at the key road junction where the road from Persimmon Gap branches to go to the canyons and the Chisos Basin. Although this is not in the same category as the proposed interpretive centers it will be more fully covered under that heading due to its connection with the Chief Park Naturalist's office and other interpretive facilities.

- (b) Interpretive Centers - Proposed.--There are no existing interpretive centers in the park. The park naturalist has a small office along with the other administrative offices in their temporary location.

In it is also the few specimen cases we now have, the books and pamphlet files composing the present park library as well as slide file, photographic files and various items of photographic equipment. Due to lack of other space the park herbarium cases are in the Chief Ranger's office.

Chisos Basin Visitor Center (4-10).--The Chisos Mountains Basin is at present the only place in the park where the visitors may secure accommodations and meals and campground provided with modern restrooms. It is also the scenic focal point to which nearly all visitors will go sometime during their visit both now and in the future, with concentration being especially heavy during the summer months.

In order to provide adequate interpretation of park features at this point a suitable visitor center is proposed. Here the exhibits will have as their principal theme the geology, biology and ecology of the Chisos Mountains section of the park. Here also a small auditorium accommodating up to 150 visitors will be needed. Although a campfire circle will be utilized for evening programs during the summer, the auditorium would provide an indoor location in case of inclement weather, a place for evening programs during other seasons of the year and could also be utilized for daytime programs either conducted or given with automatic audio-visual equipment.

Since no other administrative facilities are proposed for the Basin the visitor center building should also provide office space for the District Naturalist and Ranger and a small storage room. The Basin is a fragile area and a definite limitation is being placed on the amount of accommodations and camping space to be provided. Since space is at a premium the visitor center should provide adequate space but cannot be a pretentious unit.

A campfire circle will also be needed for summertime use, suitably located to be accessible to both lodge and campground visitors with capacity to care for the number of overnight visitors provided for.

In the design of the exhibits for the visitor center consideration should be given to the use of suitable audio-visual devices.

Rio Grande Visitor Center (8-7).--An extensive development of lodge and campground facilities is being planned for the Rio Grande area in the vicinity of Boquillas Canyon. This will be the visitor concentration point in the winter and have the summer overflow from the Chisos Basin. A visitor center is therefore needed to care for the interpretive program at this development.

Here the Rio Grande story will be told with exhibits of biology and geology for the park in general and the relation to that portion of the park, the ecological relations of plants and animals of the lower country. The archeological story connected with the Big Bend should be included here with certain phases of the history. Certain material should also be included with reference to our neighbor, Mexico, across the border. If a park is established on the Mexican side additional exhibits will be needed telling something of their culture, how visitors should conduct themselves in Mexico and other appropriate information.

Here, too, the visitor center will also be the administrative center for this portion of the park, with provision for office space for District Naturalist and Ranger in charge of that section and limited work room and storage place for supplies. An adequate auditorium, with capacity in keeping with overnight facilities, will be needed to provide a place for evening interpretive programs during that part of the season when the campfire circle cannot be used and possible day use as well. Consideration should also be given, in exhibit planning, to the use of appropriate audio-visual devices.

A campfire circle suitably located so as to be accessible to both lodge and campground is also necessary.

Castolon Visitor Center (9-1).--If the Castolon ranch property is acquired and added to the park and the tentative plans to develop it as a ranch type facility with overnight accommodations and campground a modest visitor center will also be needed for this development. In keeping with the ranch atmosphere this center should feature small exhibits with emphasis on early ranching history with minor coverage on other early history facts, audio-visual devices

being used where practical. Office space will be needed for the ranger and naturalist for that district and limited auditorium and campfire circle provisions for evening interpretive programs.

Panther Junction Administration-Information Office (1-1).--The Park Administration Offices will be located on the main highway at Panther Junction, a key point in the park. Since there are no visitor accommodations planned for this vicinity there is no need for a visitor center to be developed here; however, it is an excellent location from which to orient the visitor and give park information. The Administration Building should be provided with a lobby and information office in connection with it. The lobby should contain suitable orientation exhibits and devices sufficient to give the visitor an inventory of park resources and points of interest for him to visit. The large, existing relief map of the park might well be utilized here together with a suitable audio-visual aid. No auditorium would be required.

Experience in other national parks and monuments has demonstrated that an effective interpretive program requires not only interpretive devices, facilities for their use and adequate funds for their maintenance and improvement, but also suitable facilities for administering and expanding the interpretive program to keep up with the visitor demands. Such facilities include offices and workrooms for interpretive staff members, adequate storage for the systematic filing and protection of valuable study collections, a library that is kept up-to-date, suitable laboratory space and equipment for repairing and maintaining exhibits, and for collecting, preparing, preserving and storing scientific specimens. For most efficient administration the location of the Chief Park Naturalist's office and these interpretive facilities should be in the Administration Building. Here he has the clerical office, park files and records, warehouse, shops and source of supplies available to him. The naturalist is more readily available for consultation with other key staff members. Here the library, photographic files and scientific collections would be most readily

available to other staff members desiring to make use of them. The administrative center for the park is also the place where visitors and scientists wishing to see the Chief Park Naturalist or scientific collections would ordinarily expect to find them. The design for the new park administration building should include space for these facilities.

All of the foregoing proposals for visitor centers and information office and interpretive offices and facilities will greatly improve visitor services and make adequate interpretive information available to the visitor wherever he may be, filling a great deficiency which exists at the present time.

Personnel Requirements.--The operation of a complete and satisfactory interpretive program as shown here with three visitor centers open on a daily basis the year around, an information-orientation office and lobby at headquarters, conducted walks and evening programs require a complete interpretive staff of permanent and seasonal naturalist personnel in addition to that assistance provided by the ranger staff. The existing staff consists of one park naturalist with the possibility of addition of two seasonal ranger-naturalists in the 1958 fiscal year. The minimum staff necessary to operate the program should consist of the Chief Park Naturalist, an Assistant Chief Naturalist who will assist in supervision of the program as well as act as a substitute for district naturalists during any extended annual leave periods or other occasions when required, a District Park Naturalist for each visitor center as it comes into operation, making a total of five permanent naturalists. Secretarial assistance should also be provided for the Chief Naturalist. During the seasons of heavy travel a staff of approximately 18 seasonal naturalists will be required to assist with visitor contact duties at the three visitor centers and headquarters information office, evening programs and conducted walks. During other periods of the year assistance will be required from the ranger staff to carry on the informational and interpretive activities at the visitor centers or else additional interpretive personnel provided. The information-orientation office at headquarters

may be attended by a seasonal during heavy travel periods and by office information personnel, with the Chief Naturalist available for more technical questions during other periods.

Either a park biologist or a man with a combination of ranger-biologist duties will be needed on the staff, particularly after the completion of the ecological survey studies now being carried on by Texas A. & M. College. His services will be needed to interpret the findings of the research projects, carry on any action necessitated in the wildlife program, provide continuity after individual research projects are finished and carry on any new biological investigations that are needed or made necessary by changing conditions.

To summarize - the minimum staff would be as follows: Chief Park Naturalist, Assistant Chief Naturalist, Office Secretary, three District Naturalists, Biologist and 10 seasonal Naturalists.

(c) Self-Guiding and Conducted Trails and Tours

Self-Guiding Trails

1. Lost Mine Trail (4-7).--Existing (foot trail only). This trail was developed as a self-guiding nature trail in 1949. Starting from the saddle between Green Gulch and the Basin it ascends gradually for the first three-quarters of a mile to a saddle overlooking Juniper Canyon. This portion has been developed with numbered stakes on plants and other features and a printed guide booklet containing interpretive texts. From this saddle the trail ascends rapidly for another one and one-quarter miles to the top of the Lost Mine Ridge from which a view of a large portion of the southeast section of the park can be obtained. It has been described as a hiker's version of the South Rim trip. An orientation device is at the terminus. Round-trip distance is $4\frac{1}{2}$ miles; time, 3 hours.
2. Window Trail (4-3).--Existing for foot or horseback. Round-trip distance about $4\frac{1}{2}$ miles; time 3 hours. Interesting scenic trail to the point where Oak Creek pour-off is located. Self-guiding labels and markers proposed for this trail.

3. South Rim Trail (4-11).--Existing for foot or horseback. Round-trip 12 miles; time by horse 7 hours, foot 10 hours. Horse trips guided by horse concessioner. Climb from Basin 5,400' elevation, to Rim 7,200' elevation. Exceptional view of southern part of park and Mexico. Interesting mountain flora. Addition of some interpretive markers proposed. The one-mile portion of this trail from the Basin to Juniper Flat is a good section for a conducted walk from the Basin Interpretive Center. Interesting mountain flora and possibly birds and deer.
4. Santa Elena Canyon Trail (5-5).--Existing. About $\frac{1}{2}$ mile long going a short distance into the mouth of the Canyon to a point at river level. Self-guiding labels proposed for installation.
5. Boquillas Canyon Trail (7-2).--Existing $\frac{1}{2}$ mile trail into entrance of Canyon. Excellent fault line visible. Self-guiding markers and labels proposed for addition.
6. Rio Grande Trail (2-3).--Proposed. A proposed nature trail along the river in vicinity of new proposed Rio Grande village development. For self-guiding and conducted trips. Exact route and length not yet determined.

Self-Guiding Road.--Giant Dagger Road (6-1): Existing 8-mile road into Dagger Flats. Proposed to be made self-guiding by addition of signs and markers visible from car giving names of desert flora or other features.

Conducted Trips

Basin Area.--The Lost Mine and Window trails are basically self-guiding; however, they and the trail to Juniper Flat (4-12) will also be utilized for naturalist conducted trips when personnel is available and travel warrants.

Rio Grande Area.--It is planned to use the proposed Rio Grande nature trail both as a self-guiding and for conducted trips.

(d) Other Facilities and Services

Observation Stations - Orientation.--There are certain locations along the park highways where visitors may view quite an expanse of country with various mountains and other prominent landmark features to be seen in all directions. The visitors are naturally curious about these features, particularly their names. These locations also provide good points for photography, especially under certain conditions of light or weather. In each case the terrain is suitable for turnouts to be provided. At these points it is proposed to place orientation plaques which will delineate and name the prominent features of the surrounding landscape. It is also planned to arrange three plaques at each point in a triangular device which will provide 360° coverage. In this open country of direct sun and summer heat, shade is at a premium. In order to make these orientation stations more inviting and comfortable to the visitor a simple ramada type shade is planned for installation over the plaques.

The following locations are proposed for these installations of orientation plaques:

1. Near Dugout Wells, Route 2 (2-3).
2. Just north of Lower Tornillo Bridge, Route 2 (2-4).
3. Junction of Route 3 and road to Grapevine Hills (3-1).
4. Vicinity Indian Head Mountain on Route 3 where Mule Ear Peaks visible (3-3).

It is also our desire to provide one or more observation points where wildlife might be observed and photographed, possibly around Dugout Wells or Grapevine Hills. This requires further study before definite recommendations, if any, can be made.

Wayside Exhibits.--The proper interpretation of certain features requires the presentation of more detailed information than can be incorporated on an interpretive marker or sign. Also this interpretation can best be given in the field where the

features themselves can be viewed rather than in the visitor center. The following exhibits are proposed:

1. Dagger Flat Exhibit (6-2).--A small wayside exhibit to contain explanatory material about the Giant Dagger, including pictures of the plants in bloom for benefit of those visiting at other times of the year; about the other yuccas found in the park and the part that the yucca moth plays in their life cycle. This will be located near the turning loop at the far end of the Dagger Flat Road. The road itself will be self-guiding and an interpretive sign placed on the main highway at the turnoff. Route 6.
2. Santa Elena Canyon Overlook Wayside Exhibit (5-4).--To contain a geological explanation of the canyon and formation of rift valley between it and Boquillas. Statistics on canyon size, length, length of Rio Grande above and below, etc. Photographs of interior of canyon. Exhibit not attached to, but shaded by, a ramada. Located at observation overlook facing mouth of canyon. New proposed location in place of existing overlook point in use.
3. Boquillas Canyon Overlook Wayside Exhibit (7-1).--A wayside exhibit is proposed for this point that will contain the same story with relation to Boquillas Canyon as that for Santa Elena. To be located beside the loop, at the end of the side road, on the observation point overlooking the river and canyon. Another exhibit is also proposed for this location to contain the following subjects: Orientation - river and features in Mexico, including Boquillas village and ruins visible downstream; Fluorite mining early operations with tramway, and present practices - samples of fluorite with characters and uses listed. These two exhibits would probably be best placed on opposite sides of the same shelter.
4. Fossil Bone (1-5).--Existing. On Route 1, north side of Upper Tornillo Crossing. Exposed, in place, fossil bones of Coryphodon, under glass in shelter with interpretive explanation.

Interpretive Markers

1. Comanche Trail (1-14).--Existing bronze tablet on stone base at Persimmon Gap giving brief explanation of Comanche trail route through gap. Turnout is provided.
2. Dagger Flat Junction (1-7).--Sign giving brief explanation of what is in Dagger Flat and self-guiding road to it. Provide place at bottom for changeable sign stating whether yuccas are or are not in bloom.
3. Candelilla Plant (2-6).--Brief interpretive statement about candelilla plants and their uses. Locate beside parking area at west portal of tunnel on Route 2 to Boquillas. Sign either placed among candelilla plants or some moved to it. Many others are nearby.
4. Chisos Mountains Volcanism (3-2).--Interpretive statements regarding origin of Chisos Mountains by volcanism and pointing out terraces and other volcanic features visible from this point. Located on Route 3 at point where Casa Grande is visible through the Window.
5. "Painted Desert" Badlands (3-5).--Brief geological statement about badlands visible from road just northeast of Santa Elena junction on Route 3.
6. Cinnabar Mining (5-1).--Marker about cinnabar mines found at Study Butte and Terlingua visible from point on Route 5 about one mile south of Santa Elena Junction.
7. Start of Santa Elena Canyon Trail (5-3).--Marker containing orientation information about trail into mouth of canyon, distance, etc.
8. Start of Boquillas Canyon Trail (4-2).--A marker containing orientation information about short trail into this canyon located at start of the trail.
9. Lost Mine Peak (4-2).--Existing. Brief geologic statement about peak. On Green Gulch road. Route 4.

10. Ward Mountain (4-8).--Existing. Brief geologic statement about mountain. (Basin parking area)
11. Lost Mine Trail (4-6).--Existing. Explanation about trail route.

Other Markers.--A number of small markers now exist at scattered locations along the highways giving the names of prominent features along the way. It is proposed to retain these plus the addition of a few others carefully selected and located so as to keep from overdoing this feature. Visitors naturally wish to know names of various things along the way and have greatly appreciated the assistance of these markers.

The following are existing unless otherwise indicated:

- Route 1 (1) Dagger Mountain (1-9)
(2) Rosillos Mountains (1-8)
(3) Tornillo Creek (both sides at approaches) (1-6)
(4) Lone Mountain (1-3)
(5) Chisos Mountains, Wright, Panther, Pummel Peaks (Proposed) (1-2)
(6) Bone Spring Draw (both sides) (1-11)
(7) Nine Point Draw (both sides) (1-10)
- Route 2 (1) Pummel Peak (Proposed) (2-1)
(2) Nugent Peak (Proposed) (2-2)
(3) Tornillo Creek (both sides) (2-5)
- Route 3 (1) Mule Ear Peaks (3-4)
- Route 4 (1) Elevation 5,000' (4-1)
(2) Entering Green Gulch (4-3)
(3) Elevation 5,280' - One mile above sea level (4-4)
(4) Panther Pass - Elevation 5,300' (4-5)
- Route 5 (1) Castellan Peak (Correction from present Castolon) (5-2)

Lecture or Talks

Existing - Chisos Basin

Campfire Circle.--Nightly except Sunday during summer. Subjects of Natural History, History and General Park tours. Other more specific subjects proposed.

Auditorium.--Some being carried on during winter in temporary auditorium as travel may warrant.

Proposed.--The same program is proposed for other visitor centers as they are established in the future.

Lecture and Assembly Facilities - Existing

Chisos Basin - Temporary campfire circle and auditorium - both to be replaced by permanent ones.

Rio Grande Visitor Center

Proposed Campfire Circle
Proposed Auditorium

Castolon Visitor Center

Proposed Campfire Circle
Proposed Auditorium

Headquarters - Panther Junction.--Proposed training and conference hall principally for service training use.

The various elements enumerated under exhibits, interpretive markers, etc. include very little on the subjects of archeology and history. This is not intended to indicate that the interpretive program is not going to include these subjects. Sufficient information is not at present available, due to lack of research on these subjects to permit definite recommendations for interpretive markers or other treatment. Certain sections of park highways are due for reconstruction and relocation. In the case of Route 5 the location of the new alignment is not yet known. It is therefore hoped that more adequate treatment for these subjects may be incorporated as both research and construction program progress.

Summary of Facilities and Services

Visitor Centers - 3

Chisos Basin
Rio Grande
Castolon

Information - Orientation - Administration

Headquarters at Panther Junction

Evening Programs - Campfire Circles or
Auditoriums

Chisos Basin
Rio Grande
Castolon

Self-Guiding Trails

Chisos Basin
 Lost Mine Trail
 Window Trail
 South Rim Trail
Rio Grande
 River Trail
 Boquillas Canyon Trail
Santa Elena Canyon Trail

Self-Guiding Road

Dagger Flat

Conducted Trips - 4 Points

Lost Mine Trail
Window Trail
Juniper Flat (part of South Rim trail)
Rio Grande River Trail

Observation Stations - 4 Points

Near Dugout Wells
Lower Tornillo Crossing
Junction of Route 3 and Grapevine Road
Near Indian Head Mountain

Trailside and Roadside Exhibits - 3

Dagger Flat
Santa Elena Canyon
Boquillas Canyon

Interpretive Markers - 11

Comanche Trail
Dagger Flat Junction
Candelilla Plant
Chisos Mountains
Painted Desert Badland
Cinnabar Mines
Santa Elena Canyon Trail
Boquillas Canyon Trail
Lost Mine Peak
Lost Mine Trail
Ward Mountain

Other Markers - 16

Lectures - 3 Points

Chisos Basin
Rio Grande
Castolon

Lecture and Assembly Facilities

Campfire Circles - 3 - Above locations
Auditoriums - 3 - Above locations

(e) Cooperating Agencies and Concessions

Big Bend Natural History Association.--This Association has been established to assist with the interpretive program through the sale of literature, publishing of booklets on subjects in which the visitors are interested; trail guides and other materials, and in the procurement of publications for the park library; equipment, supplies and materials for use in the interpretive program not made available otherwise.

Concessioner Facilities.--Concessioner developments have been established and expanded and now offer guided horseback trips in the mountains and may offer the same plus float trips in the future along the river. The Concession stocks and sells certain books, postcards and pamphlets. They have in the past shown movies or slides to visitors during the winter in the store when travel was low, but this activity has currently been replaced by Service conducted programs.

- (f) Special Problems.--Dissatisfaction with fishing conditions on the part of visitors who come especially to fish in the Rio Grande has indicated desirability of fish studies to determine whether there is a practical method of developing a permanent increase in channel catfish population.

Bighorn restoration has been proposed in the past. The State Game Department plans to re-establish these animals on the Black Gap Refuge just east of the park. If this proves successful, further study will be in line with reference to re-establishing them in the park proper.

Mountain lion may occasionally be a problem due to the proximity of sheep ranches. One special case has already been handled and others may occasionally arise. Each will have to be handled as a separate problem unless unusual circumstances arise. Predator population studies should be maintained.

A species of mosquito fish (*Gambusia gaigei*) is known to exist only in the warm springs of the Rio Grande development section. Since this is the only known natural habitat of this particular species an effort should be made to preserve a population of this species. Measures have already been taken and should be continued in order to preserve the species. Consideration should be given to maintaining some by aquarium methods in connection with interpretive exhibits at the Rio Grande visitor center.

Exotic plantings occur at old ranch sites and have been authorized for use at visitor developments on the river in order to provide adequate shade. These will have to be considered in the interpretation of the flora of the park and proper restrictive measures considered to prevent their spread to other areas.

The ore hauling operations from Mexican mines across the park via park roads present an additional problem for park maintenance and must also be considered in the interpretation of the park and its resources to visitors.

Wild burros have occasionally posed problems of control and may in the future, though no particular consideration is required by present conditions.

Interpretation
Page 27
May 1957

Big Bend National Park, Texas
Name of Park

Prepared by Harold J. Brodrick, Park Naturalist Date 12/31/56
Name and Title

REVIEWED

WESTERN OFFICE, DIVISION OF DESIGN AND CONSTRUCTION

Architect /s/ Lyle E. Bennett Date 2/14/57
Engineer /s/ P. E. Smith Date 2/14/57
Landscape Architect /s/ Robert G. Hall Date 2/14/57
Interpretive Planner /s/ Carl P. Russell Date 2/7/57

REGIONAL OFFICE

Recreation Resource
Planning George W. Miller Date 5/28/57
Interpretation Sanford Hill Date 2/15/57
Operations Sanford Hill Date 2/15/57

RECOMMENDED

/s/ George W. Miller Date 5/28/57
Superintendent
/s/ Sanford Hill Date 2/15/57
Chief, Western Office, Division of Design & Construction
Sanford Hill Date 2/15/57
Regional Director
Sanford Hill Date 2/15/57
Chief, Division of Design and Construction

APPROVED

Sanford Hill Date 2/15/57
Director

MASTER PLAN DEVELOPMENT OUTLINE

Big Bend National Park, Texas

OPERATION (Continued)

c. FORESTRY

(1) Summary of Fire History to Date

History of forest fires prior to 1944 in the Big Bend area is very scanty. A fairly reliable report from one of the workmen, Macario Hinojos, states that about 1900 or 1901 a fire burned extensively in the Chisos Mountains for about five months. Evidences of this fire may still be seen on Ward Mountain and the west fringe of the Basin. One large fire in May, 1944, burned approximately six sections (3,840 acres) before it was "rained out". The fire started from a lightning strike in the vicinity of Sue Peak on the eastern side of the park. There was no manpower available, and since the area had not been officially established as a national park, we could not obtain funds for the suppression of this fire.

Since 1944 there has been a total of 23 fires or an average of three fires per year. However, 13 of the 23 fires occurred in 1950 and 1951. The average burned acreage has been high until 1951 when 7 fires burned a total of 6.7 acres. The high acreage of the earlier fires was attributable to low manpower and poor access roads. Fifteen of the fires or 65% were lightning caused and 8 or 35% were man-caused. It is likely that as the park develops and visitor use increases, the number of man-caused fires will also increase. However, improved road conditions and increased manpower and equipment should tend to lower the average burned acreage.

The normal fire season for Big Bend is April 1 through July 31 and requires the employment of three fire control aids, IGS-3, 4 months each, April 1 through July 31.

(2) Forest and Range Protection

The report of Forest Protection Requirements for Big Bend approved by the Director December 17, 1951, outlines the principal needs in forest and range protection.

(a) Fire Control

There is no organized fire control for protection of private lands inside or those lands adjacent to Big Bend. Consequently the forest fire control planning for the park must take into consideration the fires originating on these lands which might endanger Service lands. The present fire control organization consists of the superintendent, assistant superintendent, chief park ranger, and four district park rangers. The seasonal

organization consists of three fire control aids (IGS-3) employed for the normal fire season, April through July. In addition, there are road and trail maintenance crews and concessioner employees that can be used to supplement the ranger organization for fire suppression.

Prevention

Information concerning forest fire prevention is brought before the public through posters, ranger contact at campgrounds and other public meeting places. The checking stations, when put into operation, will provide additional facilities for control and education. During the fire season fire prevention is carried on through limiting camping in the forested area and through the use of posters and signs and by providing special stops along the trails where smoking may be permitted. The system of a positive approach to smoking on trails by providing cleared areas where visitors may smoke in relative safety has proven very effective in reducing smoker fires along the trails. The only fire hazard reduction is done on a minor basis by removing flashy fuels from around cabins in the concessioner's operations.

Presuppression

Organized Personnel Training.

All permanent and seasonal personnel receive fire control training annually at scheduled training meetings in the park. Training programs are developed in advance of the training period with the cooperation and assistance of the Forestry Division in the Regional Office. In addition, the key personnel receive training at the regional training meetings. Also, the concessioner's employees attend the local fire control training meetings.

Summary of Fire Equipment and Maintenance of Equipment.

Forest Fire

There are sufficient hand tools to equip a 100-man fire suppression crew. These tools are maintained in caches at the Basin, Panther Junction headquarters, and the district ranger stations. Due to the remoteness of the outlying ranger districts, additional hand tools should be purchased to equip a 5-man unit each for Persimmon Gap, Boquillas and Castolon ranger stations, and an additional 100-man unit to be kept at park headquarters. The cache is in part maintained from funds provided for in the annual appropriation under accounts 122 and 129. Supplies and materials actually consumed on a going fire are replaced with forest fire suppression funds under Account 123. There are no cooperating

agencies adjoining the park where additional equipment may be secured under cooperative agreement.

The park has one International ¹⁹⁴²~~1952~~ 1½-ton camp truck equipped with 150 gallon water tank, camp equipment and hand tools for forest fire suppression. It is to be replaced in 1957 F. Y. A slip-on tanker unit was purchased during the 1951 season. This unit will be maintained at the Panther Junction headquarters. Trucks for its transportation to forest fires will be furnished from the regular equipment pool as required.

In addition to the above mentioned regular fire equipment, there are available the trucks, road graders, and other motorized equipment normally used on road maintenance and other park work.

Building Fire

The building fire equipment consists of fire trucks equipped as follows:

1. GMC - 1942, 1½-ton with mounted Champion pump, Type F, 500 gpm, 200-gallon water tank, complete with 1½" hose, applicators and nozzle. To be replaced 1954 F. Y.
2. Ford, 1942, 1½-ton, Champion pump, 500 gpm, 200-gallon tank, 1½" hose, applicators, fog nozzle and 150' 3/4 inch booster line. To be replaced 1955 F. Y.
3. Chevrolet, 1942 1½-ton with Champion pump, 500 gpm, 200-gallon water tank, 1½ inch hose, nozzles and applicators. To be replaced 1956 F. Y.

In addition to the fire trucks and hose, the park has 83 hand fire extinguishers and 25 water-pump cans. This equipment is maintained from funds provided for in the annual appropriations under Accounts 122 and 129. The concessioner's store building, Chuck Wagon, and gasoline station are equipped with dry power, carbon-tetrachloride, and foam extinguishers. In addition to these extinguishers, each cabin is equipped with a five-gallon water can, pump type, which is kept filled during the season when there is no danger of freezing.

All the fire trucks were obtained from war surplus and require considerable maintenance to keep them running. They should be replaced as funds are available according to the years recommended above. When water storage and distribution systems are completed, with hydrants and hose houses, the number of fire trucks may be reduced to two, one for the Basin and one for Panther Junction.

The building program at Panther Junction headquarters includes utility and equipment storage buildings which should provide adequate space for storage and maintenance of the fire truck and the forest fire suppression equipment. A building should be constructed for a fire station in the Basin to provide shelter and room for maintenance of the fire truck and hand tools.

Physical Improvements Primarily Used for Fire Control

Roads - Protection Motorways

There are well maintained roads to the Panther Junction and Basin Headquarters; also there are roads to Hot Springs, Boquillas, Castolon and Santa Elena Canyon. In addition there are old ranch roads into some of the more remote sections of the park, including one road along the Rio Grande from Castolon to Hot Springs. These existing roads do not permit access to all of the area requiring protection from fire and in addition to those listed on the Master Plan as secondary roads, the following should be maintained for fire control:

1. Juniper Canyon road from Route 2 to lower Juniper Canyon, a distance of approximately 5 miles from the Glenn Spring road.
2. Dripping Springs Road from the Santa Elena Canyon road to the old Wilson Ranch on Blue Creek, a distance of approximately 10 miles.

Trails - Fire, Horse, and Foot Trails and Manways

The trail system shown on Master Plan drawing NP-BB-2107 is considered adequate for fire control needs.

Fire Breaks

There are none existing and none recommended.

Detection Structures

Visibility studies completed in 1950 indicate that Emory Peak provides the best over-all coverage for fire detection, especially in the forested section of the park. This development in addition to the lookout should include living quarters for the fire control aid as well as water storage facilities. The estimated cost is \$16,000.

Ranger Stations, Fireguard and Patrol Cabins

In addition to the fire lookout station and water storage facilities on Emory Peak, a barn and corral for pack and saddle stock should be constructed in the vicinity of Boot Spring to care for the stock used by the fire control aids.

Communication System

Telephone

There is a grounded telephone line from the Basin headquarters to the Boot Spring cabin. It is recommended that a metallic telephone line be constructed from the Boot Spring cabin to Panther Junction via Emory Peak and the Basin.

Radio

Plans have been completed and partial installation made of an FM radio-telephone system for communication to Alpine, Texas, 100 road miles from park headquarters, and for communication within the park to be used for general administration and fire control.

One 200-watt AM radio is maintained at Panther Junction headquarters for communication with the Border Patrol station at Marfa, Texas, and for communication with the Regional Office. The radio system as now planned and partially installed is considered adequate for fire control.

Water Sources

A majority of the stream courses carry water only for brief periods following rains. Portions of Tornillo Creek in the eastern part of the area and portions of Terlingua Creek in the western part of the park carry surface water the year round. There are quite a number of permanent springs in the area, particularly around the base of the Chisos Mountains. Stockmen who formerly lived in the area developed a number of "tanks" for water storage as well as developing wells for livestock watering purposes. Water sources in the Basin are from wells and have proven inadequate. The area as a whole has little surface water and the development of springs and wells for permanent water throughout the park is vitally important to the protection and administration of the area.

Boat Landings

There are no regular boat landings but there are several places along the Rio Grande where small boats could be used and landings made.

Fire Toolboxes and Caches.

Fire caches at present are maintained at the Basin headquarters with a small complement of tools at the fire patrol cabin at Boot Spring and at the district ranger stations. Five-man tool caches should be maintained at the Persimmon Gap, Boquillas and Gastolon ranger stations and an additional 100-man cache should be maintained at Panther Junction headquarters. Fire tools should be kept in caches separate from other tools and appropriately marked for fire use only. In planning the utility layout for Panther Junction and the Basin, provision should be made for the main cache at Panther Junction and each of these caches also should provide storage of one fire truck.

Suppression

Duties of Protection Organization

The duties of the protection organization in suppression are as follows:

1. To maintain at all times during hazardous fire danger conditions a trained suppression force commensurate with the degree of fire danger so as to attain fast, energetic and thorough suppression of all fires in all locations during the first burning period following discovery of any fire or fires. Also to maintain all suppression facilities such as equipment, communication, trails, etc., in conformity with the fire danger.
2. Should first attack forces fail to attain the above, the attack and supporting facilities each succeeding day will be planned and executed with the aim of obtaining control before ten o'clock of the next morning.
3. Full utilization of cooperator's aid will be made if necessary to cope with the above situation.
4. The regional fire dispatcher shall be kept informed of situations when auxiliary assistance in any form is required or is likely to be required.

5. To attain the above, advance training and selection of suppression personnel must be done and a written plan made to permit orderly execution of suppression operations.

Cooperation with Other Agencies

There are no forest protection agencies bordering the park. However, the park has received cooperation from the border patrol in securing additional men for fire suppression.

Use of Equipment

All fire control equipment shall be maintained and used primarily for prevention and suppression of fires. Exceptions to this are any incidents in which human life is endangered and for forest insect and tree disease control operations or on other planned forestry projects. All projects benefiting from the use of fire control equipment shall bear the costs of repair and replacement of equipment used. Use of fire equipment on forestry projects shall be only during the off-fire season and such use should have prior review and approval by the regional forester.

Specific Recommendations, Especially for Immediate Action

The following improvements are required now to secure better fire control for Big Bend. These are shown below in the order of priority for need.

1. Construct metallic circuit connecting the Basin, Emory Peak and the Boot Spring Cabin with the metallic line to be constructed from Panther Junction to the Basin.
2. Construct a combination fire lookout, fire tool cache, and living quarters on Emory Peak.
3. Develop adequate water and water storage for use in building fire control at the Basin and Juniper Flat.
4. Purchase one building fire truck and accessories for Panther Junction. Provide storage space for truck and hand tools at Panther Junction and Basin.

(b) Reforestation

Purpose and Objective

The purpose of any reforestation program at Big Bend would be to restore cover types destroyed by fire or floods. There are no areas in need of reforestation at this time.

(c) Tree Disease Control

There are no indications of any serious tree disease infections at this time.

(d) Tree Insect Pest Control

General

Areas in which intensive control measures always will be needed are the Basin and other developed areas of intensive public use; Pine Canyon, where insect attacks might destroy the few large Ponderosa pine trees in the area and the forested area of the Chisos Mountains, which consists of a rather dense pinyon-juniper forest. The loss of this forest area would detract from the aesthetic value of the mountainous portion of the park. In this area control measures would be applied to prevent general epidemic infestations from developing.

Status of Insect Pest Attacks

General observations throughout the forested portion of the park indicate only an occasional pinyon pine that has been killed by the engraver beetle, Ips sp. A few pinyon pine trees in the vicinity of the concessioner's development have been killed by insects as a result of man's activities.

In 1948 the mesquite along the Rio Grande and other water courses at the lower elevations was injured by a round-headed borer (Oncideres sp.). The damage has continued to spread throughout a greater part of the mesquite at lower elevations. No control measures have been taken against this infestation.

(e) Browsing and Grazing Control

Overuse by Wildlife

Overgrazing by wildlife in Big Bend has never been a major problem. Most of the overuse of vegetation was the result of grazing and browsing by domestic livestock consisting of cattle and goats, as well as large numbers of feral burros.

Range Plots

During the period of 1935-40 of the CCC program in Big Bend, several small fenced plots were established for the purpose of studying the vegetation in the area proposed for a national park. Dr. Omar E. Sperry did most of the work in establishing those plots. Since 1941 his time in the park has been limited and the necessary follow-up studies have not been continued.

Investigations

In the fall of 1948 a program was started for the purpose of studying vegetative recovery following the elimination of grazing by domestic livestock. The study is being carried on by the park staff. Recovery of the vegetation has progressed to the stage where it was practical to re-establish antelope in the park. The Texas State Game Department furnished 136 antelope for re-stocking purposes in December 1947 and 33 in November 1948. These animals have done well, and it is estimated there are 110 of them at the present time.

Grazing by Pack and Saddle Stock

The only grazing by pack and saddle stock is by horses and burros owned by the National Park Service. Most of this grazing is within fenced pastures formerly used by ranchers in the park and the number of head of stock is being held to a minimum.

Agricultural Permit

National Park Concessions, Inc. has been granted an agricultural permit on the Hacienda Rio Grande Area (Daniel's Ranch) below Hot Springs. Under this permit the saddle horse sub-concessioner will be allowed to raise agricultural crops for horse feed. The fundamental purpose of this permit is to provide irrigation of the ranch to perfect and maintain the park's water rights in the name of the Federal Government, and for the planting and growth of trees in anticipation of the time when concession facilities will be installed in this area.

Grazing by Cattle, Sheep, and Goats

Practically the entire area now within Big Bend National Park was at one time heavily grazed by cattle, horses and goats. The period of this grazing was at least fifty years. Most of this grazing was terminated in September, 1945, following the establishment of the national park in 1944. One ranch belonging to the Cartledges was not purchased, and this area is being grazed by 300 head of cattle under permit to the Cartledges. The grazing is yearlong and will be terminated upon purchase of the property by the Federal Government. The entire ranch, including park lands, is under fence and includes a total of 3,750 acres of privately-owned land, 450 acres of which is farm land or can be used for farming, and approximately 100 sections or 64,000 acres of park lands.

There are also quite a number of feral burros in some sections of the park, namely Burro Mesa, Castolon and Tornillo Creek. Control measures will be necessary to reduce the damage from overgrazing by these burros.

(3) Vegetative Cover: Types and Species

(a) Description

Although mostly desert in character, Big Bend National Park is well vegetated, the types ranging from Sonoran-Desert shrub at the lower elevations to the Ponderosa pine forest in the Chisos Mountains. The vegetation may be grouped into four general types or plant communities. The most extensive of these is the desert shrub, which occupies nearly all of the park aside from the Chisos Mountains and the flood plain of the Rio Grande. The desert vegetation is by no means monotonous; it varies from place to place, often with yuccas, ocotillo, or with various cacti predominating.

Desert Shrub Type

The desert shrub type is the most extensive in the park, covering approximately 570,000 acres. The dominant species in this type are: Coville creosotebush (Larrea tridentata), honey mesquite (Prosopis juliflora var. glauca), catclaw acacia (Acacia greggii), silverleaf (Leucophyllum spp.), lechuguilla agave (Agave leonantha poselgeri), American tarbush, (Flourensia cernua), leather bush (Jatropha spathulata), and ocotillo, (Fouquieria splendens). There are many less conspicuous species of plants that make up the cover type in the desert-shrub zone. The most prominent of the grasses in this type is chino, one of the grama species.

Grass-Herbaceous Type

The second largest type consists of approximately 60,000 acres of grassland composed of the following dominant species: chino grass (Bouteloua brevifolia), blue grama (B. gracilis), black grama (B. eriopoda), bluestems (Andropogon spp.), tanglehead (Heteropogon contortus), and mahly grass (Muhlenbergia spp.). Associate species of shrubs in this type are: sotol (Dasylirion spp.) and yuccas. Prickly pear and hedgehog cacti are common throughout the type. The grass herbaceous type extends up the slopes of the foothills to the chaparral type in the foothills of the mountains. The type is remnant

of the old plains vegetation and has been heavily grazed in the past. Following the exclusion of grazing by livestock, the grass herbaceous vegetation has become re-established and furnishes a considerable amount of flashy fuels. Fires spread rapidly in this type but resistance to control is low.

Chaparral Type

The chaparral type occupies some 30,000 acres of rough terrain in the foothills of the mountains. This type has a high resistance to control, and the rate of spread is high due to the steepness of the slopes.

The dominant species in this type are several species of oaks (Quercus spp.), southwestern chokecherry (Prunus virens), mountain-mahogany (Cercocarpus spp.). An understory of grasses such as grama, sprangletop and bluestem are gradually becoming re-established here.

Woodland Type

The woodland type occupies approximately 25,000 acres, principally in the Chisos Mountains, and is the most extensive type. The dominant species are Mexican pinyon (Pinus cembroides), drooping juniper (Juniperus flaccida), alligator juniper (J. deppeana), one-seed juniper (J. monosperma), Texas madrone (Arbutus texana), oak (Quercus sp.) and century plant (Agave sp.).

Forest Type

In the upper portion of Pine Canyon on the east side of the Chisos Mountains there is a forest of ponderosa pine of approximately 200 acres. At the higher elevations of the Chisos Mountains in the vicinity of Boot Spring and Emory Peak there are approximately 4,800 acres of Douglas-fir-Arizona cypress (Cupressus arizonica), forest type.

Other Types.

Other vegetative cover types include the aquatic community found along the Rio Grande and a few isolated spots in the mountains. This type is made up largely of plants which grow in running or standing water. In some places along the river these plants may be found associated with the desert type of vegetation.

(b) Aggregate Area

The Big Bend National Park comprises an area of approximately 708,000 acres. The extent of main vegetative cover types are estimated as follows:

Desert shrub - 572,000 acres
Grass-herbaceous - 61,200 acres
Chaparral - 41,000 acres
Woodland - 25,000 acres
Forest - 5,000 acres

(c) Special Conditions

Fire Hazard

During the past ten years, since grazing has been reduced in the park, grasses are becoming re-established. It is anticipated that the density and extent of grasses will increase for the next fifteen years, when the maximum growth should be reached. The grasses have increased the rate of spread of fire in vegetative types which were formerly classed as low hazard fuels.

A rating of the fuel types is shown below:

<u>Veg. Cover Type</u>	<u>Area (Acres)</u>	<u>Rate of Spread</u>	<u>Resistance to Control</u>
Desert shrub	572,000	None	None
Grass herbaceous	61,200	High	Medium
Chaparral	41,000	High	High
Woodland	25,000	Medium	High
Forest	5,000	Medium	Low

Erosion

Erosion, due to past heavy grazing use, varies from slight and moderate in the higher elevations to severe and critical in the larger drainages. However, since live-stock has been eliminated, the vegetative cover has increased to the point where the slight and moderate erosion will heal by natural means. In the areas where erosion is severe and critical, control by natural means will be slow and may require management, such as seeding and placing of diversion dikes to control it.

Entomological

None

Pathological

None

Physiological

None

Prepared by Forester

Date 2/27/52

Submitted by Regional Forester
R. V. WILSON

Date 3/19/52

Regional Office

Washington Office

Architect _____
Landscape _____
Architect /s/ C. D. Carter 3-19-52 _____
Engineer /s/ Lassiter 3-19-52 _____
Forestry/s/ Carlson 3-19-52 _____
History/s/ Reed -----3-19-52 _____
Natural _____
History /s/ Matt N. Dodge 4-3-52 _____
Concessions _____
Management _____
Lands _____
Safety _____
Recreation _____
Planning _____

RECOMMENDED

/s/ Ross A. Maxwell _____ Date 3-26-52 _____
Superintendent

_____ Date _____
General Superintendent

/s/ H. Cornell _____ Date 4-30-52 _____
Assistant Regional Director (Design and Construction)

/s/ H. M. Miller _____ Date 4-30-52 _____
Actg. Regional Director

(SGD.) W. G. GARNES _____ JUL 21 1952
Chief of Design and Construction

APPROVED

_____ Date OCT 15 1952 _____
Acting Director

Master Plan Development Outline

Big Bend National Park, Texas

3. Operation (Continued)

d. SOIL AND MOISTURE CONSERVATION

(1) Project Area Symbol

P-1-13-1

(2) General Statement

Big Bend National Park is located in Brewster County, Texas, where the Rio Grande, forming the boundary between the United States and Mexico, makes a big U-shaped bend in its course. There are 708,221 acres of land in this park, all of which is Federally owned with the exception of 15,916 acres of private land.

The park is predominantly semi-arid plains characterized by gravel covered slopes, arroyos, and washes. This general landscape is interrupted by conspicuous mountain belts and by the winding Rio Grande which has carved spectacular canyons.

The soils vary from igneous and calcareous mountain soils down through loamy gravelly ridges and gravelly outwash soils to the clay loam flat soil types. The infiltration capacity is good in the higher elevations to very poor on the lower flats. Elevations vary from some 1800 feet where the Rio Grande leaves the park up to 7835 feet in the Chisos Mountains. The topography is flat to extremely rugged. Tornillo and Terlingua Creeks flowing into the Rio Grande are the two primary drainages in the park. Although normally small in flow they become raging rivers of sediment during flash floods.

The average annual rainfall in the Basin during the last eight years has been 15 inches with an average of 11 inches received during the period May through September. Summer temperatures up to 95 degrees are quite common. Temperatures up to 115 degrees have been recorded at the lower elevations and it is estimated that the annual rainfall will not exceed four or five inches in the lowest elevations.

The vegetative types are Forest, Woodland, Chaparral, Grass Herbaceous and Desert Shrub. Elaboration on these types is given in the Forestry Section. In addition the following grasses occur below 3500 feet elevation: tanglehead, cane bluestem, sideoats grama, black grama, hairy grama, Chino grama,

oush muhly, sand dropseed, Arizona cottontop, alkali sacaton, sacaton, vine mesquite, tabosa, and plains bristle-grass. The vegetal condition is good in the mountainous sites to extremely poor on the lower flats.

(3) Problem Area and Program

For over fifty years, prior to establishment of the park in 1944, the ranchers consistently overgrazed the range until the palatable grasses and shrubs all but disappeared. The bulk of this grazing was terminated in 1945. Most of the northwest boundary has been fenced since establishment of the park. Grazing is now reduced to 300 head of cattle grazing under permit, quite a number of feral burros, trespass cattle, horses, sheep and goats; and wildlife. The vegetal cover has made a remarkable recovery in the higher elevations as a result of the reduction in grazing.

The remaining problem area that has not responded favorably to improved management is the lower elevations generally below 3500 feet. These flats above 2500 feet in elevation once supported native grasses that were mowed for hay. Now these grasses are reduced to occasional remnants and sheet, rill, and gully erosion has advanced through slight and moderate to severe and critical stages. The organic top soil is absent, the water table has lowered and the soil is relatively non-productive.

Considerable study has been made of this problem by local, regional, and Soil Conservation Service technicians. A "Range Site and Condition Class Map" has been prepared with the assistance of the SCS technicians. This map indicates that all of the problem lands are in poor condition. A soil and Moisture Conservation Plan, Drawing No. NP-BB/2134, has been prepared indicating erosion types and proposed treatment. The Program Summary, Page 4 of 5, gives a summary of the problem and proposed treatment along with improved management for control of this problem.

A cautious soil conservation program has been active since 1949 to determine the most economical and satisfactory practices for continued operation. Experience may dictate revision to the proposed plan. Management alone is controlling the upper country, and the most favorable sites in the lower elevations will be treated first. The development or improvement of springs and the construction of small ponds in the fair-to-good range will result in better distribution of grazing and relief on the problem sites. This program is coordinated with that of the Big Bend Soil Conservation District.

(4) Estimated Costs

The estimated total cost of the proposed soil conservation program is \$190,000. It is recommended that the National Park Service, through regular appropriations and the equivalent of contributed labor, equipment, and materials from other sources provide \$25,000 of the above proposed expenditure and that the remaining balance of \$165,000 be made available through the appropriation for Soil and Moisture Conservation. Funds specifically appropriated for S & MC will not be used for practices B-8, D-2, and D-5, as shown on the Program Summary, except for technical assistance and supervision. It is further recommended that this program be extended over a period of approximately fifteen years.

(5) Cooperating Agencies

A cooperative agreement for soil conservation has been entered into between the Big Bend Soil Conservation District and the Superintendent of Big Bend National Park. Technicians of the Soil Conservation Service are available to the Service through this cooperative agreement. Cooperation through the District has been outstanding in planning and operations to date. The park has been visited by numerous delegations of land owners and administrators to observe the results of the program to date.

Form No. 10-740
(Revised April 1953)

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

PROGRAM SUMMARY
SOIL AND MOISTURE CONSERVATION

<u>Threes</u> Region	<u>Big Bend National Park</u> Name of Park or Monument	<u>Texas</u> State
<u>P-11-13-1</u>		
Project Area Symbol		
		Extent of Problem Areas
		Erosion Area Involved
		Types Acres
		Slight <u>162,740</u>
	<u>Acres</u>	Moderate <u>148,041</u>
Federal area of Park or Monument	<u>692,305</u>	Severe <u>227,200</u>
Non-Federal area of Park or Mon.	<u>15,916</u>	Critical <u>170,240</u>
Total Area	<u>708,221</u>	Total <u>708,221</u>

S & M C WORK NEEDED

<u>Type of Work</u>	<u>Amount of Work</u>				<u>Estimated Cost</u>
	<u>Attendance</u>	<u>No.</u>	<u>Miles</u>	<u>Acres</u>	
A. <u>Land Use Adjustments and Arrangements</u>					
1. Capability Classification					
2. Education					
3. General Programming					<u>Complete</u>
4. Operating Schedules					<u>Complete</u>
B. <u>Soil Protection and Stabilization</u>					
1. Brush Control					
2. Checks		<u>100</u>			<u>1,000</u>
3. Contouring (Pitting)				<u>20,000</u>	<u>10,000</u>
4. Cover Crops					
5. Crop Improvement					
6. Crop Residues (Mulch)				<u>100</u>	<u>1,000</u>
7. Deep Plowing					
8. Fencing			<u>25</u>		<u>17,500</u>
9. Fertilizer				<u>100</u>	<u>900</u>
10. Land Renovation				<u>50</u>	<u>150</u>
11. Meadow Strips					
12. Pest Control					
13. Rotations					
14. Rough Tillage					

(Over)

Type of Work	Amount of Work					Estimated Cost
	Feet	Sq.Yds.	Cu.Yds.	No.	Miles Acres	
B. Soil Protection and Stabilization(contd.)						
13. Rotations					103,000	500
14. Rough Tillage						
15. Seeding					20,000	70,000
16. Soil Amendments						
17. Strip Cropping						
18. Tree Planting				25,000	25	2500
19. Weed Control						
C. Water Control						
1. Canals						
2. Conduits						
3. Detentions (Small)			200,000	200,000		50,000
4. Dikes	500		1,000			100
5. Drops						
6. Jetties				100		1900
7. Revetments						
8. Terraces						
9. Waterways						
D. Water Supply and Utilization						
1. Diversions (Small)			5,000	50		1,250
2. Leveling					10	600
3. Ponds(Small)			20,000	10		5,000
4. Springs				25		5,000
5. Distribution Systems					10	400
6. Wells						
E. Performance Inventory					250,000	2,500
GRAND TOTAL						\$ 190,000

Supplementary Accomplishments

	<u>Miles</u>	<u>Acres</u>
Drainage		
Dune Control		
Gully Control	<u>1,000</u>	
Land Conversion		
Streambank Protection	<u>10</u>	
Waterspreading		<u>20,000</u>

Prepared by Paul L. Balch Date 6-30-53
Soil Conservationist

REVIEWED

Regional Office

Washington Office

Architect		
Landscape Architect	by Miller	8-11-53
Engineer	Lassiter	8-7-53
Forestry	Carlson	8-10-53
History		
Natural History	Dodge	8-10-53
Concessions Management		
Lands		
Safety		
Recreation Planning		

RECOMMENDED

Lemuel A. Garrison Date 7-25-53
Superintendent

General Superintendent or Coordinating Supt.

s/ H. Cornell
Asst. Regional Director (Design & Construction)

Date 8-11-53

s/ W. R. Tillotson Date 8-12-53
Regional Director

Chief of Design and Construction _____ Date _____

APPROVED

Director _____ Date _____

Master Plan Development Outline

Big Bend National Park, Texas

3. Operation (Continued)

e. CONCESSIONS

(1) Concession Policy

(a) Concessions Desired

Existing:

Basin Area: Lodging, meals, refreshments, groceries, curios and souvenirs, automobile service station, transportation services, including saddle horses; photographic services, equipment and supplies, camera rentals and repairs, photo school, conducted field trips and illustrated lectures on photographic problems and techniques.

Hot Springs area: General store and post office, cabins (if sanitary requirements are met - see paragraph (2c)), gasoline and oil.

Proposed:

Basin Area: Present accommodations for approximately 100 people should be doubled immediately and plans made for additional expansion of overnight accommodations and restaurant facilities in accordance with the approved Master Plan development plan for this area (See Drawing No. NP-BB-2109A). Such increased accommodations will necessitate expansion of the water supply and sewage disposal systems. Electricity appears to be forthcoming.

Panther Junction: A service station is needed at Panther Junction which should furnish cold drinks, confections, and tobaccos, in addition to gasoline, oil and other service station supplies. A small wrecker and service truck is needed here for towing cars and making repairs.

Rio Grande Area: At the Rio Grande area, future planning contemplates a Mexican Hacienda with residences for employees, necessary utilities, including water, sewage disposal and power. The Mexican village portion of this development will include shops, campgrounds, picnic areas, and employees' residences. Saddle horse services undoubtedly will be desirable. Upon completion the above development will

undoubtedly eliminate the necessity for the present concession operation at Hot Springs.

Santa Elena Developed Area: Travel to Santa Elena Canyon is increasing steadily and establishment of a small lunchroom and curio shop is desirable.

(b) Services Provided Outside of Park

Distance

Alpine, Texas, approximately 110 miles from Headquarters and Basin areas. Marathon, Texas, 80 miles from same central locations.

Capacity

Adequate accommodations are available at Alpine and Marathon.

Quality

Standard lodging accommodations and restaurant facilities, suitable for park visitors, are available in both Alpine and Marathon. However, they are of little value to park visitors other than as overnight stops before entering and after leaving the park because distances are too great for commuting purposes.

(2a) Concession Contracts and Permits

(a) Name of Concessioner

National Park Concessions, Inc.

(b) Agreement

Contract No. I-lp-18179, dated April 1, 1942, is a general contract for a 20-year term from January 1, 1942. The contract was made applicable to Big Bend by Acting Director Tolson's memorandum of February 29, 1944, approved March 9, 1944, by then Assistant Secretary Oscar L. Chapman.

(c) Services Authorized

Lodging, meals, refreshments, groceries, curios and souvenirs, service station, transportation services, including saddle horses.

(2b) Concession Contracts and Permits (Continued)

(a) Name of Concessioner

Peter Koch, doing business as Koch Camera Shop.

(b) Agreement

Concession Permit No. I-5np-73, dated August 16, 1949, approved August 22, 1949, was issued for the period from August 15, 1949, to December 31, 1953.

(c) Services Authorized

Photographic services, equipment, and supplies; camera rentals and repairs; photo school; conducted field trips and illustrated lectures on photographic problems and techniques.

(2c) Concession Contracts and Permits (Continued)

(a) Name of Concessioner

Mrs. Margaret Smith, doing business as Hot Springs Trading Post.

(b) Agreement

Concession Permit No. I-5np-78, dated October 19, 1949, approved November 14, 1949, was issued for the period from January 1, 1950, to December 31, 1950, and renewed by letter through December 31, 1951. There is pending a proposal to issue a new permit. However, action on the new permit is being withheld temporarily and the concessioner is operating under the conditions of the expired permit, pending action on the recommendations of the United States Public Health Service that the baths be discontinued, that the cabins either be discontinued or improved, and that other sanitary improvements be made.

(c) Services Authorized

General store and post office, cabin rentals (if sanitary requirements are met), gasoline and oil.

(3a) Use Permits

(a) Name of Developed Area

Hacienda Rio Grande (Daniel's Ranch)

(b) Name of Concessioner

National Park Concessions.

(c) Permit

Number I-5np-99; renewable annually to 12/31/61; agricultural permit for pasturing saddle stock and growing forage crops in connection with basic concession contract I-lp-18179 (See (2a) above).

(d) Description of Site

The operation is located in the Hacienda Rio Grande Area (Daniel's Ranch) and covers "lands suitable for irrigation purposes located in Sections 4 and 5, block G-19; exact acreage is not known but believed not to exceed 312 acres as shown in water rights application".

(3b) Use Permits (Continued)

(a) Name of Developed Area

Mexican Village Area (Graham's Ranch)

(b) Name of Concessioner

B. F. Beckett, Marathon, Texas.

(c) Permit

Number I-5np-109; expires Dec. 31, 1952; for use of the old Berekley Residence as living quarters for farm hands working at Hacienda Rio Grande (See (3a) above).

(d) Description of Site

See Master Plan Drawing NP-BB-2113, building labeled "Existing Ranch House".

Prepared by Ross A. Maxwell, Superintendent 5-5-52
A. M. Koehler, Reg. Chief, Concess. Mgmt. 6-27-52
John E. Kell, Reg. Chief, Land Planning 6-27-52

REVIEWED

<u>Regional Office</u>	<u>Washington Office</u>
Architect /s/ K. M. Saunders 7-9-52	_____
Landscape	_____
Architect /s/ Miller 7-9-52	_____
Engineer /s/ Lassiter 7-1-52	_____
Forestry	_____
History	_____
Natural	_____
History /s/ Natt N. Dodge 7-9-52	_____
Concessions	_____
Management /s/ A.M. Keeler 7-8-52	_____
Maps /s/ John E. Kell, Actg. 7-9-52	_____
Safety	_____
Recreation	_____
Planning	_____

RECOMMENDED

<u>Ross A. Maxwell</u> Superintendent	Date <u>5-5-52</u>
_____	Date _____
General Superintendent	_____
<u>/s/ H. Cornell</u> Asst. Regional Director (Design & Construction)	Date <u>7-9-52</u>
<u>/s/ M. R. Tillotson</u> Regional Director	Date <u>7-10-52</u>
<u>(SGD.) W. G. CARNEY</u> Asst. Dir. of Design and Construction	Date <u>SEP 16 1952</u>

APPROVED

<u>_____</u> Director	Date <u>OCT 14 1952</u>
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Master Plan Development Outline

Big Bend National Park, Texas

BUILDINGS

(1) General

(a) Chisos Basin

((1)) Climate

Temperature

Maximum: 100° F.

Minimum: -3° F.

Average summer day-night temperature difference: 24.2° F.

Mean Temperature

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>
Maximum	62.0	64.9	71.3	76.9	84.1	89.5
Minimum	38.1	40.6	45.4	51.1	57.7	63.3

	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Maximum	86.1	85.2	82.1	75.9	66.1	61.5
Minimum	62.6	62.2	57.8	51.4	41.2	37.6

Prevailing wind from southeast in summer and west northwest in winter.

Maximum recorded velocity: 45 m.p.h.

Subject to frequent strong winds, hail, lightning, northers. Northers are frequent in winter - extensive morning shadows due to Casa Grande.

Annual rainfall: 13.45"; maximum rate of fall: 2" an hour (estimate).

Maximum snow pack: 9"; average moisture content: 10%

There are no structural failures caused by snow.

No mechanical cooling is required.

((2)) Site Data

Elevation: 5,440'; longitude: 103°18'; latitude: 29°16'; county: Brewster

Topography: A confined mountain basin with few good building sites. Flat areas are divided by numerous steep-sloped ravines.

Vegetation: Scrub forest consisting of piñon, juniper and oak. Ground cover of grass, lechiguilla, cactus.

((3)) Soil and Foundation Data

Geological description: Shallow gravel surface underlain by a heavy, rocky conglomerate or sedimentary bed-rock.
Depth of water table: Unknown.
Water permeability: Excellent except in heavy soil.
Frost penetration: Average - 6"; maximum: unknown.
Bearing capacity: None tested.
Foundation types usually used in vicinity: No data.
Usual depth of foundations: 18" to 24".
Special foundation or soil problems: Heavy clay soils are impermeable, creating problem for draining affluent.
There are no structural failures due to soil or foundation design.

((4)) Miscellaneous Design Considerations

Wood destroying insects: Termites.
Flies: Abundant.
Poisonous insects and reptiles: Scorpions, tarantulas, rattlesnakes.
Other: Skunks.

((5)) Architectural Influences--Existing permanent cabins with tile roofs reflect Mexican theme. All others are temporary frame. Permanent cabins were built by CCC in 1938,

Design of future buildings should not dominate the landscape due to the confining character of the Basin.

((6)) Facilities for Contractor's Use

Electric power: See data for voltage and rate under Parther Junction, (a)((6)), page 5, below.
Water supply rate: \$1/M gallons.
Telephone arrangements to be made with Southwest Bell Telephone Co., Alpine, Texas.
Housing and Mess Facilities
Government: None.
Concessionary
Location: Chisos Basin.
Capacity: 50 in off-season.
Rate: As low as \$7.00
Commercial: None.
Trailer Camps: None.

Construction Office Space: None.
Materials Storage Space: None.
Nearest railroad at Marathon - 65 miles;
line: Southern Pacific.
Construction Season: Year round.

((7)) Building Materials

Building stone

Source: Dog Canyon - quarried, field.
Distance from site: 40 miles.
Kind: limestone; color: buff.

Flagstone

Source: Dog Canyon.
Distance from site: 40 miles
Kind: limestone; color: buff; quality:
excellent.

Coarse aggregate

Source: Tornillo Creek.
Distance from site: 10 miles.
Clean gravel; screen analysis available at Park.

Sand (concrete)

Source: Tornillo Creek.
Distance from site: 18 miles.
Impurities: Slight.
Analysis available at Park.

Sand (plaster)

Source: Rio Grande.
Distance from site: 35 miles.
Impurities: Slight; analysis not available.

Logs: None - nearest source of pine and fir
400 to 500 miles; impractical for this area.

Lumber

Source: Alpine lumber suppliers.
Any species can be ordered - pine and fir
in stock (all kiln dried).
Availability of West Coast lumber and com-
parative cost: 1" dimension \$165 per M;
larger \$185 per M - Douglas fir or pine.

Concrete Blocks: Local supplier - Alpine
Lumber Co.; made in El Paso - \$32 per 100.

Brick and Tile: El Paso or San Antonio.

Availability of:

Plant or transit mix concrete: None.

Plant mix road materials: None.

Concrete testing facilities: None.

Light weight plaster or concrete aggregates:

Texas Concrete Block Co., Midland - expanded
shale 8x4x16 block 12#.

Reinforcing steel: Local source - Alpine
suppliers.

Structural steel: Very limited.

Other local building material of special
interest: Flagstone, adobe.

(1) General (Continued)

(b) Panther Junction

((1)) Climate

Temperature

Maximum: 108° F.
Minimum: 8° F.

Mean Temperature (1955 - 1956)

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>
Maximum	65.1	69.4	73.6	80.4	94.5	95.4
Minimum	33.0	36.9	47.3	53.2	63.5	67.8

	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Maximum	94.4	93.0	87.3	84.0	71.7	69.4
Minimum	67.9	67.0	61.9	55.3	42.6	40.9

Prevailing wind from southeast in summer and west northwest in winter.

Maximum recorded velocity: 75 m.p.h.

Subject to frequent strong winds, hail, lightning and northers; dust storms - hot days - temperature drops rapidly at close of day.

Annual rainfall: 7.55"; maximum rate of fall: 2" an hour (estimate)

Snow pack: None

There are no structural failures caused by snow.

Mechanical cooling; required May - September; evaporative type.

Special climatic requirements: Low humidity - dust storms with rapid drop in temperature in winter.

((2)) Site Data

Elevation: 4,000'; longitude: 103°12'; latitude: 29°19'; county: Brewster.

Topography: Alluvial sediment at base of Chisos Mountains cut by numerous gulleys and washes.

Vegetation: Desert scrub, dominated by lechiguilla, yucca, scaccia, creosote bush, prickly pear, cholla.

((3)) Soil and Foundation Data

Geological description: Unconsolidated
outwash containing boulders up to 18"
in diameter, deep in residential area,
shallow in utility area, underlain by
bedrock.

Depth of water table: 185'

Water permeability: Highly absorptive.

Frost penetration: Average - 1" to 2";
maximum known: 6"

Bearing capacity: Good - without test.

Foundation types usually used in vicinity:
Floating slab.

Usual depth of foundations: 18" to 24"

There are no special foundation or soil
problems.

There are no structural failures due to
soil or foundation design.

((4)) Miscellaneous Design Considerations

Wood destroying insects: Termites.

Flies: Yes.

Poisonous insects and reptiles: Scorpions,
rattlers.

((5)) Architectural Influences -- Cinder block
walls, concrete floors, existing buildings
constructed in 1951.

There are no special historical,
archeological or traditional considerations
related to design of future buildings.

((6)) Facilities for Contractor's Use

Electric power

Voltage: 12-/240/480.

Rate: \$1.50 KW of billing demand in
excess of the first 10 KW plus energy
charges of:

\$.14 KWH for the first 40 KWH used per
month per KW of billing demand.

\$.08 KWH for the next 40 KWH used per
month per KW of billing demand.

\$.03 KWH for the next 920 KWH used per
month per KW of billing demand.

\$.025 KWH for the next 2,000 KWH used per
month per KW of billing demand.

\$.02 KWH for all power in excess of
3,000 KWH used per month per KW of
billing demand.

Sand (concrete)

Source: Tornillo Creek.

Distance from headquarters: 8 miles.

Impurities: Slight.

Analysis available at Park.

Sand (plaster)

Source: Rio Grande.

Distance from headquarters: 25 miles.

Impurities: Slight.

Analysis not available.

Logs: Nearest source of pine and fir is 400 to 500 miles; impractical for this area.

Lumber

Source: Alpine lumber suppliers.

Any species can be ordered - pine and fir in stock (all kiln dried).

Availability of West Coast lumber and comparative cost: 1" dimension \$165/M; larger \$185/M - Douglas fir or pine.

Concrete Blocks: Local supplier - Alpine Lumber Co., made in El Paso - \$32 per 100.

Brick and Tile: El Paso or San Antonio.

Availability of:

Plant or transit mix concrete: None.

Plant mix concrete materials: None.

Concrete testing facilities: None.

Light weight plaster or concrete aggregates:

Texas Concrete Block Co., Midland -
expanded shale 8x4x16 block 12#.

Reinforcing steel: Alpine suppliers - local.

Structural steel: Very limited.

Other local building material of special interest: Flagstone, adobe.

(1) General (Continued)

(c) Rio Grande Area

((1)) Climate

Temperature

Maximum: 115° F.

Minimum: 12° F.

Average summer day-night temperature difference: 33° F; winter: 40° F.

Mean Temperature

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>
Maximum	81	80.5	84	87.7	97.6	105.2
Minimum	40.6	37.4	47.1	56.8	62.7	72.7

	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Maximum	102.6	108.7	100.4	92.1	74.6	69
Minimum	70	73.9	65.9	48.5	44.2	31.2

Prevailing wind from southeast in summer and west northwest in winter.

Maximum recorded velocity: 75 m.p.h.

Subject to frequent strong winds, hail, lightning and northers; dust storms, oppressive dry heat in summer.

Annual rainfall: 7"; maximum rate of fall: 2" an hour (estimate).

Snow pack: None.

There are no structural failures caused by snow.

Mechanical cooling required April - October; evaporative type.

Special climatic requirements: Low humidity, dust storms, oppressive summer heat.

((2)) Site Data

Elevation: 2,146'; longitude: 102° 57'; latitude: 39° 12'; county: Brewster.

Topography: Area situated on or near banks of Rio Grande. Area surface is river silt deposited over large flat areas with numerous rocky hills protruding throughout. Several warm springs. Surface mostly silt and river gravel except rocky knobs. Subsurface, silt

and gravel 2 to 10 feet deep lying on a strata of hard pan 5" to 5' or 6' thick underlain with river gravel to solid rock. Approximately 320 acres subject to irrigation. Vegetation: Mesquite thickets dominant with associated cactus, creosote bush, catclaw on hills and flats. River cane dominates river banks. In the irrigated area a lush green growth of Bermuda grass and shade trees takes over.

((3)) Soil and Foundation Data

Geological description: Powdery alluvial silt at least to depth of 40' except where underlying limestone protrudes.
Depth of water table: Surface at river edge - otherwise unknown.
Water permeability: Slight
Frost penetration: None
Bearing capacity: No record.
Foundation types usually used in vicinity: No designed foundations exist. Early ranchers merely extended wall below ground.
Usual depth of foundations: Unknown
Special foundation or soil problems: Many failures evident in native building.
Structural failures due to soil or foundation design: Unstable soil requires special design.

((4)) Miscellaneous Design Considerations

Wood destroying insects: Termites
Flies: Abundant
Poisonous insects and reptiles: Mosquitoes, scorpions, rattlesnakes
Other: Red ants are special problem.

((5)) Architectural Influences.--Mexican influence is reflected in the typical adobe and rock masonry structures. Simple frame houses introduced about 1900 by Texans.

In the design of future buildings, area architecture should reflect Texas ranch influence rather than imitating Mexican style.

((6)) Facilities for Contractor's Use

Electric power: See data for voltage and rate under Panther Junction, (a)((6)), page 5, above.
Water supply, rate: Hot springs and river water \$1.00/1000 gallons.
Telephone facilities: None.
Housing and Mess Facilities
Government: None.
Concessioner: Chisos Basin - 35 miles.
Commercial: None.
Trailer Camps: None.
Construction Office Space: None.
Materials Storage Space: None.
Nearest railroad at Marathon - 95 miles; line: Southern Pacific.
Construction Season: Year round - October through March preferable.

((7)) Building Materials

Building stone
Source: On site - quarried, field.
Kind: limestone; color: buff.
Flagstone
Source: On site.
Kind: limestone; color: buff; quality: excellent.
Coarse aggregate
Source: On river bars.
Distance from site: 1 to 3 miles.
Clean gravel; screen analysis available - EPR.
Sand (concrete)
Source: On river bars.
Distance from site: 1 to 3 miles
Impurities: Slight
Analysis available - EPR.
Sand (plaster)
Source: Near site - 1 to 3 miles.
Impurities: Slight.
Analysis: not available.
Logs: Nearest source of logs (pine and fir) is 400 to 500 miles; impractical for this area.
For all other data see Building Materials for Chisos Basin (a)((7)).

(1) General (Continued)

(a) Castolon

((1)) Climate

Temperature

Maximum: 115° F.

Minimum: 12° F.

Average summer day-night temperature difference: 33° F; winter: 40° F.

Mean Temperature

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>
Maximum	81	80.5	84	87.7	97.6	105.2
Minimum	40.8	37.4	47.1	56.8	62.7	72.7

	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Maximum	102.8	108.7	100.4	92.1	74.6	69
Minimum	70	73.9	65.9	48.5	44.2	31.2

Prevailing wind from southeast in summer and west northwest in winter.

Maximum recorded velocity: 75 m.p.h.

Subject to frequent strong winds, hail, lightning, northerners; dust storms and oppressive dry heat in summer.

Annual rainfall: 7"; maximum rate of fall: 2" an hour (estimated).

Snow pack: None

There are no structural failures caused by snow.

Mechanical cooling required April - October; evaporative type.

Special climatic requirements: Low humidity, dust storms, oppressive summer heat.

((2)) Site Data

Elevation: 2,100'; longitude: 103°31';

latitude: 29°08'; county: Brewster.

Topography: Alluvial plane of silt and gravel surrounded by flat-topped clay hills.

Vegetation: Mesquite thickets dominant with associated cactus, creosote bush and catsclaw. Large cottonwoods, willow and river cane grow densely along the river.

((3)) Soil and Foundation Data

Geological description: Deep alluvial
silt and river gravel in the flood plane
of the Rio Grande, surrounding hills are
bentonitic and gravel covered.
Depth of water table: Unknown
Water permeability: Poor
Frost penetration: None
Bearing capacity: No tests
Foundation types usually used in vicinity:
No designed foundations exist. Early
residents simply extended wall below ground.
Usual depth of foundations: Unknown
Special foundation or soil problems: Many
failures evident in early buildings.
Structural failures due to soil or foundation
design: Unstable soil requires special
design.

((4)) Miscellaneous Design Considerations.--Same
data as for Rio Grande Area (c)((4)).

((5)) Architectural Influences.--Typical Mexican
influences are reflected in the adobe and
rock walls except for the Castolon store and
two residences which were built by the Army
as barracks during Border troubles, 1916.

Existing architectural character of this
area should be preserved in the design of future
buildings. The two architectural styles exist
alongside each other with little or no mixture.

((6)) Facilities for Contractor's Use

Electric power: None
Water supply, rate: Unknown
Telephone facilities: None
Housing and Mess Facilities: None
Construction Office Space: None
Materials Storage Space: None
Nearest railroad at Alpine - 97 miles;
line: Southern Pacific and branch line of
AT&SF
Construction Season: Year round - October
to March preferable.

((7)) Building Materials

Building stone

Source: Terlingua - quarried, field.

Distance from site: 20 miles

Kind: limestone; color: buff

Flagstone

Source: Terlingua

Distance from site: 20 miles

Kind: limestone; color: buff; quality:
fair.

Coarse aggregate

Source: Rio Grande and Terlingua Creek

Distance from site: 2 to 15 miles

Clean gravel

Screen analysis not available

Sand (concrete)

Source: Rio Grande and Terlingua Creek

Distance from site: 2 to 15 miles

Impurities: Slight

Analysis not available

Sand (plaster)

Source: Rio Grande and Terlingua Creek

Distance from site: 2 to 15 miles

Impurities: Slight

Analysis not available

Logs: Nearest source of logs is 400 to 500
miles; impractical for this area.

For all other data see Building Materials for
Chisos Basin (a)((7))

(1) General (Continued)

(e) Persimmon Gap

((1)) Climate

Temperature

Maximum: 108° F.

Minimum: 6° F.

Mean Temperature (1955 - 1956)

	Jan.	Feb.	Mar.	Apr.	May	June
Maximum	85.1	69.4	78.6	80.4	91.5	95.4
Minimum	38.0	36.9	47.3	53.2	63.5	67.8

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Maximum	94.4	93.0	88.3	84.0	71.7	69.4
Minimum	67.9	67.0	61.9	55.3	42.6	40.9

Prevailing wind from southeast in summer;
west-northwest in winter.

Maximum recorded velocity: 75 m.p.h.

Subject to frequent strong winds, hail,
lightning and northers; dust storm, hot
days, temperature drops rapidly at close
of day.

Annual rainfall: 7.55"; maximum rate of
fall: 2" an hour (estimate).

Maximum snow pack: none; average moisture
content: none.

Mechanical cooling required May - September;
evaporative type.

Low humidity - dust storms with rapid drop
in temperature in winter.

((2)) Site Data

Elevation: 2,300; longitude: 103°10';

latitude: 29°40'; county: Brewster.

Topography: An alluvial fan at the base of
the Santiago Mountains cut by numerous gullies
and washes.

Vegetation: Desert scrub, dominated by
lechuguilla, yucca, acacia, creosote bush,
prickly pear, cholla.

((3)) Soil and Foundation Data

Geological description: Poorly consolidated outwash material containing considerable gravel and variable-sized boulders.
Depth of water table: Unknown.
Water permeability: Average.
Frost penetration: Average.
Bearing capacity: Not tests made.
Foundation types usually used in vicinity: Former residents merely extended wall below surface.
Usual depth of foundations: 18" to 24".
There are no special foundation or soil problems and no structural failures due to soil or foundation design.

((4)) Miscellaneous Design Considerations

Wood destroying insects: Termites.
Flies: Yes.
Poisonous insects and reptiles: Scorpions, rattlers.

((5)) Architectural Influences.--No existing development; style of architecture should be coordinated with treatment in similar areas elsewhere in the park.

((6)) Facilities for Contractor's Use

Electric power: See data for voltage and rate under Panther Junction, (a)((6)), page 5, above.

Water supply: None available.

There are no telephone facilities.

Housing and Mess Facilities

Government: None.

Concessioner

Location: Chisos Basin.

Capacity: 50 in off-season.

Rate: As low as \$7.00 per day.

Commercial: None.

Trailer Camps

Location: Panther Junction.

Distance: 30 miles.

Rate: \$1.25 a night.

Construction Office Space: None.

Materials Storage Space: None.

Nearest railroad at Marathon, 40 miles; line: Southern Pacific, branch line of AT&SF.

Construction Season: Year round.

((7)) Building Materials

Building stone

Source: Dog Canyon - quarried, field.
Distance from site: 8 miles
Kind: limestone; color: buff.

Flagstone

Source: Dog Canyon
Distance from site: 8 miles
Kind: limestone; color: buff; quality:
excellent

Coarse aggregate

Source: Maravillas Creek
Distance from site: 4 miles
Clean gravel; screen analysis available in
Park.

Sand (concrete)

Source: Maravillas Creek
Distance from site: 4 miles
Impurities: Slight
Analysis not available

Sand (plaster)

Source: Maravillas Creek
Distance from site: 4 miles
Impurities: Slight
Analysis not available

Logs: Nearest source of pine and fir is 400 to
500 miles; impractical for this area.

Lumber

Source: Alpine lumber suppliers.
Any species can be ordered - pine and fir
in stock (all kiln dried).
Availability of West Coast lumber and com-
parative cost: 1" dimension \$1.25 per M;
larger \$1.65 per M - Douglas fir or pine.
Concrete Blocks: Local supplier - Alpine Lumber
Co.; made in El Paso - \$32 per 100.

Brick and Tile: El Paso or San Antonio

Availability of:

Plant or transit mix concrete: None
Plant mix road materials: None
Concrete testing facilities: None
Light weight plaster or concrete aggregates:
Texas Concrete Block Co., Midland - exploded
shale 8x4x16 block 12#

Reinforcing steel: Local source - Alpine
suppliers

Structural steel: Very limited

Other local building material of special
interest: Flagstone, adobe.

(1) General (Continued)

(1) Maverick Entrance

((1)) Climate

Temperature

Maximum: 115° F.

Minimum: 12° F.

Average summer day-night temperature
difference: 33° F; winter: 40° F.

Mean Temperature

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>
Maximum	81	80.5	84	87.7	97.6	105.2
Minimum	40.8	37.4	47.1	56.8	62.7	72.7

	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Maximum	102.8	108.7	100.4	92.1	74.6	69
Minimum	70	73.9	65.9	48.5	44.2	31.2

Prevailing wind from southeast in summer
and west northwest in winter.

Maximum recorded velocity: 75 m.p.h.

Subject to frequent strong winds, hail,
lightning, northers; dust storms, oppressive
dry heat in summer.

Annual rainfall: 7"; maximum rate of fall:
2" an hour (estimate).

Snow pack: None.

There are no structural failures caused by
snow.

Mechanical cooling required April - October;
evaporative type.

Special climatic requirements: Low humidity,
dust storms, oppressive summer heat.

((2)) Site Data

Elevation: 2,750'; longitude: 105°30';

Latitude: 29°17'; county: Brewster.

Topography: Badlands formation surrounded
by eroded clay terraces.

Vegetation: Very sparse vegetative cover
consisting principally of cactus.

((3)) Soil and Foundation Data

Geological description: Deep clay deposits resulting from erosion of surrounding gravel-covered clay hills.

Depth of water table: Unknown

Water permeability: Poor

Frost penetration: Average - 1" to 2";
maximum known - 6"

Bearing capacity: Unknown

Foundation types usually used in vicinity:
No designed foundations exist.

Usual depth of foundations: Unknown

Special foundation or soil problems: Many failures evident in early buildings.

Structural failures due to soil or foundation design: Unstable soil requires special design; bentonite occurs in area.

((4)) Miscellaneous Design Considerations.--Same data as for Rio Grande Area (c)((4)).

((5)) Architectural Influences.--None.

There are no special historical, archeological or traditional considerations related to design of future buildings but typical Mexican influences are reflected in the adobe and rock wall structures nearby. Also west Texas ranch style.

((6)) Facilities for Contractor's Use

Electric power: None

Water supply, rate: Unknown

Telephone facilities: None

Housing and Mess Facilities: None

Construction Office Space: Available at
Study Butte

Materials Storage Space: Available at Study Butte

Nearest railroad at Alpine - 80 miles; line:

Southern Pacific and branch line of AT&SF.

Construction Season: Year round - October to
March preferable.

((7)) Building Materials.--See data for Castolon (d)((7)).

(1) General (Continued)

(-) Santa Elena Canyon

((1)) Climate

Temperature

Maximum: 115° F.

Minimum: 12° F.

Average summer day-night temperature difference: 33° F.; winter: 40° F.

Mean Temperature

	Jan.	Feb.	Mar.	Apr.	May	June
Maximum	81	80.5	84	87.7	97.6	105.2
Minimum	40.8	37.4	47.1	56.8	62.7	72.7

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Maximum	102.8	108.7	100.4	92.1	74.6	69
Minimum	70	73.9	65.9	48.5	44.2	31.2

Prevailing wind from southeast in summer and west northwest in winter.

Maximum recorded velocity: 75 m.p.h.

Subject to frequent strong winds, hail, lightning, northers; dust storms, oppressive dry heat in summer.

Annual rainfall: 7"; maximum rate of fall: 2" an hour (estimate).

Snow pack: None

There are no structural failures caused by snow.

Mechanical cooling required April - October; evaporative type.

Special climatic requirements: Low humidity, dust storms, oppressive summer heat.

((2)) Site Data

Elevation: 2,100'; longitude: 103°37';

latitude: 29°12'; county: Brewster.

Topography: Flood plain of Rio Grande surrounded by flat-topped clay hills.

Vegetation: Mesquite thickets dominant with associated cactus, creosote bush and catsclaw. Large cottonwoods, willow and river cane grow densely along the river.

((3)) Soil and Foundation Data

Geological description: Deep alluvial silts and river gravel in the flood plane of the Rio Grande surrounding hills.
Depth of water table: 10' to 20'
Water permeability: Excellent
Frost penetration: None
Bearing capacity: No data
Foundation types usually used in vicinity:
No designed foundations exist. Early residents simply extended wall below ground.
Usual depth of foundations: Unknown
Special foundation or soil problems: Many failures evident in early buildings.
Structural failures due to soil or foundation design: Unstable soil requires special design.

((4)) Miscellaneous Design Considerations

Wood destroying insects: Termites
Flies: Abundant
Poisonous insects and reptiles: Mosquitoes, scorpions
Other: Snakes, red ants
Area is subject to flooding from the Rio Grande and Terlingua Creek.

((5)) Architectural Influences.--No buildings exist. Consideration should be given to prevailing architectural influences at Castolon when considering development for this area.

((6)) Facilities for Contractor's Use

Electric power: None
Water supply, rate: Unknown
Telephone facilities: None
Housing and Mess Facilities: None
Construction Office Space: None
Materials Storage Space: None
Nearest railroad at Alpine - 97 miles;
line: Southern Pacific and branch line of AT&SF
Construction Season: Year round - October to March preferable.

((7)) Building Materials.--See data for Castolon (1)((7)).

(1) General (Continued)

(h) Boquillas Canyon

((1)) Climate

Temperature

Maximum: 115° F.

Minimum: 12° F.

Average summer day-night temperature difference: 33° F; winter: 40° F.

Mean Temperature

	Jan.	Feb.	Mar.	Apr.	May	June
Maximum	81	80.5	84	87.7	97.6	105.2
Minimum	40.8	37.4	47.1	56.8	62.7	72.7

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Maximum	102.8	108.7	100.4	92.1	74.6	69
Minimum	70	73.9	65.9	48.5	44.2	31.2

Prevailing wind from southeast in summer and west northwest in winter.

Maximum recorded velocity: 75 m.p.h.

Subject to frequent strong winds, hail, lightning, northers; dust storms, oppressive dry heat in summer.

Annual rainfall: 7"; maximum rate of fall: 2" an hour (estimate).

Snow pack: None

There are no structural failures caused by snow.

Mechanical cooling required April - October; evaporative type.

Special climatic requirements: Low humidity, dust storms, oppressive summer heat.

((2)) Site Data

Elevation: 1,873'; longitude: 102°57';

latitude: 29°12'; county: Brewster.

Topography: Area situated on or near banks of Rio Grande. Area surface is river silt deposited over large flat areas with numerous rocky hills protruding throughout. Several warm springs. Surface mostly silt and river gravel except rocky knots. Sub-surface, silt and gravel 2 to 10 feet deep.

lying on a strata of hard pan 6" to 5' or 6' thick underlain with river gravel to solid rock. Approximately 320 acres subject to irrigation. Vegetation: Mesquite thickets dominant with associated cactus, creosote bush, catsclaw on hills and flats. River cane dominates river banks.

((3)) Soil and Foundation Data

Geological description: Uniform alluvial silt to depth of 40' except where underlying limestone protrudes.
Depth of water table: Surface at river edge - otherwise unknown.
Water permeability: Slight
Frost penetration: None
Bearing capacity: No records
Foundation types usually used in vicinity:
No designed foundations exist. Early ranchers rarely extended wall below ground.
Usual depth of foundations: Unknown
Special foundation or soil problems: Many failures evident in native buildings.
Structural failures due to soil or foundation design: Unstable soil requires special design.

((4)) Miscellaneous Design Considerations.--See data for Rio Grande Area (c)((4)).

((5)) Architectural Influences.--See data for Rio Grande Area (c)((5)).

((6)) Facilities for Contractor's Use

Electric power: None
Water supply, rate: Spring of unknown flow (over 5 gpm).
Telephone facilities: None
Housing and Mess Facilities
Government: None
Concessioner
Location: Chisos Basin
Capacity: 50 in off-season
Commercial: None
Trailer Camps: None
Construction Office Space: None
Materials Storage Space: None
Nearest railroad at Marathon - 95 miles;
Line: Southern Pacific

((7)) Building Materials.--See data for Rio Grande Area (c)((7)).

					Chris Basin	Pillow capacity per room
1	Dallas Hut, 2 room	X	X	X	X	2 plus 2
2	" " " "	X	X	X	X	" " "
3	" " " "	X	X	X	X	" " "
4	" " " "	X	X	X	X	" " "
5	" " " "	X	X	X	X	" " "
6	" " " "	X	X	X	X	" " "
7	" " " "	X	X	X	X	" " "
8	" " " "	X	X	X	X	" " "
9	" " " "	X	X	X	X	" " "
10	" " " "	X	X	X	X	" " "
11	" " " "	X	X	X	X	" " "
12	" " " "	X	X	X	X	" " "
13	Warehouse, sheet metal	X	X	X	X	" " "
14	Dallas Hut, 2 room	X	X	X	X	2 plus 2
15	" " " "	X	X	X	X	" " "
16	" " 1 "	X	X	X	X	3
17	Cabin, 1 room, alcove, bath	X	X	X	X	6
18	" " " " "	X	X	X	X	6
19	" " " " "	X	X	X	X	6
20	" " " " "	X	X	X	X	6
21	Cabin, 3 rooms, alcove, 2 baths	X	X	X	X	6 & 6 & 6
22	Dallas Hut, 3 rooms, 2 baths	X	X	X	X	Emp. qtrs.
23	Dallas Hut, 2 rooms, no bath	X	X	X	X	" " "
24	Dallas Hut, 2 rooms, 1 bath	X	X	X	X	" " "
25	Dallas Hut, 2 rooms, 1 bath	X	X	X	X	" " "
26	Dallas Hut, 2 rooms, no bath	X	X	X	X	" " "
27	Comfort Station - showers	X	X	X	X	" " "
28	Kitchen-Dining	X	X	X	X	" " "
29	Service Station	X	X	X	X	" " "
30	NPC Office, 1 bedroom	X	X	X	X	" " "

MASTER PLAN DEVELOPMENT OUTLINE
BUILDING CHART
Big Bend National Park, Texas

BUILDINGS
PAGE 1
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MASTER PLAN DEVELOPMENT DOCUMENT
 BOLLINGER CHART
 Big Bend National Park, Texas

BUILDINGS
 PAGE 2
 July 1957

					Chrisos Basin	Other	
31	General Store - Post Office	x	x		x		
32	Tent House, 1 room	x		x	x		
33	NPS Information Office, 1 room	x	x	x	x		
34	Comfort Station, 4 rooms, shower	x	x		x		
35	Apartment		x	x	x		
36	Apartment		x	x	x		
37	Residence		x	x	x		
38	Residence		x	x	x		
39	Residence		x	x	x		
40	Comfort Station		x	x	x	x	Campground
41	Visitor Center		x	x	x		
42	Residence		x	x	x		
43	Residence		x	x	x		
44	Dallas Hut, 1 room	x		x	x		Pillows 4
45	" " " "	x		x	x		Pillows 4
46	" " " "	x		x	x		Pillows 5
47	" " " "	x		x	x		Pillows 5
48	Cabin, Frame, 1 room, bath	x		x	x		Pillows 2
49	Comfort Station		x	x	x	x	Campground
50	Comfort Station		x	x	x	x	Campground
51	Unassigned number				x		
52	" "				x		
53	" "				x		
54	" "				x		
55	" "				x		
56	" "				x		
57	" "				x		
58	" "				x		
59	" "				x		
60	Lodge Guest Unit	x	x		x		

Big Bend National Park, Texas

BUILDINGS
PAGE 3
JULY 1957

				Chisos Basin	Other
61	Lodge Guest Unit	x	x	x	
62	Chisos Mountain Lodge	x	x	x	
63	Lodge Guest Unit	x	x	x	
64	" " "	x	x	x	
65	" " "	x	x	x	
66	Public Garage	x	x	x	
67	Utility Building Unit #1	x	x	x	
68	Utility Building Unit #2	x	x	x	
69	Unassigned number			x	
70	" "			x	
71	" "			x	
72	" "			x	
73	" "			x	
74	" "			x	
75	" "			x	
76	" "			x	
77	" "			x	
78	" "			x	
79	" "			x	
80	Cabin, 7 rooms	x	x	UNUSED	x Hot Springs
81	Cabin, 1 room and porch	x	x	UNUSED	x Hot Springs
82	General Store	x	x	UNUSED	x Hot Springs
83	Unassigned number			x	
84	" "			x	
85	" "			x	
86	" "			x	
87	" "			x	
88	" "			x	
89	" "			x	
90	Tack Room and Saddle Shed	x	x	x	

					Chisos Basin	Other
91	Comfort Station	x	x	x	x	
92	Unassigned number				x	
93	"				x	
94	"				x	
95	"				x	
96	"				x	
97	"				x	
98	"				x	
99	"				x	
100	"				x	
101	Residence -Duplex, 12 rms, 2 baths	x		x	x	
102	Unassigned number					
103	Residence, 5 rooms, bath	x	x	x	x	
104	Recreation Hall	x	x	x	x	
105	Apt. - 4-Unit, 13 rms., 4 baths	x	x	x	x	
106	Unassigned number					
107	Residence, 4 rooms, bath	x	x	x		x Gov't. Spr.
108	Unassigned number					
109	Residence, 5 rms, bath, utility rm.	x	x	x	x	
110	Residence, 4 rooms	x	x	x		x Boquillas
111	Residence, 3 rooms	x	x	x		x Castolon
112	Residence, 4 rooms	x	x	x		x Grapevine
113	Warehouse, 5-rooms, office-----	OBLIT.		x		x Coop. Store
114	Unassigned number				x	
115	"				x	
116	"				x	
117	Residence -Duplex, 7 rms, 2 baths	x		x	x	
118	Unassigned number				x	
119	"				x	
120	"				x	

a. Includes 5 apartments and fire tool cache.

				Chisos Basin	Santa Elena	Other
121	Unassigned number					
122	"					
123	Residence, 2 rooms	x	x	x		x Grapevine
124	Residence, 2 rooms	x	x	x		x Grapevine
125	Residence, 4 rooms	x	x	x	x	
126	Bunkhouse	x	x	x	x	
127	Warehouse	OBLIT.		x	x	
128	Garage and Shop	OBLIT.		x	x	
129	Residence, 4 rooms, garage	x	x	x		x K-Bar Ranch
130	Residence	OBLIT.				x Chates' House
131	Residence, 3 rms, screened porch	x	x	x		x Boquillas
132						
133	Residence & Ranger Station, 2 rms	x	x	x x		x Persimmon Gap
134	Sublett House, 4 rooms	x	x	UNUSED	x	x Castolon
135	Ranch House, 6 rms, screened porch	x	x	UNUSED		x Johnson Ranch
136	WPA Lodge, 11 rooms	x	x	UNUSED		x Johnson Ranch
137	Residence	x	x	UNUSED		x Viviana Mine
138	Ranch House, 6 rooms, bath	x	x	UNUSED		x Oak Spring
139	Dorgan Residence, 3 rooms	x	x	UNUSED		x Castolon
140	Comfort Station	x	x	x	x	
141	Comfort Station	x	x	x	x	
142	Comfort Station	x	x	x	x	Upper Basin
143	Trailer House	x	x	x	x	
144	Trailer House	x	x	x		x Maverick
145	Unassigned number				x	
146	"				x	
147	"				x	
148	"				x	
149	"				x	
150	"				x	

Big Bend National Park, Texas

U.S. GEOLOGICAL SURVEY

BUILDINGS
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Big Bend National Park, Texas

Line	Unassigned number	Chaos Design
151	"	X
152	"	X
153	"	X
154	"	X
155	"	X
156	"	X
157	"	X
158	"	X
159	"	X
160	"	X
161	"	X
162	"	X
163	"	X
164	"	X
165	"	X
166	"	X
167	"	X
168	"	X
169	"	X
170	"	X
171	"	X
172	"	X
173	"	X
174	"	X
175	"	X
176	"	X
177	"	X
178	"	X
179	"	X
180	"	X

Figure 1 is a line graph showing the percentage of total energy expenditure (TEE) for different activities over a 24-hour period. The Y-axis is 'Percentage of TEE' (0-100) and the X-axis is 'Time of Day' (0-24). The activities and their approximate percentages are:

Time of Day	Sleeping (%)	Resting (%)	Standing (%)	Walking (%)	Running (%)
0	40	10	10	10	10
2	50	10	10	10	10
4	40	10	10	10	10
6	30	10	10	10	10
8	20	10	10	10	10
10	10	10	10	10	10
12	10	10	10	10	10
14	10	10	10	10	10
16	10	10	10	10	10
18	10	10	10	10	10
20	10	10	10	10	10
22	10	10	10	10	10
24	40	10	10	10	10

July 1957

BUILDINGS
PAGE 8

A. Proposal deleted.

1667 8700

Big Bend National Park, Texas

Well #4
Temp. Adm.
Hdqttrs.

Other

Partner Jet.

241	Pumphouse, 1 room	Well No 4	X	X		X	X
242	Utility Building	Shops	X	X		X	X
243	Equipment Storage			X	X		X
244	Warehouse and Storage			X	X		X
245	Equipment Storage			X	X		X
246	"	"		X	X		X
247	"	"		X	X		X
248	Residence, 3 bedrms., bath, garage		X	X		X	X
249	School		X			X	X
250	Residence, 2 bedrms., bath, garage		X	X		X	X
251	Trailer and Tent Site		X	X		X	X
252	"	"	X	X		X	X
253	"	"	X	X		X	X
254	"	"	X	X		X	X
255	"	"	X	X		X	X
256	"	"	X	X		X	X
257	"	"	X	X		X	X
258	"	"	X	X		X	X
259	"	"	X	X		X	X
260	"	"	X	X		X	X
261	"	"	X	X		X	X
262	"	"	X	X		X	X
263	"	"	X	X		X	X
264	"	"	X	X		X	X
265	"	"	X	X		X	X
266	"	"	X	X		X	X
267	"	"	X	X		X	X
268	"	"	X	X		X	X
269	"	"	X	X		X	X
270	"	"	X	X		X	X

[illegible]

100

[illegible]

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[Faint, illegible handwritten notes]

[illegible]

301	Unassigned number				X
302	" "				X
303	" "				X
304	" "				X
305	" "				X
306	" "				X
307	" "				X
308	" "				X
309	Residence, 3 bedrms., bath, garage	x	x	x	x
310	Visitor Center		x x		x X
311	Service Station	x		x	x X
312	Residence, 3 bedrms., bath, garage	x	x	x	x X
313	" " " " "	x	x	x	x X
314	Residence		x x	x	x X
315	"		x x	x	x X
316	"		x x	x	x X
317	"		x x	x	x X
318	"		x x	x	x X
319	Residence, 3 bedrms., bath, garage	x	x	x	x X
320	" 2 " " "	x	x	x	x X
321	Residence		x x	x	x X
322	"		x x	x	x X
323	"		x x	x	x X
324	"		x x	x	x X
325	"		x x	x	x X
326	"		x x	x	x X
327	"		x x	x	x X
328	Apartment		x x	x	x X
329	"		x x	x	x X
330	Unassigned number				x X

Unassigned number

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Panther Jet X

2

THE UNIVERSITY OF CHICAGO

BUILDINGS
PAGE 14
July 1957

	Panther Jct.	Rio Grande	Daniel Ranch
391 Unassigned number	X		
392 " "	X		
393 " "	X		
394 " "	X		
395 " "	X		
396 " "	X		
397 " "	X		
398 " "	X		
399 " "	X		
400 Pumphouse	X X	X	
401 Lodge	X X	X	
402 Quarters (Concessioner)	X X	X	
403 Lodge Guest Unit	X X	X	
404 " " "	X X	X	
405 " " "	X X	X	
406 " " "	X X	X	
407 " " "	X X	X	
408 " " "	X X	X	
409 " " "	X X	X	
410 Visitor Center	X X	X	
411 Utility Building	X X	X	
412 Residence (Concessioner)	X X	X	
413 Residence	X X	X	
414 " "	X X	X	
415 " "	X X	X	
416 " "	X X	X	
417 Residence, 2-room	X X	X	
418 Stable Development	X X	X	
419 Residence	X X	X	
420 " "	X X	X	

421 Apartment
 422 " "
 423 Pumphouse SPRING NO 4
 424 Residence
 425 Garage and Service Station
 426 Ranger Shelter
 427 Comfort Station
 428 " "
 429 " "
 430 " "
 431 " "
 432 Bathhouse and Swimming Pool
 433 Comfort Station
 434 " "
 435 Unassigned number
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 450 " "

	Rio Grande
421	x x
422	x x
423	x x
424	x x
425	x x
426	x x
427	x x
428	x x
429	x x
430	x x
431	x x
432	x x
433	x x
434	x x
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Spring #4

Campground Entrance

Big Bend National Park, Texas

BUILDING CHART

WATER AND DEVELOPMENT DIVISION

BUILDINGS
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 JULY 1957

July 1957

WATER PLANT DEVELOPMENT

BUILDING CHART

Big Bend National Park, Texas

Castolon

Rio Grande

451 - 599 Unassigned numbers

465 600 - 699 Unassigned numbers

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Big Bend National Park, Texas

BUILDING COPY

UNITED STATES DEPARTMENT OF THE INTERIOR

BUILDINGS
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					Persimmon Gap	Maverick	Other
700	Entrance Station, Office, Rest Rms.	x x	x	x	x		
701	Residence, 3 bedrooms, bath	x x	x		x		
702	Residence, 3 bedrooms, bath	x x	x		x		
703	Apartment, 3-Unit, 2 bedrms., bath	x x	x		x		
704	Utility-Storage Building	x x		x	x		
705	Unassigned number						
706	" "						
707	" "						
708	" "						
709	" "						
710	" "						
711	Entrance Station, Office, Rest Rms.	x x	x	x		x	
712	Residence, 3 bedrooms, bath	x x	x			x	
713	" " " "	x x	x			x	
714	Apartment, 3-Unit, 2 bedrms., bath	x x	x			x	
715	Utility-Storage Building	x x		x		x	
716	Unassigned number						
717	" "						
718	" "						
719	" "						
720	" "						
721	Shelter, Exhibit, Fossil	x x		x			x Tornillo Crossing
722	Pumphouse	x x		x			x Oak Spring
723	Pumphouse	x x		x			x K-Bar

Buildings
Page 18
July 1957

El Estero National Park, Texas
Name of Park

Prepared by George W. Miller, Superintendent
Name and Title

Date July, 1957

REVIEWED

WESTERN OFFICE, DIVISION OF DESIGN AND CONSTRUCTION

Assistant /s/ Lyle E. Bennett Date 7-22-57
Engineer /s/ Homer L. Crowley, Acting Date 7-22-57
Landscape Architect /s/ Robert G. Hall Date 7-22-57
Safety /s/ Wm. H. Richardson Date 7-22-57

REGIONAL OFFICE

Recreation Resources
Planning /s/ Wm. J. Bowen Date 8-22-57
Interpretation /s/ Matt Dodge, Acting Date 8-23-57
Operations /s/ David H. Canfield Date 8-23-57

RECOMMENDED

/s/ George W. Miller Date 9-30-57
Superintendent
/s/ Sanford Hill Date 7-24-57
Chief, Western Office, Division of Design and Construction
/s/ Hugh M. Miller Date 8-26-57
Regional Director
/s/ Robert E. Smith, Actg Date 12-17-57
Chief of District

APPROVED

/s/ Thos. C. Vint Date 12-17-57
Regional Director

Sec. I Utilities

Master Plan Development Outline
Big Bend National Park, Texas

UTILITIES

PANTHER JUNCTION

(1) Water System

Existing

- (a) Source.--Three wells were drilled in 1948 in the area south and east of Headquarters. These wells tapped an underground basin which is trapped behind an igneous dyke, which runs southeast from Lone Mountain, probably as far as Nugent Mountain. The following data on the wells is available:

<u>Well No.</u>	<u>Depth</u>	<u>6" Casing</u>	<u>Water Head</u>	<u>G.P.M.</u>
2	187	97	90	50
3	234	187	165	8
4	217	217	150	30

(See Superintendent's memorandum of November 22, 1949.)

The well at the K-Bar Ranch is available as a future source.

- (b) Supply Mains.--A 3-inch galvanized steel pipeline from Well No. 4 to the reservoir is 1,300 feet in length.
- (c) Storage.--150,000-gallon concrete reservoir, built in 1950.
- (d) Treatment.--None.
- (e) Distribution Mains.--6" cast-iron from reservoir to residential and utility areas. Four 6" hydrants, each with one 4" steamer connection and two 2½" hose connections.

- (f) Pumping Equipment.--In Well No. 4 there is installed a 12 G.P.M. deep well displacement pump, with windmill operation. A gasoline engine is available for auxiliary power.

Proposed.--As the headquarters develops, extend mains to points of use. With increase in use it will be necessary to connect other wells to the system and to provide additional storage.

(2) Sewerage System

Existing.--At present each of the five residences has its individual septic tank, 750-gallon capacity, close to the building, with tile lines laid along the outer lines of the patio to provide irrigation water for trees and planting. The soil is very open. Septic tanks were made over-size to reduce the number of times they would have to be pumped out.

The utility area has a separate septic tank, with tile field.

Proposed.--Continue the present method of sewage disposal as the development increases. When this method becomes inadequate, collecting system and central disposal is proposed.

- (3) Garbage and Refuse Disposal.--Garbage and trash hauled to an open pit near Government Spring and burned.

(4) Power System

Existing.--Power is generated by a 25 KW Caterpillar Diesel, located on the west side of wash between residential and utility areas. Voltage is 120/240.

Supply lines are underground cable from generator to residences.

Proposed.--Standby generator, 25 KW, 2,300-volt, Diesel operated, to be located in power house included in Utility Building.

An agreement has been executed with the Rio Grande Electric Cooperative for commercial power. This REA Cooperative proposes to bring in power from Alpine, Texas at 33,000 volts, and to serve Panther Junction, The Basin, Oak Spring and the Rio Grande Development.

(5) Communication Systems

Existing.--War surplus A.M. Radio equipment, obtained in 1947, furnished intra-Park communication and contact with the Regional Office network at 5150 KQ. Contact with outside is made through the Border Patrol Station at Marfa, Texas.

Proposed.--At present (March, 1952) an FM intra-Park system is being installed.

An automatic dial telephone system is in process of being installed. This system will be connected through two trunks with the Basin switchboard. Effort will be made to provide a carrier circuit on the REA powerline to connect with the Alpine switchboard.

(6) Fuel Systems

Existing

Heating is by fuel oil, with underground tank at each building.

Cooking and water heating is by LP-Gas, piped from central aboveground tank.

Proposed.--If the REA brings in power, electricity will replace LP-Gas for cooking and water heating.

THE BASIN

(1) Water System

Existing.--Water is now obtained from three dug wells in the wash below the CCC camp. This supply is inadequate to meet the needs in mid-summer, making it necessary to haul water from Panther Junction. The water from the two upper wells is pumped into the lower well, from which it is pumped by a displacement pump, through 4,500 feet of 2½" galvanized steel pipe to a 6,000-gallon wood tank and a 63,000-gallon steel tank, located above the concession development. A take-off from the pump line feeds four 1,000 and one 3,000-gallon steel tanks which serve the old CCC Camp Development. Distribution in both areas is through 2" galvanized pipe.

Proposed.--To provide an adequate and reliable water system, it is proposed to develop Oak Spring, located west of the Basin, at the foot of the Chisos Mountains. From this point the water will be pumped to a sump at the site of the existing source, augmenting the present supply. Oak Spring has a dependable supply of 25 G.P.M.

With the installation of commercial power, the existing gas engine operating the pump will be replaced with an electric motor.

(2) Sewerage System

Existing.--Two septic tanks are in operation, one serving the concession and one serving the old CCC Camp. The concession system, which was installed by National Park Concessions, is not adequate in size of septic tank and in tile field. The same is true in the case of the disposal plant serving the CCC Camp.

Proposed.--Extend the outfall line from the concession to site near the horse concession, install new septic tank with adequate spray nozzles for the effluent. For the CCC Camp it is proposed to install approximately 600 feet of tile to provide adequate sub-surface disposal.

- (3) Garbage and Refuse Disposal.--All garbage and refuse is collected and carried to an open pit near Government Spring, where it is burned. The concessioner hauls his garbage to the pit.

(4) Power System

Existing.--Power for the CCC Camp is generated by a 30 KW Diesel operated plant. Distribution throughout the camp is by overhead wires. At the concession a 5 KW plant furnishes light for the dining room, kitchen, office, store and some of the help's quarters.

Proposed.--If the Rio Grande Cooperative comes into the Park, power will be run to all facilities and the present generating plants eliminated.

(5) Communication System

Existing.--Automatic dial telephone service is available throughout the CCC Camp area, with similar service to the concession office and to the horse concession.

A.M. radio is available for intra-Park communication, and for communication with the Regional Office network, and with the Border Patrol Station at Marfa, Texas.

F.M. radio has been installed for intra-Park communication.

Proposed.--Provide two trunk lines to be connected with the automatic switchboard at Panther Junction.

(6) Fuel System

Existing.--Heating is by fuel oil. Cooking and water heating is by bottled propane gas.

Proposed.--When commercial power is available, convert to electric cooking and water heating.

RIO GRANDE DEVELOPMENT

(1) Water System

Existing.--Water is pumped from a spring at the proposed "Mexican Village" to a 5,000-gallon galvanized tank above the village site. Water is piped from the tank to several faucets to serve a temporary campground.

Irrigation. The horse concessioner, Mr. Beckett, has developed the Daniels Ranch into a farming operation. Irrigation water is pumped from the Rio Grande into a series of ditches which convey it over approximately 120 acres.

The overflow from the "Mexican Village" Spring is piped into a collecting open earth-tank for irrigation purposes.

Proposed.--Enlarge the "Mexican Village" system to take care of the proposed Rio Grande Development.

(2) Sewerage System

Existing.--None available.

Proposed.--Install an adequate sewerage system to meet the requirements of the proposed development.

(3) Garbage and Refuse Disposal

Existing.--None available.

Proposed.--Establish a pit for burning of garbage and rubbish.

(4) Power System

Existing.--None available.

Proposed.--When REA power is available, provide distribution to proposed development.

(5) Communication System

Existing.--None available.

Proposed.--Provide radio communication with intra-Park FM system.

Utilities
Page 7
March 1952

SANTA ELENA CANYON DEVELOPMENT

This portion of the outline will be prepared after more detailed studies are made.

Big Bend National Park, Texas
Name of Park

Prepared by J. R. Lassiter, Regional Engineer Date _____
Name and Title

REVIEWED - REGIONAL OFFICE

Architect /s/ Lyle E. Bennett Date 4-30-52
Landscape Architect /s/ C. D. Carter Date 3-19-52
Engineer /s/ J. R. Lassiter Date 3-19-52

RECOMMENDED

/s/ Ross A. Maxwell Date 5-5-52
Superintendent
/s/ Jerome C. Miller, Acting Date 5-14-52
Assistant Regional Director
/s/ M. R. Tillotson Date 5-16-52
Regional Director
/s/ Carnes and Miller Date 9-8-54
Assistant Chiefs of Design and Construction

APPROVED

/s/ Thom. C. Vint Date 9-8-54
Per the Director

MISSION 66

FOR

BIG BEND NATIONAL PARK

NATIONAL PARK SERVICE

UNITED STATES

DEPARTMENT OF THE INTERIOR

WHAT IS MISSION 66?

MISSION 66 is a forward-looking program for the National Park System intended to so develop and staff these priceless possessions of the American people as to permit their wisest possible use; maximum enjoyment for those who use them; and maximum protection of the scenic, scientific, wilderness, and historic resources that give them distinction.

Construction is an important element of the program. Modern roads, well planned trails, utilities, camp and picnic grounds, and many kinds of structures needed for public use or administration, to meet the requirements of an expected 80 million visitors in 1966, are necessary; but they are simply one means by which "enjoyment-without-impairment" is to be provided.

Under this program, outmoded and inadequate facilities will be replaced with physical improvements adequate for expected demands but so designed and located as to reduce the impact of public use on valuable and destructible features. It will provide both facilities and personnel for visitor services of the quality and quantity that the public is entitled to expect in its National Park System. It is intended to assure the fullest possible degree of protection, both to visitors and resources.

MISSION 66 is a long-range program; it will require at least 10 years to accomplish on a sound and realistic dollar basis. That means completion in 1966-- the 50th anniversary year of the establishment of the National Park Service. The program has received enthusiastic endorsement by the President of the United States and his Cabinet, and has been well received by the Congress and the Nation at large.

The MISSION 66 program, as it pertains to Big Bend National Park, is briefed in the accompanying report to provide information on what is planned and when it will be accomplished.

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

MISSION 66
FOR
BIG BEND NATIONAL PARK
TEXAS

Introduction

What is Big Bend National Park?

Big Bend National Park is a vast, primitive wilderness preserving an unusually fine example of Chihuahuan desert. It contains spectacular geological features and a wide variety of plants, birds and mammals whose habits have been modified profoundly by the arid environment. In ancient times the Rio Grande on its meandering way to the Gulf of Mexico was caused to deviate from its normal course by conditions for which the geological explanation is still uncertain. After swinging deeply to the southeast, the river angled abruptly to the northeast to form a pocket which, from the time of early settlement, has been known as the Big Bend Country. In the deepest part of this section lies the area, in excess of 1100 square miles, composing Big Bend National Park.

Big Bend National Park was established on June 12, 1944, and is one of the few National Parks which were purchased by the citizens of a state and given to the people of the nation. This climaxed the efforts of Texas people who started in 1933 to lay the ground-work for a national park. Big Bend took its place as 27th of the current 29 National Parks and is the 7th in size.

Much of the park is semi-arid plains characteristic of the Chihuahuan Desert and made up of gravel-covered slopes, arroyos, and wide washes. This topography is interrupted by several conspicuous mountain belts, through three of which, in addition to other lesser highlands, the Rio Grande has cut spectacular canyons. Thus Big Bend National Park, with elevations ranging from 1800 to 7835 feet, contains scenery typical of the arid Chihuahuan Desert, forested mountains, and winding river with zones where contrasting types of topography and vegetative cover meet and intermingle.

Geologically, the Big Bend region is one in which there are spectacular examples of physiographic features. Crustal movements have been extensive. Displacements range up to 6,000 feet and a large, elongate, structurally low area called a "sunken block" has formed. Into and through this broken surface, the Chisos Mountains were extruded. An abundance and an unusual variety of fossil remains are to be found.

Biologically the Park is of great interest with more than 1,000 species of plants, several of which are not found elsewhere north of Mexico. There are more than 240 species of birds, over 50 species of mammals and approximately 63 species of reptiles and amphibians.

The Significant Values of Big Bend.

Harsh, physically inhospitable, arid, hot in summer, the region either attracts and fascinates the visitor or repels him utterly. There are no dashing mountain streams, no grassy glades nor towering trees, but instead the stark desert lowlands and bare mountains which simmer in the summer heat, apparently devoid of life.

The observing visitor, however, soon learns that the higher mountains are a treasure house of plant and animal life as unusual as unexpected, and that even the drab lowlands come to life at sundown with birds, mammals and reptiles in surprising numbers.

Most visitors are impressed by the vastness of the land, by the far views limited only by the haze of distance, by the sharp relief of mountains and lowlands, by the dry desert washes which may become raging torrents minutes after the brief, torrential summer rains.

Some visitors like to hike or ride along mountain trails seeking hidden nooks with their surprising variety and associations of plants and animals. Others prefer the canyon sections and the river shore. To some the park means a stroll in the sand searching for tracks, while children scamper over the nearby dunes. To others it spells adventure and an urge to make a canyon run by boat. To some it means the sport of fishing for catfish in the deeper holes.

Many people are intrigued by the folklore and history of the Big Bend Country; the early Indians, Basketmaker, Apache and Comanche; how the early people made a living from the land - their problems - their successes or failures. Many are interested by the proximity to a foreign country, the romance of Old Mexico represented in the isolated, primitive border villages and farms on the other side of the Rio Grande.

Some visitors time their visits so that they may see the cactuses and other desert plants at their peak of bloom.

To some people the park offers a tranquil and unhurried trip through desert or mountain solitude. Later, with future development proposals realized it will also offer extended vacations in a restful winter climate.

Big Bend appeals to scientists because of its complex problems in geology, the details of which have not yet been worked out, and its biological and ecological relationships. To botanists or ornithologists, it offers opportunity to see several species not found elsewhere north of the border.

The Means to the End.

To make it possible for all who visit Big Bend to derive the greatest benefit and enjoyment from their visit as well as to adequately safeguard the features of the park for the future four things are essential: an adequate road and trail system serving the principal features; adequate facilities for their comfort and welfare; effective means of presenting, interpreting and protecting the resources and values of the park; and a staff of sufficient size to enable the Service to attain these objectives.

Adequate Roads and Trails.

Since the atmosphere of the desert and mountain wilderness are of paramount concern no extensive expansion of the present road and trail system is being considered. The program consists principally of improvement of the present routes with some relocations to shorten distance, avoid washes or make more satisfactory crossings possible. An access road to the third of the major Rio Grande Canyons, Mariscal, is contemplated during the latter phases of the MISSION 66 program. However, this point too is already reached by an unimproved road used for patrol purposes. Existing trails will be improved with minor additions particularly in the Rio Grande and Castolon Development areas.

Adequate Facilities.

A park comprising a section of country approximately the size of the State of Rhode Island with such widely diversified features cannot be satisfactorily appreciated in a single day's visit. This fact and the distances to outside facilities make the development of overnight accommodations and related services within the park, as well as adequate campground and picnic areas, a necessity. These needs will be provided for through Service and concession developments.

Effective Means of Interpretation and Protection.

Beneficial use and enjoyment of the park by its visitors will be attained only through proper presentation of the park scenes and interpretation of their meaning. Many of the values of Big Bend are hidden and not apparent to the visitor

as he drives along the highways or hikes along the trails. The roads and trails serve as the necessary arteries which the visitor utilizes to reach the important features of the park but here their function ceases. In addition to the basic information and orientation that must be made available to those who request it, interpretation of the widely diversified features of this park is necessary. The interpretive program must portray the outstanding characteristics of Big Bend National Park: its complicated geological story; the rugged Chisos and other ranges and the desert and river country; the spectacular canyons; its more than 1,000 species of plants, many of which are more typical of Mexico and some of which are not found elsewhere in the United States; the varied animal and bird life and ecological relationships of the flora and fauna. To a minor degree the archeological and historical facts about the Big Bend also are of visitor interest.

The interpretive and protection programs will be carried out so that visitors will receive the general information which will enable them to use the park safely and wisely, and the basic knowledge necessary to permit them to derive the greatest benefits from its inspirational and educational resources.

Preservation of the wilderness character of the park will be paramount and facilities and improvements will be carefully limited and controlled to attain this objective.

Adequate Staff.

The personnel necessary for administration, interpretation, protection, and maintenance of the park are of basic importance in attaining the other objectives. The staff must be expanded to keep pace with the expansion of facilities and increase of visitation.

The Problem

Travel.

Situated as it is on the southern border of Texas, isolated and some distance from the principal through routes of travel, Big Bend National Park will not expect to receive the million or more visitors annually that crowd into some of the parks. Travel, however, should be steady and an increase from the present 90,000 annual total to 500,000 by 1966 is visualized. The present travel pattern now runs from a low in the winter months to the peak in June, July, and August. The major difference between this and the pattern for 1966 will be a vast increase in winter travel. This gain will start in

1957 and move rapidly as better accommodations are developed. Summer travel will not have a proportionate increase due to the fact that there is a limited amount of space in the cooler mountain country for this type of use.

A mild climate and two widely contrasting locations make this park an ideal one for year-round activity. Although nearly all visitors will go to the Chisos Mountains Basin for at least a brief visit, at any time of year, it will receive its heaviest use in the summer due to its cooler climate. The river area, little used at present, will receive heavy visitation, particularly during the winter months, as soon as facilities become available.

Inadequate Facilities.

Although many visitors enter and leave the park the same day, visiting the Basin and usually one or the other of the two canyons, of Santa Elena or Boquillas, the trend is for greater numbers to remain overnight, at least they desire to do so if accommodations are available. The need is more acute because the nearest available accommodations outside the park are in Marathon or Alpine, 80 to 100 miles away. Distance effectively prohibits the visitor from using outside facilities overnight and entering the park during the daytime for more than one trip.

This, then, poses the problem of a need for immediate expansion of concession facilities in the Basin with developments on the river soon to follow.

Campgrounds and Picnic Areas.

Campgrounds and picnic areas are greatly needed as existing camping facilities are taxed to capacity. Desirable locations for such developments are limited due to scarcity of shade and other prerequisites.

Water.

Probably the greatest controlling factor in the development of facilities in Big Bend National Park is the ever present problem in any desert area - water. The amount of water available influences the selection of locations for development and limits their maximum capacity.

Roads.

Park roads are only partially improved. Those that are completed are adequate to handle present traffic and that contemplated in the future. However, there yet remain unsurfaced and poorly graded sections of roads, rough and dusty, and with numerous

wash crossings. Road construction in desert country is complicated by many drainage washes, ordinarily dry but subject to flooding during precipitous summer rains with high water temporarily halting traffic. This presents the problem of road location, to reduce these crossings to a minimum, bridge the major ones and provide adequately marked fords for the countless small ones.

Interpretation and Protection.

Interpretation and protection facilities are lacking. There are no regularly attended entrance stations where visitors may receive initial information and orientation. There are no visitor centers where the interpretive story may be obtained. There are only a few interpretive markers and wayside exhibits to provide visitors with interesting bits of the park story. Due to the small staff engaged in a multitude of duties there are no regularly attended ranger stations to which visitors may go for assistance or advice.

Park Operation.

Annual operating funds and adequate staffing have never reached the level needed by the present travel. Such deficiency is reflected by inadequate maintenance of facilities, and a serious lack of protection of park values and service to the visitors.

The Program

MISSION 66 seeks to improve and correct present inadequacies and to provide adequate facilities and direct proper use of the park, in keeping with the conservation and protection of its values, along the lines adapted to the kind and volume of use anticipated in the predictable future.

Improved Road and Trail System.

No changes in the existing pattern of road circulation are planned. Unimproved sections of the existing system will be brought up to park standards with minor relocations in some sections and with major and minor bridges and other crossings incorporated according to the needs.

The park through roads and roads leading to the Basin, Rio Grande Village, Castolon and Santa Elena Canyon are to be high standard and oil-surfaced. The spur roads leading to Boquillas Canyon from Rio Grande Village, Dagger Flat, Fossil Bone Exhibit, Grapevine Hills, and Mariscal Canyon from Lower Tornillo are to be lower standard and oil-surfaced.

The majority of existing trails are in good condition. Those requiring additional improvement will be completed and new trails featuring the river in the vicinity of Rio Grande Village and Castolon will be constructed.

Visitor Accommodations.

Accommodations are proposed at the Chisos Basin, Rio Grande Village, and Castolon. These accommodations include lodges, guest rooms, kitchen and dining facilities, stores, service stations, saddle horses and trailer campsites.

The existing accommodations in the Chisos Basin will be replaced with modern facilities including 75 guest rooms. The proposed Rio Grande Village site will be developed to include up to 160 guest rooms and other facilities including a swimming pool. There will be ample room at the latter site for expansion if needed. Existing structures at Castolon will be retained and expanded to a ranch-type facility including guest accommodations of 50 rooms. A house trailer camp will be operated near Panther Junction to take care of extra large trailers which cannot conveniently negotiate the Chisos Mountains grades.

There is no existing public transportation to or within the Park. Such facilities will be established as a concession at the earliest practicable date.

Campgrounds and Picnic Facilities.

It is proposed to construct campgrounds, picnic facilities, and group camps at various locations throughout the park, the camp and picnic sites to include table and bench combinations, charcoal fireplaces, and ramadas. Major camp developments will be at the Rio Grande Village, Castolon, and Chisos Basin areas, with picnic sites at Santa Elena and Boquillas Canyons and roadside points.

The existing campground in the Chisos Basin will be abandoned in favor of a new location with greater capacity in the Lower Basin area.

Visitor Services.

The initial informational contacts will be made at the two entrance stations to the park upon the installation of these facilities as presently planned and with a high priority on the program.

Visitor Centers.

To carry out the visitor services in the most advantageous way the installation of several visitor centers is of special importance. They will form the central point or hub from which visitor activities radiate.

These visitor centers will be located at the Chisos Basin, Rio Grande Village, and Castolon, near the concessions developments and campgrounds at those locations. Each will have exhibits explaining various phases of the park story of geology, biology, and history. A small auditorium and campfire circle will be included at each location for programs to be presented by park personnel. Nature trails will also be established for self-guiding and conducted walks.

Park Headquarters at Panther Junction will have a lobby for suitable orientation exhibits and other information on the park as well as an information and publication sales counter. The park library, scientific study collections and the Chief Park Naturalist's office will be located here also.

Wayside Exhibits.

In addition to the visitor centers and their coordinated activities at and adjacent to points where accommodations are developed it is also proposed to develop a series of orientation and wayside exhibit devices and interpretive markers at various points or features of particular significance and interest. These proposed exhibits and orientation devices help fill in the interpretive program by providing informative material to the visitor as he travels along the way.

A well-rounded interpretive program will enable visitors to enjoy all of the values of the park and receive the most pleasure while encouraging the preservation and protection of the park features for future generations.

Conservation and Protection.

The activities of the Protection Division of the Park will be largely influenced by the size of the park; rugged mountainous terrain and deeply eroded canyons and arroyos; proximity of a foreign culture; and the need to inform and safeguard an increasingly large number of visitors who may possess varying degrees of unfamiliarity with the hazards of an arid desert and mountainous environment.

The services of this organization will be divided among such activities as traffic control, wildlife management,

information, safety, forest and structural fire control, soil and moisture conservation, and the park patrols and special problems arising from the location of the park on the United States-Mexican border.

Behind the Scenes.

There are a great many things in a park the size of Big Bend that never come to the attention of visitors, but without which the park could not operate. The visitor turns the tap and water flows from a campground hydrant, or gushes from a drinking fountain. Automobiles hum over the highways and hikers travel the trails to the more remote areas of the park. This is such an everyday occurrence that he never realizes the extensive system of utilities required to support him and his thousands of companions in the park. Water systems, power plants, transmission lines, sewage and garbage disposal, radio and telephone systems must be installed and maintained. Carpenter shops, mechanical repair, paint shops, storage buildings, garages for equipment - all are part of the necessary behind-the-scenes facilities. All of these functions are performed by a highly skilled maintenance and construction organization, under the direction of professional technicians such as engineers and landscape architects.

Administrative offices, ranger and patrol stations, and fire lookouts, manned by qualified personnel are essential operations of the park.

A considerable part of the MISSION 66 development program will consist of expansion and improvement to bring these facilities up to a standard that will adequately complement the expanded visitor use facilities.

Annual Operations.

The complete program must also take into account the stepped-up requirements for maintenance, protection and service to visitors. Today, Big Bend National Park requires an appropriation each year of approximately \$303,000 for these operations. The greatest expansion will be required for visitor services -- maintenance and operation of utilities, roads, buildings, and campgrounds; safeguarding human life and property; and information and interpretive services. There is no point in building new and modern facilities unless a realistic program for their maintenance and operation is embarked upon at the same time, and unless the program also provides those protective regulatory and informational services which the visitors have a right to expect and which are necessary for their comfort, convenience and pleasure.

One aspect of the operating program deserves special mention. Most of the improvements proposed under MISSION 66 are for the use of or are necessitated by the presence of man in the area. The Big Bend contains over 700,000 acres of land, much of it covered by grass, brush, or other desert vegetation while the higher parts of the mountains are forested and throughout is a large population of native birds and animals. If this park had no visitors whatsoever, the protection and management of this sizable resource would still be necessary. Increased visitation increases this responsibility, for many forest or brush fires are man-caused. Man's developments and activities effect certain changes in the environmental relationships, and some of the chief problems involved in maintaining a balanced wildlife population arise from wildlife's relationship to man. The MISSION 66 program for annual operations includes personnel and funds necessary for a continuing program of research, and for defense against forest fires, tree disease and insect infestation, and soil erosion. An additional operation is required in an arid country such as this by the necessary plantings of trees for shade in the developed areas, requiring water and regular care.

Summary of Construction Costs:

The following tabulation, while not a firm statement, does indicate the size and scope of improvements included in the program over the next ten years:

<u>Developed Sites</u>	<u>Roads and Trails</u>	<u>Buildings and Utilities</u>	<u>Total</u>
Chisos Basin	283,000	495,000	778,000
Rio Grande	156,000	1,437,000	1,595,000
Castolon	142,000	847,000	989,000
Park Headquarters	75,000	1,836,000	1,911,000
Entrances & Outlying	36,000	474,000	510,000
Park General	<u>6,923,000</u>	<u>135,000</u>	<u>7,108,000</u>
Entire Area Total	\$ 7,617,000	\$ 5,274,000	\$12,891,000

In addition to the above tabulation for the program to be carried on by the government, an estimated expenditure of approximately \$1,500,000 will be necessary by a concessioner within the first four years with additional expenditures to follow in later phases of the development.

Conclusion

There is a new day ahead for the visitors of Big Bend National Park. New developments which are now under way, plus those to come will, by 1966, prepare the park to return to the people of America a full measure of enjoyment, understanding, and inspiration -

the products of an unspoiled natural scene. By eliminating the frustrations of traffic jams, crowded camps, "NO VACANCY" signs, and rough, dusty roads, more time and certainly a frame of mind more receptive to enjoyment will be generated.

For a while, as new facilities are being installed, there will be a period of some inconvenience -- roads, especially, are not rebuilt without some disruptions in traffic. But on the whole, new construction will be packaged so that each new development will be completed rapidly, economically, and with least disturbance to the visitors. By 1966 visitors will find Big Bend attuned to the times, and equipped for the needs of the day.

December 17, 1937

Memorandum

To: Regional Director, Region Three

From: Superintendent, Big Bend

Subject: MISSION 66 Prospectus Brief - Big Bend

We appreciate the fine review you gave our prospectus and your thoughts and comments have been recorded in the final draft. It has now been mimeographed and is ready for distribution, but because of the Christmas mailing, we are holding these copies until December 27 before putting them in the post office.

Copies are being distributed as outlined in your memorandum of October 31 and are being forwarded by parcel post.

(Byd) GEORGE W. MILLER
George W. Miller
Superintendent

Copy to: Director
WDC
Region One
Region Two
Region Four
Region Five
WDC

DEC 17 1937 A

Of you
George W. Miller
WDC

April 19, 1957

Memorandum

To: Director

From: Superintendent, Big Bend National Park

Subject: Reporting on Accommodations for the Public - MISSION 66

In accordance with your memorandum FO-19-57, dated March 22 on the above subject, there is attached the information requested on the forms furnished.

It is to be noted that no information has been furnished by the concessioner for the park. This concession operation is being advertised in an attempt to obtain new capital for the development of public accommodations.

(Sgd) GEORGE W. MILLER

In duplicate
Attachments (2)

George W. Miller
Superintendent

Copy to: Regional Director
WDC
each w/copy of report

APR 22 1957

Rest → *[Signature]*
[Signature]
[Signature]

WACO BEACH NATIONAL PARK

Three

SUMMARY - ENTIRE PARK

Facilities	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Pillow Capacity				200		70	250		250	710
Supt. Est.										
Conc. Est.										
Trailer Courts				65			35		25	125
Supt. Est.										
Conc. Est.										
Eating Facilities				255			150		50	555
Supt. Est.										
Conc. Est.										
Stores				2					1	3
Supt. Est.										
Conc. Est.										
Gasoline Stations										2
Supt. Est.										
Conc. Est.										
Boat Docks and Slips									10	30
Supt. Est.										
Conc. Est.										

1/ Totals should agree with the appropriate totals in Columns 4 and 5, Schedule A, and Columns 3 and 4, Schedule B, for the entire park.

Swimming Pool

1

1

Page Three

TRAILER COURTS, EATING FACILITIES AND
AND OTHER SERVICES

HOOD NATIONAL PARK

(Leave blank)

SUMMARY - ENTIRE PARK

Type and Class	Unit of Measure	Existing Facilities Jan. 1, 1957	Add'l. Facilities Required by 1966		Concessioner MISSION 66 Plans	Remarks
			Supt. Est.	Conc. Est.		
Trailer Courts *	(1) Trailer Sites	(2) 4	(3) 123	(4)	(5)	(6)
Eating Facilities (Total)	Seating Capacity					
Dining Rooms		65	475			
Coffee Shops		-	80			
Cafeterias		-	-			
Refreshment Counters		5				
Stores (Total)	Number					
General		0	0			
Grocery		1	3			
Photographic Supply		1	3			
Souvenirs		1	3			
Gasoline Service Stations	Number	2	2			
Boat Docks and Slips	Docking Capacity	0	30			

Total number stores - 3,
each selling groceries,
photographic supplies
and souvenirs.

* Definition: Concessioner-operated facilities that have been developed
and designed specifically for accommodation of house trailers.

SECRET - EYES ONLY

Type and Class of Accommodations	Existing Facilities January 1, 1961			Additional Pillow Capacity Required by 1964		Concessioner's REVISION OF Plans		Total Pillow Capacity Required by 1964
	No. of Bldgs.	No. of Sleeping Rooms	Pillow Capacity	Supt. Est.	Conc. Est.	No. Rooms to be Rehabilitated	No. Pil- lows to be Added	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<u>Total-Visitor Accommodations</u>	—	—	—	—	—	—	—	—
<u>Hotels (Total)</u>	—	—	—	—	—	—	—	—
Class A	—	—	—	—	—	—	—	—
Class B	—	—	—	—	—	—	—	—
Class C	—	—	—	—	—	—	—	—
<u>Cabins (Total)</u>	—	—	—	—	—	—	—	—
Class A	5	6	35	400	—	—	—	—
Class B	—	—	—	120	—	—	—	—
Class C	—	—	—	150	—	—	—	—
Housekeeping	—	—	—	0	—	—	—	—
Shelter	—	—	—	0	—	—	—	—
Tennis	—	—	—	0	—	—	—	—
Other (Specify) <i>Dallas Huts</i>	19	23	77	0	—	—	—	—
<u>Concessioner Employee Quarters (Additional to Col. 8 above)</u>	8	12	32	180	—	—	—	—

SCHEDULE B

DEVELOPMENT PROGRAM - 1957-1966 CONSTRUCTION FACILITIES ESTIMATE

Region Three

WYO BEAR NATIONAL PARK

(Developed Area or Location in Park)

Facilities	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	Total by 1966 1/
Pillow Capacity Supt. Est. Conc. Est.				90			100		200		490
Trailer Courts Supt. Est. Conc. Est.				40			35				75
Eating Facilities Supt. Est. Conc. Est.				100			150			100	350
Stores Supt. Est. Conc. Est.				1							1
Gasoline Stations Supt. Est. Conc. Est.				1							1
Boat Docks and Slips Supt. Est. Conc. Est.				10			10				20

1/ Totals should agree with the appropriate totals in Columns 4 and 5, Schedule A, and Columns 3 and 4, Schedule B, for the entire park.

Swimming Pool

1

1

SCHEDULE C

MISCELLANEOUS SERVICES

Region Three

BIG BEND NATIONAL PARK
(Name of Park)

NID (NAME)
(Developed Area or Location in Park)

Type and Class	Available Jan. 1, 1957		Superintendent's Estimate of Needs by 1966				Concessioner's Plans			Remarks
	Yes	No	None	Improve	Expand	Discontinue	No Change	Improve	Expand	
Marine Services										
Repairs		X	X							
Supplies		X	X							
Launching Facilities		X		X						
Boat Rentals										
Power		X	X							
Other		X		X						Rubber raft only
Rental Services										
Horses		X		X						
Camping Equipment		X	X							
Automobiles		X		X						
Winter Sports Equip.		X	X							
Public Laundries		X		X						
Public Lodges		X		X						
Medical Services		X		X						
Barber and Beauty Shops		X		X						
Amusement Services		X		X						
Amusement Facilities		X	X							
Amusement		X	X							
Swimming Pool		X		X						

SCHEDULE B

TRAILER COURTS, EATING FACILITIES AND STORES
AND OTHER SERVICES

Region Three

WISCONSIN NATIONAL PARK
(Name of Park)

WISCONSIN
(Developed Area or Location)
Park)

Type and Class	Unit of Measure	Existing Facilities Jan. 1, 1957	Add'l. Facilities Required by 1966		Concessioner MISSION 66 Plans	Remarks
			Supt. Est.	Conc. Est.		
	(1)	(2)	(3)	(4)	(5)	(6)
Trailer Courts *	Trailer Sites		75	-		
Eating Facilities (Total)	Seating Capacity					
Dining Rooms			300			
Coffee Shops			30			
Cafeterias			0			
Refreshment Counters			0			
Stores (Total)	Number					
General			0			
Grocery						
Photographic Supply						
Souvenirs						
Gasoline Service Stations	Number		1			
Boat Docks and Slips	Docking Capacity		20			

For rubber rafts only

* Definition: Concessioner-operated facilities that have been developed and designed specifically for accommodation of house trailers.

SCHEDULE A

OVERNIGHT ACCOMMODATIONS

Region Three

RIO GRAND NATIONAL PARK
(Area of Park)

NIO GRANDE
(Developed Area or Location in Park)

Type and Class of Accommodations	Existing Facilities January 1, 1957			Additional Pillow Capacity Required by 1966		Concessioner's MISSION 50 Plans		Pillow Capacity used for Concession Employees 1956
	No. of Bldgs.	No. of Sleeping Rooms	Pillow Capacity	Supt. Est.	Conc. Est.	No. Rooms to be Rehabilitated	No. Pil- lows to be Added	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<u>Total-Visitor Accommodations</u>	—	—	—	—	—	—	—	—
<u>Hotels (Total)</u>	—	—	—	—	—	—	—	—
Class A	—	—	—	—	—	—	—	—
Class B	—	—	—	—	—	—	—	—
Class C	—	—	—	—	—	—	—	—
<u>Cabins (Total)</u>	—	—	—	—	—	—	—	—
Class A	—	—	—	240	—	—	—	—
Class B	—	—	—	150	—	—	—	—
Class C	—	—	—	150	—	—	—	—
Housekeeping Shelter	—	—	—	—	—	—	—	—
Tents	—	—	—	—	—	—	—	—
Other (Specify)	—	—	—	—	—	—	—	—
Concessioner Employee Quarters (Additional to Col. 3 above)	—	—	—	150	—	—	—	

UNITED STATES DEPARTMENT OF THE INTERIOR

BIG BEND NATIONAL PARK

CHisos BASIN

Three

(For use in location)

Facilities	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	Total
Pillow Capacity Supt. Est. Conc. Est.				130		70					160
Trailer Courts Supt. Est. Conc. Est.				0							
Eating Facilities Supt. Est. Conc. Est.				135 0							135
Stores Supt. Est. Conc. Est.				1							1
Gasoline Stations Supt. Est. Conc. Est.				0							0
Boat Docks and Slips Supt. Est. Conc. Est.				0							0

1/ Totals should agree with the appropriate totals in Columns 4 and 5, Schedule A, and Columns 3 and 4, Schedule B, for the entire park.

SCHEDULE C

MISCELLANEOUS SERVICES

BIG BEND NATIONAL PARK
(Name of Park)

CHICOPEE RIVER Location in Park
(Developed Area)

Type and Class	Available Jan. 1, 1957		Superintendent's Estimate of Needs by 1966				Concessioner's Plans			Remarks
	Yes	No	None	Improve	Expand	Discontinue	No Change	Improve	Expand	
Marine Services										
Repairs		X	0							
Supplies		X	0							
Launching Facilities		X	0							
Boat Rentals		X	0							
Power		X	0							
Other										
Rental Services										
Horses	X			X						
Camping Equipment		X	0							
Automobiles		X		X						
Winter Sports Equip.		X	0							
Laundries		X		X						
Public Baths	X			X						
Medical Services		X	0							
Hair and Beauty Shops		X		X						
Postal Services		X	0							
Telephone Facilities		X	0							
Trails		X	0							

Table 30

TRAILER-CAMPING FACILITIES AND
AND OTHER DEVELOPMENTS

BIG BEND NATIONAL PARK

CHisos BASIN

(Developed Area or Areas)

Type and Class	Unit of Measure	Existing Facilities Jan. 1, 1957	Add'l. Facilities Required by 1960		Concessioner MISSION 36 Plans	Remarks
			Supt. Est.	Conc. Est.		
	(1)	(2)	(3)	(4)	(5)	(6)
Trailer Courts *	Trailer Sites	0	0	-	-	
Eating Facilities (Total)	Seating Capacity					Existing dining room to be replaced
Dining Rooms		65	125			
Coffee Shops		0	30			
Cafeterias						
Refreshment Counters						
Stores (Total)	Number					Existing store to be replaced
General		0	0			
Grocery		1	1			
Photographic Supply						
Souvenirs						
Gasoline Service Stations	Number	1	0			
Boat Docks and Slips	Docking Capacity	0	0			

* Definition: Concessioner-operated facilities that have been developed and designed specifically for accommodation of house trailers.

Three

ACCOMMODATIONS

RED WING NATIONAL PARK

CHESAPEAKE BASIN

Type and Class of Accommodations	Existing Facilities January 1, 1957			Additional Pillow Capacity Required by 1966		Concessioner's MISSION Plans		Capacity Used for Concession Employees 1956
	No. of Bldgs.	No. of Sleeping Rooms	Pillow Capacity	Supt. Est.	Conc. Est.	No. Rooms to be Rehabilitated	No. Pil- lows to be Added	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total-Visitor Accommodations	—	—	—	—	—	—	—	—
Hotels (Total)	—	—	—	—	—	—	—	—
Class A	—	—	—	—	—	—	—	—
Class B	—	—	—	—	—	—	—	—
Class C	—	—	—	—	—	—	—	—
Cabins (Total)	—	—	—	—	—	—	—	—
Class A	—	—	—	—	—	—	—	—
Class B	—	—	—	—	—	—	—	—
Class C	—	—	—	—	—	—	—	—
Housekeeping Shelter	—	—	—	—	—	—	—	—
Tents	—	—	—	—	—	—	—	—
Other (Specify) Baller Huts	19	33	* 77	0	—	—	—	—
Concessioner Employee Quarters (Additional to Col. C above)	6	12	32	40*	—	—	—	—

* To be replaced with better accommodations
Pillow factor - 3 persons per room used
* Not included in pillow capacity on summary

SCHEDULE C

MISCELLANEOUS SERVICES

Region Three

BIG FORD NATIONAL PARK

(Name of Park)

CASTOLAN

(Developed Area or Location in Park)

Type and Class	Available Jan. 1, 1957		Superintendent's Estimate of Needs by 1966				Concessioner's Plans			Remarks
	Yes	No	None	Improve	Expand	Discontinue	No Change	Improve	Expand	
Marine Services		X	-							Rubber Raft Only
Repairs		X	-							
Supplies		X	-							
Launching Facilities		X	-							
Boat Rentals			-							
Power		X		X						
Other										
Rental Services		X		X						
Horses		X	-							
Camping Equipment		X	-							
Automobiles		X	-							
Winter Sports Equip.										
Public Laundries		X		X						
Public Baths		X		X						
Medical Services		X		X						
Barber and Beauty Shops		X	X							
Medical Services		X		X						
Winter Use Facilities		X	X							
Ski Tows		X	X							

Three

BIG BEND NATIONAL PARK

Castolon

Facilities	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Pillow Capacity											
Supt. Est.									50		50
Conc. Est.									-		-
Trailer Courts											
Supt. Est.									25		25
Conc. Est.									-		-
Eating Facilities											
Supt. Est.									50		50
Conc. Est.									-		-
Stores											
Supt. Est.									1		1
Conc. Est.									-		-
Gasoline Stations											
Supt. Est.									1		1
Conc. Est.									-		-
Boat Docks and Slips											
Supt. Est.									5		5
Conc. Est.									-		-

1/ Totals should agree with the appropriate totals in Columns 4 and 5, Schedule A, and Columns 3 and 4, Schedule B, for the entire park.

Region **Three**

**TRAILER COURT, WATER FACILITIES AND
AND OTHER SERVICES**

Big Bend National Park

Castolon

Type and Class	Unit of Measure	Existing Facilities Jan. 1, 1957	Add'l. Facilities Required by 1956		Concessioner MISSION 55 Plans	Remarks
			Supt. Est.	Conc. Est.		
	(1)	(2)	(3)	(4)	(5)	(6)
Trailer Courts *	Trailer Sites	0	25			
Eating Facilities (Total)	Seating Capacity					
Dining Rooms		0	50			
Coffee Shops		0	0			
Cafeterias		0	0			
Refreshment Counters		0	0			
Stores (Total)	Number					
General			0			
Grocery						
Photographic Supply			1			
Souvenirs						
Gasoline Service Stations	Number		1			
Boat Docks and Slips	Docking Capacity		10			rubber raft docking facility

* Definition: Concessioner-operated facilities that have been developed and designed specifically for accommodation of house trailers.

SCHEDULE A

OVERNIGHT ACCOMMODATIONS

Region Three

HOPE BEND NATIONAL PARK

(Development or Location in Park)

Type and Class of Accommodations	Existing Facilities January 1, 1957			Additional Pillow Capacity Required by 1966		Concessioner's MISSION 56 Plans		Pillow Capacity used for Concession Employees 1956
	No. of Bldgs.	No. of Sleeping Rooms	Pillow Capacity	Supt. Est.	Conc. Est.	No. Rooms to be Rehabilitated	No. Pil- lows to be Added	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<u>Total-Visitor Accommodations</u>	—	—	—	—	—	—	—	—
<u>Hotels (Total)</u>	—	—	—	—	—	—	—	—
Class A								
Class B								
Class C								
<u>Cabins (Total)</u>	—	—	—	—	—	—	—	—
Class A				50				
Class B				—				
Class C				—				
Housekeeping				—				
Shelter				—				
Tents				—				
Other (Specify)				—				
Concessioner Employee Quarters (Additional to Col. 8 above)				—				

SCHEDULE D

DEFERRED PROGRAM - ADDITIONAL CONCESSION FACILITIES

Region Three

(Name of Park) HIG BEND NATIONAL PARK

Panther Junction or nearby
(Developed Area or Location in Park)

Facilities	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	Total by 1966
Pillow Capacity Supt. Est. Conc. Est.											
Trailer Courts Supt. Est. Conc. Est.				25 —							25 —
Eating Facilities Supt. Est. Conc. Est.											
Stores Supt. Est. Conc. Est.				1 —							1 —
Gasoline Stations Supt. Est. Conc. Est.											
Boat Docks and Slips Supt. Est. Conc. Est.											

1/ Totals should agree with the appropriate totals in Columns 4 and 5, Schedule A, and Columns 3 and 4, Schedule B, for the entire park.

ARTICLE 6

TRAILER COURTS, EATING FACILITIES AND STORES AND OTHER SERVICES

Three

(Hwy 66 National Park)

(Development Junction)

Type and Class	Unit of Measure	Existing Facilities Jan. 1, 1957	Add'l. Facilities Required by 1956		Concessioner MISSION 66 Plans
			Supt. Est.	Conc. Est.	
	(1)	(2)	(3)	(4)	(5)
Trailer Courts *	Trailer Sites	4	25	-	
Eating Facilities (Total)	Seating Capacity				
Dining Rooms		0	0		
Coffee Shops		0	0		
Cafeterias		0	0		
Refreshment Counters		0	0		
Stores (Total)	Number				
General		0	0		
Grocery		0	0		
Photographic Supply		0	0		
Souvenirs		0	0		
Gasoline Service Stations	Number	1	0		
Boat Docks and Slips	Docking Capacity	0	0		

* Definition: Concessioner-operated facilities that have been developed and designed specifically for use by a group of house trailers.

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I. STATEMENT OF SIGNIFICANCE

Big Bend National Park

Big Bend National Park is a vast primitive wilderness dominated by spectacular geological features and contains a wide variety of plants, birds and animals which have been modified profoundly by the arid environment. The scenery, flora and fauna of this region is rare in its occurrence in the United States and more nearly typifies Mexico. This region with its unique scenery, climate and history makes this park one of prime interest to the traveling public. Weird, silent, colorful and everchanging, the Big Bend country is a land of moods, limitless views, and unexpected values.

Any sound plan for the management and development of Big Bend National Park must be based upon the wise use of selected values. Those upon which this one is based comprise the mountains, the canyons, the river, the desert, the interesting plants, animals and birds that inhabit them, as well as the distinctive activities of man.

Deserts are places for rest and contemplation, or for seeking out the inspiration that comes with a sunset on the del Canyons... a storm over the Dead Horse... or the moonrise in the Basin. Camping, picnicking, fishing, boating, observing wildlife and exploring the intricate by-ways of the park by horse and on foot -- these are all conforming uses.

Creating use -- even conforming uses -- has its hazards, both to the desert and to man. In some respects, the visitor needs more protection from the wilderness than it does from him. There are pitfalls inherent in the desert for the unwary. People must get off the beaten path safely. Good information and competent protection services can accomplish this. Yet, desert biotic values are fragile and they recover from over-use slowly. This caution restricts development plans in the Basin. The need to insure and safeguard the continued existence of rare species in the park is an ever-present one. The fundamental control of the use of park resources is understanding, appreciation, and awareness on the part of visitors which can be achieved through a well designed interpretive program.

Geologically, the Big Bend region is one in which there are spectacular examples of physiographic features developed under semi-arid conditions. Crustal movements are impressive and extensive. The Sierra de Anguila on the west, and the Santiago and Sierra del Camacho ranges on the east, are the approximate boundaries of an elongate, structurally low area called the "sunken block." Displacements range up to 4000 and 6000 feet. Into and through this broken surface, the Chisos Mountains were extruded. Lavas up to 2000 feet in thickness at the South Rim suggest the distances that lava flowed out over the land, even diverting the Rio Grande, according to some geologists. The river forms the southern boundary of the park for 137 miles. Three spectacular canyons in great mountain uplifts have been cut by this meandering and historic stream. The ruggedness, the boldness and the bareness of the geological landscape stirs the visitor, while the complexity of its origin interests geologists.

There is an abundance and an unusual variety of fossil remains, particularly of Cretaceous vertebrate fauna.. scales of gar fish, teeth of rays and sharks, bones of marine turtles, giant

alligators and dinosaurs. Ceratopsian and hadrosaurian dinosaurs and, tentatively at least, sauropod remains have been identified. The bones of fossil mammals in association with those of reptiles such as have been found here, are rare. Little is known of this aspect of the park.

The park is a complete biotic unit, taking in not only the lowlands along the Rio Grande and the immediate elevations, but also the woodland and the forests of the higher altitudes. It affords a complete biological picture. There is plenty of opportunity for the seasonal ebb and flow of migratory species within the park and for the development of an unusual variety of plant and animal life under the influence of widely varying conditions of soil and climate. The mammals, insects and the reptiles are characteristically out of sight, many of them nocturnal. The game species are self-effacing and cautious, waiting to see you before you see them. Even the birds are not easy to see and follow. One is sure to be impressed with the barrenness and lifelessness of the area until he begins to get somewhat better acquainted with it, but the resources are there even if they are so largely hidden.

No less than 240 kinds of birds have been recorded in the park, including a number of rare forms such as the blue-throated hummingbird, dwarf red-shafted flicker, Mexican phainopepla, Colima warbler, and the hooded oriole. The varieties of mammals total 57, among the most interesting of them being the ringtail cat, the mountain lion, the beaver and the peccary. The flagtail deer are found in the high mountain section and the mule deer in the lower parts of the park.

Almost any of the 1,000 or more species of plants in the park are of special interest: the drooping juniper, occurring nowhere in the United States except in the Chisos Mountains; the tobosa grass, once marking the range of the antelope; acacia, found only in the Big Bend and, with its fleshy leaves, thorns and tall stalk reminding one of a little century plant; the long-spurred columbine, a species from Mexico, restricted to three springs in the park; the giant dagger, king of all the yucca tribe in the United States, as impressive as the giant saguaro of southern Arizona or the giant tree yucca of the Mohave desert.

Some of the plants are rare; some are relict - survivors of another age. Others are unusual for the adaptations they have made to a harsh environment. To the casual visitor, the abundance, the variety, the color, and perhaps the strangeness of the plants is always a source of interest. To the specialist, however, they are indicators of changes in the past, or those in process.

The occurrence on the higher portions of the mountains of a forest type with western yellow pine, Douglas fir, quaking aspen, Arizona cypress, flammulated screech owl, and Rocky Mountain nuthatch indicate relationships with high mountain areas, both north and south. Similarly, the woodland type on the Chisos mountains shows relationship with the Rocky Mountains to the northwest and the Chihuahua-Coahuila area in Mexico as well.

The sctol-grass type on the Park area is the southernmost extension of the plants and animals of the Great Plains which extend from Texas and northeastern New Mexico to the Canadian boundary. In the Big Bend we find Great Plains species and Mexican derivatives intermingled. The desert scrub itself indicates close relationship with the vast desert area of the southwestern United States and northern Mexico.

Migrations of flora and fauna to and from the warmer climates to the south, caused by glacial advance and recession, explains, perhaps, the abundance of species, the unusualness of some of them and the processes of hybridization so fascinating to biologists. Complex, little known, nevertheless here exist dramatic illustrations of the chain of relationships between living things and their environment.

Harsh, generally physically inhospitable, arid, hot in summer, the region instantly attracts and fascinates the visitor or repels him utterly. There are no dashing mountain trout streams, no grassy glades nor towering trees, but instead, the bleak drab desert lowlands and stark bare mountains which shimmer in the summer heat, apparently devoid of life. The observing visitor, however, soon learns that the higher mountains are a treasure house of plant and animal life as exotic as unexpected and that even the drab lowlands come to life at sundown with birds, mammals and reptiles in surprising numbers. Thus it is the time of day, season of the year, type of weather which has much to do with one's impression of Big Bend. Appreciation comes to the perceptive, to the unhurried and to those who watch it from day to day.

People interest people; the folklore rather than history is significant in Big Bend. The quality of human use -- how people make a living off the land -- their problems -- their quarrels -- their successes -- their failures -- the toll levied on them by this mode of living -- this interests visitors. The border incidents of the past, dramatized in terms of individuals, provide insight into today's strife along the frontiers of the world. Basketmaker Indians, the Apache and Comanche were here before them, but the focal points of human history center around the Texans and the Mexicans of today and the recent past.

Any management plan to bring about better conservation and use must capitalize upon these characteristics.

This plan, illustrated on the five accompanying charts, represents a radical change from the existing organization. It is necessary because of the need to spread visitor accommodations over three areas rather than concentrating in the Chisos Basin alone. Park headquarters, a fourth developed area, will remain at Panther Junction. This will make possible the removal of all but a five-man staff from the restricted Chisos Basin; headquarters will absorb the balance of the load.

The role of Park Headquarters in this plan is that of control center for the functioning of the park divisions and to carry out those activities which can be most effectively handled from a central headquarters. These activities include all administrative services, procurement, warehousing, concessions management, overall planning and project proposal activities, technical coordination of protection, interpretation and maintenance activities, repair of equipment, buildings and utilities, specialized services in the fields of engineering, landscape architecture, biology and interpretation, cooperative activities and some phases of public relations. There will also be a visitor center in the administrative building.

Ranger districts will be reduced from four to two in 1958. By 1966 the Division of Ranger Activities will have a permanent staff of 19, a seasonal staff of seven man-years. The two ranger districts will be established to include areas of similar activities and problems; they will be the River District, encompassing all the Rio Grande frontage, and the Headquarters District including the Chisos Mountains, Sierra del Carmen, and Persimmon Gap Entrance. Four sub-districts will be established, as follows: Chisos Mountains, Persimmon Gap, Boquillas and Santa Elena.

Interpretive services will be centered at Chisos Basin, Rio Grande, Castolon and Park Headquarters. Visitor centers, each emphasizing a different phase of the park, are proposed for each of these areas. Ultimately this division will be staffed with 13 permanents and 18 seasonals.

Districts for routine maintenance will be established at Rio Grande and Castolon in addition to the existing one at Park Headquarters. Headquarters will continue to provide the technical and professional phases. This division will consist eventually of 40 permanent and 24 seasonal personnel.

This type of organization is designed for routine maintenance and operation. It is not geared for other than minor construction activities.

Big Bend National Park

Superintendent
Assistant Superintendent

Ass't. to Superintendent
Superintendent's Secretary

Landscape Architect

Interpretation

Chief Naturalist
Ass't. Chief Naturalist
Clerk-Stenographer

District Naturalist
 Boquillas
District Naturalist
 Castolon
District Naturalist
 Chisos Basin
Naturalist
 Headquarters
Biologist
Museum Preparator

Protection

Chief Park Ranger
Ass't. Chief Park Ranger
Clerk-Stenographer

River District Ranger
Headquarters Dist. Ranger

Administration

Administrative Officer

1 - Clerk-Stenographer
1 - Clerk-General
1 - Clerk-Personnel
1 - Clerk-Mails & Files
3 - Clerk-Typist
3 - Clerk-Typist
 (seasonal)
1 - Gen. Supply Clerk

Engineering and
Maintenance

Park Engineer
Engineer-Trainee
Clerk-Stenographer

Supervisor, R&T
Supervisor, B&U
Shop Foreman

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Rig Bend National Park

Headquarters District

CHIEF NATURALIST

Ass't. Chief Naturalist

Panther Junction

2 Park Naturalists
3 Naturalists (seas.)

Basin Center

Dist. Naturalist
Ass't. Naturalist
5 Naturalists (seas.)

CHIEF PARK RANGER

Assistant Chief Park Ranger

District Ranger
Headquarters

Chises Mountains
Sub-District Ranger

Basin Area
Supervisory Ranger
Park Ranger
2 Fire Control Aids

Headquarters Area
Park Ranger
2 Rangers (seas.)

Persimmon Gap
Sub-District Ranger

Entrance Station
Park Ranger
3 Rangers (seas.)

Sub-District Personnel
Park Ranger
3 Rangers (seas.)

ENGINEER

Supervisor
Maintenance (R&T)

1 Foreman, Mixed Gang
2 Equip. Operators
1 Truck Driver
1 Laborer (Perm.)
5 Laborers (Seas.)
1 Laborer (Boat Spg.)

Shop Foreman
2 Mechanics, H.D.
1 Grease Man

Supervisor
Maintenance (B&U)

1 Carpenter
1 Laborer (Perm.)

1 Plumber
1 Truck Driver
1 Janitor
4 Laborers (seas.)

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Big Bend National Park

RIVER DISTRICT

BOQUILLAS SUB-DISTRICT
(Rio Grande)

Chief Naturalist	Chief Park Ranger Assistant Chief Ranger	<u>Supervisor</u>
Dist. Naturalist	River District Ranger	Foreman, Mixed Gang
Ass't. Naturalist	Boquillas Sub-District Ranger	1 Equip. Operator R&T
7 Seasonal Naturalists	Rio Grande Village Area Park Ranger 3 Rangers (seasonal)	2 Truck Drivers R&T
	Sub-District Personnel Park Ranger 2 Rangers (seasonal) 1 Fire Control Aid	2 Laborers (Perm.) 5 Laborers (seas.) R&T
		2 Campmen B&U
		1 Maintenanceman 1 Truck Driver B&U Sanitation
		2 Laborers (perm.) 3 Laborers (seas.)

Big Bend National Park

RIVER DISTRICT

SANTA ELENA SUB-DISTRICT
(Castolon)

Chief Naturalist

Chief Park Ranger
Assistant Chief Park Ranger

Supervisor

Dist. Naturalist

River District Ranger

Foreman, Mixed Gang

Ass't. Naturalist

Santa Elena
Sub-District Ranger

1 Equip. Operator
R&T

3 Naturalists
(Seasonal)

Castolon Area
Park Ranger
3 Rangers (Seasonal)

1 Truck Driver
R&T

Maverick Entrance
Park Ranger
3 Rangers (seasonal)

2 Laborers (Perm.)
3 Laborers (Seas.)
R&T

Sub-District Personnel
Park Ranger
2 Rangers (Seasonal)

1 Campman (R&U)

1 Laborer (perma.)
3 Laborers (seas.)

(3.) Conservation and Protection

Big Bend National Park

The activities of the Protection Division of Big Bend National Park will be largely influenced by the following considerations:

- (1) Proximity of a foreign culture and presence of a population which has difficulty in achieving a bare subsistence. Mexican nationals commit most major park violations, such as poaching, destruction of native plants, trespass grazing, and theft of government and visitor property.
- (2) Extensiveness of the park, 223 miles of boundary; 107 miles of park's southern boundary, the Rio Grande, adjoins Mexico with almost unlimited accessibility to Mexican nationals; 116 miles of remaining boundary are occupied by cattle and sheep ranches which are used for deer hunting camps each fall; periodic trespass grazing from this source may be expected to continue.
- (3) Rugged, mountainous terrain as well as deeply eroded canyons and arroyos affect the efficiency of ground protection patrols of large portions of park making patrols extremely difficult and time consuming, if not impossible at times.
- (4) The need to inform and safeguard an increasingly large number of visitors who may possess varying degrees of unfamiliarity with the hazards of an arid desert and mountainous environment.

In order to cope with the wide and unusual variety of protection problems in Big Bend National Park, the park will be organized into two large ranger districts along geographic, as well as functional lines. The Chief Park Ranger's office at Park Headquarters will exercise over-all control of the protection program, but will delegate well defined responsibilities and duties to the district level for independent decision and action.

The River District includes Boquillas and Santa Elena Sub-Districts will have similar major activities involving water safety, safeguarding of park flora and fauna from destruction by Mexican nationals, traffic safety, visitor safety in a desert environment, and two large public use developments. The district will provide complete informational service to visitors at two visitor centers, and will eventually operate two entrance stations for the collection of fees. Because of the long distances, difficult accessibility, and large acreages involved, the River District is by necessity divided into two sub-districts. Scope of activities and workload will more or less be evenly spread throughout the year.

The Headquarters District will have the major forest and grass fire control activity, critical soil and moisture area and responsibility for visitor safety on mountain trails. In addition, this district will also have a large public use development, entrance station, two information station operations, and a traffic safety problem due to long straight stretches of park road, conducive to high speeds, and additionally, steep, sharply curving mountain roads. Scope of activities and workload will undoubtedly be heaviest during the spring and summer months. Due to the brittle and unstable nature of the rocks and formations in the Chisos Mountains, rock climbing in this area is an extremely hazardous undertaking. Visitors must be warned of the hazards involved, and rangers must be trained in rock climbing and rescue techniques.

One of the most unusual protection problems in Big Bend National Park is the candelilla wax-making operations. Processing of the candelilla plant for the high grade wax it contains has been a part of the border economy for many years, and persistent harvesting of the plant on both sides of the Rio Grande has seriously depleted the species. It is extremely important that the only remaining excellent stand of candelilla, which is in the park, be protected. The location of a wax camp is usually determined by its proximity to candelilla and water, and every effort is made to satisfy these requirements in an isolated, hidden location, necessitating extensive ground and aerial patrol measures for detection and control. The most effective means found of dealing with the wax makers, who are Mexican nationals, has been to search out their camp and destroy it. The most economical and effective method of detection will continue to be through air patrol, supplemented by ground patrols to known wax-making areas. Aircraft will be rented. Wax-making operations in the park will accelerate or diminish according to fluctuations in the market price of the high grade wax, used in the production of chewing gum, as well as in many other industrial processes. If undetected, entire areas of the park can be stripped of this plant in a relatively short period of time, and operators may net several hundred dollars for a few days of work. To the impoverished border Mexicans,

the incentive for this activity is quite strong. Approximately 200,000 acres along the Rio Grande and inland in other widely separated and difficult of access locations must be intensively patrolled in combating the wax operations. Year long vigilance must be maintained. Poaching for deer and other wildlife, dynamiting of fish in the Rio Grande, theft of government and private property along the Rio Grande and the deliberate grazing of Mexican-owned horses and burros on the park will require vigorous protective measures. It is highly desirable that rangers in the River District be bilingual.

Although the scope and variety of violations committed by Mexican nationals will continue as a primary threat to park values along the Rio Grande, another difficult situation will be faced on the remaining boundary line each fall hunting season. As there are no public lands open to hunting in Texas, hunters must lease or arrange with private land owners for deer hunting privileges. Private lands occupied by ranches adjoin the park for 116 miles, this boundary being accessible by jeep in 26 places. As deer and other wildlife become increasingly scarce outside the park due to hunting and population pressures, poaching of park wildlife by American hunters is expected to rise. Periodic trespass throughout the year by horses, cattle, sheep and goats from these ranches is expected to continue.

Visitor use of the Rio Grande is expected to materially increase with increased park visitation, the river being the focal point for many visitors because of the water recreation opportunities. Canyon float trips, shorter concessioner-guided float trips and sport fishing will increase. Search and rescue activities in the two river districts must be geared to this expanding water recreation. Because of the natural desire of the average park visitor to at least briefly visit Mexico, the number of visitors crossing the Rio Grande to the Mexican village of Boquillas will undoubtedly be stimulated when the proposed Rio Grande development begins functioning. The many aspects of visitor protection which must be faced when large numbers of visitors cross the river into Mexico, and their relationship with the Border Mexicans, remain to be seen.

Over 100 miles of relatively straight park roads will be conducive to high speeds, and lengthy road patrols in all districts must necessarily be performed for visitor safety. Occasional emergencies on approach roads must be handled. Flash floods during the summer months present annually recurring hazards to river recreationists and to automotive traffic over all park roads. Due to varying degrees of unfamiliarity of large numbers of visitors with the hazards of desert and mountains, special emphasis must be given to this phase of protection throughout the park as visitation increases, specifically: trail safety and rescue in the Chisos Mountains and along the Rio Grande; dissemination of accurate information, warnings and first aid for rattlesnake and scorpion bites; and the effects of extreme heat on unwary visitors and their automotive equipment.

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IV. THE PROGRAM

Big Bend National Park

The following thirteen sections set forth the over-all program for the park management and development theme. The identity, extent, and scope of services and facilities required for this program are given by narrative and chart form in concise statements or statistics.

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(1.) Visitor Accommodations

a. Provided by Concessionary

Accommodations are proposed at the Chisos Basin, Rio Grande Village, Castolon and vicinity of park headquarters. These accommodations include lodges, guest rooms, kitchen and dining facilities, stores, service stations, saddle horses, and trailer campsites. Transportation to, within, and from the park is not available. This service to be furnished by a concessioner.

Concessioners will provide a minimum of 260 units of overnight accommodations during the next ten years, plus an undetermined number of modern trailer spaces. The comparable government program will provide over 400 campground and picnic sites.

The existing accommodations in the Chisos Basin consist of 19 non-modern cabins, comprising 33 guest rooms; 5 modern stone cottages, including 1 large duplex. These stone cottages were constructed by the federal government. There is also a store building owned by the government with temporary additions added thereto, owned by the concessioner. A small dining room with kitchen attached, consisting of grouped temporary structures, is existing. There is also a gasoline service station owned and operated by the concessioner. All of the present concession-owned structures in the Basin to be replaced. Saddle horse service is available. Transportation to be a concession. It is proposed that a lodge, 50 guest rooms, store, gasoline service station and related facilities be constructed by the concessioner in this area.

At the proposed Rio Grande Village site no visitor accommodations exist. A development totaling 160 guest rooms, lodge, store, service station, saddle horse spread, house trailer site, swimming pool, and other guest facilities are to be constructed by the concessioner. Also, boat, saddle horse and public transportation will be a concession requirement. For immediate development it is proposed that the initial installations be concentrated on a modest motel-type development with dining facility, store, house trailer site, service station, and swimming pool. A more elaborate lodge, guest rooms, dining room, swimming pool, and other facilities, in addition to more motel-type guest rooms to be constructed at a later date but prior to 1966.

The existing adobe structures at Castolon, consisting of a store, two residences and a few related buildings, are to be retained in the future development of the ranch-type facility proposed for this area. New visitor accommodations to be built around the existing structures include guest accommodations of 50 rooms, lodge, dining room and service station. Saddle horses, boat and public transportation will be a concession operation.

At Panther Junction the concession-operated service station will continue. In addition, it is proposed that the concessioner construct a small house trailer camp in the rear of the existing service station or at the existing K-Bar ranch. This trailer campsite to take care of those extra large house trailers which cannot be taken conveniently into the Chisos Mountains Basin. A temporary four-unit trailer site has been established at the service station to take care of the present problem.

b. Provided by the Government.

There exists in the Chisos Mountains Basin a small campground constructed by the government, consisting of 18 campsites. Also, at Santa Elena Canyon there are 10 sites. A modern comfort station exists in the Chisos Mountains Basin with pit toilets at the other sites. The existing Basin campground will be abandoned to make room for the proposed lodge development. It will be located in the lower Basin area.

It is proposed to construct campgrounds, picnic facilities and group camps at various locations throughout the park, the camp and picnic sites to include table and bench combinations, charcoal fireplaces, and ramadas. The group camps are to be constructed in two units of approximately 25-man each, at each site, which units shall include cooking facilities, large table and bench combination, covered with a ramada. A small picnic area shall be incorporated as part of the campground development in the Chisos Basin and Castolon. The following table sets forth the statistics for this government accommodations program.

<u>Location</u>	<u>Compsites</u>	<u>Group Camps</u>	<u>Picnic Sites</u>
Mio Grande	200	2 25-man	50
Castolon	100	2 25-man	10
Chisos	75	2 25-man	10
Santa Elena			30
Boquillas			30
Roadside			20

(2.) Visitor Services

Big Bend National Park

a. Provided by the Government

The themes which govern the management and development plans will be presented to the visitors through several means.

The initial informational contacts will be made at the two entrances to the park upon the installation of these facilities as planned. Here the visitor will receive a copy of the general informational booklet for the park and be given such directions and information as may be necessary to start him on his visit.

To carry out the visitor services in the most advantageous way, the installations at several visitor centers are of special importance. These will be located primarily at the points of visitor concentration and concession development. They will form the central point or hub from which visitor activities radiate.

Since the interpretive program will be carried on at several scattered areas within the park, an administrative headquarters will be needed from which to coordinate the program. This will be at park headquarters at Panther Junction. Here a visitor center is planned which will consist of exhibits of orientation character to give an overall picture of the park. Here, also, the park library, scientific specimen collections, storage, and exhibit workshop will be located. Suitable publications will be sold at this as well as all other visitor centers.

The Rio Grande Village visitor center is to be located near the concession and campground development at that point. Exhibits here will feature the Rio Grande story, biology and geology of the park in general and relation to that portion and ecological relations and adaptations; suitable exhibits with reference to adjacent Mexico and good manners across the border; minor exhibits on history and archaeology. A small auditorium, a campfire circle, and riverside nature trails will be centers for interpretive programs of lectures and conducted walks, as well as self-guiding trips. Horseback riding to be featured by the concessioner.

The Chisos Mountains Basin visitor center will give emphasis to the Chisos Mountains geology, biology and ecological relationships. A small auditorium and campfire circle will be used for interpretive talks. The Lost Mine, Window, and South Rim trails radiating from this point will serve as routes for conducted and self-guiding trips to interesting scenic points through interesting communities of flora and fauna. Horseback riding on mountain trails is also offered here by a concessioner.

At such time that the proposed ranch style visitor accommodations are developed at the Castolon ranch area, a small visitor center will be needed at this point. Here, Big Bend ranch history will be given major emphasis with other subjects minor coverage. Evening programs and conducted walks through river and semi-arid localities will be included in the program. Horseback riding will also be a feature at this area.

In addition to the visitor centers and their coordinated activities at and adjacent to points where accommodations are developed it is also proposed to develop a series of orientation and wayside exhibit devices and interpretive markers along the major highways at points or features of particular interest. These proposed exhibits and orientation devices help fill in the interpretive program by providing informative material to the visitor as he travels along the way. They have been made the base of a special study and report (Field Naturalist Carl P. Russell, March 13, 1956, File D62), and are briefly recapitulated as follows:

Seven wayside exhibits (Dagger Flat, "Schipper" fossils, Bequillas, Chisos Geology, Badlands, Cinnabar Mining, and Santa Elena Canyon).

Four locations at which a total of twelve orientation plaques will be installed. (Three at Dugout Wells vicinity, three at a point north of Hot Springs, three at Government Springs turnoff, and three for Mule Ear Peaks).

Three interpretive signs and markers. (Paradise Gap, Dagger Flat Junction, and Candelilla north of Bequillas (Highway tunnel parking area)).

There are twenty-two individual items at fourteen sites. Some of the facilities pertain to more than one subject, but generally, it may be said that four of the installations are given to physical geology, three to botany, one to paleontology, two to human history and four to orientation.

In addition to these features, photographic turnouts at suitable points will be provided as well as consideration given to provision of wildlife observation posts at suitable places where these values can be retained, yet permit the visitor with special interest in the subject opportunity to enjoy them.

The plans are to present a well-rounded interpretive program to enable the visitor to enjoy all of the values of the park and receive the most pleasure from his visit consistent with the preservation and protection of the park features for future generations.

b. Provided by Commissioner.

Sight-seeing tours of the park and saddle horse trips.

Barro and barro-cart tours to the village of Boquillas.

Motorless boating on the larger river pools at the Castolon and Rio Grande Village areas.

Float trips through Mariscal and Boquillas Canyons.

(1.) Conservation and Protection

Big Bend National Park

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- (2) Extensiveness of the park, 223 miles of boundary: 107 miles of park's southern boundary, the Rio Grande, adjoins Mexico with almost unlimited accessibility to Mexican nationals; 116 miles of remaining boundary are occupied by cattle and sheep ranches which are used for deer hunting camps each fall; periodic trespass grazing from this source may be expected to continue.
- (3) Ragged, mountainous terrain as well as deeply eroded canyons and arroyos affect the efficiency of ground protection patrols of large portions of park making patrols extremely difficult and time consuming, if not impossible at times.
- (4) The need to inform and safeguard an increasingly large number of visitors who may possess varying degrees of unfamiliarity with the hazards of an arid desert and mountainous environment.

In order to cope with the wide and unusual variety of protection problems in Big Bend National Park, the park will be organized into three large ranger districts along geographic, as well as functional lines. The Chief Ranger's office at Park Headquarters will exercise over-all control of the protection program, but will delegate well defined responsibilities and duties to the district level for independent decision and action.

Two river districts -- Bequillas and Santa Elena -- will have similar major activities involving water safety, safeguarding of flora and fauna from destruction by Mexican nationals, traffic safety, visitor safety in a desert environment, and a large public use development. Each district will provide complete informational service

to visitors at a visitor center, and each eventually will have an entrance station operation for the collection of a fee. Because of the long distances, difficult accessibility, and large acreages involved, the Rio Grande section is by necessity divided into two districts. Scope of activities and workload will more or less be evenly spread throughout the year.

The remaining Headquarters District will have the major forest and grass fire control activity, critical soil and moisture area and responsibility for visitor safety on mountain trails. In addition, this district will also have a large public use development, entrance station, two information station operations, and a traffic safety problem due to long straight stretches of park road, conducive to high speeds, and additionally, steep, sharply curving mountain roads. Scope of activities and workload will undoubtedly be heaviest during the spring and summer months. Due to the brittle and unstable nature of the rocks and formations in the Chisos Mountains, rock climbing in this area is an extremely hazardous undertaking. Visitors must be warned of the hazards involved, and rangers must be trained in rock climbing and rescue techniques.

One of the most unusual protection problems in Big Bend National Park is the candelilla wax-making operations. Processing of the candelilla plant for the high grade wax it contains has been a part of the border economy for many years, and persistent harvesting of the plant on both sides of the Rio Grande has seriously depleted the species. It is extremely important that the only remaining excellent stand of candelilla, which is in the park, be protected. The location of a wax camp is usually determined by its proximity to candelilla and water, and every effort is made to satisfy these requirements in an isolated, hidden location, necessitating extensive ground and aerial patrol measures for detection and control. The most effective means found of dealing with the wax makers, who are Mexican nationals, has been to search out their camp and destroy it. The most economical and effective method of detection will continue to be through air patrol, supplemented by ground patrols to known wax-making areas. Aircraft will be rented. Wax-making operations in the park will accelerate or diminish according to fluctuations in the market price of the high grade wax, used in the production of chewing gum, as well as in many other industrial processes. If undetected, entire areas of the park can be stripped of this plant in a relatively short period of time, and operators may net several hundred dollars for a few days of work. To the impoverished border Mexicans, the incentive for this activity is quite strong. Approximately 200,000 acres along the Rio Grande and inland in other widely separated and difficult of access locations must be intensively patrolled in combating the wax operations. Year long vigilance must be maintained. Poaching for deer and other wildlife, dynamiting of

dynamiting of fish in the Rio Grande, theft of government and private property along the Rio Grande and the deliberate grazing of Mexican-owned horses and burros on the park will require vigorous protective measures. It is highly desirable that rangers in the Boquillas and Santa Elena ranger districts be bilingual.

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Visitor use of the Rio Grande is expected to materially increase with increased park visitation, the river being the focal point for many visitors because of the water recreation opportunities. Canyon float trips, shorter concessioner-guided float trips and sport fishing will increase. Search and rescue activities in the two river districts must be geared to this expanding water recreation. Because of the natural desire of the average park visitor to at least briefly visit Mexico, the number of visitors crossing the Rio Grande to the Mexican village of Boquillas will undoubtedly be stimulated when the proposed Rio Grande development begins functioning. The many aspects of visitor protection which must be faced when large numbers of visitors cross the river into Mexico, and their relationship with the Border Mexicans, remain to be seen.

Over 100 miles of relatively straight park roads will be conducive to high speeds, and lengthy road patrols in all districts must necessarily be performed for visitor safety. Occasional emergencies on approach roads must be handled. Flash floods during the summer months present annually recurring hazards to river recreationists and to automotive traffic over all park roads. Due to varying degrees of unfamiliarity of large numbers of visitors with the hazards of desert and mountains, special emphasis must be given to this phase of protection throughout the park as visitation increases, specifically: trail safety and rescue in the Chisos Mountains and along the Rio Grande; dissemination of accurate information, warnings and first aid for rattlesnake and scorpion bites; and the effects of extreme heat on weary visitors and their automotive equipment.

The major forest fire control activity will be the Chisos Mountains area. Ten years of drouth have killed a high percentage of oaks and junipers, and the danger of a major fire in future years due to the presence of this fuel will increase drastically. The effects of the drouth will undoubtedly result in increased tree insect and disease infestations in weakened trees. The normal fire season is April 1 to July 30 when dry lightning storms are most likely, however, post season hazards are not infrequent. Lightning-caused fires, in addition to the Chisos, most frequently occur in the Dead Horse Mountains, an area of difficult accessibility. Recovery of large portions of the park from serious overgrazing during the ranching era is producing a highly flammable grass cover, especially along the roadsides, and a vigorous prevention program against man-caused fires will be necessary. The fragile scenic and aesthetic values of the relict forest in the Chisos Mountains can be irreparably damaged by fire. Development of three widely separated large public use areas and the Park Headquarters development will necessitate independent and well trained building fire brigades at each developed area.

Tornillo Flat is considered the most critical section of the park requiring SANC work and has been given the highest priority. Work has thus far been concentrated on approximately 1,500 acres located west of the Tornillo Creek crossing, Route 1. The program has consisted of pitting, ripping, small detentions and seeding with native grasses. Improvement of selected springs and earthen tanks in the park as wildlife watering places has also been accomplished. Seeding and related SANC activity must be performed in the spring months prior to the summer rainy season for best results. The park's modest SANC program should be expanded; however, limitations imposed by weather conditions, favorable periods of vegetative growth, and a relatively arid climate on the success of the program are factors for consideration.

(A.) Circulation System

No changes in the existing pattern of road circulation are planned. Access into the park is through Persimmon Gap on the north, from Marathon, and Study Butte on the west from Alpine. This through road leads to the spur road junction for Santa Elena, Castolon, Basin, Rio Grande Village, Bequillas Canyon and Mariscal Canyon. Minor spur roads will lead to Grapevine Hills, Dagger Flat, and the Fossil Exhibit. The narrow, unsurfaced roads that lead to special sites and others used for administrative purposes shall be retained in their present condition. There are many miles of unsurfaced and abandoned roadways that are to be obliterated.

The park through road and the roads leading to the Basin, Rio Grande Village, Castolon and Santa Elena Canyon are to be high standard and oil-surfaced. The spur roads leading to Grapevine Hills from the Basin Junction, Dagger Flat from Route 1, Fossil Exhibit from Route 1, Bequillas Canyon from Rio Grande Village, Mariscal Canyon from lower Tornillo Creek Crossing, are to be lower standard and oil surfaced.

The 16 miles of road from Persimmon Gap south is to be reconstructed, on the existing alignment, including two bridges. A bridge is to be constructed at the upper Tornillo Creek crossing including four miles of road. The remainder of this through road to the Maverick Entrance and the side roads to the Basin, Park Headquarters and to the lower Tornillo Creek crossing is to be sealed and given a chip surface.

The road from the lower Tornillo Creek Crossing to the Rio Grande Village is for construction during 1957. The lower Tornillo Creek Bridge is scheduled to follow. The low standard road from the Rio Grande Village to Bequillas Canyon to be oil surfaced. The low standard road from the lower Tornillo Creek Crossing to Mariscal Canyon to be constructed on existing road alignment so far as possible.

The road from Santa Elena Junction to Santa Elena Canyon and Castolon to be reconstructed high standard, with the Alamo Wash section relocated on higher ground. The low standard spur roads to Dagger Flat, Grapevine Hills and Fossil Exhibit to be improved somewhat by grading and an oil surface.

Roads in development areas will be constructed as may be required for circulation and parking.

The majority of the existing trails are located in the Chisos Mountains leading to the South and East Rims, Lost Mine Peak, the "Window", and thence to Oak Spring. Old trails which will not be maintained for visitor use lead through Pine and Juniper Canyons. No major extensions are proposed to the primary trail system in the Chisos Mountains.

Trails featuring the river in the vicinity of the Rio Grande Village area and Castolon are proposed to supplement the existing ones at Boquillas and Santa Elena Canyons. Their use, however will be principally the winter months when temperatures make this type of activity more pleasant.

Utility Systems consisting of power, telephone, radio, water sewerage, sanitation, and irrigation will be required at all of the development areas within Big Bend National Park. At the present time these facilities, in various stages of construction, are available in the Chisos Mountains Basin and Park Headquarters. All other proposed development areas are new ones with no facilities existing other than electric power at the Rio Grande Village site and the existing FM radio system.

Chisos Mountains Basin

Power System. Power, under government contract, is being furnished by the Rio Grande Electric Cooperative directly to the buildings. For the concession and campground areas it may be best for the government to run underground power lines from terminal overhead poles to the various facilities because of landscape values. This phase of government construction is programmed.

Telephone System. The telephone system into the park and at the Basin is owned and operated by the Southwestern Bell Telephone Company. This system is adequate and can be readily extended at no cost to the government for additional service. Because of landscape values it may be best to terminate the overhead lines at poles near the developed area with the federal government excavating and filling the trench and the telephone company furnishing the cable for underground lines to the various buildings. This phase of development is included as part of the government development program.

Radio System. The existing radio station at the Chisos Basin is inadequate for the park's purpose. The existing system is owned by the government and serviced under contract with Motorola, Inc. It is proposed in later years to have the radio system on a lease- rental basis.

Water System. Water for the area is obtained by pumping from two wells in the lower Basin area and also from Oak Spring, three miles from the area and outside the "window", into a 500,000-gallon storage reservoir. The lower Basin wells furnish 2000 to 3000 gallons of water per day. The Oak Spring system furnishes approximately 14,000 gallons per day from the pumping system, housed, with a head of 670 pounds pumping a distance of three miles. This system is being augmented by an extension from Oak Spring to Cattail Falls to increase the water supply by 150 per cent. The Cattail Falls-Oak Spring extension will be gravity-flow into a 500,000 gallon storage tank, and pumped through the Oak Spring plant to the Basin. Extension of water mains and laterals are required for the Basin development.

Sewer System. The main sewage disposal line from the upper Basin development and a septic tank is of sufficient size to handle the future development of the area. Laterals and mains are required for new development. For the proposed campground area and residential area in the lower Basin an entirely new sewage disposal system will be required.

Sanitation System. For sanitary purposes it is proposed to construct an incinerator in the vicinity of park headquarters to handle the garbage from both areas.

Irrigation System. No irrigation is planned for this development.

Park Headquarters

Power System. Commercial power from the Rio Grande Electric Cooperative is available and can be extended to take care of all future development without cost to the government. For the protection of landscape values it is planned to install at government cost an underground distribution throughout the residential area.

Telephone Service. Commercial telephone service is available and can be extended to meet all future requirements. It is proposed under the program for the federal government to excavate and fill trenches from terminal poles to the various buildings with the cable being furnished by the telephone company so as to protect the landscape values.

Radio System. The existing system is owned by the federal government and serviced under contract by Motorola, Inc. The existing fixed station at headquarters is adequate but it is proposed for the future to have the radio facilities under a lease-rental basis with a commercial concern.

Water System. The existing system comprises a 150,000 gallon concrete reservoir with a 6" main to the residential and utility area. Water is obtained from well #4 at a rate of around 3000 gallons per day and from well #2 located near A-Bar at 30 gallons per minute. Small pump houses are located at both wells and at well #2 there is also a 5,000-gallon storage tank. Providing these wells hold up, sufficient water is available for several years in the future, but under the program it is planned to extend the water supply lines to the A-Bar well and to well #1. The installation will require the construction of two pump houses with two water pumps and 1 1/2 miles of pipe line.

Sewer System. A sewer system is not required in that it is proposed to continue installing individual septic tanks for each residence or other facility so as to utilize the effluent trenches for sub-irrigation for planting.

Sanitation System. The disposal of garbage by incineration with the incinerator being constructed in the vicinity of the park headquarters to be used also for the disposal of garbage and debris from the Basin area.

Liquefied Petroleum Gas System. The existing system comprising a bulk tank and distribution lines to take care of five existing residences is now in operation. It is proposed under the program to install an additional bulk tank and distribution lines for future residential construction.

Irrigation System. Irrigation is not programmed for the headquarters area.

Rio Grande Village

Power System. The transmission lines for commercial power are already in this area. The system is adequate and extensive enough to take care of all possible development in the area. The power company will run power to all of the facilities in the area; however, it is proposed under this program to protect the landscape values in the public use section of this development by installation of underground cable, which will be a government cost.

Telephone System. No telephone service is available but the Southwestern Bell Telephone Company will run the trunk lines and furnish service in the area whenever the development is started or in place. Also, it is proposed under the program for the government to excavate trenches and backfill, with the telephone company furnishing the cable to the various facilities.

Radio System. Radio communication in the area is non-existent but one of the government-owned fixed stations can be located there for communication. The radio system is inadequate and it is proposed in the future to operate the radio system on a lease-rental basis.

Water System. No water system is available. It is proposed to construct a complete unit which will include a 1,000,000-gallon storage reservoir. Water is to be pumped to the reservoir from two warm springs. One pump house is available but one additional pump house for the second spring is proposed, together with two water pumps - one rated at 90 gallons per minute and the other at 160 gallons per minute. It is also proposed that this one system be designed to handle the entire area which would include the campground, picnic area, motel area, lodge area, residential and utility areas.

Sewer System. No sewer system is existing. It is proposed to install a complete sewage disposal system which will include collection tanks, pumps, pump buildings, septic tank, and sewer lines.

Sanitation System. No sanitation facilities now exist for the disposal of garbage and debris in this area. An incinerator is proposed.

Liquefied Petroleum Gas System. For the operation of the government residential area it is proposed to install bulk tanks and distribution lines for hot water heating and cooking purposes.

Irrigation System. The existing irrigation system is designed for farm use and has over the many years deteriorated so that a complete new system is required. It is proposed to re-study the entire irrigation program along with a planting program for the area and make an installation that will be sufficient to irrigate trees, shrubbery and alfalfa fields so as to give a pleasing appearance to the entire area. The use of the water is important for the preservation of an existing water right which the government now owns. The plan calls for the installation of a 3000-gallon-per-minute pump, with priming pump, suction and discharge lines, together with the repair, reconstruction or construction of ditches, gates and laterals. The existing pump house is to be rehabilitated. The installation and operation of the system will be by the government. It is also planned to issue an agriculture lease for the raising of alfalfa and watering the trees and other growth in the area in return for the hay raised. This agriculture lease may result in a return to the government through watering of trees and payment of pumping costs.

Castolon

Power System. Power is not existing in the area but the REA (Rural Electrification Administration) is willing to run a transmission line into the area whenever developments are under way. Power distribution will be by the REA to centrally located terminal poles with the government installing underground cable to the various facilities in the concession and campground areas only, for the protection of landscape values. The REA will run power directly to the various sites by overhead lines.

Telephone System. The Southwestern Bell Telephone Company will run trunk lines and furnish service in the area. It is proposed that the government excavate and fill trenches, with the telephone company to furnish cable for an underground system in the concession area.

Radio System. No communication by radio available. However, any fixed station located here will be on a lease-rental basis.

Water System. No domestic water system existing. It is proposed to sink a well, construct pump house, install pump, and 500,000 gallon reservoir for one complete water system to serve the campground, concession area, and government residential area.

Sewer System. Complete system, including septic tanks, collection tanks, pump lines, pump houses, is proposed for the campground, concession, and residential areas.

Sanitation System. A small incinerator is proposed for the disposal of garbage and debris.

Liquefied Petroleum Gas System. It is proposed to install a bulk tank and distribution lines for the government residential area to heat water and for cooking purposes.

Irrigation System. For the growth of trees and shrubbery and the watering of fields it is proposed to construct a pump house install 3000-gallon-per-minute pump, suction and discharge lines, ditches, headgates and laterals for the area. A special use permit for the operation of the farmland for growing alfalfa is also considered, with the permittee watering the tree growth as part payment for the use of the lands.

Paradise Canyon

Power System. Power is available from the existing REA system and can be extended and distributed at no cost to the government.

Telephone System. No telephone service is available at this time but further development in the park would justify the long line required to furnish telephone service at this entrance. This will be done by the company at no cost to the government as soon as further developments are made in the park so as to justify the cost.

Radio System. The fixed station at this point is adequate. The station is owned by the government and serviced under contract with Motorola, Incorporated. It is proposed that future radio facilities be on a lease-rental basis.

Water System. No water is available at this proposed development. It is planned to construct a complete system, including well, pump house, pump and 25,000-gallon reservoir. The nearest water is approximately three miles outside the park on privately-owned land for which a lease will be required from the owner to drill the well and use the water.

Sanitation System. For this small development, sanitation is no problem.

Maverick Station

Power System. No power exists at this proposed development area, but the Rio Grande Electric Cooperative is agreeable to extending their transmission line from Oak Spring to the site, a distance of about 15 miles. They will also distribute the power to the various facilities.

Telephone System. Telephone trunk lines, distribution lines and telephones will be installed by the Southwestern Bell Telephone Company on power poles erected by the REA at no cost to the government.

Radio System. A fixed station exists. This station is owned by the government and serviced under contract. It is adequate but future plans call for the system to be on a lease-rental basis.

Water System. No existing water system. It is proposed to construct a complete system including a 25,000-gallon reservoir and seven miles of main line from Tule Spring. This will be a gravity-flow system.

Sewer System. No system existing. It is planned to install individual septic tanks for each area with the effluent being utilized for subirrigation of trees and shrubbery.

Sanitation System. Sanitation is of no concern at this site.

OUTLYING AREAS

Power System. Power facilities not required.

Telephone System. Telephone facilities not required.

Radio System. None required other than mobile sets which may be in the area.

Water Systems. At the Boquilla Canyon and Santa Elena Canyon small picnic areas are proposed for which complete water services are required. At these two proposed picnic areas pump houses, pumps, 10,000-gallon reservoirs and pipelines will be required. No water systems now exist at either of these places. At Boot Spring it is proposed to construct a catchment basin, 5000-gallon reservoir and install a small gas engine pump. No facilities existing. At Grapevine Spring and Dugout Wells it is proposed to rehabilitate the existing water systems which consist of a windmill and small tank at each place.

Sewer Systems. None required.

(6.) Administrative Facilities

The existing administrative facilities are temporary and inadequate, the administration offices being located in one end of a utility building at park headquarters. A park headquarters building is planned for construction at Panther Junction and will include administrative offices and visitor center facilities.

The existing warehouse operation is also concentrated in the one utility building. A warehouse building is planned. All equipment is now stored outside, subject to heat and other elements resulting in rapid deterioration of the equipment. It is planned to construct equipment storage sheds to properly house these expensive items.

Visitor center buildings at the Rio Grande Village, Chisos Basin and Castolon where none now exist will provide office space as well as space for information and interpretive activities. Equipment storage buildings are also proposed for these areas.

(7.) Employee Housing

All housing for park employees and concessioner employees must be provided within the park. The park is isolated and no nearby communities exist which would permit employees to live elsewhere. There exists at park headquarters five modern residences. Other than these five residences, all housing consists of converted Civilian Conservation Corps barracks located in the lower Chisos Mountains Basin.

Twenty residences and one 10-unit seasonal employee quarters building are to be constructed in the 1957 fiscal year. This will alleviate the present employee housing problem. A total of 161 sets of quarters are needed at the four development areas. Eighty-five sets of quarters are required for permanent personnel with the remainder for seasonal employees. The majority of these residences are needed at park headquarters, with only a sufficient number at the development areas to take care of the employees on routine protection, interpretive and maintenance activities. Specialized services for the development areas to be supplied from park headquarters.

Additional housing is urgent for the proper development of the park. Because of the living conditions inherent in a very isolated park, we plan on constructing individual houses for each permanent family insofar as may be possible. Some duplex or apartment type structures are planned for the Rio Grande Village and Castellan. All seasonal employee housing will be in multiple units comprising efficiency apartments.

No determination has been made as to the type and number of quarters required for concession employees.

Maintenance services will be required for roads and trails, buildings and utilities, grounds, and equipment. All maintenance work will be accomplished as a year-round program. Until development is under way and facilities are available at Rio Grande Village and Castolon all maintenance activities will be carried on from park headquarters.

For roads and trails maintenance the park will be divided into three districts - Park Headquarters, Rio Grande Village, and Castolon. Whenever feasible, large or heavy maintenance jobs, such as road sealing and center striping, will be contracted. Only routine road and trail maintenance and minor construction will be carried on by park forces.

Routine building and utility maintenance and rehabilitation programs will be done by park forces located at headquarters. Any major building and utility repair or rehabilitation will be done by contract. In general, power, telephone, and radio installations, repair and service will be furnished by commercial concerns.

Grounds maintenance will be accomplished by park forces located in the developed areas. Grounds activities to include the operation of facilities for and the irrigation of trees, shrubs and fields at Castolon.

All equipment maintenance and repair will be done at park headquarters, except the normal preventive maintenance work which shall be carried on by employees located at developed areas. Specialized equipment such as electric motors, electric and LPG ranges, refrigerators, etc., will be accomplished by commercial concerns whenever deemed advantageous to the government.

2. Physical Improvements

(FILED IN PLANS AND PROJECTS CONTROL SECTION)

LAND

In 1943, the State of Texas deeded some 691,000 acres of land in Brewster County, Texas, to the Federal Government for the establishment of Big Bend National Park. These lands were acquired by the State of Texas at a cost of about \$1,500,000.

At the time the State conveyed these lands to establish the park, there remained 17,000 acres of privately owned land within the park boundaries for which the State had been unable to clear title or otherwise acquire in its land purchase program. Since that time the State has cleared title and conveyed one section of 640 acres to the United States, and when certain curative title action now pending is completed, will be prepared to convey some 7,040 additional acres for the park.

Since the park's establishment, the National Park Service has purchased some 2,350 acres of private inholdings for \$125,000. There are still approximately 7,750 acres of privately owned lands inside the park held by 39 individual owners (present address of many unknown) and totaling 45 tracts. The estimated acquisition cost as of 1956 was \$159,480. Of the existing private lands, 1,280 acres might be acquired through tax title suits in the Brewster County Court, 640 acres through land exchange, and the remaining 5,836 acres will undoubtedly require extensive negotiation to purchase. One minor boundary change is contemplated through the addition of 160 acres now outside the existing boundary at Persimmon Gap.

WATER RIGHTS

The Medina Ditch Permit 927, Pocket 1, Daniels Ranch area, authorizes withdrawal from the Rio Grande of 780 acre feet annually, and is the only existing permit. In view of the extensive public use development proposed in the Rio Grande area, it is imperative that the maximum authorized withdrawal of river water for irrigation purposes be continued in order to maintain this existing water right. Maintenance of this water right might be accomplished through an agricultural lease. Eventually any water rights to irrigation water which might be acquired in the Castolon area must be evaluated and proven.

In order to adequately protect and maintain existing and future rights to use of underground water under the States underground

water code, very high priority must be given to properly documenting three major water systems -- Chisos Mountains Basin, Panther Junction (San Hito.), and the Rio Grande Village. Documentation should include maps, flow or pumping records, location of water sources by known section corners, and a description of the role that these systems occupy in park operations.

A low priority may be assigned to six additional developed area water systems of lesser importance which must be documented in the same manner. Whether or not it will be necessary to include a large number of widely scattered minor water sources, consisting for the most part of small springs which will be used principally as wildlife watering places, is problematical.

CIVILIZATION - 1966

HEADQUARTERS

ADMINISTRATION

Superintendent
Assistant Superintendent

2
1
4
5
6
7
8
9

: Management Assistant :
: Superintendent's Secretary :

: Administrative Assistant
: 1 Clerk-Stenographer
: 2 Clerk, General
: 1 Clerk, Mails & Files
: 3 Clerk-Typists
: 1 Clerk, Personnel
: 1 Clerk, General Supply
: 1 Janitor
:

Headquarters District

File Home National Park

: Chief Park Naturalist	:
: Asst. Chief Naturalist	:
:	:
: Biologist	:
:	:
: Park Naturalist	:
: (Chisos Basin)	:
:	:
: Clerk-Stenographer	:
: (Panther Junction)	:
:	:
: Seasonal Naturalists:	:
: (Chisos Basin) 1 m.y.	:
: (Panther Junct.) 1.5 m.y.	:

1 Chief Park Ranger
1 Asst. Chief Ranger
1 Clerk-Stenographer

1 District Ranger
1 (Headquarters)

1 Persepolis Gap Sub- 3
2 District 4

1. Persimmon Gap
1. Sub-Dist. Pl. Agr.

: 1 Sup. Hk. Ranger
: 1 Park Ranger

Park Hotel.

: 1 Sup. Park Ranger :
: 2 Park Rangers :

Mountain Sub-District

Chicago Basin

1 Sub-District Ranger

: 1 Sup. Park Ranger :

1. Park Avenue

Seasonal Park Ranger

* (Permeation Cap) 1.5 wt%

:(Crisos Bain) .S my:

: Park Engineer :
: Landscape Architect :
: Foreman IV, Maint. :

Engineer Trainee:-----:----: Clerk-Steno:

Foreman III Mixed Gang	Foreman III, H.G.
(BAT)	(BAU)

2 Operator, General	1 Carpenter
1 Truck Driver, U.S.	1 Electrician

1	Truck Driver, Med.	1	Plumber
2	laborers	1	Painter

:	:	:	:	:	:1 Caretaker	:
:	:	:	:	:	:1 Truck Dr. Med.	:

1	Electrs. - General	1	1 Laborer
1	1 Mvy.	1	1 Seas. Laborers,

Hq. & Gen. L.A. Y.

1 Foreman II, Shop	1
1 Mechanic, Automotive	1
1 Mechanic, E. D.	1
1 Mechanic, Helper	1

River District

: Chief Park Naturalist :
: Asst. Chief Naturalist :
:
:
: Park Naturalist :
: (Rio Grande) :
:
:
: Park Naturalist :
: (Castolon) :
:
:
: Seasonal Naturalists: :
: (Castolon) 1 m.y. :
: (Rio Grande) 1 m.y. :

: Chief Park Ranger :
: Asst. Chief Ranger :
: Clerk-Stenographer :
:
:
: District Ranger :...
: (Headquarters) :
:
: Santa Elena Sub-Dist. :
: Castolon :
: 1 Sub-District Ranger :
: 1 Park Ranger :
:
:
: Maverick :
: 1 Sup. Park Ranger :
: 1 Park Ranger :
:
: Boquillas Sub-District :
:
: Rio Grande Village :
: Sub-District Ranger :
: Sup. Park Ranger :
:
:
: Boquillas :
: 1 Park Ranger :
:
: Seasonal Park Rangers :
: (Maverick) 1.5 m.y. :...
: (Castolon) .6 m.y. :
: (Rio Grande) 1 m.y. :
: Village) .6 m.y. :...

: Park Engineer :
: Landscape Architect :
: Foreman IV, Maint. :

: Foreman III, (RST-B&U) :
: (Castolon) :
:
:
: Operator General (RST) :
: 1 Truck Driver (RST) :
: 2 Laborers (RST) :
:
: Seasonal Laborers: :
: 2 m.y. :
:
: 1 Caretaker (B&U) :
: 1 Maintenanceman (B&U) :
: 2 Laborers (B&U) :

: Foreman III, (RST-B&U) :
: (Rio Grande) :
:
:
: 1 Operator Gen. (RST) :
: 1 Truck Driver (RST) :
: 2 Laborers (RST) :
:
: Seasonal Laborers: :
: 2 m.y. :
:
: 1 Caretaker (B&U) :
: 1 Maintenanceman (B&U) :
: 1 Truck Driver (B&U) :
: 2 Laborer (B&U) :

<u>Position</u>	<u>Grade</u>	<u>Proposed</u>	<u>Orig.</u>	<u>Rev.</u>	<u>Orig.</u>	<u>Rev.</u>	<u>Orig.</u>	<u>Rev.</u>	<u>Orig.</u>	<u>Rev.</u>	<u>Orig.</u>	<u>Rev.</u>	<u>Orig.</u>	<u>Rev.</u>
<u>Permanent</u>			M-66 1961	M-66 1961	M-66 1962	M-66 1962	M-66 1963	M-66 1963	M-66 1964	M-66 1964	M-66 1965	M-66 1965	M-66 1966	M-66 1966
<u>Administrative</u>														
Superintendent	GS-14	GS-14	1	1	1	1	1	1	1	1	1	1	1	1
Assistant Superintendent	GS-13	GS-13	1	1	1	1	1	1	1	1	1	1	1	1
Management Assistant		GS-9			1		1		1	1	1	1	1	1
Secretary	GS-5	GS-6	1	1	1	1	1	1	1	1	1	1	1	1
Administrative Officer	GS-9	GS-11	1	1	1	1	1	1	1	1	1	1	1	1
Clerk-Stenographer	GS-3	GS-4	1	1	1	1	1	1	1	1	1	1	1	1
Clerk (General)	GS-4	GS-4	2	1	2	1	2	2	2	2	2	2	2	2
Clerk (Mails & Files)		GS-3	1		1	1	1	1	1	1	1	1	1	1
Clerk-Typist		GS-3	2		2	1	2	1	3	2	3	2	3	2
Clerk (Personnel)		GS-6	1		1		1	1	1	1	1	1	1	1
General Supply Clerk	GS-5	GS-6	1	1	1	1	1	1	1	1	1	1	1	1
Janitor	WB		1		1	1	1	1	1	1	1	1	1	1
<u>Seasonal</u>														
Clerk-Typist		GS-3	2	0	2	0	2	0	2	0	2	0	2	0
Total Permanent and Seasonal			16	7	17	13	17	12	18	14	18	14	18	14

[illegible]

Positions			Orig. M-66	Rev. M-66	Orig. M-66	Rev. M-66	Orig. M-66	Rev. M-66	Orig. M-66	Rev. M-66	Orig. M-66	Rev. M-66	Orig. M-66	Rev. M-66
			1961	1961	1962	1962	1963	1963	1964	1964	1965	1965	1966	1966
<u>Permanent (Cont'd)</u>														
<u>Ranger Activities (Cont'd)</u>														
Park Ranger (Perainmon Gap)		GS-5	1		1		1	1	2	1	2	1	2	1
Park Ranger (Panther Junction)		GS-5	1		1		1		1	1	1	1	1	1
Park Ranger (Panther Junction)		GS-5											1	1
Park Ranger (Chisos Basin)		GS-5	1		1		1		1	1	1	1	1	1
Park Ranger (Rio Grande)	GS-5	GS-5	1	1	1	1	1	1	1	1	1	1	1	1
Park Ranger (Maverick)		GS-5	1		1		1	1	1	1	1	1	2	1
Park Ranger (Castolon)		GS-5			1		1	1	1	1	1	1	1	1
Clerk-Typographer		GS-4	1	-	1	1	1	1	1	1	1	1	1	1
Totals			19	9	20	11	20	15	21	17	21	19	23	21
Seasonal Rangers	GS-4	GS-4	4.25	0.3	4.25	2.5	5.5	3.0	5.5	3.5	5.5	5.0	7.0	5.0
Clerk-Typist (Seasonal)		GS-3								.5		.5		1.0

[illegible]

<u>Positions</u>	<u>Grade</u>	<u>Proposed</u>	<u>Orig.</u> M-66 1961	<u>Rev.</u> M-66 1961	<u>Orig.</u> M-66 1962	<u>Rev.</u> M-66 1962	<u>Orig.</u> M-66 1963	<u>Rev.</u> M-66 1963	<u>Orig.</u> M-66 1964	<u>Rev.</u> M-66 1964	<u>Orig.</u> M-66 1965	<u>Rev.</u> M-66 1965	<u>Orig.</u> M-66 1966	<u>Rev.</u> M-66 1966
<u>Permanent</u>														
<u>Interpretive</u>														
Chief Park Naturalist	GS-11	GS-12	1	1	1	1	1	1	1	1	1	1	1	1
Asst. Chief Park Naturalist		GS-11	1		1	1	1	1	1	1	1	1	1	1
Park Naturalist (Chisos Basin)		GS-7	1	1	1	1	1	1	1	1	1	1	1	1
Park Naturalist (Rio Grande Village)		GS-7					1		1		1	1	1	1
Park Naturalist (Castolon)		GS-7					1		1		1		1	1
Clerk-stenographer		GS-4	1		1	1	1	1	1	1	1	1	1	1
Biologist		GS-11	-	-	-	-	-	-	1	1	1	1	1	1
Totals			4	2	4	4	6	4	7	5	7	6	7	7
<u>Seasonal Positions</u>														
Seasonal Naturalist		GS-4	2.25	.3	2.25	1.3	3.5	3.0	3.5	3.0	3.5	3.5	4.5	4.5
Clerk-Typist		GS-3						.5		.5		.5		1.0

[illegible]

Positions	Rate	Proj. 1961	Orig. 1961	Orig. 1962	Orig. 1963	Orig. 1964	Orig. 1965	Orig. 1966	Orig. 1967	Orig. 1968	Orig. 1969	Orig. 1970	Orig. 1971
Permanent (Cont'd)													
<u>Maintenance and Rehabilitation of Physical Facilities</u>													
Laborer (R.T.)	WB	WB	6	2	6	3	6	4	6	4	6	5	6
Building Repairman (B&U)	WB	WB	1	1	1	1	1						
Maintenanceman (Hdqtrs.)	WB	WB	1	1	1	1	1	1	1	1	1	1	1
Maintenanceman (Castolon)	WB	WB					1		1		1		1
Maintenanceman (Rio Grande)	WB	WB	1		1	1	1	1	1	1	1	1	1
Carpenter		WB	1		1		1	1	1	1	1	1	1
Plumber		WB					1	1	1	1	1	1	1
Electrician		WB	1		1		1	1	1	1	1	1	1
Painter		WB	1		1		1	1	1	1	1	1	1
Caretaker (Rio Grande)		WB	1	1	1	1	1	1	1	1	1	1	1
Caretaker (Hdqtrs. Dist)		WB	1	1	1	1	1	1	1	1	1	1	1
Caretaker (Castolon)		WB	1		1	1	1	1	1	1	1	1	1
Truck Driver (Med.)		WB	2	2	2	2	2	2	2	2	2	2	2
Laborers (B&U)		WB	4	2	4	3	4	3	4	3	4	4	4
Clerk-Steno		GS-4	1	-	1	1	1	1	1	1	1	1	1
Totals			42	27	42	33	43	37	44	38	45	41	42
Other than Permanent (W.A.S.)(R.Y.)	WB		4	3.9	4	4	4	4	5	5	5	5	6

Present Staffing

11. Park Staff

Big Bend National Park

Management and Protection

June 18, 1958

Positions	Man-Years for Fiscal Years Shown									
	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
PERMANENT										
<u>Administrative (Total):</u>	4	4	4	4	13	14	14	13	13	13
Superintendent and Assistant	2	2	2	2	2	2	2	2	2	2
Clerical and Stenographic	2	4	4	4	10	11	11	12	12	12
Janitor	0	0	0	0	1	1	1	1	1	1
<u>Div. of Ranger Activities (Total):</u>	7	8	8	14	19	20	20	21	21	23
Rangers	7	8	8	14	19	20	20	20	20	22
Wardens and Guards	0	0	0	0	0	0	0	0	0	0
Clerical and Stenographic	0	0	0	1	1	1	1	1	1	1
<u>Interpretive (Total):</u>	1	1	1	1	4	5	6	7	7	7
Naturalists and Biologists	1	1	1	1	3	4	5	6	6	6
Historians and Archeologists	0	0	0	0	0	0	0	0	0	0
Museum Exhibit Preparator	0	0	0	0	0	0	0	0	0	0
Clerical and Stenographic	0	0	0	1	1	1	1	1	1	1
Total Permanent	12	15	15	27	34	39	40	43	43	45
SEASONAL, ETC.:										
Keepers	0.2	.3	.3	1.25	4.25	4.25	3.50	3.50	3.50	7.00
Ranger-Naturalists	0	.1	.3	1.25	2.25	2.25	2.50	3.50	3.50	4.50
Ranger-Historian & Historical Aids	0	0	0	0	0	0	0	0	0	0
Tour Leaders	0	0	0	0	0	0	0	0	0	0
Fire Control Aids	0	0	.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Other	0	0	.2	.5	.5	.5	.5	.5	.5	.75
Total Seasonal, etc.	1	2	2	4	10	10	12	12	12	15
GRAND TOTAL - M & P	13	17	17	31	44	49	52	55	55	60

Revised 6/24/58

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Financial Statement

12. Fund 1200

San Diego Building Fund

Maintenance and Rehabilitation

Fund 12, 1954

Positions	Fiscal Years Shown									
	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
PERMANENT										
Hand and Trolly (Total):	14	14	14	24	24	24	24	24	23	23
Engineer	1	1	1	1	1	1	1	1	1	1
Landscape Architect	0	0	0	1	1	1	1	1	1	1
Person or Supervisor	2	2	2	3	3	3	3	3	3	3
Equipment Operators, Truck Drivers, Laborers, etc.	11	11	11	20	20	20	20	20	17	17
Chief Stenographer	0	0	0	0	0	0	1	1	1	1
Buildings, Utilities and Other Facilities (Total):	20	20	21	21	20	21	22	22	22	22
Engineer (Utilities)	0	0	0	1	1	1	1	1	1	1
Person or Supervisor	1	2	2	3	3	3	3	3	3	3
Skilled Craftsmen	0	0	0	1	2	2	2	3	3	3
Semi-skilled, Truck Drivers, Laborers, etc.	3	3	3	12	11	11	11	11	11	11
Clearing Account employees, Shop, Warehouse, etc.	6	4	4	4	4	4	4	4	4	4
Total Permanent	44	44	45	62	62	62	67	67	65	65
OTHER THAN PERMANENT	0	0	0	1	1	1	1	1	1	0
GRAND TOTAL M & R	44	44	45	63	63	63	68	68	66	65

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	Operating Requirements	Physical Facilities	Total
1957	\$ 77,413	\$ 6,781	\$ 84,194
1958	104,440	7,505	111,945
1959	104,400	7,505	111,905
1960	223,514	12,233	235,747
1961	258,000	14,000	272,000
1962	290,000	14,000	304,000
1963	295,000	14,000	309,000
1964	310,000	14,000	324,000
1965	310,000	14,000	324,000
1966	337,000	14,000	351,000

**Ten-Year Program of Operating Requirements
for MAINTENANCE AND REHABILITATION OF PHYSICAL FACILITIES**

Fiscal Year	Roads and Trails	Buildings Util., Etc.	Total
1957	\$ 104,440	\$ 53,380	\$ 157,820
1958	104,440	62,730	167,170
1959	111,400	65,400	176,800
1960	144,720	130,210	274,930
1961	133,000	140,000	273,000
1962	133,000	140,000	273,000
1963	143,000	140,000	283,000
1964	143,000	150,000	293,000
1965	172,000	150,000	322,000
1966	172,000	150,000	322,000

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Operating Requirements and Rehabilitation operating requirements do not include salaries or wages of employees working under Clearing Accounts.

(13.) Proposed Legislation

Big Bend National Park

NONE

Big Bend National Park

7. IMPROVEMENTS NOT INCLUDED IN THE MISSION 66 PROGRAM

1. Completion of the river road between the head of Mariscal Canyon and Castolon so as to form a complete loop route.
2. Permission for the addition of 50 guest rooms in the Chisos Basin to make possible a more profitable operation for the concessioner. Existing water supplies for this purpose are more than adequate. In the long view, the recovery of the vegetative cover on the mountain will automatically increase the water supply, even if the present drought proves to be the norm rather than a low in the climatic cycle.
3. Construction of airstrips in or adjacent to the park will be necessary, as demand for this kind of service is increasing rapidly in this type of country.
4. Boquillas Entrance Station. No physical improvements nor personnel services have been included in the current program for the operation of any entrance facilities at Boquillas. Should an international peace park be established prior to 1966, or should the road development in Mexico proceed rapidly, then entrance facilities will be required providing such facilities are also in operation at Persimmon Gap and Maverick. No doubt any great increase in travel to or from Mexico through Boquillas as a result of Mexican road construction, other facilities as related to the operations of Customs and Immigration Services will be required. Should entrance station facilities become essential, the cost would be approximately as follows: Roads & Trails, \$15,000; Utilities, \$15,000; Buildings, \$68,000; and miscellaneous items, \$3000 — or a total of \$121,000.

Park Origin

Big Bend National Park was authorized by Act of the 74th Congress (Public Law No. 157) approved June 30, 1935. The Secretary of the Interior formally established Big Bend National Park June 12, 1944. The Park was officially dedicated November 21, 1955. The State of Texas, by virtue of bills introduced and passed in the 43rd Legislature during 1933, had withdrawn and transferred for state park purposes all unsold public school lands and tax delinquent lands in Brewster County south of latitude 29°25' North. The establishment of the National Park was made possible by action of the State Legislature in appropriating \$1,500,000 for the purchase of necessary lands, and formally deeded these tracts and those previously withdrawn to the Federal Government on September 5, 1943. Following this, the State of Texas, as required by Act of June 29, 1935, ceded to the United States exclusive jurisdiction over the area.

Vicinity Data

(1) Relation to Other Parks

Carlsbad Caverns National Park is located approximately 300 miles north. San Jose Mission National Historic Site is near San Antonio, approximately 400 miles east. There are several state parks in West Texas within 150 to 300 miles distance.

(2) Accessibility

Big Bend National Park is in one of the most isolated sections of the United States. No railroads or through highways traverse the area. There is no regular bus service from Alpine and Marathon, and mail is delivered only three times weekly. There is no bus service within the park.

Highways - The nearest major highway is U. S. 90, which passes through Marathon and Alpine, Texas. One approach road, State Highway 118, leaves U. S. 90 at Alpine, 220 miles east of El Paso and 330 miles west of San Antonio. Over this route park headquarters is reached at a distance of 104 miles. The other approach road, State Highway 227, is from Marathon, 30 miles east of Alpine, reaching the park headquarters at a distance of 70 miles.

Railways - The Southern Pacific Lines serve Marathon and Alpine, Texas.

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Big Bend National Park

Airlines - The nearest regular route of airline travel may be reached at Marfa-Alpine airport, 17 miles west of Alpine. This flight of the Trans-Texas Airlines connects with other airline routes at El Paso, San Antonio, and Big Spring, Texas, as well as other points east and west. There are, however, emergency landing fields at Marfa, Alpine, Marathon, Fort Stockton and Sanderson.

Climatic Conditions

The mountains of Big Bend provide a cool, dry climate in summer, the lowlands a warm one in winter. The area is thus distinctive in its attractions for both winter and summer visitors. Extremes of temperature, wind and rainfall do occur, but they are of brief duration. For example, during December, January and February there are occasional "northerners." Except during brief periods in the winter in the higher elevations, construction may be carried on throughout the year. Dust storms, typical of the entire southwest, do occur in the spring.

Climate at the two major developed areas is shown on the following chart. That for Park Headquarters (Elevation 3000') falls midway between. This data is based on relatively short term records.

	CHisos BASIN-5400' Elev.					RIO GRANDE (Boquillas) 1840' Elev.				
	Ave.Temp.		Extremes		Precip.	Ave.Temp.		Extremes		Precip.
	Day	Night	Max.	Min.	7 Yr. Av.	Day	Night	Max.	Min.	3 Yr. Av.
January...	62	38	82	-3	.82	61	41	91	25	.42
February..	65	40	81	6	.28	80	39	98	14	.02
March	71	45	86	12	.22	84	48	103	29	.24
April	77	51	93	28	.78	88	57	106	42	.06
May	84	58	97	37	1.39	98	63	115	47	.18
June	90.5	63	100	45	1.88	105	73	114	54	1.40
July	86	62.6	95	53	2.69	103	70	114	62	2.36
August ...	85	62	95	53	3.32	108	73	115	65	.95
September.	82	58	96	44	1.46	100	66	113	54	1.41
October...	76	51.5	86	29	.80	92	50	104	41	.61
November..	66	37	81	16	.23	75	45	99	25	.33
December..	61.5	37	79	7	.52	73	40	82	12	.08
	14.39					8.20				

Topographic Features

The Rio Grande which forms approximately 107 miles of the southern boundary of the park, has cut three spectacular canyons -- Santa Elena, Mariscal, and Boquillas. At some points in these canyons, the river occupies the space from wall to wall, with the sheer walls rising for as much as 1500 feet or more from the bed of the river.

The central part of the park is dominated by the Chisos Mountains, a complete range entirely within the park boundary. This range is surrounded by typically Chihuahuan desert land.

In addition to the Chisos Mountains, the Sierra del Carmen, including the Sierra del Caballo Muerto ridge on the east, and the Mesa de Anguila on the west at Santa Elena Canyon, with several scattered mountains, form prominent features of the park landscape.

Torrey Creek forms the major drainage for the eastern portion of the park, while Terlingua Creek enters the western edge collecting the principal side drainages in that area as well as that of a wide territory outside. Both meet the Rio Grande within the park boundary.

Thus, the Rio Grande constitutes the lowest extreme in elevation, with the river elevation at about 2300 feet where it enters the park on the west at Santa Elena Canyon, and 1400 feet at the mouth of Boquillas Canyon on the east; while the highest point is Emory Peak, of the Chisos, which reaches 7,835 feet.

VISITATION AND USE PATTERNSTravel Patterns - Present and Future

The annual travel for 1955 was an estimated 80,990. The estimate for 1966 is a half million. The graph below shows the seasonal travel pattern typical of the present time. The major difference between this and the one for 1966 will be a vast increase in winter travel. This gain will start in 1957 and move rapidly as better accommodations are developed. Summer travel will not have a proportionate increase during the next ten years due to the fact that there is a limited amount of space in the mountain country for this type of use.

Percentage Participating in the Interpretive Program.

Of the 80,990 visitors in 1955 an estimated 5 per cent participated in the interpretive program: A total of 2,383 visitors attended the summer campfire talks; an estimated 2,376 visitors used the self-guiding Lost Mine Trail. No accounting is made for those attending the evening programs offered by the concessioner.

Seasonal Distribution

A mild climate and two widely contrasting locations make this park an ideal one for year-round activity. Although nearly all visitors will go to the Chisos Mountains Basin for at least a brief visit, at any time of the year, it will receive its heaviest use in the summer due to its cooler climate. The river area, little used at present, will receive heavy visitation as soon as facilities become available. The summer travel peaks in the month of August. The low is reached in the winter, with those months from November to March running approximately the same. Approximately 40 per cent of the annual visitation occurs during the months of June, July and August. This group is largely composed of persons from Texas and adjoining states. It contains numerous organized groups from schools, clubs and churches. They are predominantly campers seeking a wilderness experience.

Winter visitors usually are people on a winter vacation without children, many of them coming from the east and midwest. No reliable information on point of origin is available. Use by people from Texas during the winter is confined principally to weekends.

Daily use.

Although many visitors enter and leave the park the same day, visiting the Basin and usually one or the other of the two

campers of Santa Elena or Boquillas, the trend is for a greater number to remain overnight; at least they desire to do so if accommodations are available.

A satisfactory picture of the overnight use cannot be developed on a year-long basis because the demand for accommodations during the heavy travel period far exceeds the number available, and those visitors going outside to stay do not re-enter due to the distance involved. The trend, however, seems to indicate a travel pattern with a low at mid-week, building up progressively to a Saturday peak and remains high over the fore part of the week. These observations are taken from the following chart of overnight cabin use furnished by the concessioner for 1955.

	<u>Sun.</u>	<u>Mon.</u>	<u>Tues.</u>	<u>Wed.</u>	<u>Thurs.</u>	<u>Fri.</u>	<u>Sat.</u>
Overnight Guests	64	86	76	52	76	92	105
Total in July	362	363	383	283	254	332	418
Total for Year	2119	2397	2294	2075	2144	2170	2494

Overnight use is also discouraged during the summer months by inadequate campground facilities. Notwithstanding, 45 per cent of the visitors entering the park in 1955 did remain overnight; 50 per cent of this overnight use took place in June, July and August. It was evenly divided between the campground and the concessioners' cabins. The peak in monthly travel, campground use, and cabin rental occurred in August, as shown on the tabulation below. This is a recurring pattern of use.

	<u>1955</u>						
	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>
Total visitors in month	3,417	3,256	5,926	6,854	6,387	11,064	11,252
Number using cabins overnight.	551	751	920	1,203	1,222	2,446	2,425
Number using all campgrounds overnight.....	454	702	1,125	1,425	2,208	3,240	3,562
	<u>1955</u>						
	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Total</u>	
Total visitors in month	12,456	6,424	5,364	5,376	3,214	80,990	
Number using cabins overnight..	3,041	1,209	846	814	664	16,092	
Number using all campgrounds overnight	4,381	1,581	737	810	242	20,461	

Back-Country Use

Big Bend essentially is a horseback and a hiking park. The amount of trail used by hikers is difficult to determine, but it needs definite studies. The estimate for the Last Mine Trail was 2,377 persons. In this same year of 1955 only 2,202 visitors out of 60,990 rode horseback. Almost 70% of the horse concessioner's business occurred in June, July and August. A sample study of the last quarter of 1955 shows that only 0.4 of one per cent of the visitors took one-hour rides, that only 0.4 of one per cent took the trip to the Window; and that only 0.2 of one percent went to the South Rim. The need for better promotion is obvious.

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Research:

Accomplished

Research on the geological history of the area has been carried on over several years' period by Drs. Maxwell and Lowndale of the Economic Geology Department, University of Texas, and is virtually completed except for final publication of their report.

The Division of Wildlife Management of the Texas A. & M. College has undertaken an extensive five-year program of ecological research in the park, of which one year has been completed.

Other minor projects of various types have been completed.

Research Needed

Completion of the foregoing projects will provide a large amount of scientific information on the park for use in the future interpretive program. Other minor projects in these related fields and in fields of history and archaeology will provide the basic knowledge needed for the interpretive program. No additional research project of major proportions seems to be indicated at present.

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Commercial Ore Hauling

Commercial hauling of fluorapatite ore over park roads between Big Bend, Chihuahua, Mexico, and Marathon, Texas, is now allowed by special use permit. There is a road use charge of two cents per ton-mile of payload. This activity fluctuates considerably. At present there are four permittees hauling a total of one to two thousand tons per month. This will probably continue as long as the demand for fluorapatite remains as it is. It is entirely possible that the demand for commercial hauling over park routes #1 and #2 will increase. These are roads-to-market for a considerable portion of Chihuahua and Coahuila. This will be particularly true when the Big Bend-Cuatro Ciénegas road construction is completed.

Additional Automotive Equipment needs

The increase of permanent and seasonal personnel for carrying on the routine park operations will require the acquisition of additional equipment for the accomplishment of the park program. The equipment requirements as estimated by year are as follows:

<u>Management and Protection</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
Passenger Car							2			
Pickups			1	1						
Jeep Pickups				2						
Panel		1	6	1				1		

Maintenance and Engineering

Pickups		2	2				2
Panel		1		1			1
Dump Truck							1

Total for Entire Park:

Passenger Cars	2
Panel Delivery	12
Pickups	8
Jeep Pickups	2
Dump Truck	1
	<u>25</u>