INTERPRETIVE CEN
white sands national monume

IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS OF A BACHELOR OF
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R. L. Hutchinson
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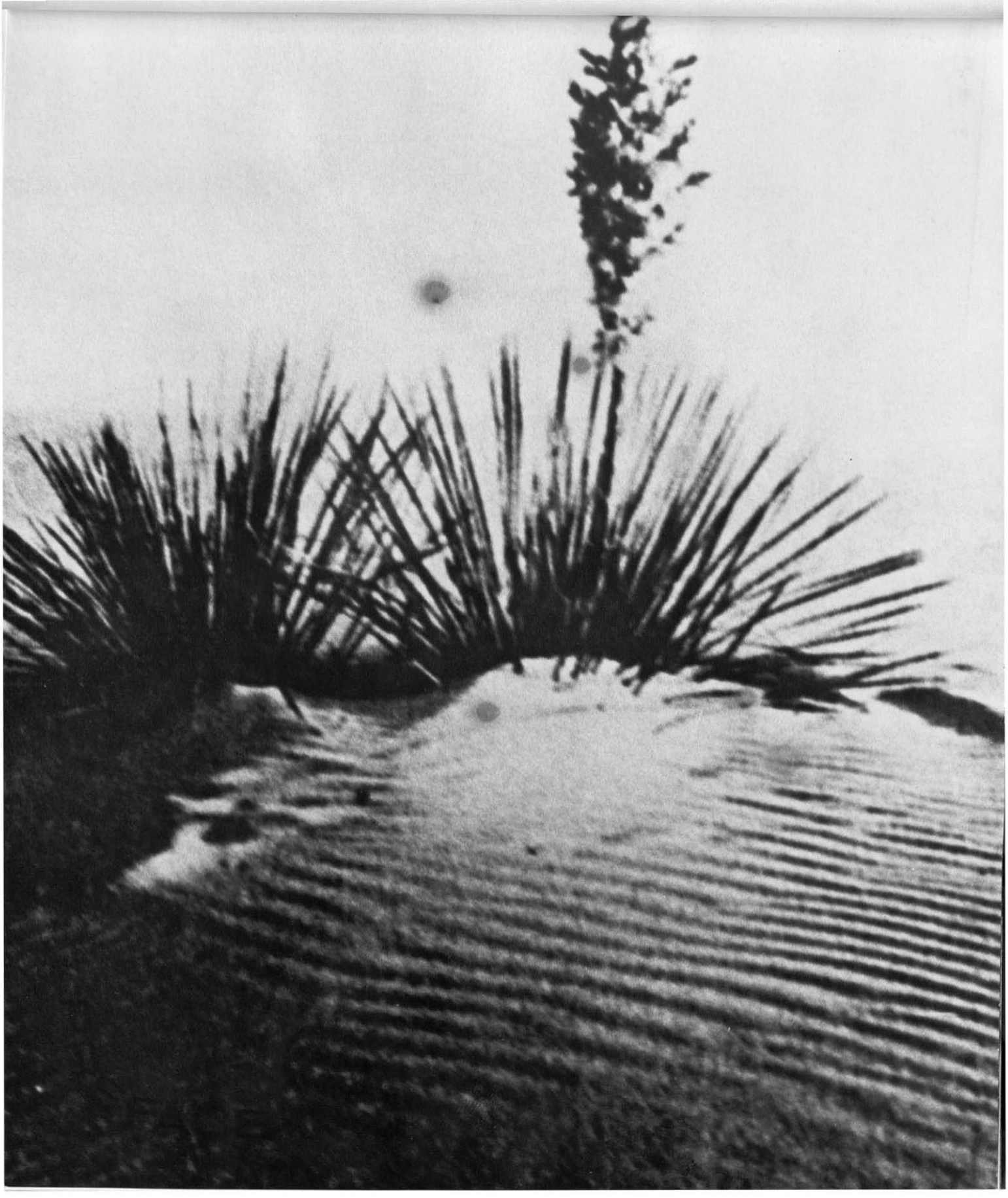
ACKNOWLEDGMENTS

I would like to express my appreciation and gratitude to Mr. William Stewart and Dr. Paul Goeldner for their help in writing this thesis.

R. L. Hutchinson



PREFACE

To select a thesis subject which would be stimulating and vital to me, several observations and considerations were made. First, as a native New Mexican, I preferred to work within the context of the state. Being the "Land of Enchantment", the state offers sites ranging from mountain forest to barren desert. A site which offers unique and varied qualities presents a challenge and at the same time gives one something upon which to build.

Certainly, no architect can imagine more wonderful sites to work within - a clearer call to make the building one integral part of the environment - than that of the national park. With few exceptions, buildings in the parks seem to run to standard acceptable patterns. They have a commendable quality of modesty; some of them are widely admired for an associative rusticity, but few seem to have the courage of convictions. They do not capture or reflect the varied glories of nature, or respond to its magnificance. The challenge and opportunity inherent in architecture for the national parks has filled my mind with intrigue. In order to meet this challenge, I have elected to do an "Interpretive Center for White Sands National Monument."

In the development of this thesis, one would strive for architecture which contains integral relationships with the environment - architecture which veers away from dominant or monumental characteristics. To create architecture which could exist only within the context of the great wavelike dunes of gypsum sand is the prime concept of this thesis.

R. Hutchinson

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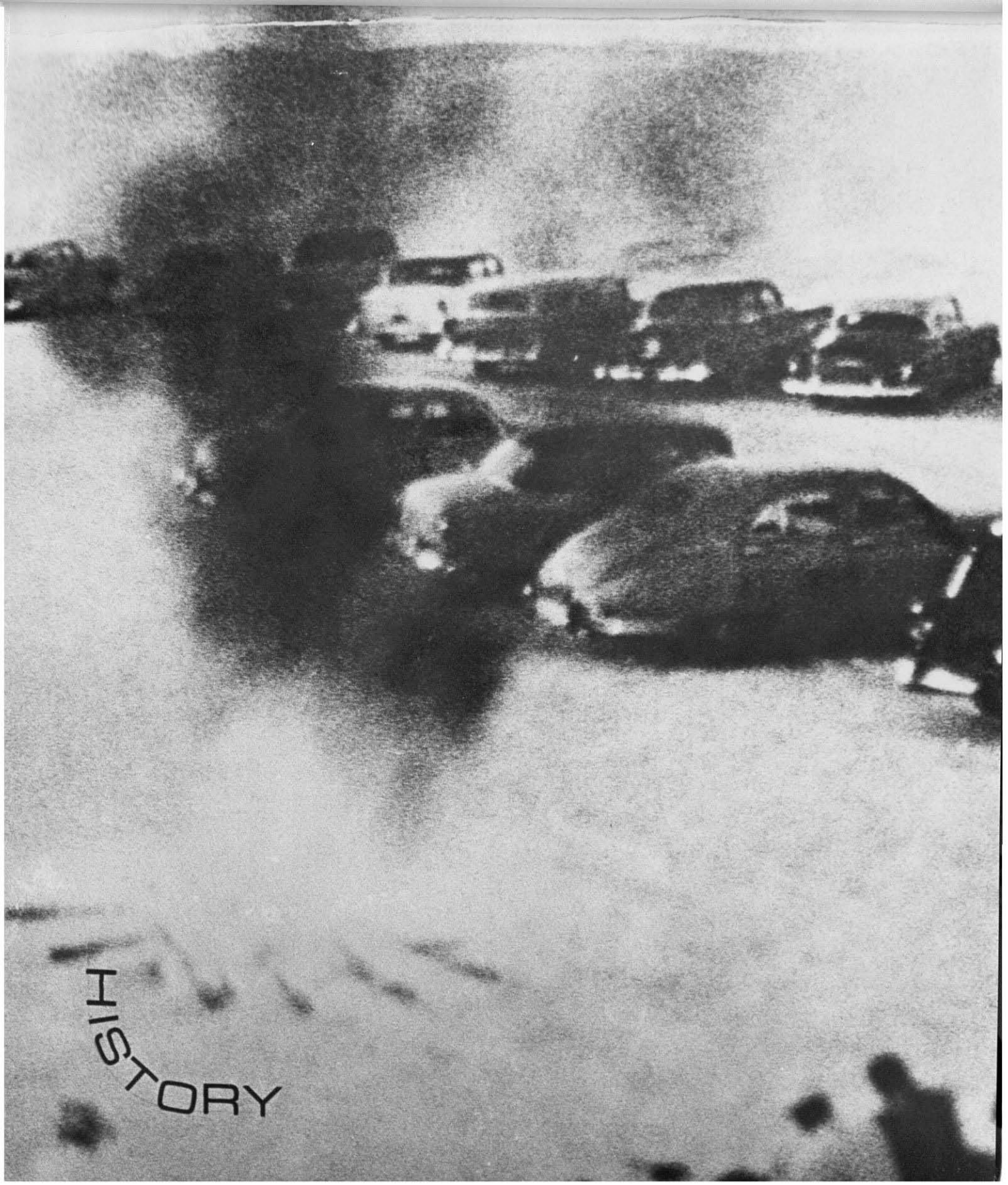

HISTORY

"How will we know it is us without our past"

John Stienbeck

NATIONANAL PARK SYSTEM The preservation of great works of nature and of sites of significant historic events is predicated upon the belief that a reasonable proportion of the country's native landscape and of its sites connected with events that have helped to shape the national destiny, should be held inviolate for the benefit and use of all the people as part of their national heritage. Areas set aside for this purpose make up the National Park system, which is administered by the national park service, a bureau of the United States department of the interior.

The first national park, Yellowstone, was established by congress in 1872, "as a pleasuring ground for the benefit and enjoyment of the people."[1] It had been long a land of mystery, known only to a few hunters, trappers, explorers and Indians, when rumors of its geysers and other phenomena resulted in exploration of the region in 1869 and 1870. The explorers of the 1870 expedition, who first considered claiming the lands for private exploitation, were moved by the plea of one of their number to give up all idea of a private

[1]Encyclopedia Britannica, Copyright 1959, Volume 16.

gain and work to the end that it be made a national park. Thus was conceived the national park system and with it a new form of land use that later spread to all continents.

Four more national parks were created during the last decade of the 19th century and others followed in the 1900's. These were mostly of the scenic wilderness type.

An important development in the growth of the national park system occurred in 1906 when congress enacted the Antiquities act - legislation that empowered the president to establish as national monuments areas containing historic, prehistoric or scientific objects. Passage of this act not only indicated a broadening of public and official interest in preserving for posterity areas of unusual interest scientifically or those tied into the historic background of the country, but it made possible the quick preservation of many areas that otherwise might have been exploited or destroyed in the westward surge of settlement.

The protection afforded the scenic, scientific and historic areas under park and monument reservation was not sufficient to guard their rare exhibits. Eventually the growth and expansion of the national park system pointed up the need for establishment of a federal agency to co-ordinate protective and use activities. As a result the national park service was created by act of congress and approved Aug. 25, 1916.

In that act the bureau thus established was directed to "promote and regulate the use of the Federal areas known as national parks, monuments, and reservations herein specified by such means and measures as conform to the fundamental purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."[2]

In 1933 all federal park activities were consolidated. Transferred to the department of the interior at that time were the military and other historical parks, memorials and allied areas formerly managed

[2]Ibid.

by the war department, numerous national monuments of historic nature administered by the war department and other monuments until then under the control of the department of agriculture and the national capital parks of the District of Columbia consisting of more than 700 units. A new type of recreational area that developed was the national parkway.

Protection of these diverse areas and the management thereof for public use and enjoyment involve problems in many fields of endeavour. Administration originates in the office of the director of the national park service and flows through four regional offices, with headquarters in Richmond, Va.; Omaha, Neb.; Santa Fe, N.M.; and San Francisco, Calif., to the individual areas. The local officer in charge is the superintendent or custodian (the latter title applies to some of the smaller areas). Protection is afforded by the park rangers.

Protective policies of the national park service are based upon congressional mandate as expressed in the organic act creating the national park service. "Protection" implies a certain degree of

management especially of wildlife. All areas of the system are game sanctuaries. The basic wildlife policy is to permit each native species, once established on a normal, healthy basis, to carry on its struggle for existence without artificial aid, in the belief that this is for the ultimate good of the species and conforms to primary national park purposes, provided a proper balance among all species is maintained. Should emergency management of a particular species become necessary, protective measures may be adopted.

Foreseeing the demand for accommodations for visitors to national parks, congress provided, in the acts creating the various parks, for the granting of franchises to private capital for the furnishing of public facilities. This franchise policy was reaffirmed in the act establishing the national park service.

Later, however, a beginning was made toward government ownership of the physical plants, wherever possible, with operation on a concession basis.

In 1956 every area of the National Park system was scheduled for overdue improvements under a long term program called Mission 66[3] - the most comprehensive improvements program the parks had ever known. This ten year program was designed to meet the growing needs of the visiting public by rebuilding facilities such as public accommodations, information centers and museums, employee housing, etc., along with service and protective programs.

This program did much to improve conditions in the park system; however, with the annual visitation rising from .3 million in 1916 to 50 million in 1955 and to the 164 million a year bracket in 1969,[4] there is further need for improvement.

The basis for interpretive programs throughout the national park system is found in the desire of the visitor to develop his understanding and appreciation and to be guided in the full use of the park areas. In the scenic and scientific areas he wants to know the genesis of the Grand Canyon, the cause of eruptive geysers, and

[3]Goble, Emerson, "Architecture for the National Parks", Architectural Record (Jan, 1957), pp 173-184.
[4]National Park Service Bulletin, Statistics of annual visitation.

the underlying causative factors of the other geological and the biological features. In the historic areas his desire is to know who did what, when and where.

In the early days of park use, information, frequently based upon folklore and local opinion, was furnished by the pituresque old-time guides. With the influx of visitors that came with the arrival of the motor age, the need was demonstrated for an interpretive service based upon the latest scientific and historical data. Such a service was inaugurated in Yosemite National Park in the form of a free nature guide service in 1920. The California State Fish and Game Commission, the University of California and certain private interest co-operated in making this experiment possible. The guide service rapidly spread to other parks, both on a federal basis and with private financial assistance.

WHITE SANDS NATIONAL MONUMENT

Established as a national monument on January 18, 1933 by order of President Hoover, this national monument comprises some 230 square miles.

Created millions of years ago by downfaulting of a huge block of the earth's crust, the Tularosa Basin is surrounded by mountains and highlands. In these mountains, including the forested Sacramentos to the east and the rugged San Andres to the west, are massive layers of gypsum rock.

For centuries, waters collecting from seasonal rains and melting snows in these high ranges have eroded the gypsum deposits. The dissolved gypsum is carried to Lake Lucero, the lowest part of the basin. There the warm sun and dry winds, prevalent much of the year, evaporate the lake leaving the gypsum-crystal encrusted marsh. The arid southwest wind persistently scours the bed of Lake Lucero and the alkali flats to the north. Weathering disintegrates the gypsum crystals into sand-size, glistening white grains, which are swept away by the wind and added to nearby embryonic sand dunes.

As each dune grows and moves farther from the lake and flats, new ones form, rank after rank, in a seemingly endless processional.

Gypsum sand differs from ordinary quartz sand in several ways. Gypsum sand is softer and water soluble. When quartz sand is heated, it turns liquid; while gypsum sand becomes plaster of parris. An interesting and important feature of gypsum sand is that it will not pit the finish on one's automobile. Also gypsum sand piles higher than quartz sand because the edges are sharper like those of salt.

White Sands is a place of extreme and often rapidly changing environmental conditions, capable of supporting only specialized life forms. A few varieties of small creatures of bleached coloration have made the dunes their natural habitat because they are able to blend with the white background for protection against preying animals. These, together with plants that have special means for surviving the smothering sands, make up a living community -- a dynamic life system. They are entirely dependent on each other and the gypsum dunes for their sustenance and well-being.

The monument is about fifteen miles southwest of Alamogordo, on U.S. 70/80. There is no scheduled transportation to the monument, but rental cars are available in Alamogordo and Las Cruces (fifty four miles).

An eight mile scenic drive begins at the visitor center on U.S. 70 and winds into the heart of the dunes. A guide to the drive, corresponding to numbered posts along the roadside is given upon payment of $1.00 per car, entry fee. A short orientation slide program is shown at the visitor center. Also available, are exhibits on the natural history of the dunes.

Near the end of the scenic drive are picnic areas with tables, fireplaces and comfort facilities. Pets are permitted on leash.

Refreshments and souvenirs may be purchased from a concessioner in the visitor center. Overnight lodging is available in Alamogordo and Las Cruces, as no camping is currently allowed in the dune area. The nearest camping facilities are in Lincoln National Forest, thirty five miles to the east.

Park naturalist give evening programs on the natural history of White Sands in the picnic area on weekends in summer. Periodically, auto caravans are led to Lake Lucero, the place of origin of the sands. Other programs and tours are given by prior arrangement.[5]

5 History taken from leaflet, "White Sands National Monument" Copyright 1969, U.S. Government Printing Office.


CLIENT & FINANCE

CLIENT AND FINANCING

National parks and monuments are both administered by the National Park Service, which is a branch of the Department of the Interior; whereas the National Forests fall to the Department of Agriculture for management, The difference in parks and monuments lies in their creation. Monuments may be created by a Presidential Order, while the establishment of a park requires an Act of Congress.

National parks are defined as "...spacious land areas essentially of primitive or wilderness character that contain scenery and natural wonders so outstanding in quality that their preservation for the benefit, enjoyment and inspiration of the people is a national concern."[6] National monuments are "...those lands given that status under the Antiquities Act for the protection and perpetuations of the historic, prehistoric or scientific objects or features that they contain."[7] For the purpose of convenience, both will be referred to in certain instances as parks.

[6] Encyclopedia Britannica, Copyright 1959, Volume 16.
[7] Ibid.

Foreseeing the demand for accommodations for visitors to national parks, Congress provided, in the acts creating the various parks, for the granting of franchises to private capital for the furnishing of public facilities. This franchise policy was reaffirmed in the act establishing the national park service. Later, however, a beginning was made toward government ownership of the physical plants, wherever possible, with operation on a concession basis.

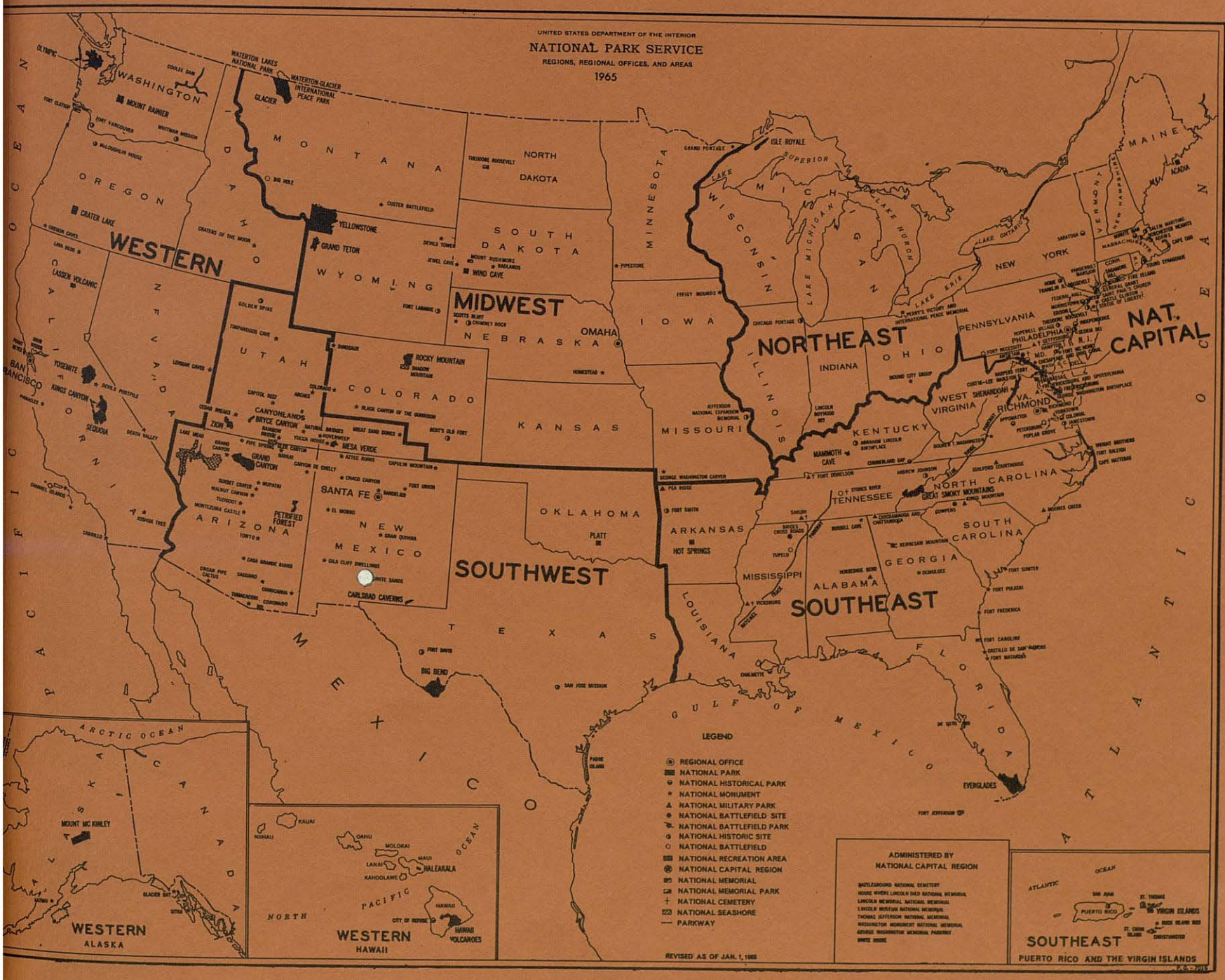
Today, a project such as this would be channeled through the National Park Service, establishing them as the client. There are two design centers set up to program national park facilities. White Sands falls into the district administered by the National Park Service Western Service Center, San Francisco, California. All programming and funding would be through this agency.[8] Funds would be appropriated through the general construction fund. The Interpretive Center and related service facilities construction budget has been limited to a maximum of one-half million dollars. The site in the instance, as with all national parks, has been previously

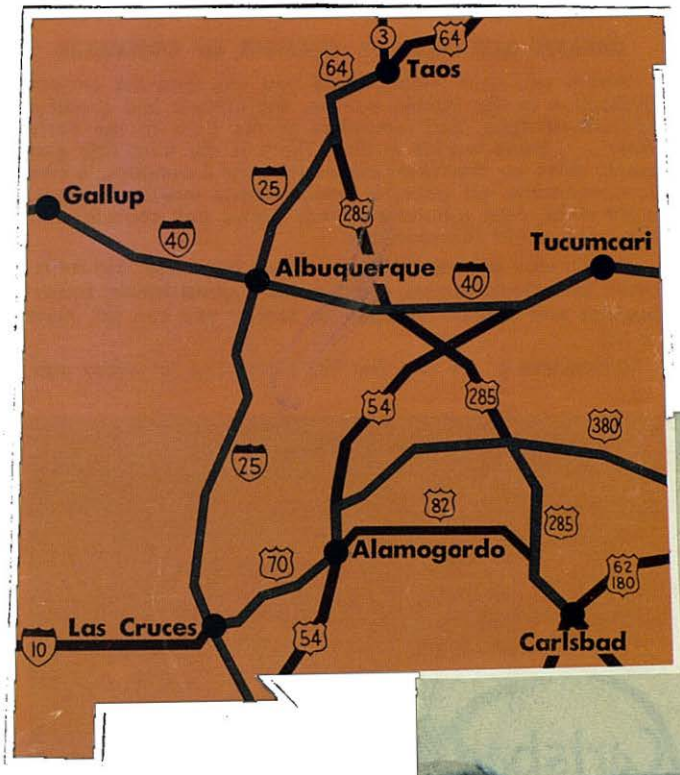
[8] Correspondence with Mr. John F. Turney, Park Superintendent.

acquired and, therefore, will not be included in the cost. Due to the fact that such projects have to be programmed several years in advance, this thesis will be in the form of a proposal.

An effort will be made in this project to work with the administrative staff of White Sands National Monument, headed by Mr. John F. Turney, Park superintendent. A special effort will be made to coordinate all programming decisions with the existing master plan through Mr. Turney. It is hoped that through these efforts, a realistic project may be achieved.

SITE


UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
REGIONS, REGIONAL OFFICES, AND AREAS
1965
WESTERN
MIDWEST
NORTHEAST
NAT. CAPITAL
SOUTHWEST
SOUTHEAST
WASHINGTON
OREGON
CALIFORNIA
MONTANA
IDAHO
WYOMING
NEVADA
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
VERMONT
NEW HAMPSHIRE
MAINE
MEXICO
GULF OF MEXICO
ATLANTIC OCEAN
PACIFIC OCEAN
ARCTIC OCEAN
LEGEND
REGIONAL OFFICE
NATIONAL PARK
NATIONAL HISTORICAL PARK
NATIONAL MONUMENT
NATIONAL MILITARY PARK
NATIONAL BATTLEFIELD SITE
NATIONAL BATTLEFIELD PARK
NATIONAL HISTORIC SITE
NATIONAL BATTLEFIELD
NATIONAL RECREATION AREA
NATIONAL CAPITAL REGION
NATIONAL MEMORIAL
NATIONAL MEMORIAL PARK
NATIONAL CEMETERY
NATIONAL SEASHORE
PARKWAY
REVISED AS OF JAN. 1, 1965
ADMINISTERED BY
NATIONAL CAPITAL REGION
BATTLEGROUND NATIONAL CEMETERY
HOUSE WHERE LINCOLN DIED NATIONAL MEMORIAL
LINCOLN MEMORIAL NATIONAL MEMORIAL
LINCOLN MUSEUM NATIONAL MEMORIAL
THOMAS JEFFERSON NATIONAL MEMORIAL
WASHINGTON MONUMENT NATIONAL MEMORIAL
GEORGE WASHINGTON MEMORIAL PARKWAY
WHITE HOUSE
WESTERN
ALASKA
WESTERN
HAWAII
SOUTHEAST
PUERTO RICO AND THE VIRGIN ISLANDS


Taos
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Las Cruces
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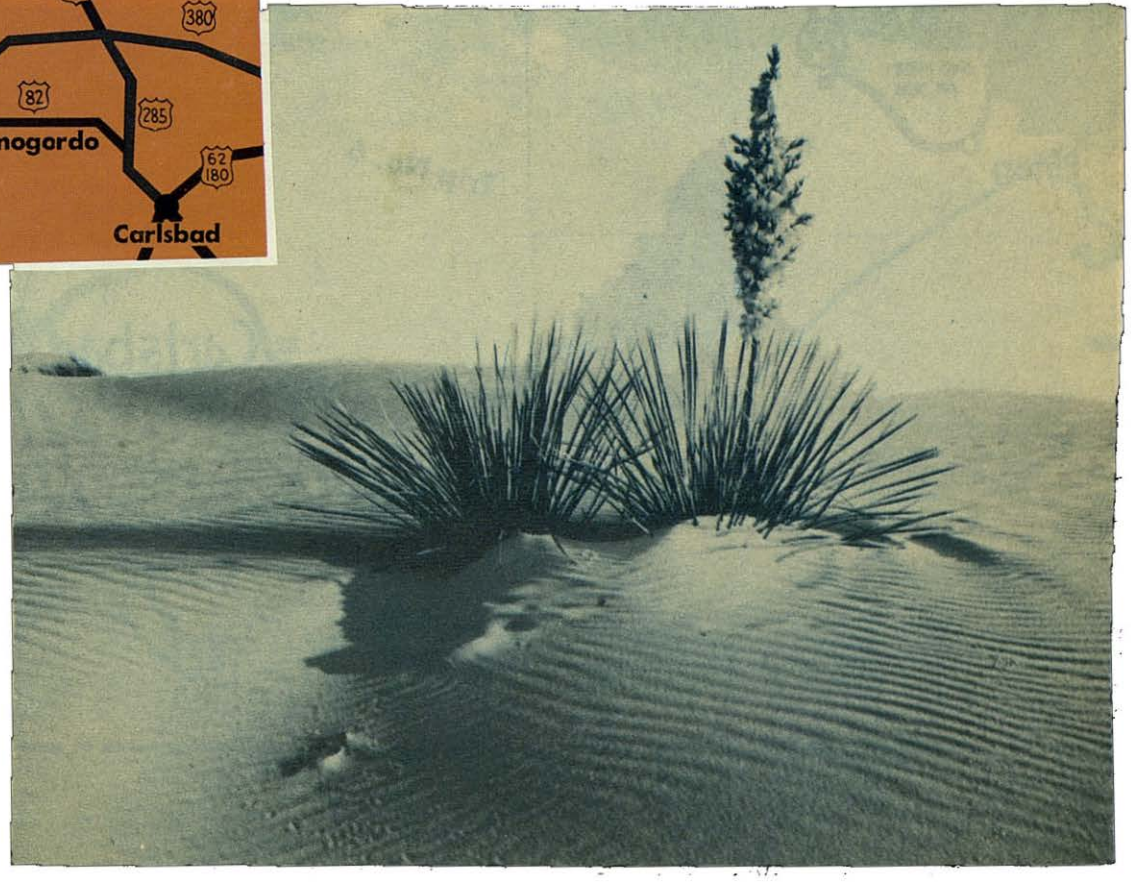

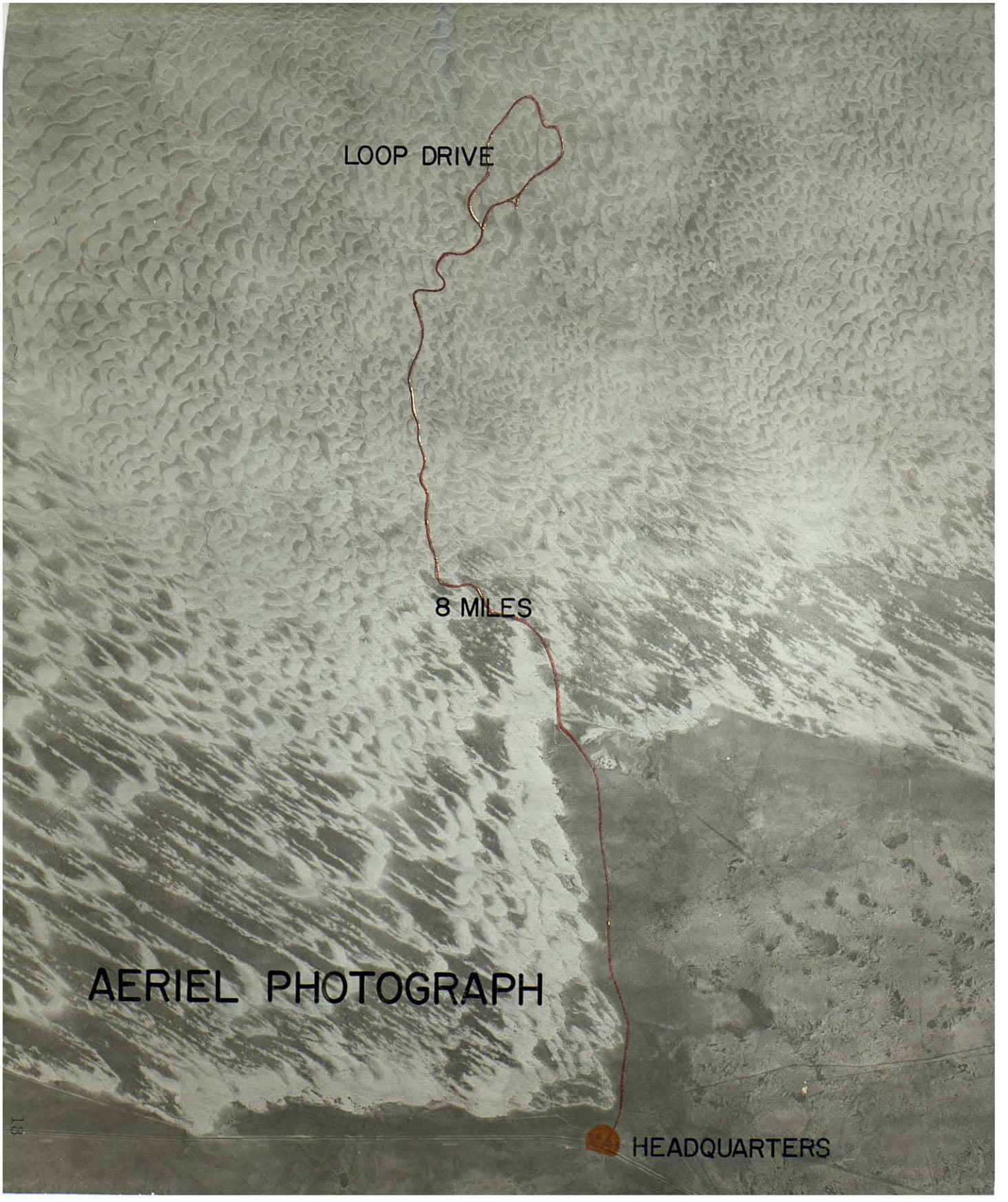
LOOP DRIVE
8 MILES
AERIEL PHOTOGRAPH
HEADQUARTERS

AREA DESCRIPTION

Lying fifteen miles to the west of Alamogordo, New Mexico on U.S. Highway 70, the White Sands is a sea of graceful, white gypsum dunes - a landscape of stark natural beauty. The absence of plant life in the interior of the dune field is indicative of the harsh physical conditions that prevail. There, only a few grasses and small shrubs, along with small rodent and reptile life, are able to survive for a time between the endlessly migrating dunes.

However, on the margins of the White Sands, the dunes have become relatively heavily populated with flora and fauna, able to withstand such physical conditions. These are there now, because over the generations a few naturally vigorous plants became established, slowing the rate of dune movement enough to allow others to take root hold. This developing plant community attracted animal life from the adjacent desert, which became fit to live on the dunes through evolutionary adaptation. Thus the marginal dunes are now an ecological complex of unexpected variety and diversity.

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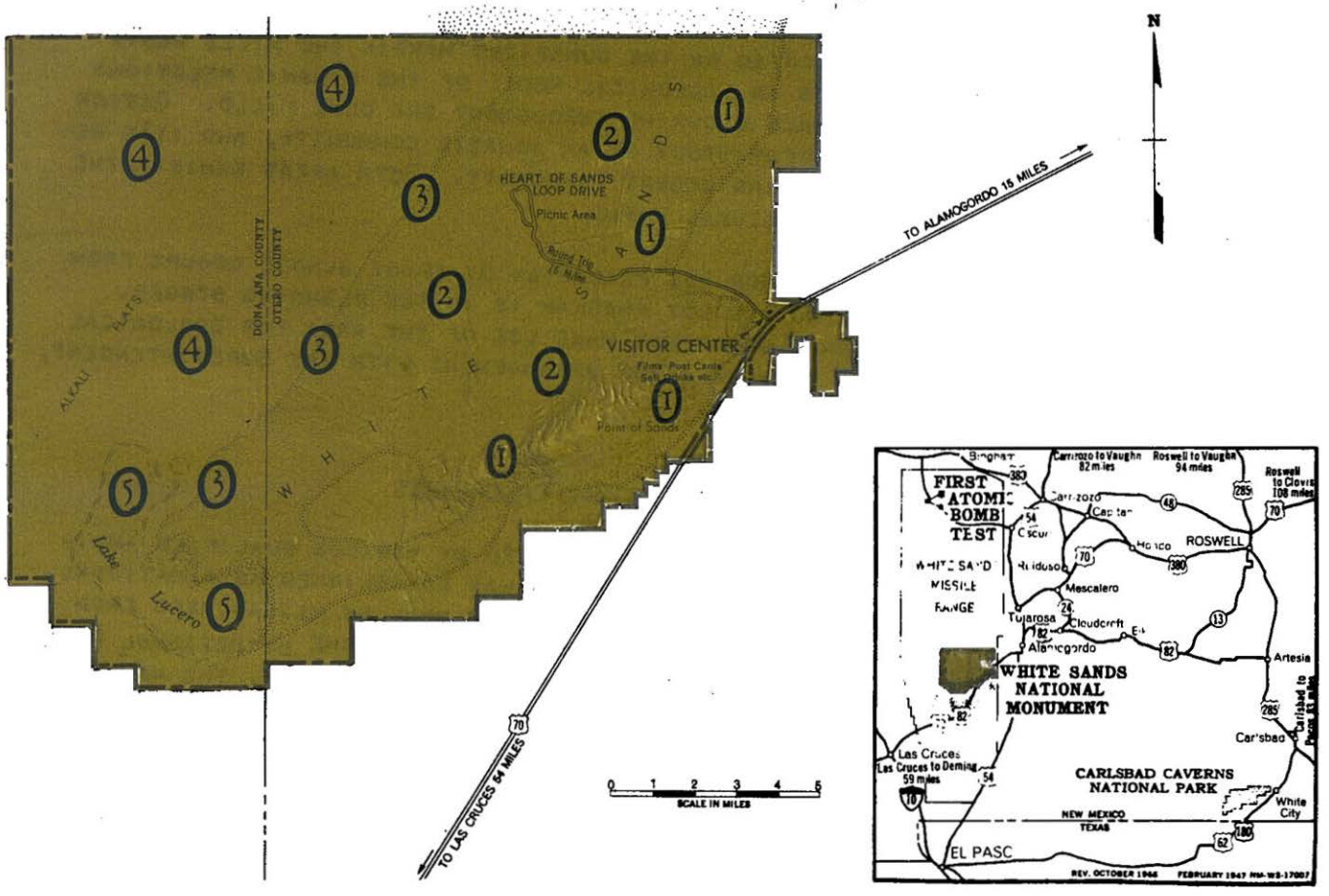
These marginal dunes (Area 1) extend into the dunefield two or three miles from its' southern and eastern boundary. Most of the dunes in this habitat are scattered and are separated by large grassland areas. Although the dunes are still the prominent feature here, the effects of vegetation in slowing the rate of dune movement is very evident. Large shrubs such as skunkbush sumac and hoary rosemarymint anchor the edges of the dunes, allowing movement only in the central portion, thus the dune becomes parabola shaped. Small rodents, such as the white apache pocket mouse finds the bases of these shrubs to be good places for ready-made shelter, as does the bleached earless lizard. Hiding among scattered clumps of dwarfed Rio Grande cottonwoods are occasional porcupines, a mammal that seems very out of place in the dunes. Soaptree Yucca is found scattered throughout the area near the foot of relatively stabilized dunes. The most showy annuals include wooly paperflower which stands out against the white dunes in bright yellow clumps, and the tall stalks of soft orange globemallow, both being early fall varieties. Included in this section is a complete check list of plants and animals found within the monument.

WHITE SANDS NATIONAL MONUMENT
AREA DISCRIPTION MAP



Next come the transverse and barchan dunes (Area 2). Here the physical forces of nature reign supreme. These large, free moving dunes creep forward many feet per year, overwhelming all plant life in their paths. Only a few hearty species, such as alkali sacaton and indian ricegrass, along with some scale-leaf, shrublike plants such as torrey ephedra are able to live in the inter-dunal flats until they are covered by sand. White lizards are commonly seen scurrying between plants on warm, sunny days. Sand verbena, common in most parts of the White Sands in the spring and summer, produces colorful pink blooms against the sterile white of the dune flats.

The transverse-barchan dunes grade to the west into a narrow zone of embryonic dunes (Area 3). The latter mark the eastern boundary of the alkali flats (Area 4). Here, alkaline conditions prevent the growth of plant life except for a few scattered grasses and a scaley pseudo-evergreen known as pickleweed. Fauna is very scarce, but white lizards have been observed using missile fragments, laying about, for cover. There is no plant growth in the dry bed of Lake

Lucero (Area 5) due to extreme alkaline conditions and infrequent flooding. However, alkaline tolerant grasses sparsley fringe the shore of the lake.[9]

[9] Area description taken from leaflet, "Plants and Animals of the White Sands", Copyright, 1970, published by National Park Service

GENERALAL

In the National Park Service today, there are three categories of parks: "historical, natural, and recreational." At first glance, White Sands would appear to be classified as "recreational;" however, it is interpreted as a "natural " site. A prime objective of the Park Service is to convey the natural aspects of the monument and suppress the idea of being just a "big sand pile" to run and play in.[10]

At present only about forty percent of the six hundred thousand (600,000) annual visitation utilize the Visitor Center, with a still smaller percentage doing so before their visit to the dunes. An average visit to the Center lasts twenty minutes, compared to an average stay in the dune fields of two hours. As a result, most people leave the monument with little knowledge of the area's history. It is the goal of the National Park Service and of this thesis to provide facilities to better educate the visitor.

Just recently, interpretive programs were initiated in the dune area.

[10] "Interpretive Prospectus for White Sands National Monument", copyright 1965, U.S. Government Printing Office.

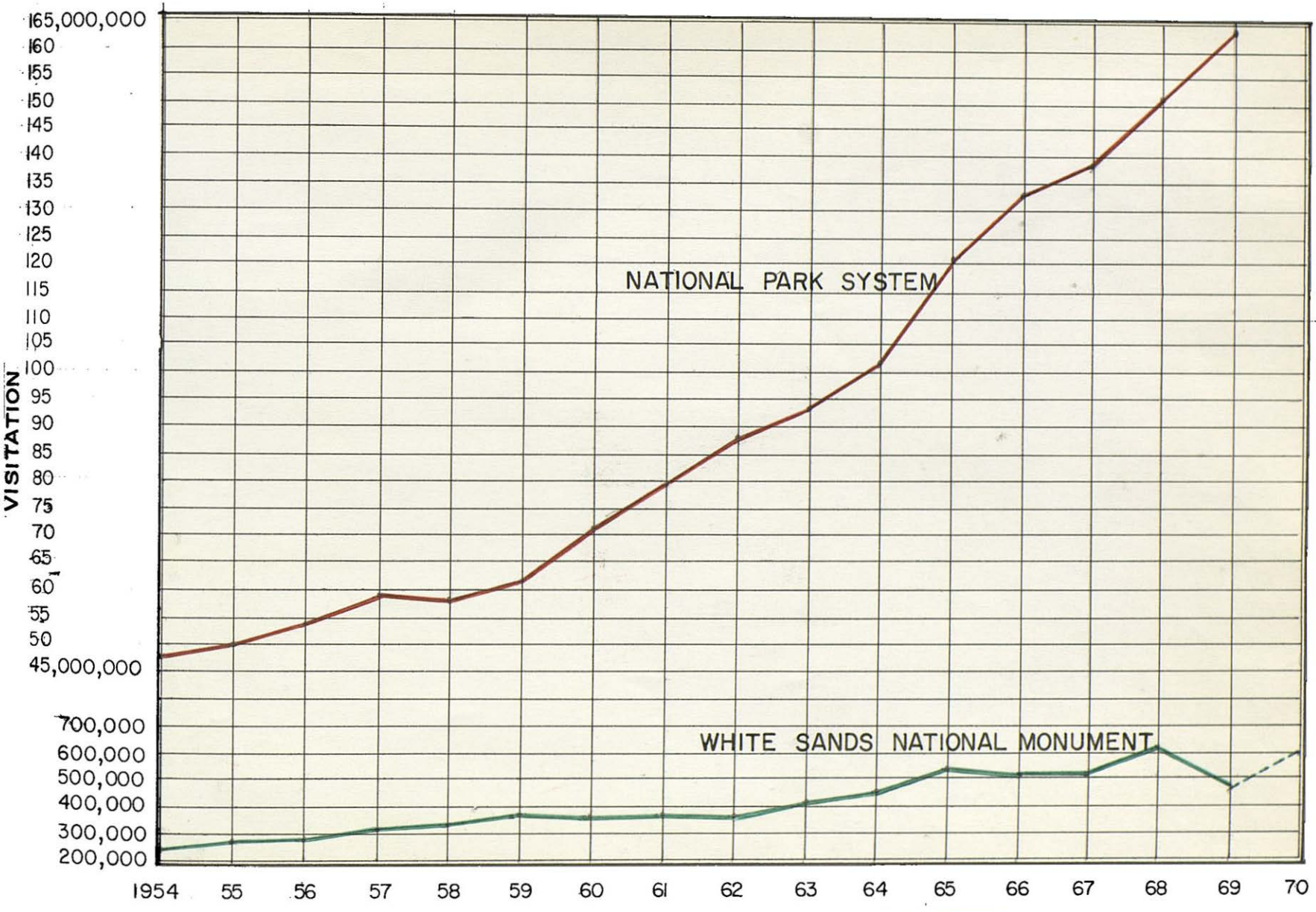
Due to the nature of these programs, they were limited to evening presentation only. A three night schedule was caused by the shortage in staff and the time required for transportation and setting up of audio-visual equipment.

These interpretive programs have done much to increase the knowledge of the visitor; however, due to the schedule, a large portion of the visitors do not have the opportunity to view the programs. It has been established that an interpretive center within the dune area would increase center visitation to seventy five percent[11] stressing the natural aspects over the recreational.

Incorporated with a new center would be such supporting facilities as restaurant, camping supplies sales, picnic area, and campground with amphitheater. These would be required to fully accommodate the visitor, a field in which the current center is lacking.

To further research the need for a new Interpretive Center, a chart was constructed to compare visitation at White Sands to that of the National Park System (Page 26). The chart indicates a similar growth pattern with both areas tripling in the past fifteen years.

11 Ibid.



VISITATION PER YEAR

However, while the visitation has been keeping stride with the national system, the interpretive facilities have never been updated.

SITE SELECTION

Selection of a site entails much consideration for inter- and intra-relationships and requirements. The following descriptions should be used as criteria for site selection.

Due to the nature of this problem interpretation of this criteria would be considered as design solution, therefore, inhibiting the development of the master plan. It is for this reason a specific site has not yet been chosen. A selection will be made in the design phase with the aid of aerial photographs secured at that time.

CRITERIA

The Interpretive Center must be so located as to stimulate a visit to the center before one proceeds to the dunes. Approximately forty percent of the visitors are local and are on repeat visits. For this reason, the center should not obstruct access or egress from other areas within the monument. The campground and picnic areas should be in close proximity to the center in order to utilize concessions and various park services. The reverse is also true; the center will be required to service the picnic and campground in such fields as campfire programs, protection, administration, foot trail tours, and guided automobile tours.

A part of the interpretive program will require an elevated view of the dune field.[12] This view should encompass all stages of dune growth. Dune growth and shadow patterns indicate a view from northeast to southwest to be most satisfactory, however, a view in all directions would be disirable.

The barren flats between the interior or Barchan dunes lend themselves very well for parking as they require no pavemented surface.

[12] Ibid.

This portion of the dune field would do well for picnic grounds and camp sites.

The dune development in this area is also very suitable for recreation. One can run, jump, slide and sand-surf, without bodily injury in the moist gypsum sand. The large open areas allow for such sports as badminton, croquet, softball and tag football. Rental of equipment would be at the concessions in the center.

Equally important is the absence of utilities in the area. All utilities must be underground from the existing Visitor Center. Not only is this added expense, but there are further problems in the rate at which iron and other common metals corrode. Economics will dictate the shortest possible run which will satisfy the site criteria.

UTILITIES[13]

All utilities must meet with USPHS health and safety standards.

Water

Water is available at the present Visitor Center at a pressure of sixty psi. It is supplied by the City through Holloman Air Force Base via a three inch line. This line will supply nine hundred thousand (900,000) gallons per month at a rate of twenty gallons per minute. A one hundred thousand (100,000) gallon elevated storage tank some forty two hundred (4200) feet northeast of the center is used for storage and pressure.

The new complex will require one million five hundred thousand (1,500,000) gallons of water per month, thus the three inch line must be replaced. A new line will extend a minimum of thirty thousand (30,000) feet to the Interpretive Center. A tank type watercloset is recommended to reduce friction loss. Planning should include a peak demand factor of less than two hundred (200) gallons per minute. Iron and other common metals corrode rapidly in the soil, therefore, protective steps should be taken with the piping.

[13] "Master Plan for White Sands National Monument" copyright 1965, U.S. Government Printing Office.

Sewage

The existing sewage disposal system at headquarters consists of a collection system lift pump and two-section stabilization pond. Current sewage disposal at the comfort stations consists of septic tank and leaching fields.

The sewage system for the Interpretive Center and new comfort stations will be the same type as employed at headquarters. One system will handle all sewage disposal at the new complex. Much study and planning must be done in placement of the stabilization pond. It must be obscured from sight down wind, and at an economical distance to all areas served. The capacity of the system should be ample to process the following peak loads:

peak Sunday	26,000 gallons
peak weekday	10,000 gallons
peak week	86,000 gallons

(does not include Easter Sunday)

Electricity

The Otero Electric Co-operative services the existing structure via a seventy two hundred (7200) volt overline. The new service

will be underground, keeping the monument as free from man-made objects as possible. Due to the length of the run, a primary service with step down transformers is recommended.

Gas

Due to the nature of the site, the climate, and corrosive nature of the soil, no natural gas will be extended to the new facilities. The small heating load will be handled by electric units. The water heating and food preparation will also be electric.

Communications

An underground system of telephone communications will be utilized from the Interpretive Center to headquarters. At present, a radio - phone system is used to communicate between the dune area and headquarters. This system will remain in the future to communicate with the service vehicles. An additional telephone intercom system will link the center to headquarters, requiring additional underground lines.

CLIMATIC FACTORS

This high desert basin, averaging four thousand feet in elevation, is subject to harsh, and sometimes rapidly changing climatic conditions. Summers are hot, averaging ninty five degree highs in July and August, with frequent readings over one hundred degrees. Winters are relatively mild, but night time temperatures often go below freezing and cold spells can send the mercury to below zero. The lowest on record is a minus twenty five degrees. Snowfall is infrequent, but heavy snows have occurred on occasion. Precipitation averages about eight inches per year, with most of this occuring during summer thunderstorms, often accompanied by heavy hail.

Wind is the dominant climatic factor here, especially from February through May. The prevailing southerly winds blow unimpeded across the desert and at times reach gale proportions. Storms sometimes last for several days in the spring. This is the time of the greatest dune movement, when living conditions for dune plant and animal communities become extremely harsh.

TOPOGRAPHY

The average floor elevation of this high desert basin is four thousand feet. Dunes rise from a few feet in height along the west perimeter to heights of sixty five feet in the interior dune fields. These interior or Barchas Dunes will average fifteen feet a year movement. Hence, no topographic maps exist for the area. All recording of dune movement is done by aerial photography. White Sands Missile Range provides the Park Service with these photographs. Scale is given by the rotor of a helicopter which has landed on the dune to be studied. If possible, aerial photographs of the specific site will be obtained from the park service during the design phase. The overall aerial photograph at the beginning of this section indicates the nature of dune growth.

SOILS ANALYSIS

Contrary to what one might be lead to believe, the dunes do not extend below the surface. Between and under the dunes lie hard packed alkali flats. Bearing upon the soil will present no special problem, as it is considered among the hardest in the world. This is evident with the placement of the missile launching facilities nearby. One point, however, must be considered in foundation design. The shallow water table of thirty inches to eighteen inches may require special consideration and planning.

CHECKLIST OF PLANTS
(REVISED 1969)

AMARANTH FAMILY (AMARANTHACEAE)

REDROOT AMARANTHUS	AMARANTHUS RETROFLEXUS
WOOLY TIDESTROMIA	TIDESTROMIA LANUGINOSA

CASHEW FAMILY (ANACARDIACEAE)

SKUNKBUSH SUMAC	RHUS TRILOBATA

DOGBANE FAMILY (APOCYNACEAE)

DOGBANE	*AMSONIA ARENARIA

MILKWEED FAMILY (ASCLEPIADACEAE)

BROADLEAF MILKWEED	ASCLEPIAS ARENARIA
POISON MILKWEED	ASCLEPIAS GALIODES

BIGNONIA FAMILY (BIGNONIACEAE)

DESERTWILLOW	CHILOPSIS LINEARIS

BORAGE FAMILY (BORAGINACEAE)

PURPLE BORAGE	COLDENIA HISPIDISSIMA
CRYPTANTHA	*CRYPTANTHA FULVOCANESCENS

CACTUS FAMILY (CACTACEAE)

NIPPLE BEEHIVE CACTUS	*CORYPHANTHA MACROMERIS
FLAMING TORCH HEDGEHOG	ECHINOCEREUS TRIGLOCHIDIATUS
DESERT PRICKLY PEAR	OPUNTIA ENGELMANNII
TREE CHOLLA	*OPUNTIA IMBRICATA
DESERT CHRISTMAS CHOLLA	*OPUNTIA LEPTOCAULIS

GOOSEFOOT FAMILY (CHENOPODIACEAE)

PICKLEWEED	ALLENROLFEA OCCIDENTALIS
FOURWING SALTBUSH	ATRIPLEX CANESCENS
RUSSIAN THISTLE	*SALSOLA KALI L. VAR. TENUIFOLIA TAUSCH
DESERT SEEPWEED	*SUAEDA SUFFRUTESCENS
TORREY SEEPWEED	*SUAEDA TORREYANA

COMPOSITE FAMILY (COMPOSITAE)

WILD ASTER	ASTER CICHORIACEUS
WILD ASTER	ASTER LINEARIS
WILD ASTER	ASTER PARVULA
TANSYLEAF ASTER	ASTER TANACETIFOLIUS
SEEPWILLOW BACCHATIS	BACCHARIS GLUTINOSA
RUSSIAN KNAPWEED	CENTAURCA PIERIS
RUBBER RABBITBRUSH	CHRYSOTHAMNUS NAUSEOSUS
SOUTHWEST RABBITBRUSH	*CHRYSOTHAMNUS PULCHELLUS
WHEELER THISTLE	CIRSIUM WHEELERI
CLAPPIA	*CLAPPIA SUAEDIFOLIA
DICRANOCARSUS	*DICRANOCARSUS PARVIFLORUS

WILD DAISY	*ERIGERON ARENARIUS
AMERICAN TARBUSH	*FLOURENSIA CERNUA
BROOM SNAKEWEED	GUTIERREZIA SAROTHRAE
IRONPLANT GOLDENWEED	HAPLOPAPPUS SPINULOSUS
JIMMYWEED	*HAPLOPAPPUS HETEROPHYLLUS
COMMON SUNFLOWER	*HELIANTHUS ANNUUS
SINGLEWHORL BURROBRUSH	*HYMENOCLEA MONOGYRA
HYMENOPAPPUS	HYMENOPAPPUS ARENOSUS
GOLDENROD	ISOCOMA HETEROPHYLLA
LIMONCILLE	PECTIS ANGUSTIFOLIA
DESERT HOLLY	*PEREZIA NANA
WOOLY PAPERFLOWER	PSILOSTROPHE TAGETINA
	*SARTWELLIA FLAVERIAS
	SENECIO RIDELLII
BROOM GROUNDSEL	SENECIO SPARTIODES
YELLOW COMPOSITE	SIDERANTHOS AUSTRALIS
THELESPERMA	THELESPERMA MEGAPOTAMICU
GOLDEN CROWNBEARD	*VERBESINA ENCELIOIDES
ROCKY MOUNTAIN ZINNIA	*ZINNIA GRANDIFLORA

MORNING-GLORY FAMILY (CONVOLVULACEAE)

CRESSA	CRESSA TRUXILLENSIS

GOURD FAMILY (CUCURBITACEAE)

BUFFALOGOURD	CUCURBITA FOETIDISSIMA

MUSTARD FAMILY (CRUCIFERAE)

WISLIZENUS SPECTACLLPOD	DITHYREA WISLIZENI
TURIST FLOWER	GREGGIA CAMPORUM
LARGE-FLOWERED WHITE MUSTARD	GREGGIA LINEARIFOLIA
PEPPERWEED	LEPIDIUM MONTANUM
URN FLOWER	STREPTANTHUS ARIZONICUS
SMALL-FLOWERED WHITE MUSTARD	LEPIDIUM ALYSSOIDES

SEDGE FAMILY (CYPERACEAE)

ALKALI BULRUSH	SCIRPUS PALUDOSUS

SPURGE FAMILY (EUPHORBIACEAE)

WHITEMARGIN EUPHORBIA	*EUPHORBIA ALBOMARGINATA
HOARY EUPHORBIA	*EUPHORBIA LATA
EUPHORBIA	*EUPHORBIA SERRULA

OCOTILLO FAMILY (FOUQUIERIACEAE)

OCOTILLO	*FOUQUIERIA SPLENDENS

FRANKENIA FAMILY (FRANKENIACEA)

	FRANKENIA JAMESII

GENTIAN FAMILY (GENTIANACEAE)

CENTAURY	CENTAURIUM TEXENSE
RUSSELL PRAIRIEGENTIAN	*EUSTOMA RUSSELLIANUM

JOINTFIR FAMILY (GNETACEAE)

TORREY EPHEDRA	EPHEDRA .....
LONGLEAF EPHEDRA	*EPHEDRA TRIFURCA

GRASS FAMILY (GRAMINEAE)

LITTLE BLUESTEM	ANDROPOGON SCOPARIUS
SIXWEEKS THREEAWN	*ARISTIDA ADSCENSICHIS
SIXWEEKS GRAMA	*BOUTELOUA BARBATA
GYP GRAMA	BOUTELOUA BREVISETA
BLUE GRAMA	BOUTELOUA GRACILIS
INLAND SALTGRASS	DISTICLIS STRICTA
EAR MUHLY	*MUHLENBERGIA ARENACEA
ALKALI MUHLY	*MUHLENBERGIA ASPERIFOLIA
SANDHILL MUHLY	MUHLENBERGIA PUNGENS
INDIAN RICEGRASS	*ORYZOPSIS HYMENOIDES
WIDGENGRASS	*RUPPIA MARITIMA
ALKALI SACATON	SPOROBOLUS AIROIDES
SPIKE DROPSEED	*SPOROBOLUS CONTRACTUS
MESA DROPSEED	*SPOROBOLUS FLEXUOSUS
GIANT DROPSEED	SPOROBOLUS GIGANTEUS
NEALLEY'S DROPSEED	SPOROBOLUS NEALLEYI
	DISTICLIS SPICATA

WATERLEAF FAMILY (HYDROPHYLLACEAE)

WATERLEAF	ANDROPUS CARNOSUS
NAMA	*NAMA HISPIDUM
BLUE CURLS	PHACELIA CORRUGATA

RUSH FAMILY (JUNCACEAE)

RUSH	*JUNCUS MEXICANUS

JUNCO FAMILY (KOEBERLINACEAE)

SPINY ALLTHORN	KOEBERLINIA SPINOSA

MINT FAMILY (LABIATAE)

HOARY ROSEMARYMINT	POLIOMINTHA INCANA

PEA FAMILY (LEGUMINOSAE)

HALFMOON LOCO	ASTRAGALUS ALLOCHROUS
CASSIA	*CASSIA LINDHIMERIANA
INDIAN RUSHPEA	HOFFMANSEGGIA DENSIFLORA
HONEY MESQUITE	PROSOPIS JULIFLORA

LILY FAMILY (LILIACEAE)

DATIL YUCCA	*YUCCA BACCATA
	YUCCA ANGUSTIFOLIA
SOAPTREE YUCCA	YUCCA ELATA

LOASA FAMILY (LOASACEAE)

CEVALLIA	CEVALLIA SINUARA
BLAZING STAR	*MENTZELIA INTEGRA
DESERT MENTZELIA	MENTZELIA MULTIFLORA

BLAZINGSTAR	*MENTZELIA PUMILA
	MENTZELIA STENOPHORA

MALLOW FAMILY (MALVACEAE)

CHEESES	*SIDA LEPIDOTA
NARROWLEAF GLOBEMALLOW	*SPHAERALCEA ANGUSTIFOLIA
GLOBEMALLOW	*SPHAERALCEA ARENARIA
	SPHAERALCEA LOBATA
SOFT GLOBEMALLOW	SPHAERALCEA INCANA
GLOBEMALLOW	*SPHAERALCEA OMSPIDATA

FOUR O'CLOCK FAMILY (NYCTAGINACEAE)

SAND VERBENA	ABRONIA ANGUSTIFOLIA
MOONPOD	*SELINOCARPUS CHENOPODIOIDES
MOONPOD	*SELINOCARPUS LANCEOLATUS
TRAILING FOUR O'CLOCK	ALLIONIA INCARNATA
FOUR O'CLOCK	MIRABILIS MULTIFLORA

EVENING PRIMROSE FAMILY (ONAGRACEAE)

SCARLET GAURA	GAURA COCCINEA
PALE EVENING PRIMROSE	*OENOTHERA ALBICAULIS
WHITE EVENING PRIMROSE	OENOTHERA RUNCINATA
YELLOW EVENING PRIMROSE	*OENOTHERA HARTWEGII
	OENOTHERA LAVAENDELAEFOLIA

LEADWORT FAMILY (PLUMBAGINACEAE)

SEA-LAVENDER	LIMONIUM LIMBATUM

PHLOX FAMILY (POLEMONIACEAE)

GILIA	GILIA PUMILA

BUCKWHEAT FAMILY (POLYGONACEAE)

ERIOGONUM	ERIOGONUM ROTUNDIFOLIUM

BUCKTHORN FAMILY (THAMNACEAE)

KNIFELEAF CONDALIA	*CONDALIA SPATHULATA

WILLOW FAMILY (SALICACEAE)

RIO GRANDE COTTONWOOD	POPULUS WISLIZENI
GOODDING WILLOW	*SALIX GOOODINGII

SANDALWOOD FAMILY (SANTALACEAE)

BASTARD-TOADFLAX	COMMANDRA PALLIDA
	COMANDA UMBELLATA

POTATO FAMILY (SOLANACEAE)

WOLFBERRY	*LYCIUM BERLANDIERI
PALE WOLFBERRY	LYCIUM PALLIDUM
TORREY WOLFBERRY	*LYCIUM TORREYI
SILVERLEAF NIGHTSHADE	SLOANUM ELAEAGNIFOLIUM

TAMARIX FAMILY (TAMARICACEAE)

FRENCH TAMARIX	TAMARIX GALLICA

CATTAIL FAMILY (TYPHACEAE)

NARROWLEAF CATTAIL	*TYPHA ANGUSTIFOLIA
COMMON CATTAIL	TYPHA LATIFOLIA

VERBENA FAMILY

TIDESTROM	*LIPPIA INCISA
BIGBRACT VERBENA	*VERBENA BRACTEATA

CALTROP FAMILY (ZYGOPHYLLACEAE)

HAIRY CALTROP	*KALLSTROEMIA HIRSUTISSIMA
SPREADING CREOSOTEBUSH	*LARREA TRIDENTATA
	PEGANUM HARMALA

*HERBARIUM SPECIMENS ARE NOT PRESENTLY AVAILABLE FOR PLANTS DENOTED BY AN ASTERISK, BUT HAVE BEEN REPORTED BY QUALIFIED PERSONS IN THE MONUMENT.

CHECKLIST OF MAMMALS
(REVISED 1968)

CALIFORNIA MYOTIS (C)	MYOTIS CALIFORNICUS
MEXICAN FREETAIL BAT (C)	TADARIDA MEXICANA
PALLID BAT (C)	ANTROZOUS PALLIDUS
BADGER (C)	TAXIDEA TAXUS BERLANDIERI
KIT FOX (C) *	VULPES MACROTIS NEOMEXICANA
GRAY FOX (C) *	UROCYON CINEREOARGENTEUS
COYOTE (C)	CANIS LATRANS
SPOTTED GROUND SQUIRREL (C)	CITELLUS SPILESOMA ARENS
(R)	CITELLUS SPILESOMA MAJOR
BLACKTAIL PRAIRIE DOG (R)	CYNOMYS LUDOVICIANUS ARIZONENSIS
PLAINS POCKET GOPHER (A) *	GEOMYS ARENARIUS BREVIROSTRIS
MEXICAN POCKET GOPHER (R)	CRATOGEOMYS CASTANOPS LACRIMALIS
SILKY POCKET MOUSE (R)	PEROGNATHUS FLAVUS FLAVUS
APACHE POCKET MOUSE (C) *	PEROGNATHUS APACHE GYPSI
DESERT POCKET MOUSE (C)	PEROGNATHUS PENICILLATUS EREMICUS
BANNERTAIL KANGAROO RAT (C)	DIPOSEMYS SPECTABILIS BAILEYI
ORD KANGAROO RAT (C)	DIPODOMYS ORDI ORDI
SOUTHERN GRASSHOPPER MOUSE (R)	ONYCHOMYS TORRIDUS TORRIDUS
(R)	ONYCHOMYS TORRIDUS LONGICAUDUS
NORTHERN GRASSHOPPER MOUSE (R)	ONYCHOMYS LEUCOGASTER RUIDOSAE
WESTERN HARVEST MOUSE (R)	REITHRODONTOMYS MEGALOTIS MEGALOTIS
DEER MOUSE (C)	PEROMYSCUS MANICULATUS BLANDUS
HISPID COTTON RAT (R)	SIGMODON HISPIDUS
SOUTHERN PLAINS WOODRAT (C)	NEOTOMA MICROPUS LEUCOPHAEA
WHITETHROAT WOODRAT (C)	NEOTOMA ALBIGULA

DESERT WOODRAT (C)	NEOTOMA LEPIDA LEPIDA
MEXICAN WOODRAT (C)	NEOTOMA MEXICANA
PORCUPINE (C) *	ERETHIZON DORSATUM
BLACKTAIL JACKRABBIT (C)	LEPUS CALIFORNICUS TEXIANUS
DESERT COTTONTAIL (C)	SYLVILAGUS AUDOBONI MINOR

(A) ABUNDANT (C) COMMON (R) RARE

*THESE FREQUENT BOTH MARGINAL AND INTERIOR DUNES, OTHERS ARE FOUND MOSTLY ON MARGINAL AREAS.

CHECKLIST OF BIRDS
(REVISED 1968)

THIS LIST IS MADE UP OF THE SPECIES THAT HAVE BEEN OBSERVED AT WHITE SANDS NATIONAL MONUMENT, INCLUDING THE GARTON WELL AREA. MANY SPECIES ARE ONLY SEEN AS MIGRANTS.

WESTERN GREBE
HORNED GREBE
EARED GREBE
PIED-BILLED GREBE

WHITE PELICAN

BLACK CROWNED NIGHT HERON
GREAT BLUE HERON
SNOWY EGRET
WHITE-FACED GLOSSY IBIS

CANADA GOOSE
SNOW GOOSE

MALLARD
GADWALL
PINTAIL
GREEN-WINGED TEAL
BLUE-WINGED TEAL
CINNAMON TEAL
AMERICAN WIDGEON
SHOVELLER
REDHEAD
RING-NECKED DUCK
CANVASBACK
GREATER SCAUP
LESSER SCAUP
RUDDY DUCK
BUFFLEHEAD

COMMON MERGANSER

TURKEY VULTURE

SHARP-SHINNED HAWK

COOPER'S HAWK
FERRUGINOUS HAWK
BLACK HAWK
WESTERN RED-TAILED HAWK
SWAINSON'S HAWK
ROUGH-LEGGED HAWK

GOLDEN EAGLE

MARSH HAWK
PRAIRIE FALCON
PEREGRINE FALCON
PIGEON HAWK
DESERT SPARROW HAWK

GAMBEL'S QUAIL
SCALED QUAIL

SANDHILL CRANE
BLACK-BELLIED PLOVER

COMMON GALLINULE
AMERICAN COOT
VIRGINIA RAIL

SEMIPALMATED PLOVER
SNOWY PLOVER

KILLDEER
COMMON SNIPE
LONG-BILLED CURLEW
SPOTTED SANDPIPER
SOLITARY SANDPIPER
WILLET
GREATER YELLOW-LEGS
LEAST SANDPIPER

LONG-BILLED DOWITCHER
SEMIPALMATED SANDPIPER
WESTERN SANDPIPER
BAIRD'S SANDPIPER
LESSER YELLOW-LEGS
AMERICAN AVOCET
BLACK-NECKED STILT
WILSON'S PHALAROPE

BONAPARTE'S GULL
RING-BILLED GULL
FRANKLIN'S GULL

BLACK TERN
FORSTER'S TERN

MOURNING DOVE
GROUND DOVE

ROADRUNNER

GREAT HORNED OWL
SHORT-EARED OWL

COMMON NIGHTHAWK
LESSER NIGHTHAWK

WHITE-THROATED SWIFT
BLACK-CHINNED HUMMINGBIRD

BELTED KINGFISHER

LADDER-BACKED WOODPECKER
RED-SHAFTED FLICKER

YELLOW-BELLIED SAPSUCKER
VERMILLION FLYCATCHER
WESTERN KINGBIRD
CASSIN'S KINGBIRD
ASH-THROATED FLYCATCHER
EMPIDONAX SP.
BLACK PHOEBE
SAY'S PHOEBE
WESTERN WOOD PHOEBE

HORNED LARK

VIOLET-GREEN SWALLOW
TREE SWALLOW
BANK SWALLOW
ROUGH-WINGED SWALLOW
BARN SWALLOW
CLIFF SWALLOW
PURPLE MARTIN

CROW
WHITE-NECKED RAVEN
PIÑON JAY

BEWICK'S WREN
HOUSE WREN
LONG-BILLED MARSH WREN
ROCK WREN
CACTUS WREN

MOCKINGBIRD
CRISSAL THRASHER
SAGE THRASHER

ROBIN
HERMIT THRUSH
MOUNTAIN BLUEBIRD
WESTERN BLUEBIRD
BLUE-GREY GNATCATCHER
RUBY-CROWNED KINGLET
VERDIN

WATER PIPIT

CEDAR WAXWING

NOTHERN SHRIKE
LOGGERHEAD SHRIKE

ORANGE-CROWNED WARBLER
YELLOW WARBLER
AUDUBON'S WARBLER
MACGILLIVRAY'S WARBLER
YELLOW-THROAT
WILSON'S WARBLER
BLACK-AND-WHITE WARBLER
PALM WARBLER
STARLING
SCOTT'S ORIOLE
WESTERN MEADOWLARK
YELLOW-HEADED BLACKBIRD
RED-WINGED BLACKBIRD
BULLOCK'S ORIOLE
BREWER'S BLACKBIRD
BOAT-TAILED GRACKLE
COMMON GRACKLE
BROWN-HEADED COWBIRD

WESTERN TANAGER
SUMMER TANAGER

DICKCISSEL
CASSIN'S FINCH
HOUSE FINCH
GREEN-TAILED TOWHEE
RUFOUS-SIDED TOWHEE
LARK BUNTING
BAIRD'S SPARROW
SAVANNAH SPARROW
VESPER SPARROW
LARK SPARROW
SAGE SPARROW
OREGON JUNCO
SLATE-COLORED JUNCO
GREY-HEADED JUNCO
RED-BACKED JUNCO
CLAY-COLORED SPARROW
BREWER'S SPARROW
BLACK-CHINNED SPARROW

WHITE CROWNED SPARROW
LINCOLN'S SPARROW
SONG SPARROW
HOUSE SPARROW
CHIPPING SPARROW

CHECKLIST OF REPTILES & AMPHIBIANS
(COMPILED 1969)

REPTILES

BLEACHED EARLESS LIZARD	HOLBROOKIA MACULATA RUTHVENI
SOUTHERN PRAIRIE LIZARD	SCELOPORUS UNDULATUS COWLESI
LITTLE STRIPED WHIPTAIL LIZARD	CNEMIDOPHORUS INORNATUS
DESERT SIDE-BLOTCHED LIZARD	UTA STANSBURIANA
WESTERN COLLARED LIZARD	CROTAPHYTUS COLLARIS
ROUND-TAILED HORNED LIZARD	PHRYNOSOMA MODESTUM
TEXAS HORNED LIZARD	PHRYNOSOMA CORNFUM
YELLOW-BELLIED KINGSNAKE	LAMPROPELTIS CALLIGASTER
CHECKERED GARTER SNAKE	THAMNOPHIS MARCHIANUS
GOPHER SNAKE	PITUOPHIS CATENIFER
WESTERN HOG-NOSED SNAKE	HETERODON NASICUS
LONG-NOSED SNAKE	RHINOCHEILUS LECONTII
COMMON WHIPSNAKE	MASTICOPHIS FLAGELLUM
WESTERN DIAMONDBACK RATTLESNAKE	CROTALUS ATROX
PRAIRIE RATTLESNAKE	

AMPHIBIANS

WESTERN SPADEFOOT	SCAPHIOPUS HAMMONDI
GREAT PLAINS TOAD	BUFO COGNATUS
SALT BASIN BOX TURTLE	TERRAPENE ORNATA LUTEOLA
TIGER SALAMANDER	AMBYSTOMA TIGRINUM

DESIGN CRITERIA

"He is wise who, anticipating change, plans for it."

Anon


WHITE SANDS
NATIONAL MONUMENT
VISITOR CENTER
INFORMATION - SCENIC DRIV'
MUSEUM

GENERAL

This harsh, constantly changing environment with its great wave-like dunes of gypsum sand - this vast undulating landscape of brilliant white - offers a challenge to unite building and site no architect could resist. To design a structure which will harmonize with unique qualities of the site, one which will simulate growth in the true manner of the dunes is the prime design criteria. Every characteristic of the monument should be studied, analyzed and incorporated in this design solution.

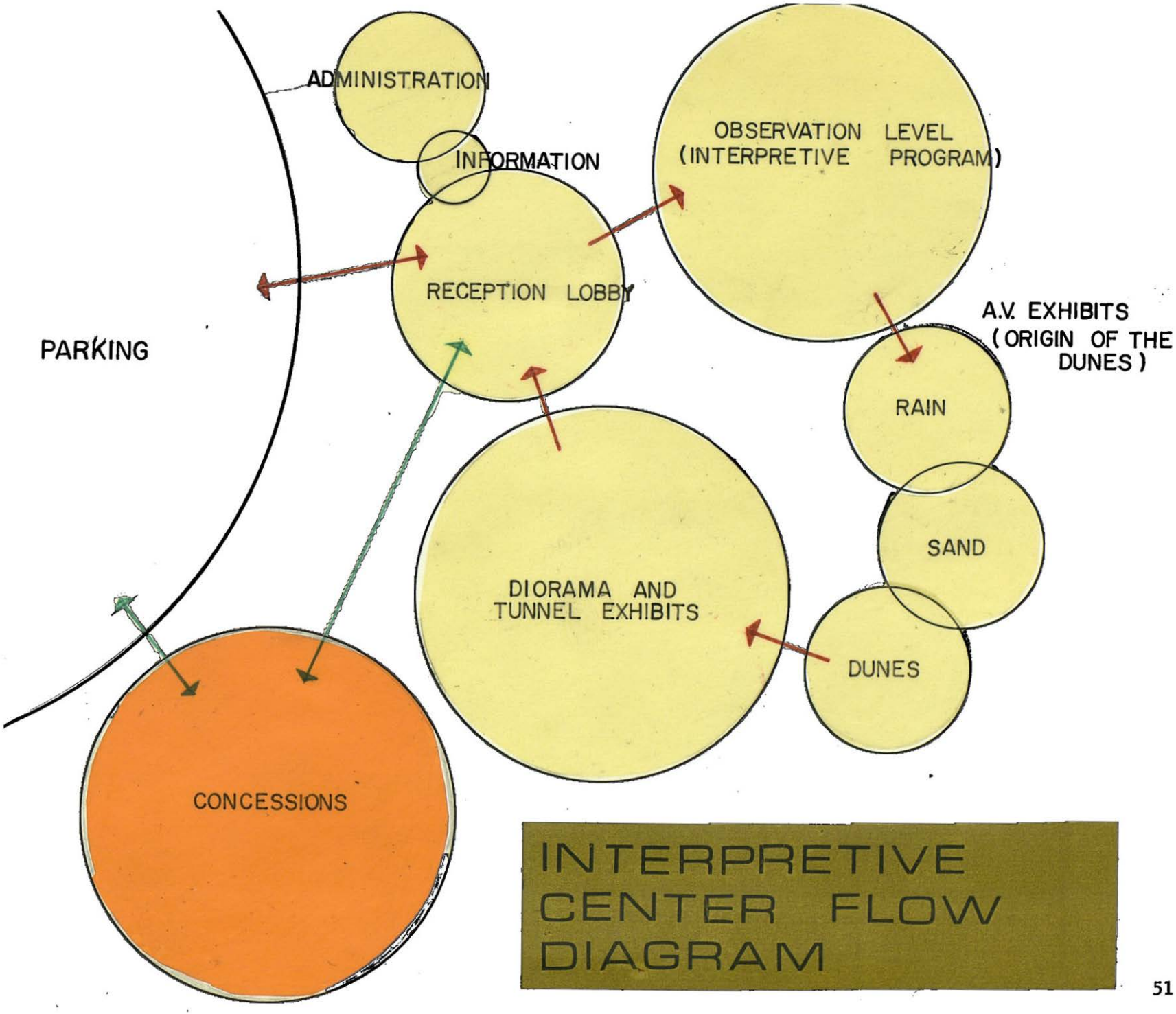
Other criteria will also need to be considered if a comprehensive design is to be obtained. Written as well as graphic description of this criteria is included in this section.

INTERPRETIVE PROGRAM FLOW

The route of the visitor upon entering the center will be as follows: He will arrive at the parking area, proceed to the entrance lobby and information desk. He will then be directed to the observation level to receive an orientation talk while viewing the dunes. He will then stroll through the exhibits area where he will see three short eight mm movies on the origin of the dunes. He will exit the exhibits area via diorama and tunnel exhibits.[14] He may then leave through the reception lobby or proceed to the concession portion of the center. Additional entrances should be provided for the visitor to utilize only the supporting services of the center.

For a graphic illustration of visitor movement, refer to the Interpretive Center flow diagram.

[14] "Interpretive Prospectus for White Sands National Monument" copyright 1965, U. S. Government Printing Office



INTERPRETIVE CENTER FLOW DIAGRAM

"Conceive the building in imagination, not first on paper but in the mind, thoroughly, before touching paper."

Frank Lloyd Wright

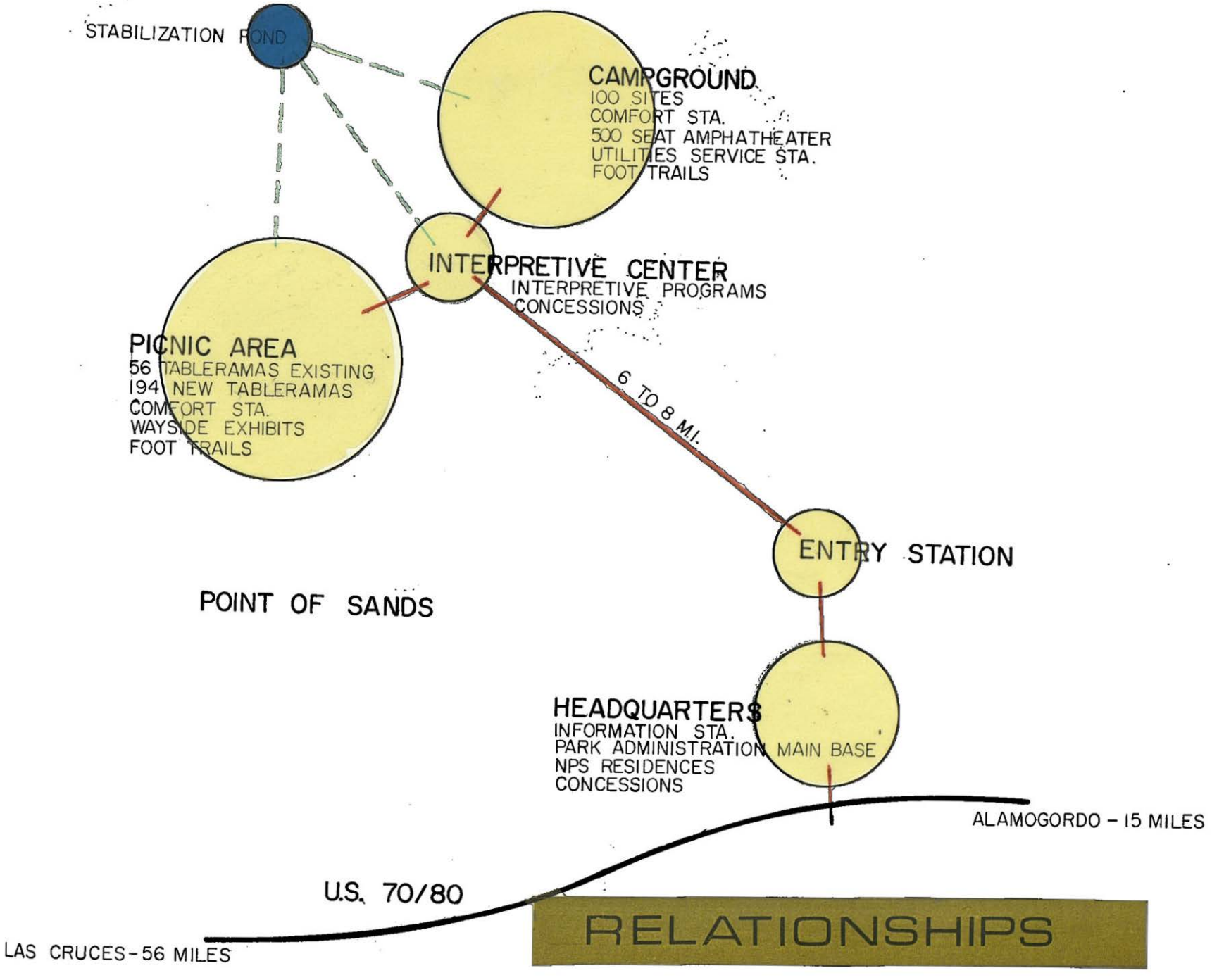
Upon a visit to White Sands today, one would be greeted at the Visitor Center immediately after leaving Highway 70/80. There is no transitional period for one to relax and prepare himself for a visit with nature.

The eight mile drive from Highway 70/80 to the heart of the dunes is in itself a transition. As one drives along, numbered posts tell of the natural development in the area. The further one goes, the less vegatation and more gypsum sand he sees. This is an ideal transition from desert to dune. It would also be an ideal transition from the hustle and bustle of the highway to the stark silence of the dune fields.

When one arrives at the Interpretive Center he should not be greeted first by a sea of automobiles. The first sight should be the center itself. The design and location of the structure should cause him to pause for a moment to reassure himself that it is real and not just a mirage created by the endless dunes.

The picnic area and campground should also be obscured from view upon arrival at the Center. The elements of surprise should be used in location of these areas. As one drives through, they should unfold in a panorama before him.

To fully develop a master plan the parts and their connections must be studied, analyzed, and envisioned. For a detailed description of the parts, refer to the section on "Space Requirements." For a graphic illustration of the parts and their relation to one another, refer to the following diagram.



RELATIONSHIPS

TAKEN IN PART FROM THE NATIONAL PARK SERVICE MASTER PLAN - REVISED 1965 (UNAPPROVED OFFICALLY)

SPACE REQUIREMENTS

Interpretive Services[15] Here the function will be to tell the historical and geological story of the sands. To do so, these facilities will be required:

Reception Lobby: This would be the primary entrance to the structure. It would serve for both access and egress, therefore, any "bottlenecking" should be avoided. The space would contain an information desk, seating for ten to fifteen persons, and two exhibits. One exhibit will be of the southwest park region while the other would be a changing exhibit.

Park Naturalist's Office: An area for the Park Naturalist will be provided. It should accommodate a desk, two file cabinets, typewriter and a small safe. Seating should also be provided for two other persons.

Staff Area: An additional area for the administration, bookkeeping, and clerical activities will be provided. Included should be space for desk, typewriter, file, cash register, and storage for pamphlets to be sold and distributed. For economic reasons, this area and the

[15]Ibid.

information desk will be staffed at times by the same employee. Therefore, the two should be in close proximity and contain a visual link.

Interpretation Workshop: The Park Naturalist and other members of the staff will require a space to prepare audio visual interpretive programs. Six cabinets (30 x 18 x 36) for museum collections, herbarium, specimen, and equipment storage; five cabinets (30 x 18 x 72) for library, screen, slide and projector storage will be required. Two work tables, a desk as well as area for training of up to three staff members should also be provided.

Observation Level: The height of this area above the desert floor will hinge upon location. However, it must not intrude upon the skyline. This level would function in both interpretation and observation capacities. Hence, the area should be provided for one hundred seated persons along with ample room to stand and view the landscape. Service for wheelchairs and maintenance must be considered here. A view to the southwest would illustrate dune growth and utilize shadow patterns to their full extent.

Exhibit Area: The exhibit area will house additional interpretive aids. Three basic methods will be employed to convey the monument's history.

In the first, will be three alcoves where eight mm movies will illustrate the origin of the dunes. Each alcove should be adequate for twenty persons to view the program with seating for half.

Dioramas will be used for display of plants, animals and geological features of the area. Twelve units (42 x 24 x 96) will be required.

A schematic cross-section of the alkali flats from the surface down to about five feet would be presented here also. It would be a free standing exhibit four feet square. Two to three other free-standing exhibits would also be used.

The third type of exhibit was derived from the example at Arizona's Sonora Desert Museum. There, a below grade tunnel was constructed with windows for viewing plant growth, geological features and animal burrows. This basic idea will be used here with one exception, the tunnel will be through a Barchan dune rather than underground.

The site selected must contain a dune which will accommodate the tunnel. This should pose no special problem as most dunes would comply with this requirement. The design will in part determine the nature and size of these exhibits, therefore, specific requirements cannot be given at this time. The area should be planned for the free movement of thirty to forty persons.

CONCESSIONS

These are the supporting facilities necessary to fully service the visitors' wants and needs. This portion of the center will be leased to a concessioneer according to current park policy. In this instance, it will be leased along with the existing concessions area. All sales of souvenirs would be limited to the existing center. Only such items as food, camping supplies, film, or other merchandise which could be utilized during a stay at the sands would be allowed at the new location. The area requirements for this portion of the center are based upon this distinction.

Food Service: Space will be required for the service, preparation and disposal of food. In order to fully accommodate the visitor, two types of food service should be considered. In the development of dining facilities, the possibility of outside eating areas should not be overlooked.

The visitor should have the choice of both formal and informal dining areas. The formal area will accommodate one hundred twenty five persons, while the latter will seat thirty five. A table space for

a single diner is about twenty inches square or an isosceles triangle with a forty inch base and twenty inch altitude.

Food preparation and storage space will be based upon the total number served in the dining areas. Due to the shallow water table, all garbage will be refrigerated until picked up.

Sales Area: Here the moderate sale of food and camping supplies, and rental of recreational equipment would be done. It should be of adequate size to serve a campground of one hundred sites and a picnic ground of two hundred fifty tables. The fixtures for this area will include display shelves, refrigeration equipment for parishables, and check-out stant with cash register. A supplies storeroom equal to one-half the sales area should be incorporated.

Concessioneer's Office: Space for the concessioner to administer his business will be necessary. Included would be a desk, two files, typewriter, office safe, and seating for two persons.

Lounge and Locker Space: Twelve employees, primarily engaged in food service, will use this space. It should be so located as to allow for ease in movement from the various food service areas and employee entrance. Separate toilets and showers should also be included here. Although the employee make-up would vary, it will average six male and six female.

COMMON USE FACILITIES

In all cases, the designer may deploy the following areas in any way which will best serve his design.

Toilets: Separate public restrooms will be required. Depending upon the design, more than one pair may be desirable.

A private toilet and coat storage will be included for park service personnel.

Entrance Lobby(s): Due to the nature of the facility, a visitor may desire to utilize only a portion of the center. Hence, dual purpose lobbies or multiple entrances may be required depending upon the design. These spaces would need to have access to major activity areas as well as toilets, phones, and seating.

Building Service: The food preparation, camp supplies, mechanical and building maintenance areas will require servicing. This service should be obscured from public view and movement. It should be in close proximity to the area requiring service.

Mechanical: A central mechanical area should be utilized. It would house air conditioning and water heating units, electrical and communications panels and water meter. The cooling compressor will be incorperated into the design of the structure or by some other means obscured from public view.

Maintenance: Janitorial space should be provided in one or more locations within the center. Each location will contain storage shelves and service sink.

Parking: No paved surface will be required for the parking areas due to the hard barren desert floor. One hundred spaces for visitor parking, eight spaces for employee parking and two parking spaces for park service vehicles will be required.

CAMP GROUND

At present, no camping is allowed at the monument. The nearest motel accommodations are fifteen miles to the east in Alamogordo; while the nearest campground is in Lincoln National Forest some thirty five miles to the east.

To better serve the visitor at the monument, a new camping area is proposed. In order to properly service and administer this facility, it should be in close proximity to the Center. To fully accommodate the camper, these areas will be required:

Campsites: A feeling of privacy and security should be inherent in each of the one hundred sites. Each site will be provided with fire place, table and seating, garbage container, and reasonable walking distance to water and toilet facilities.

Separate Men's and Women's Comfort Facilities: Toilets and showers will be required in the campground. A tank type water closet should be used due to friction loss. The location and number of stations will hinge upon the design layout.

An outlet for drinking water will also be needed. It should accommodate the single drinker as well as containers up to five gallons. For economic reasons, its location should cause no major extension of utilities. This does not imply, however, an immediate adjacency to the restroom facilities.

Utility Service Station: With the rapid growth of camp trailers and pick-up campers, a need to service them has arisen. Service requires compressed air, sewage dump, and potable water spout. The average camper will use this station upon entering or leaving the area.

Amphitheater: To furnish the camper and visitor with further interpretive programs a five hundred seat amphitheater is proposed. The audience will be furnished by the campground and picnic areas, hence it must be located to serve both.

This facility should be planned to house audio visual and live programs. It may be disirable to shelter the area from wind and rain, however, the designer will make this decision.

PICNIC AREA

A fifty six unit picnic area is currently existing. However, it is proposed to add one hundred ninety four more units to make a total of two hundred fifty picnic sites. The designer may elect to carry out the architectural style of the existing tableramas or he may establish a new design which would blend with the old and with the site. It should be remembered that the existing units are portable and may be moved to a new location, which would better suit the design criteria.

The picnic area will require the following facilities:

Picnic Site: Each site would contain a tablerama, fire place, and garbage container. Each should be private and within reasonable walking distance of the comfort facilities.

Comfort Facilities: This facility utilizes the same criteria as the campground stations with one exception; no shower will be required.

Wayside Exhibits: The average visitor will have seen interpretive programs of one sort or another; however, an additional exhibit will be present for the person who prefers to browse and learn on

his own. This area will contain small graphic exhibits and provide a meeting place for guided trail walks. Although this is an outside space, it would be desirable to provide the user with protection from the sun and wind.

CONSTRUCTION CONSIDERATIONS

Certain construction criteria should be considered in the design of the facility.

Codes:[18] The structure must meet with the requirements of the National Building Code. Fire protection must comply with category II of the fire code. All utilities must meet with USPHS health and safety standards.

Lighting:[19] The following are suggested footcandle levels for various areas of the center. It should be remembered that skylights may be used to furnish the required light level during the daylight hours.

Area	Footcandles
Offices	100
Corridors	20
Auditoriums	15
Work shops	70
Lobbies	20
Restaurants	10
Coffee Shop	50
Kitchen	70
Exhibition:	
General	30
Supplimentary	70
Parking	1

[18]Ibid.

[19]McGuinnes, Stein, Gay & Fawcett, Mechanical & Electrical Equipment for Buildings, 1964, Wiley.

Form: Only a very small number of plants are able to survive in this harsh environment. The ones that do survive do so because they are able to extend their roots at the rapid rate, therefore, avoiding being covered by sand, When the dune moves on, it leaves behind the sand which has been trapped by the roots forming so called. "Sand formations," which are usually circular. As new dunes encroach upon them an interesting phenomenon occurs. The sand falls just in front of the curved side, sweeping the area between the two clean. During the design phase, a study will be made of the affect various geometric shapes have on sand movement. This study should be helpful in creating a functional and esthetically pleasing design.

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CORRESPONDENCE

Letters to Mr. John F. Turney, Park Superintendent.

Letter to Mr. David Petticord, Park Naturalist.

Letter to National Park Service.

Lubbock, Texas 79414

11/1/70

White Sands National Monument
Box 458
Alamogordo, N.M. 88310

ATTENTION: David Petticord
Park Naturalist

Dear Sir:

Recently I made a personal visit to the monument and talked with a part-time ranger. He possibly mentiomed our talk to you. However, if he did not, I would like to explain the nature of this letter.

I am a fifth-year architecture student at Texas Tech University in Lubbock, Texas and am currently doing my thesis. The subject I have chosen is a "New Visitor Center for White Sands National Monument." I have chosen this as my thesis for several reasons:

First, I am a native of New Mexico and, therefore, wanted to work on a project with the State. Next I like to work with arid and semi-arid land. I also like to work with a site with unique qualities such as the Sands possess. I also have an interest in and prefer to work with nature as a whole.

I hope it is evident that I like to work with the natural setting and not against it. This is a main reason for choosing the project I did. I feel that the Sands need a Visitor Center which reflects the Sands in every way and would not fit any other park or monument in the Nation. I feel that this is the main downfall of the existing Center.

I undestand the feeling which exists at this time with respect to architecture in the parks and I agree that it should not be a dominant feature. I feel that it should blend and support the setting in which it exists.

I would appreciate your help in the interpretation of the area and of the new Visitor Center. Any information which you could give me in the next two weeks along these lines would be very helpful.

Also any information with respect to the audio-visual program presented in the Sands in the Summer months would be useful; such as, how long is the program; how many people attend and what type space do you feel would best suit this program.

Thank you for any information you may be able to give me.

Yours truly,

R. D. Hutchinson

11/1/70

White Sands National Monument
Box 458
Alamogordo, N.M. 88301

ATTENTION: John F. Turney
Superintendant of White Sands National Monument

Dear Sir:

Recently I made a personal visit to the Monument and talked with a part-time ranger. He possibly mentioned our talk to you. However, if he did not I would like to explain the nature of this letter.

I am a fifth-year architecture student at Texas Tech University in Lubbock, Texas and am currently doing my thesis. The subject I have chosen is a "New Visitor Center for White Sands National Monument." I have chosen this as my thesis for several reasons:

First, I am a native of New Mexico and, therefore, wanted to work on a project with the State. Next I like to work with arid and semi-arid land. I also like to work with a site with unique qualities such as the Sands possess. I also have an interest in and prefer to work with nature as a whole.

I hope it is evident that I like to work with the natural setting and not against it. This is a main reason for choosing the project I did. I feel that the Sands need a Visitors' Center which reflects the Sands in every way & would not fit any other Park or Monument in the nation. I feel that this is the main downfall of the existing center.

For the remainder of this semester, I will be programming the thesis and next semester will enter into the design and working drawings phase. In order to do this, I will need some information on the employees and visitors of the Sands.

I would appreciate any help you can give me in answering the questions on the attached sheet and any additional help you can give. If for any reason you would like to contact me for further explanation, it may be more convenient for you to contact my father in Alamogordo. His name and address is: R. H. Hutchinson, 1313 14th, 437-6977, Alamogordo. Also you may contact T. L. Womack as a reference. My father may be able to clearify the type of answers which I need for the program.

This project is of great interest to me and I do hope that I can do justice to the Sands with this thesis. The final presentation will be given in May; however, I only have a matter of weeks for my final program. I would appreciate very much if you could get this information to me within the next two weeks. Thank you for any help you can give me.

PROGRAMMING DATA FOR WHITE SANDS VISITORS CENTER:

1. Number of employees, full and part time. Give brief summary of the duties of each.

2. Number of visitors monthly and annually and daily (average):
   a. Number visiting the dune area.
   b. Number using the Visitors Center.
   c. Number visiting the national park system for the past ten years.

3. How much time does the average person spend in the dune area and in the Visitors Center?

4. What future plans of expansion do you have presently?

5. What activities do you have at the Center and what activities do you feel might be added to the present program? Give a brief description of these activities: people, functions, relationships, interactions, etc.

6. Assuming the project were to be built, through which department would the finances be handled? How much do you estimate would be available for such a project?

7. What utilities are available at the present location? (water, gas, electricity, etc.)

8. What site limitations are there presently? Could it be located within or adjacent to the dune area?

9. Give any additional information which you feel may be helpful in order to have a complete program for the facility.

Thank you again for your time.

Yours truly,

R. L. Hutchinson

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
White Sands National Monument
P. O. Box 458
Alamogordo, New Mexico 88310

IN REPLY REFER TO:
D3415
K1817

November 4, 1970

Ronnie L. Hutchinson
4918-40th
Lubbock, Texas 79414

Dear Mr. Hutchinson:

We will try to answer your questionssas concisely as possible, or refer you to other sources for those we cannot answer.

Our master plan calls for an interpretive center to be built in the heart of the dunes near the picnic area at some future date. We have an, as yet to be approved, interpretive prospectus which goes into some detail about the function of the center. The reason for the proposed location is to better serve a greater majority of visitors, providing them with on-site interpretive services. Our present center is deficient in this because only about 40% of our annual visitation goes through it, with a still smaller percentage going through it before their visit into the dunes area. As a result, many visitors come away not really understanding the natural history of the White Sands.

The design of the center is still open to much discussion for several reasons. The primary consideration is a design that would harmonize with the surrounding natural environment, detering from it as little as possible. We agree with your thinking that the total environment should be considered in the design and construction of buildings. Another consideration is the fact that the dunes move about 15 feet per year in this area of the dune field, encroaching on any structure. So there is a possibility of burial of the center by sand dunes. There are no utilities in the heart of the dunes area, and difficulties with underground utilities are inherent in this type of soil with the water table so near the surface, so this has a major bearing.

Perhaps the most important consideration is the fact that no funds have been programmed for an interpretive center, nor does it seem as if any will be available for several years. This is primarily because of new areas being added to the National Park system requiring much of the allocated funding for new construction.

We have listed the answers to your questions in sequence on the attached sheet, as they appeared in your letter. If you need any further information, please let us know. We will be glad to have you review our planning documents should you stop in at park headquarters.

Your interest in the White Sands National Monument is appreciated We wish you much success in writing your thesis.

Very truly yours,

John F. Turney
Superintendent

1. The National Park Service employs eleven full time permanent personnel for the operation of White Sands National Monument:

   Superintendent - responsible for overall management and direction of monument operations.

   Chief Park Ranger - supervises resource management and visitor protection.

   Park Ranger - resource management and visitor protection.

   Park Technician - resource management and visitor protection.

   Park Naturalist - responsible for interpretation and environmental education.

   Park Technician - interpretation and administration.

   Administrative Officer - responsible for personnel, payroll procurement, fiscal and budgeting.

   Park Aid - entrance station operation

   Maintenance Foreman - supervises maintenance on buildings, utilities, roads and trails.

   Maintenanceman - primarily buildings and utilities maintenance.

   Equipment operator - primarily roads and trails.

   The permanent staff is supplemented by approximately twelve seasonal personnel, most of whom work during the summer months during the main visitor season.

2. A. An average of 575,000 annually, total visitation.
   B. Approximately 40% of the total annual visitation.
   C. Please write to National Park Service, Office of Information, Washington, D. C. for this information.

3. An average of two hours per person in the dunes area, and ½ hour in the visitor center.

4. Expansion plans call for increased picnic facilities, dunes interpretive center, and possibly addition of camping facilities. Suggest you stop in and look at master plan for this information.

5. Our visitor center houses exhibits on the history and natural history of the White Sands, audiovisual program in English, German, Spanish, information and natural history association sales lobby, patio, gift shop, native plant garden. The automatic AV Program is ten minutes long serving as an orientation and is viewed by about 100,000 persons annually - an average of ten persons per program.

   A new interpretive center would have auditorium facilities for film and slide programs, updated exhibits, naturalist office and work shop, observation deck for viewing the dunes (but not intruding on the skyline) and for interpretive talks, nature trail leading off from visitor center and possibly outdoor amphitheatre facilities nearby.

6. Design for such a structure would most likely be accompolished by the National Park Service Western Service Center, San Francisdo. Funding, if available, would come from the construction fund. Such projects have to be programmed several years in advance.

7. All utilities are available at present visitor center; no utilities available at proposed location.

8. As mentioned in the letter, the new interpretive center is proposed for the heart of the dunes area near the picnic loop. This is the area of concentrated activity in the monument, and would best serve the greatest majority of visitors, providing them with needed interpretive services.

   If a new center were ever built, the present center would be remodeled for much needed increased office space, storage, expansion of concession facilities, and also continue to serve as an orientation station.

9. We suggest you stop in an familiarize yourself with the master plan which gives detailed resource information and visitor activity trends upon which planning decisions have been based.

R. L. Hutchinson
4918 40th
Lubbock, Texas 79414

11/7/70

White Sands National Monument
Box 458
Alamogordo, New Mexico 88310

Attention: John F. Turney
Park Superintendent

Dear Mr. Turney:

First, I would like to thank you for your prompt reply to my letter. As I am sure you know, time is an important element in programming; and the information which you sent was very helpful as were the sources you recommended.

I plan to make a personal visit to the monument over the Thanksgiving holidays. This would put me in the Alamogordo area from November 26th thru the 29th. I would like very much to set up a meeting with you during my visit. I feel such a meeting would be a great aid in both the programming and design stages of this thesis.

On my previous visit I learned of your fondness for hunting. From what I understand, dear season will extend over the holidays this year. If you plan to be out of town at this time, would you please notify me so that I may plan to come at another time, if possible. Thank you again for your help and time.

Yours truly,

Ronnie Hutchinson

R. L. Hutchinson
4918 40th
Lubbock, Texas 79414

11/8/70

National Park Service
Office of Information
Washington D.C.

To Whom it may Concern

I am an architectural student at Texas Tech University currently programming my thesis. The subject I have chosen is a "Visitors Center for White Sands National Monument." Mr. John F. Turney, Superintent of the Monument, referred me to your department for certain information required in writing this thesis.

I would appreciate your sending me, as soon as possible, certain visitation statistics on the park system. Specifically I would like the annual number of park visitors for the past ten years. Next I need the annual number of visitors which attended White Sands during the past ten years.

Any additional information you feel might be helpful to me would also be appreciated.

As time is an important element, a prompt reply is essential.

Thank you for your time and trouble in advance.

Yours truly,

Ron Hutchinson

United States Department of the Interior

NATIONAL PARK SERVICE
White Sands National Monument
P. O. Box 458
Alamogordo, New Mexico 88310

IN REPLY REFER TO:
K1817

November 11, 1970

Ronnie L. Hutchinson
4918 40th
Lubbock, Texas 79414

Dear Mr. Hutchinson:

Thank you for your letter regarding your proposed visit to the White Sands.

We would appreciate your making advance arrangements for an interview. I will not be in the office on November 26, 28 or 29th and possibly not the 27th. The Park Naturalist, who is involved in planning for interpretive facilites, will be available the morning of the 28th or all day on the 29th.

We will be looking forward to hearing from you in advance of your visit.

Very truly yours,

John F. Turney
Superintendent

Ronnie L. Hutchinson
4918 40th
Lubbock, Texas 79414

11/20/70

John F. Turney
P. O. Box 458
Alamogordo, N.M. 88310

Dear Mr. Turney:

I am sorry I will not be able to meet you personally upon my visit to Alamogordo. However, I am looking forward to an interview with Mr. Predicord. I would like to meet with him on the morning of the 28th about 9:00 if this would be suitable.

I may be out the day before to do some photographing and site study, and will check to see if you are in.

Thank you for your co-operation. Your helpfulness is greatly appreciated.

Very truly yours,

R. L. Hutchinson

United States Department of the Interior

NATIONAL PARK SERVICE
WHITE SANDS NATIONAL MONUMENT
P.O. BOX 458
ALAMOGORDO, NEW MEXICO 88310

IN REPLY REFER TO:

DECEMBER 3, 1970

N22(A)

MR. RONNIE L. HUTCHINSON
4918 40TH
LUBBOCK, TEXAS 79414

DEAR MR. HUTCHINSON:

ENCLOSED ARE THE 8"x10" PHOTOS YOU REQUESTED. WE HOPE THEY WILL BE SATISFACTORY FOR YOUR THESIS.

YOU NEED NOT RETURN THESE PHOTOGRAPHS.

VERY TRULY YOURS,

JOHN F. TURNEY
SUPERINTENDENT

FW/FW

ENCLOSURES: 2 8x10 PHOTOS OF MOSAIC OF WHITE SANDS
2 8x10 PHOTOS OF AREA FOR PROPOSED INTERP. CENTER