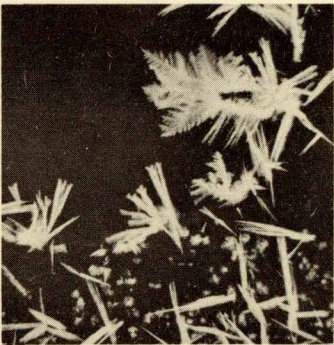
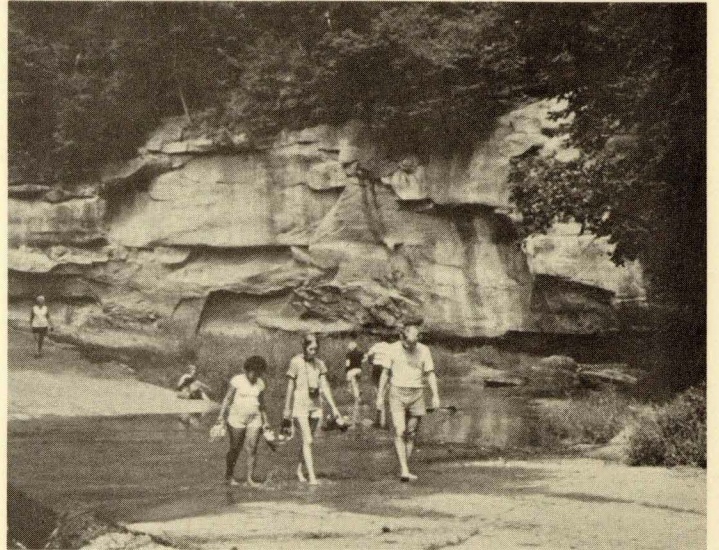
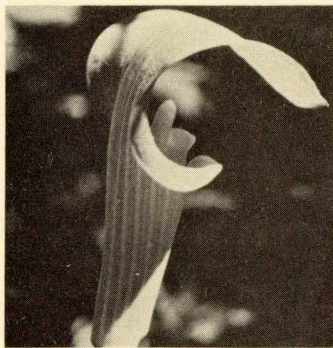
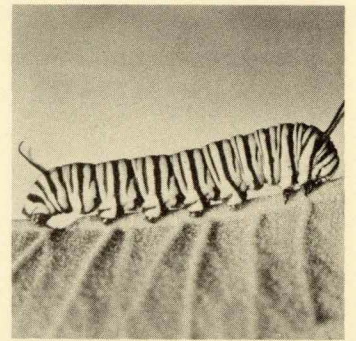
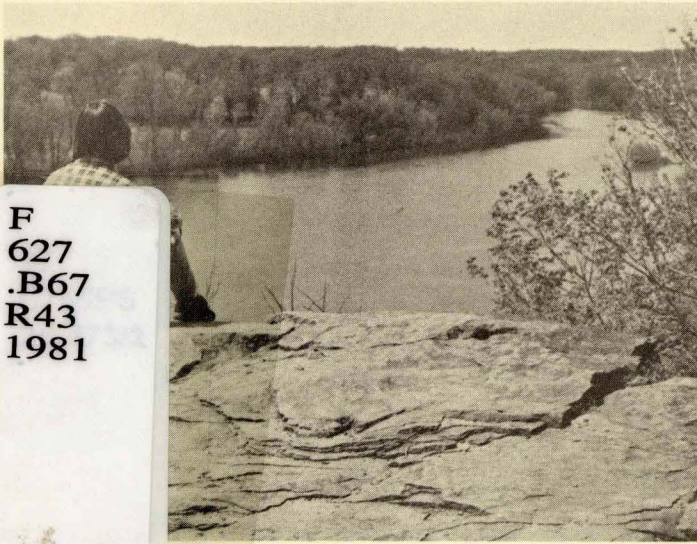
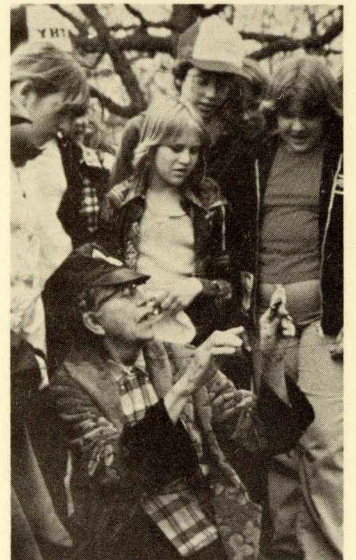
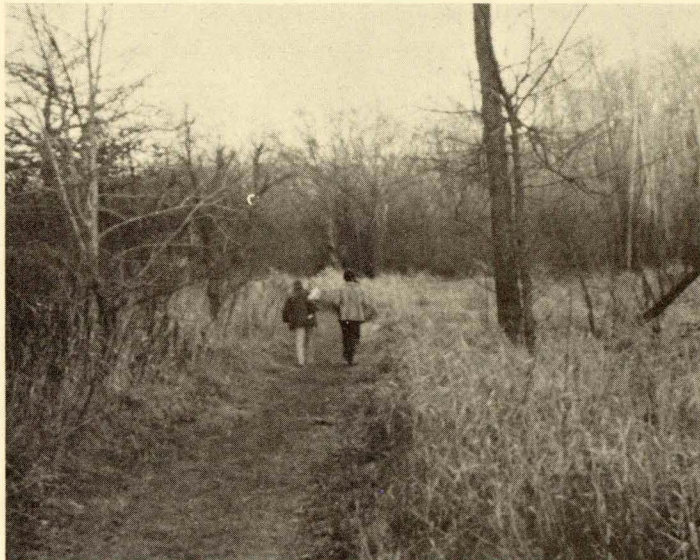


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**"REDISCOVERING"  
LEDGES STATE PARK**  
*A Master Plan for Redevelopment*



REDEVELOPMENT MASTER PLAN STUDY  
LEDGES STATE PARK  
BOONE COUNTY, IOWA

PREPARED BY:  
PLANNING AND COORDINATION SECTION  
IOWA CONSERVATION COMMISSION  
FALL, 1981

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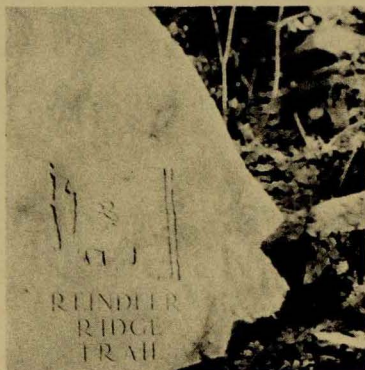
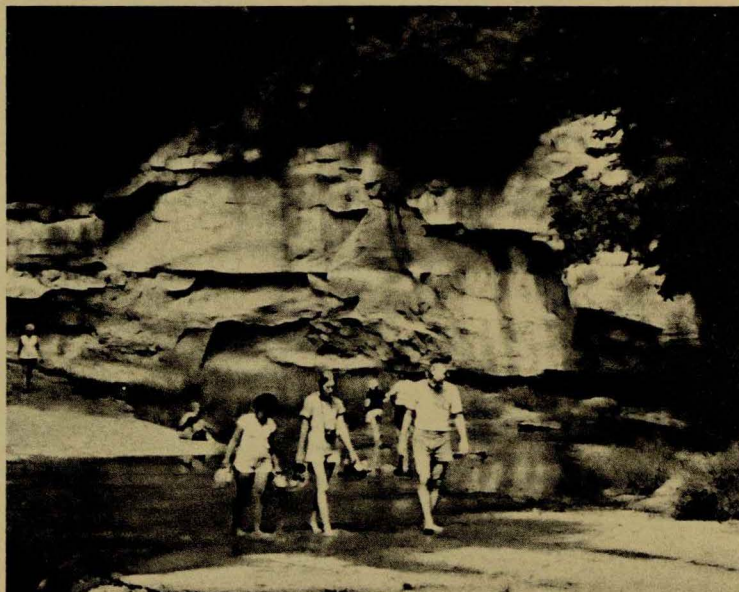
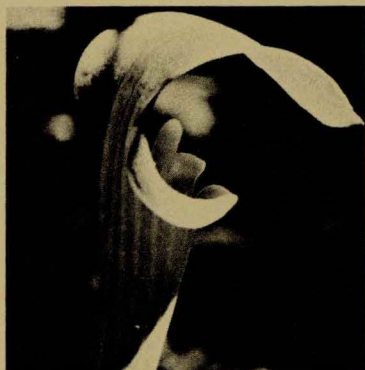
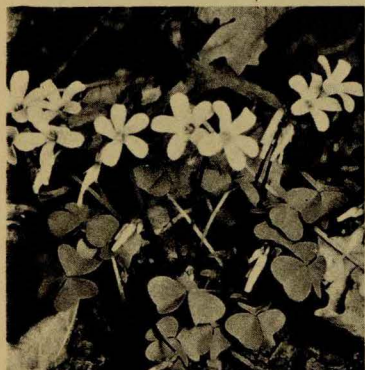
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# Introduction



## L E D G E S

### INTRODUCTION

#### Project Background and Area History

In 1921, 644 acres of rugged and wooded land along Pea's Creek, a tributary stream of the Des Moines River in Boone County, was acquired by the State of Iowa. The site, known as the "Ledges" because of its outstanding sandstone formations, was purchased for the purposes of preserving the area's splendid beauty and unique features as well as providing open space and recreation opportunities for a growing central Iowa population. Dedicated as a state park in 1924, Ledges is one of Iowa's original and oldest state parks. By 1945, Ledges State Park had been expanded to 860 acres, and recent lands transferred to the State of Iowa by the U. S. Army Corps of Engineers as mitigation for lands periodically flooded by the Saylorville Reservoir have increased the area to 1,117 acres.

The cultural and natural resources of the park offer a diversity of attractions. These include wooded slopes, restored native prairie, rare flora, abundant wildlife, significant geological formations, active landslides, archaeological and historical features, outstanding scenic qualities, and a diversity of aquatic features ranging from the Des Moines River and tributary stream environments to a small lake and marshy areas.

Popular recreation activities at Ledges are hiking, stream wading, picnicking, nature study, sightseeing, camping, winter sports, and other nature-oriented activities. Facility development at the park occurred primarily during the 1930's through the Work Progress Administration and Civilian Conservation Corps depression era programs. The CCC facilities constructed at the Ledges include shelters, latrines, entry and gate structures, trails, bridges, cabins, roads, and parking lots. Many of these fine facilities, which were constructed of fieldstone and native timber, are still standing and used today. Since the 1930's, few physical improvements or additions have been made to the area. Modern day pressures and Saylorville-related flooding impacts have made redevelopment of Ledges State Park a high priority.

Redevelopment planning for the park began in 1972 with a study by graduate students and staff of the Department of Landscape Architecture at Iowa State University. Richard Pohl, a graduate student, was principal author of a subsequent report and plan for redeveloping the park. In hindsight, the planning process utilized in the 1972 plan lacked adequate Commission staff and public input and review. The plan contained features which required further analysis; and, as a result, was not implemented. The current master plan study, begun in 1977, expands and modifies the concepts outlined in 1972. The nearly ten-year period occurring since initiating redevelopment planning in 1972 has resulted in a thorough analysis of the area, its current problems, and needs for the future. It has also allowed for ample staff and public involvement of in development sufficient well-thought design detail to ensure successful implementation.

Below is a chronology of events relating to Ledges State Park since 1971:

1971	Conceptual Master Plan for Ledges State Park (ISU Department of Landscape Architecture).
October, 1972	Commission approves the Redevelopment Master Plan for Ledges State Park (Richard Pohl)
December, 1972	A lawsuit is filed by local environmental groups to stop construction of the Saylorville Dam until an environmental impact statement is completed.
January, 1973	An out-of-court settlement is reached allowing for continued construction of the dam, but mandating the preparation of an impact statement.
September, 1973	Army Corps of Engineers sponsors public hearing.
May, 1974	Flash flood occurs and the Canyon road in Ledges State Park is closed.
May, 1974	Army Corps of Engineers releases final environmental impact statement.
August, 1974	Governor Ray announces a compromise plan which will provide protection for Ledges. Endorsements gained from state agencies but not from environmentalists or the Army Corps of Engineers.
November, 1974	Legislation introduced in Iowa legislature which would require construction of a barrier dike to protect the Ledges.
Spring, 1975	Legislation defeated.
May, 1975	New shuttle bus service to the Canyon area is provided.
June, 1975	Iowa State Inter-Agency Resource Council holds public hearing on the operation of Saylorville Dam.
June, 1975	Army Corps endorses Governor Ray's compromise plan.
September, 1975	Saylorville Dam completed but could not begin operation until Congress endorsed plan to protect Ledges and provide appropriate funds.
October, 1976	Needed congressional approval and authorization obtained.
December, 1976	Conservation Commission and Army Corps of Engineers reach a settlement. Commissioners direct ICC staff to prepare an update of the 1972 Master Plan according to the Commission's formal Master Planning Process.
February, 1977	Conservation Commission Task Force for Ledges State Park holds first meeting as part of Master Planning Process.
April, 1977	Commission approves a plan for opening of the Canyon road to intermittent traffic.

April, 1977	Saylorville Dam floodgates are closed.
October, 1977	Commission approves the revised master Plan Redevelopment Concepts formulated by Planning Task Force.
March, 1978	Conservation Commission holds public listening meeting in Boone, Iowa.
May, 1979	A professional consultant is hired to prepare the Interpretation Center Program and Facility Plan for Ledges State Park (Harland Bartholomew and Associates, North Brook, Illinois).
February, 1980	Public Review Meeting--Des Moines, Iowa--Good level of public support expressed for Revised Master Plan and Interpretive Proposals.
March, 1980	Commissioners approve Final Master Plan and Interpretive Plan for redevelopment. They also approve a ban on rappelling.

#### Purpose of the Master Plan and Planning Process

The purpose of this Master Plan is to provide the Iowa Conservation Commission with a detailed plan for park programs including facility development, recreation interpretation, and land management. The plan is based on a comprehensive study of Commission goals, objectives, and responsibilities; site characteristics, suitabilities, and limitations; and local and regional needs and desires. In addition to defining specific use areas, interpretation programs, facility development details, and land management programs, the plan also provides a logical implementation schedule with cost estimates for use by Commission administrators in preparing the Commission's biennial budget request.

The planning process, as structured by the Iowa Conservation Commission, seeks sound conservation recreation planning through a rational process. This process assures that those who have a reason to be involved or concerned with the project are given an opportunity to participate in a constructive manner. This includes staff, general public, affected local interest groups, and the Commissioners of the Conservation Commission. Public meetings are held to hear citizens' ideas and for their review of conceptual plans. A staff task force, composed of Commission staff members representing the Commission's various divisions and sections, supervises the preparation of the plan. The staff task force members provide technical data, recommendations, and periodic review of the plan.

## \* Project Goals:

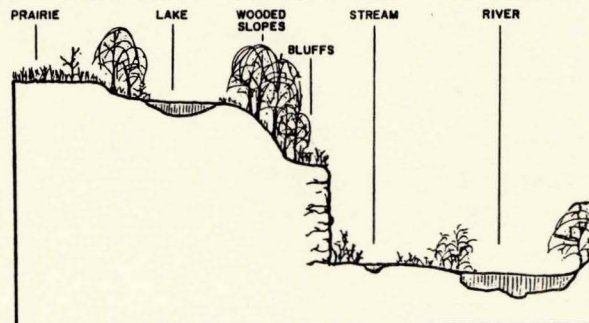
The following goals guided the development of this plan:

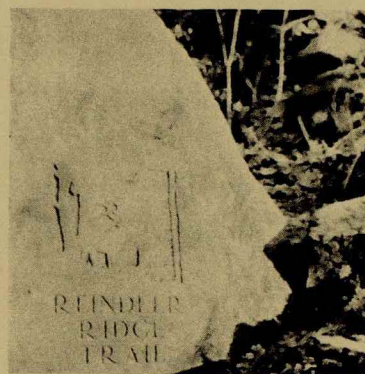
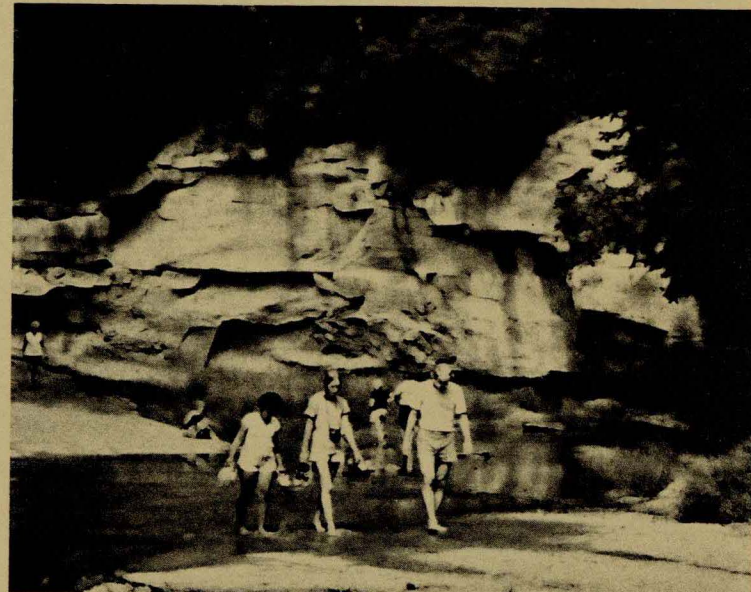
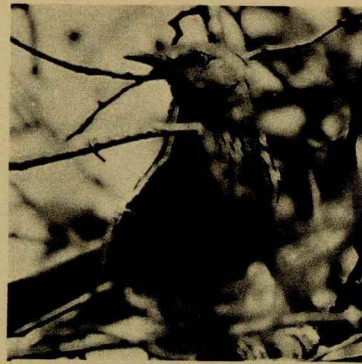
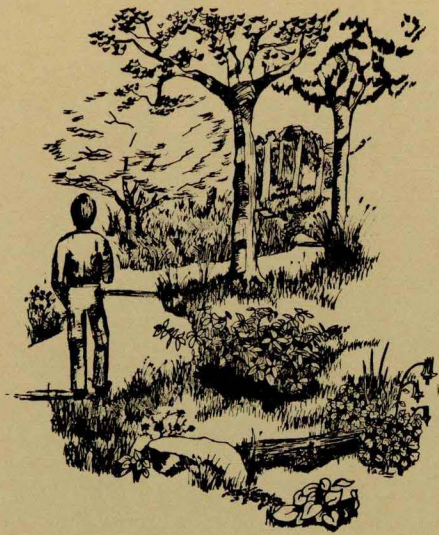
- To protect and conserve the unique natural and cultural resources of Ledges State Park. Additionally--to restore and enhance certain features with the majority of the site maintained in an undisturbed or "wild" state.
- To provide recreation developments to serve as support amenities for visitors primarily interested in experiencing the area's natural and cultural resources. Development features will occur only when they do not conflict with or affect the integrity of the site's significant resources.
- To develop an education program emphasizing interpretation of natural and cultural features in order to promote the recognition and understanding of natural systems. Intent of this program is to instill public awareness of the significance of our resource heritage and to promote public concern for the care and protection of these resources.
- To improve and modernize the park's utility system, ranger residences, and maintenance center for more efficient park management and operation.

### Area Theme

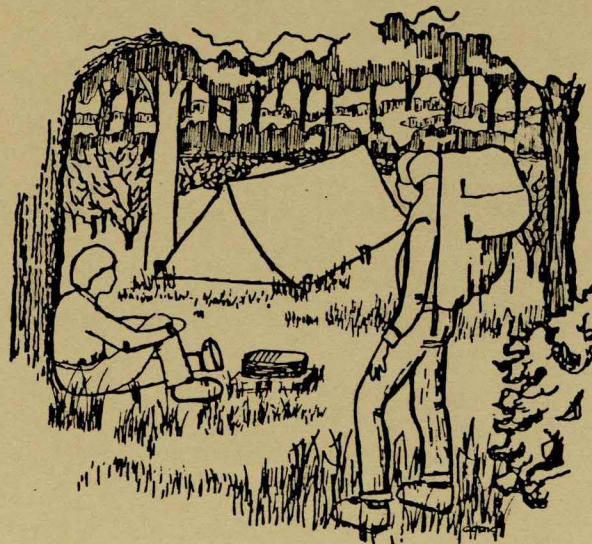
"Humanized environments give us confidence because nature has been reduced to the human scale, but wildness, in whatever form, almost compels us to measure ourselves against the cosmos. It makes us realize how insignificant we are as biological creatures and invites us to escape from daily life into the realms of eternity and infinity . . ." (The Wooing of Earth by Rene DuBois)

Rediscovery is the theme for the redevelopment plan for Ledges State Park. With the great technological advancements and urbanization over the last century, more and more people have lost touch with natural systems. The rediscovery theme attempts to establish an understanding of and sympathy for the complexities of nature in order to develop an appreciation of these resources. Whether it be a discovery or a rediscovery, it is important to experience nature, to be awed by its wonders, and to feel a reverence for the natural laws which link human kind to the rest of creation.





## Recreation Demand & Use Analysis



## CONSERVATION/RECREATION DEMAND AND USE ANALYSIS

Ledges State Park, located in the central portion of Boone County, is patronized primarily by visitors from central Iowa. Due to its unique character, however, many people are also attracted to the park from across the state. Regional and local conservation/recreation areas (supply) and statewide recreational trends (demand), were studied as part of an effort to determine the type and level of recreation facilities appropriate for Ledges State Park. An activities checklist reviewed by the staff task force, a regional recreation survey in the State Comprehensive Outdoor Recreation Plan (SCORP), and a park user survey were also used in the analysis of the recreation need.

The primary recreational needs and activities at Ledges State Park are identified as:

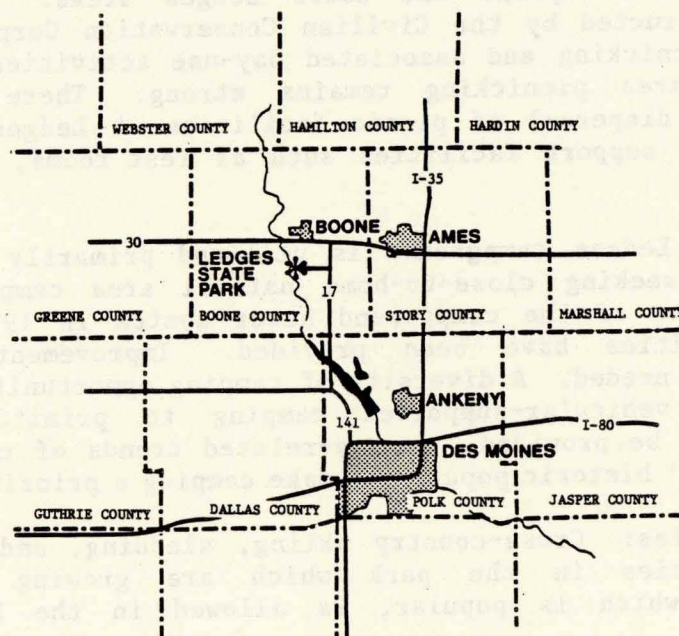
- Interpretation and Nature Study: The need for interpretation of Iowa's natural systems has been identified by the Conservation Commission as a statewide need. Recent years have seen an increase in public interest in nature study and environmental education activities. The rich and diverse resources of Ledges State Park provide a wealth of interpretative opportunities for the central Iowa area.
- Trails: The trails in the park have historically been a focal point of the recreation experience at Ledges. Numerous trails link the unique features, scenic areas, and recreation facilities of the park. Hiking demand over the years has exceeded the carrying capacity of the Ledges trail system. Overuse and resource damage has resulted. Rehabilitation of existing trails at Ledges will enhance hiking as a recreational activity and provide a necessary support facility for interpretive programs.
- Picnicking: Picnicking has always been a popular recreational activity at Ledges. Picnicking activity is concentrated primarily in the Canyon Area and adjacent upland and Lower Ledges areas. Two fine picnic shelters constructed by the Civilian Conservation Corps serve as focal points for picnicking and associated day-use activities. Public demand for natural area picnicking remains strong. There is a need for expansion and dispersal of picnic facilities at Ledges as well as the improvement of support facilities such as rest rooms, water fountains, etc.
- Camping: The Ledges campground is utilized primarily by campers from central Iowa seeking close-to-home natural area camping experiences. Since disruption of the campground sewer system in 1974, only interim camping facilities have been provided. Improvement of campground facilities are needed. A diversity of camping opportunities ranging from sophisticated vehicular-supported camping to primitive back-country camping should be provided. Energy-related trends of camping closer to home and Ledges' historic popularity make camping a priority need.
- Winter Activities: Cross-country skiing, sledding, and snowshoeing are winter activities in the park which are growing in popularity. Snowmobiling, which is popular, is allowed in the Des Moines River

Corridor; however, it is not considered appropriate in the rest of the park. Access and winterized support facilities are needed to encourage winter recreation activities in the park.

- Sightseeing: Many visitors come to the park to enjoy its visual splendor. According to the 1975 SCORP, sightseeing is the most popular recreation activity among Iowans. Hiking and pleasure driving are important activities which satisfy this demand.
- Water-Related Activities: Wading through Pea's and Davis Creeks has always been popular in the canyon area. Fishing occurs along the banks of the Des Moines River. Water crossings and access facilities need improvement.

#### Regional Conservation/Recreation Resources

Over 600,000 people live within a 60-mile radius of Ledges State Park. Their outdoor recreation and open space needs are met by a number of federal, state, county, municipal, and private conservation/recreation areas. Notable large-scale recreation areas include Saylorville and Red Rock Federal Reservoirs; and Big Creek, Brushy Creek, and Badger Creek State Recreation Areas. Both the Brushy Creek and Badger Creek areas await facility development. Secondary recreation areas or areas with significant natural resources include Dolliver, Springbrook, and Lake Ahquabi State Parks; Doolittle Pothole Prairie, Kalsow and Liska-Stanek Prairies; Woodman Hollow State Preserve, Hendrickson Marsh, and the Skunk River Greenbelt. The Des Moines River is an important open space corridor containing significant natural and cultural resources which influence Ledges State Park. Private recreational resources along the Des Moines River include the State 4-H Camp, Camp Hantesa Campfire Girl Camp, the Boy Scout Camp, and the Iowa Arboretum. Notable recreational opportunities provided by these private organizations include interpretation, group camping, lodging, kitchen services, and organized group recreation programs.



### Location/Access

The closest population centers to the park are Des Moines--35 miles south; Boone--4 miles north; and Ames--20 miles east. Interstate 35, which passes north and south through Iowa, is 18 miles east of the site. Interstate 80, which runs east and west in Iowa, is approximately 30 miles south of the park. State Highway 17 and County Road K are primary surfaced access roads to the east entrance to the park. A secondary gravel surfaced access road is State Road 164 which originates at the western entrance to the park and terminates at the intersection of Highway 30 at Boone, 4 miles north of the park.

### Park Attendance

Ledges State Park has experienced strong and increasing visitor usage since its establishment as a state park in 1924. The earliest records show an annual attendance of 117,130 in 1946 with 310 participating in camping. By 1956, the visitation had increased by 136 percent to 277,470 visitors with 2,075 campers. By 1966, visitation numbers reached 405,667 with 15,029 campers. All-time high visitation levels were experienced in the late 1960's and early 1970's with over 500,000 people visiting the park in 1973, and an average attendance for the years 1966-1973 of 438,000 people annually. While this increase in park usage was occurring, few associated physical or programmatic improvements or additions to the park were being made. "People were literally swarming all over the park."

In 1972, the preliminary redevelopment plan analysis recorded obvious park overuse, abuse, and resource degradation. The 1972 plan called for the removal of automobile traffic in the Canyon area and a dispersal of recreation uses into the more environmentally-tolerant upland areas as a method of reducing adverse user impacts. In early 1974, the septic system of the park's campground failed. The campground, proposed for relocation in the 1972 plan was closed for an interim period rather than needlessly expending monies for its repair. Also in 1974, a natural flood damaged a park road bridge over Pea's Creek and the canyon road was temporarily closed to vehicular traffic and later reopened to only intermittent traffic. These two conditions contributed to the fall in annual attendance to 129,132 in 1976 with only 6,464 people camping.

Visitation levels have also declined due to the creation of nearby major recreation areas such as Saylorville and Big Creek which have attracted visitors away from Ledges State Park. Current annual visitation levels are between 200,000 to 350,000 with 3,500 to 5,000 people camping annually. In 1981, park visitation was down due to the closure of the wildlife exhibit. The wildlife exhibit has historically been a unique attraction at the Ledges.

With park redevelopment, attendance levels are expected to increase. New facilities and programs are specifically designed to accommodate this anticipated increase without negative environmental impact. Even with redevelopment, visitation levels are not expected to return to the overuse levels experienced in the 1960's and early 1970's. This positive lessening in user pressure results principally because of the beneficial competition provided by newer, large-scale recreation areas developed in the region during the past decade.



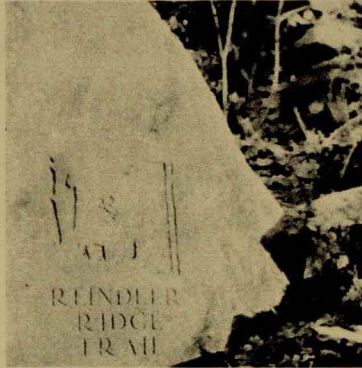
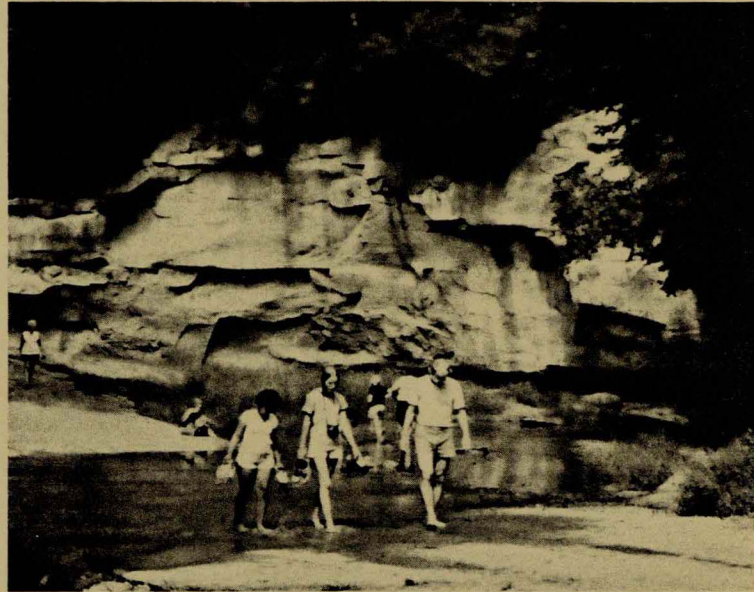
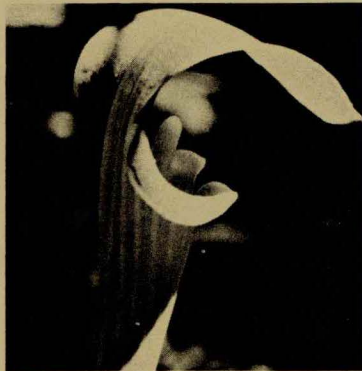
## Demand Analysis Conclusions

The central Iowa region surrounding the Ledges has many areas available to the public that are less sensitive and more suitable for intensive recreational development than Ledges State Park. For this reason, Ledges is not viewed as an area requiring intensive development. Programs and facilities at Ledges will be tailored to complement large-scale intensive recreation areas such as Saylorville and Big Creek by providing nonintensive, nature-oriented, pedestrian-scale recreational experiences.

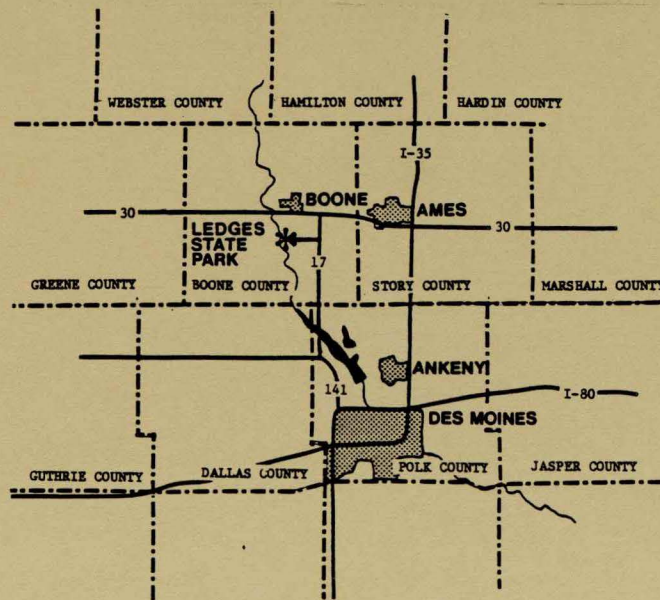
Emphasis of the redevelopment plan will be the protection of the natural resources which serve as Ledges' primary outdoor recreation and open space attractions. Recreation facilities will be developed which serve as support amenities for visitors interested in enjoying the natural environment experience Ledges has to offer.

The following priority needs have been identified:

- Outdoor Education and Interpretive Programs--both guided and self-guided interpretation including improved wildlife observation opportunities.
- Hiking Trails--with a variety of length and levels of difficulty.
- Expanded and Dispersed Picnic Areas.
- Improved Camping Opportunities--A diversity of camping opportunities including modern developed campsites for tents and trailers and "primitive backpack" camping.
- Natural Resource Conservation and Preservation.



# Site Analysis



## SITE ANALYSIS

### Preface

An understanding and knowledge of the site's cultural and natural resources is necessary in preparing the Master Plan for the redevelopment of the park. This knowledge was derived from analysis of the site, SCS soils maps and from the technical data and recommendations from the ISU advisory committee which consisted of Robert Palmquist, Geologist; David Gradwohl, Archaeologist; Don Farrar, Botanist; and Roger Landers, Botanist. The area presents a variety of constraints which restrict development and usage. The extent to which natural resources of the site limit facility development and the extent to which they would be impacted by various degrees of development and use were studied in order to determine the site's acceptable "carrying capacity".

### Topography






The relatively flat agriculture lands surrounding Ledges provide a striking contrast to the steep valleys, bluffs, ridges, ravines, and uplands of the park. The park lies in the Des Moines River Valley. Several small streams dissect the ridges and slopes.

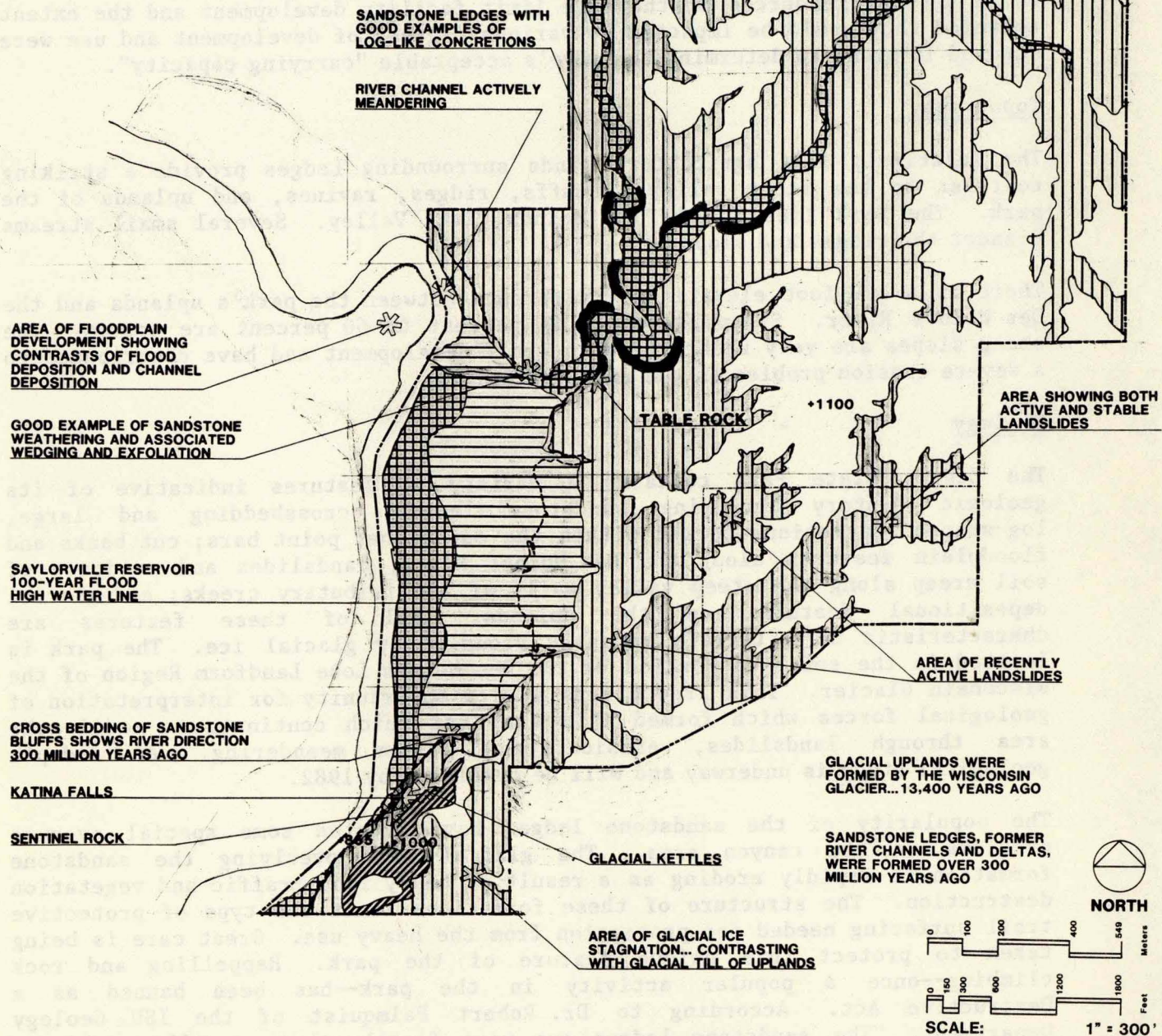
There is a 200-foot elevational difference between the park's uplands and the Des Moines River. Steep slopes of 20 percent to 60 percent are common. The steep slopes are very restrictive to trail development and have contributed to a severe erosion problem on the existing trails.

### Geology

The Ledges State Park contains a variety of features indicative of its geologic history including sandstone ledges; crossbedding and large, log-shaped concretions formed within the sandstone; point bars; cut banks and floodplain features along the Des Moines River; landslides and evidence of soil creep along the steep valley walls of the tributary creeks; and glacial depositional features on the uplands. All of these features are characteristic of a terrain recently occupied by glacial ice. The park is located in the southern portion of the Des Moines Lobe Landform Region of the Wisconsin Glacier. This area offers a rich opportunity for interpretation of geological forces which formed this area and which continue to modify the area through landslides, erosion, and stream meandering. An indepth geological study is underway and will be completed by 1982.

The popularity of the sandstone ledges have created some special overuse problems in the canyon area. The glacial till overlying the sandstone formation is rapidly eroding as a result of heavy foot traffic and vegetation destruction. The structure of these formations limit the type of protective trail surfacing needed for protection from the heavy use. Great care is being taken to protect this unique feature of the park. Rappelling and rock climbing--once a popular activity in the park--has been banned as a Destructive Act. According to Dr. Robert Palmquist of the ISU Geology Department, "The sandstone ledges are more fragile than normally realized. The sandstone is poorly cemented and thus weak and easily broken. The face of most cliffs is 'case hardened'. Case hardening is the strengthening of the surface layer of rock from the addition of calcite cement. Groundwater, as it

-  **UPLANDS:** AMES LOAM, HAYDEN, LUTHER LOAM
-  **STEEP SLOPE:** HAYDEN LOAM, STORDEN LOAM
-  **ALLUVIAL TERRACE:** MOINGONA LOAM, BUCKNEY FINE SANDY LOAM
-  **FLOODPLAIN:** BUCKNEY, LANDES, SPILLVILLE
-  **PALMS MUCK**



# LEDGES STATE PARK REDEVELOPMENT MASTER PLAN

## TOPOGRAPHY, SOILS, AND GEOLOGIC FEATURES

IOWA  
CONSERVATION COMMISSION

SUMMER 1981

flows through the sandstone, dissolves the calcite cement which holds the sand grains together. When the groundwater reaches the cliff face, it evaporates. The dissolved calcite crystallizes from the water to add cement and strength to the cliff face. The outer quarter-inch to two-inch layer of cliff face is thus stronger than the interior rock. Concern is that continued rappelling will break through the case to expose the soft interior to rapid erosion. Small scale examples of natural case breaching are the niches developed in some of the cliffs along Pea's Creek and also in the Katina Falls Area. The problem is that once the case is breached and enlargement begins, it is too late to stop the process. Prevention is thus required."

#### Soil Groupings and Capabilities

The soil types on the site were classified and assessed according to their landform position: floodplain, alluvial terrace, steep slopes, and relatively-flat uplands.

##### -- Floodplain

The soils found on the floodplain of the Des Moines River, Pea's Creek, and Davis Creek were formed by stratified water-deposited material that is not well developed due to its recent deposition. Included in this category are the Landes, Buckney, and Spillville soil association. All of these soils have severe limitations for use as road and building sites, recreational uses, trails, sewage lagoon sites, and septic fields.

##### -- Alluvial Terrace

The sandy loams of the alluvial terrace (former floodplain) consist of Moingona loam, Buckney fine sandy loam, and Hanlon fine sandy loam. These moderately well-drained soils are characterized by deep topsoil and a loose structure. The Hanlon fine sandy loam is subject to short duration flooding which creates severe limitations for building sites, camping, septic fields, and sewage lagoon sites. The other soils have few limitations and are well suited for recreational uses; however, there are limitations for sewage lagoons.

##### -- Steep Slopes

These highly-erodible loams consist of the Hayden-Storden Loam Soils Association on slopes varying from 20-60%. These soils are poorly drained and the subsoil is very susceptible to quick deterioration. The landslide-prone areas are characterized by broad shallow depressions, step-like benches, and bent tills. The structure of soils in this category have moderate to severe limitations for recreation uses and facility development primarily due to the steepness of slopes. Existing trails on steep slopes are causing severe erosion and require protective surfacing and structures due to the slope gradient and heavy use.

##### -- Uplands

The poorly-drained upland loams include Ames Loam, Hayden Loam, and Luther Loam. In this category, only Hayden Loam is adequately drained. Hayden Loam and Luther Loam are very suitable for roads, building

structures, septic fields, and sewage lagoon construction as well as active recreation uses. The high water table characteristic of Ames Loam provide severe limitations for construction of physical features such as sewage treatment systems or any active recreation uses. Vernal pools are found intermittently in the upland as a result of the high water table and wet spring conditions. Palms Muck are poorly-drained soils found around the Lost Lake Area which consists of organic material over mineral soil.

### Hydrology

The park lies in the Des Moines River Valley and is surrounded by agricultural land. Pea's Creek and Davis Creek dissect the northern half of the park before draining into the river. Water has always had a great influence on Ledges State Park. From the formation of sandstone ledges by channel deposits of rivers flowing 300 million years ago to frequent naturally-occurring floods of the Des Moines River, water continues to dramatically affect the park. Along the Des Moines River, slow migration of the river across its floodplain has resulted in development of steep channel banks at the outside of bends, and wide, sandy point bars inside the bends. Abandoned channels, small natural levees, and local scour pits characterize the floodplain. On the steep valley slopes of small tributaries, broad shallow depressions, step-like benches, and bent trees indicate that landsliding and soil creep are major processes of valley widening in areas of rapidly down-cutting streams.

During the 1930's, the Civilian Conservation Corps constructed a dam over Katina Falls to create the small pond known as Lost Lake. Located on the southern end of Lower Ledges, it now contains water intermittently due to the closure of the wildlife exhibit. Additional ponds or pools of water are found on a seasonal basis in the uplands of Ledges. These vernal ponds are intermittent, containing water in the spring and becoming dry in late summer. Before settlement of this part of Iowa and subsequent drainage of numerous wetlands, the landscape was dotted with small shallow lakes or "prairie potholes".

### Saylorville Reservoir

The 5,400-acre conservation pool of Saylorville Dam extends from 11 miles north of Des Moines to approximately 7 miles south of the Ledges. Purpose of the reservoir is to provide flood protection for the City of Des Moines and downstream properties. Ledges State Park has a history of periodic natural flooding from the Des Moines River. The level and duration of flooding at the park is affected by the Saylorville impoundment.

The average elevation on the river bank within the park is 860 feet above sea level. Natural flooding frequently occurred to the 871 elevation, but receded quickly before the dam was constructed. Army Corps of Engineers has estimated that the Saylorville Reservoir will raise the elevation of major floods approximately 20 feet and increase flood duration to 30 to 40 days for certain floods.

The sedimentation rates are also affected by the reservoir. Since duration of the Saylorville flood is longer, there is heavier sedimentation. Higher elevations receive less sediment due to the distance from the river, shallow depth of water, and a shorter duration.



UNIQUE FLOOD LEVEL MARKER  
NEAR MOUTH OF PEA'S CREEK

Heaviest damage to the park occurs during a 100-year flood which reaches an elevation of 890 feet above sea level. This flood affects 264 acres of the park and 25 acres of the adjacent wildlife area. The 890-foot impoundment lasts a relatively short time; however, the vegetation is affected. The area adjacent to the river receives a substantial vegetation kill, but it is possible that some willows, box elders, and cottonwoods may survive. Following major floods, some type of renovation will be necessary in the lower valley to prevent undesirable woody vegetation and weed species from becoming established. The stone shelter and stone toilet, lower picnic area, and playfield which lie between the 868'-870' elevation will be rendered unusable for a period of time and will require maintenance and repair following inundation. The through-road (Highway 164) along the river will be closed during inundation and for a period of time following floods to allow for restoration and cleanup. Flooding of Ledges will intermittently alter visitor use patterns in the park. Day use will temporarily focus in the uplands.

#### Terrestrial Communities

Much of the woodland at Ledges was disturbed (i.e. timber removal, grazing) prior to public ownership. The second growth forest at Ledges consists mainly of mature oak-hickory forest dominating slopes and uplands, with small areas of north-facing slopes dominated by maple and basswood, and bottomland association of willow, elm, and cottonwood occurring along the floodplains. Common shrubs include: hazelnut, bladdernut, prickly ash, wahoo, dogwood, and hop-horn beam. Woodland wildflowers can be found throughout the park.

There are also a number of unique plant species. Steep north-facing slopes adjacent to the sandstone bluffs contain communities of lichens, mosses, liverworts, and ferns. Notable is the reindeer lichen-juniper moss association, which is quite rare. A tall-grass prairie was restored in 1950 and represents the first successful prairie restoration in Iowa. Big and little bluestem, Indian grass, switchgrass, and side-oats gramma are typical grasses found in the restored prairie along with a limited variety of forbs. Combination of mature oak-hickory forest with its display of wildflowers, flowering understory shrubs, unique sandstone bluff plant species, tall-grass and forbs of the prairie, and colorful autumn foliage provide a diversity unavailable in any other setting in central Iowa.

## TERRESTRIAL COMMUNITIES

### FLOODPLAIN/BOTTOMLAND:

ALONG DES MOINES RIVER, PEAS CREEK, AND DAVIS CREEK, AND  
INTERMITTENT STREAMS

### UPLAND WOODS:

ON SLOPES AND GLACIAL TILL-DERIVED UPLANDS AND INCLUDE:

1. OAK-HICKORY ASSOCIATION - DOMINANT COMMUNITY, ESPECIALLY  
ON SOUTH AND SOUTHWEST FACING SLOPES AND UPLANDS
2. MAPLE-BASSWOOD ASSOCIATION: CLIMAX FOREST COMMUNITY OF CENTRAL  
IOWA, PREDOMINANTLY ON NORTH AND NORTHEAST FACING SLOPES

### PRAIRIE:

ON RESTORED PRAIRIE PLOT, SMALL SCATTERED PRAIRIE REMNANTS, AND  
POSSIBLE GOAT PRAIRIES

### EDGE OF ECOTONE:

TRANSITION ZONE BETWEEN PRAIRIE OR OPEN FIELD AND WOODLAND

### MICROHABITATS:

ROCK LEDGES, VERNAL POOLS, AND REINDEER LICHEN-JUNIPER MOSS ASSOCIATION

## AQUATIC COMMUNITIES

### DES MOINES RIVER:

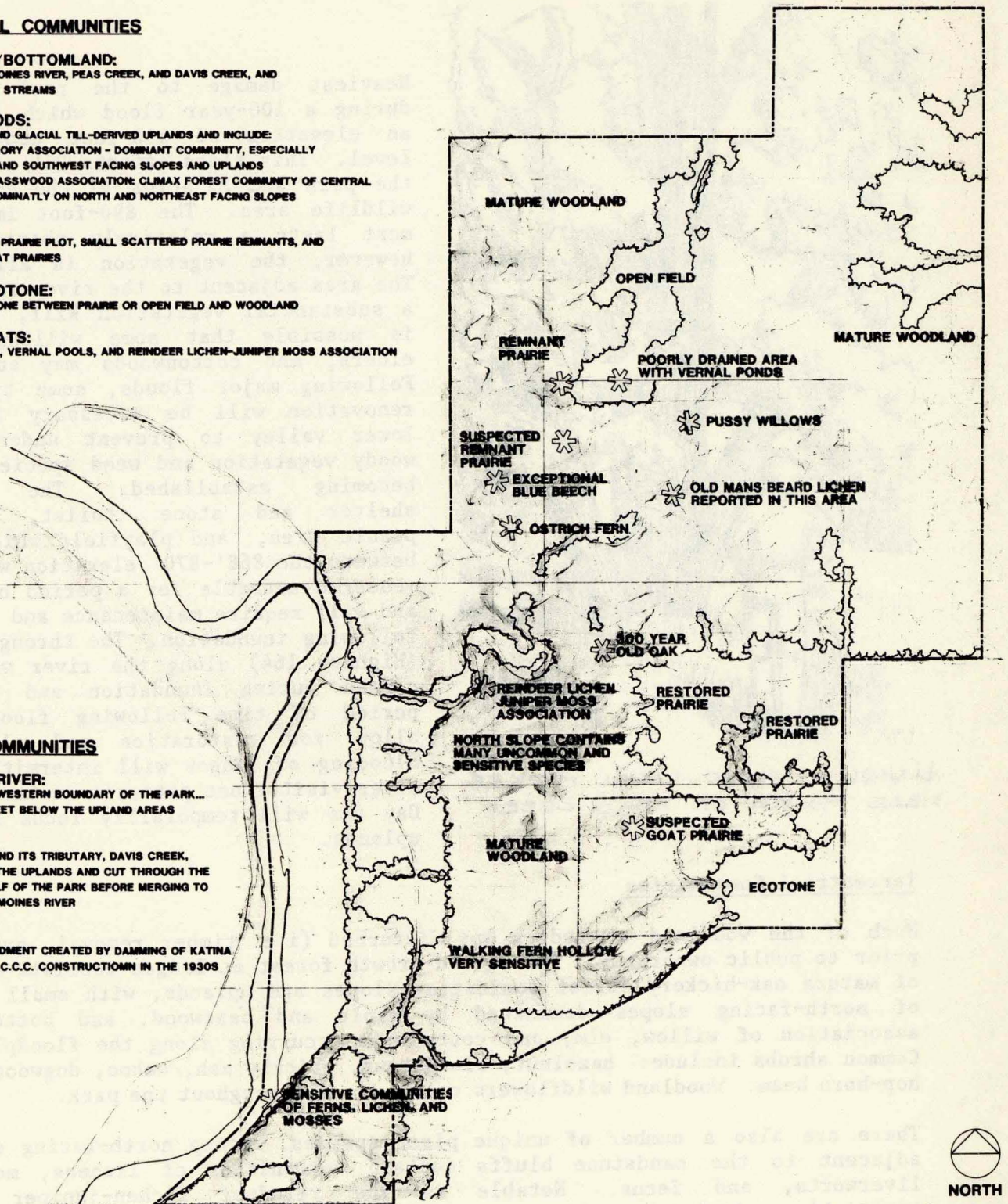
FORMING THE WESTERN BOUNDARY OF THE PARK...  
150 TO 200 FEET BELOW THE UPLAND AREAS

### STREAMS:

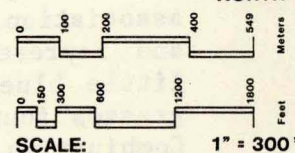
PEAS CREEK AND ITS TRIBUTARY, DAVIS CREEK,  
ORIGINATE IN THE UPLANDS AND CUT THROUGH THE  
NORTHERN HALF OF THE PARK BEFORE MERGING TO  
JOIN THE DES MOINES RIVER

### POND:

SMALL IMPOUNDMENT CREATED BY DAMMING OF KATINA  
FALLS DURING C.C.C. CONSTRUCTION IN THE 1930S



NORTH



SCALE: 1" = 300'

**LEDGES STATE PARK**  
**REDEVELOPMENT MASTER PLAN**

**NATURAL  
COMMUNITY  
ANALYSIS**

**IOWA  
CONSERVATION COMMISSION**

**SUMMER 1981**

### Aquatic Communities

The Des Moines River, Pea's and Davis Creeks, Katina Pond, Lost Lake, and intermittent pools (prairie potholes) provide a diversity of aquatic habitats. Within these habitats, intricacies of the food chain may be studied from phytoplankton and protozoa to shiners and minnows upon which the gamefish (catfish, walleye, smallmouth bass, and northerns) feed. These water features contain a diversity of aquatic vegetation, where natural succession may be observed. A variety of aquatic insects are also an integral part of this community.

### Wildlife

The rich habitat of Ledges State Park serves as a preserve and provides sanctuary for many of Iowa's native wildlife. The park supports a diversity of animal life. Songbirds are abundant and include red-headed and red-bellied woodpeckers, black-capped chickadees, cardinals, nuthatches, as well as others. Turkeys reside in the park all year. The park also provides seasonal and migratory habitat for herons, bluebirds, and nesting warblers. Over 200 species of birds have been identified in the park. Ledges State Park is an important area for the local white-tail deer population. Other common mammals include the cottontail rabbit, fox squirrel, ground squirrel, eastern chipmunk, woodchuck, striped skunk, opossum, raccoon, red fox, coyote, mink, bats, voles, and mice. Toads and a variety of frogs are common. Turtles and snakes are found throughout the park, from the prairie to the streams.

Iowa's woodlands and wetlands diminish with the continued demand for more agriculture land. The tall-grass prairie, once covering much of the state, remains as a scattered remnant. As habitat decreases, so will wildlife populations that it must support. The diversity of habitat that exists at Ledges State Park is a valuable resource.

### Human History



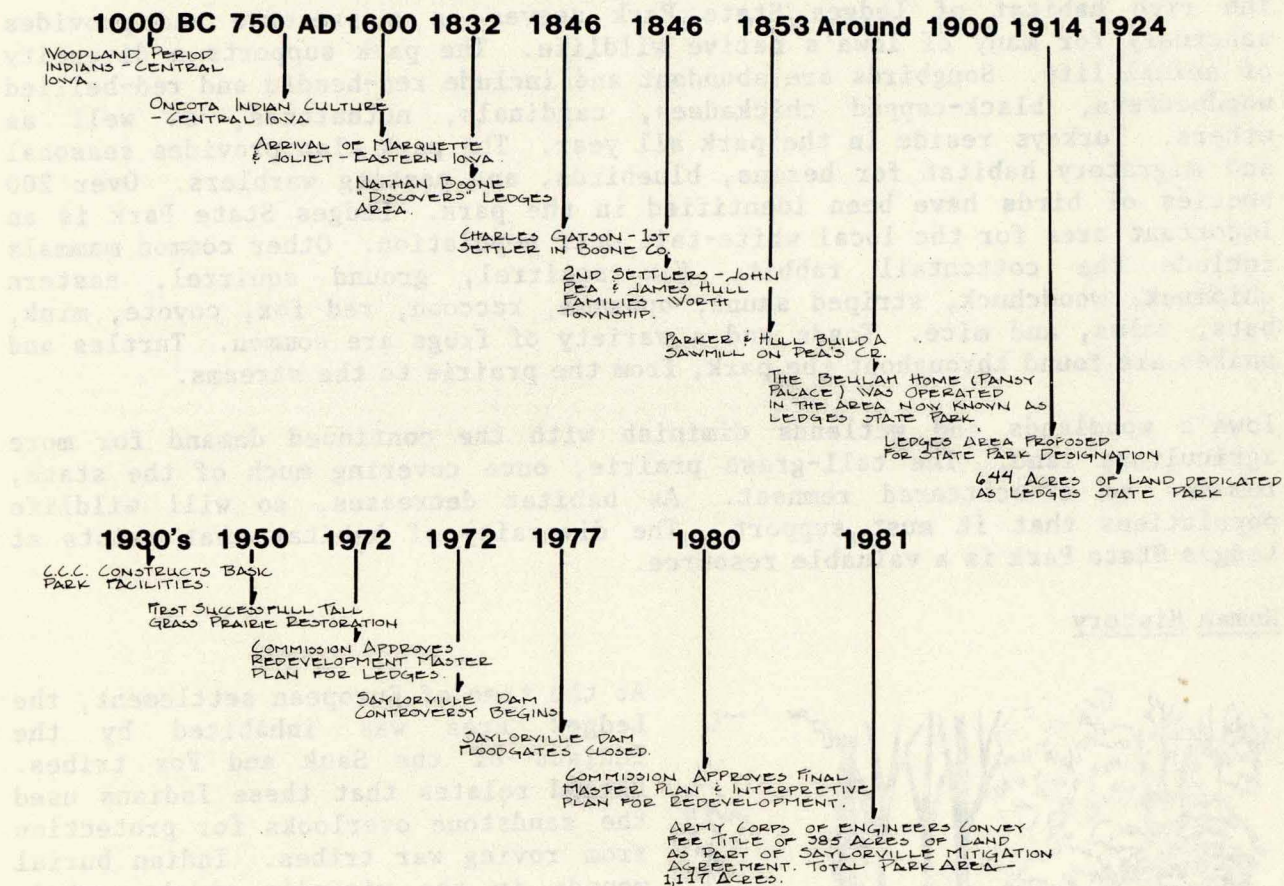
At the time of European settlement, the Ledges area was inhabited by the Indians of the Sauk and Fox tribes. Legend relates that these Indians used the sandstone overlooks for protection from roving war tribes. Indian burial mounds in the vicinity which contain weapons, tools, and other artifacts are silent reminders of the area's past inhabitants.

Ledges area was "discovered" in 1832 by Captain Nathan Boone, son of pioneer Daniel Boone. Families of John Pea and James Hull were first to settle in this township. Legislative action established the County of Boone in 1847, but the City of Boone was not established until 1865. Presence of the Chicago-Northwestern Railroad along with mining of bituminous coal abundant in the

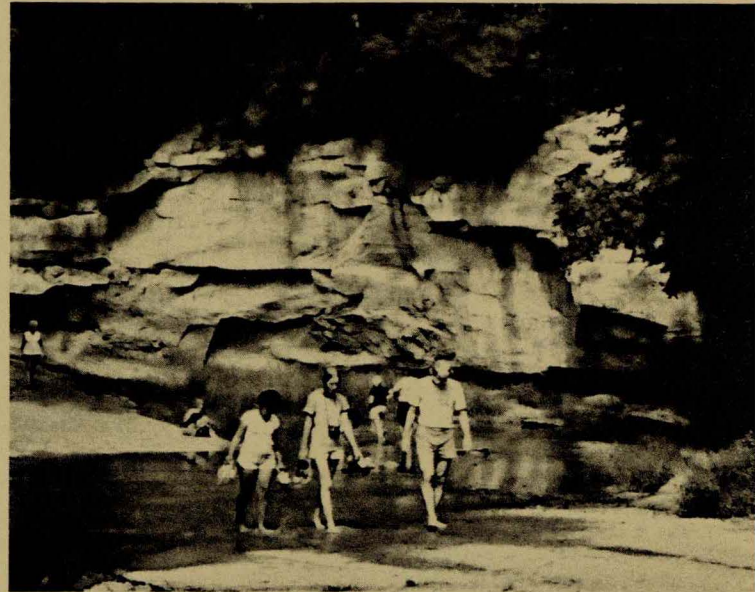
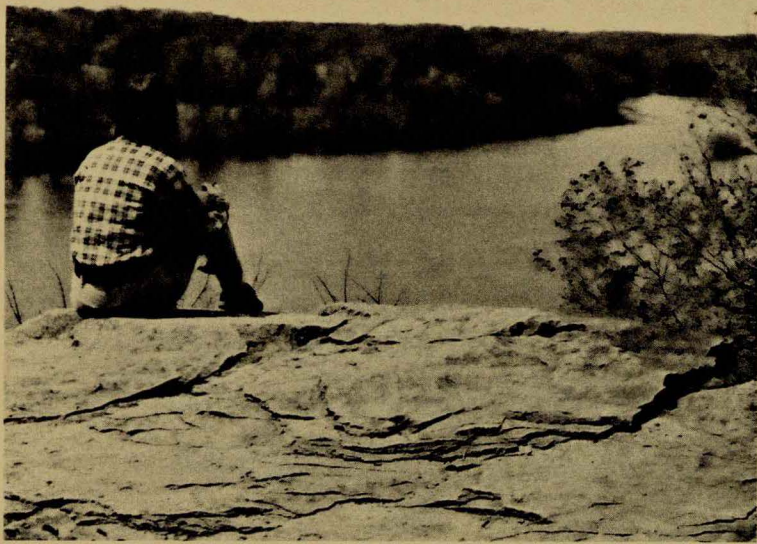
vicinity had a great influence on the growth of the community. The area now known as Ledges was a popular attraction for sightseers, picnickers, and scientists long before it was an established state park.

Since its dedication in 1924, thousands of Iowans have enjoyed the natural splendor of Ledges State Park. Most of the parks development and construction was completed during the 1930's by the Civilian Conservation Corps. Many of the facilities, constructed of native timber and field stone, are still standing today and are examples of their fine craftsmanship. They are significant historical examples of park architecture of that period.

## PREHISTORIC INHABITANTS TO PRESENT



For further details on Topography, see Page 13; Geology, see Pages 14 and 15; the Natural Communities, see Page 16-18; and Human History, see Pages 20-22 in the Ledges State Park Interpretation Program and Facility Plan.



## Existing Facilities and Conditions



## EXISTING FACILITIES AND CONDITIONS

### Recreation Facilities



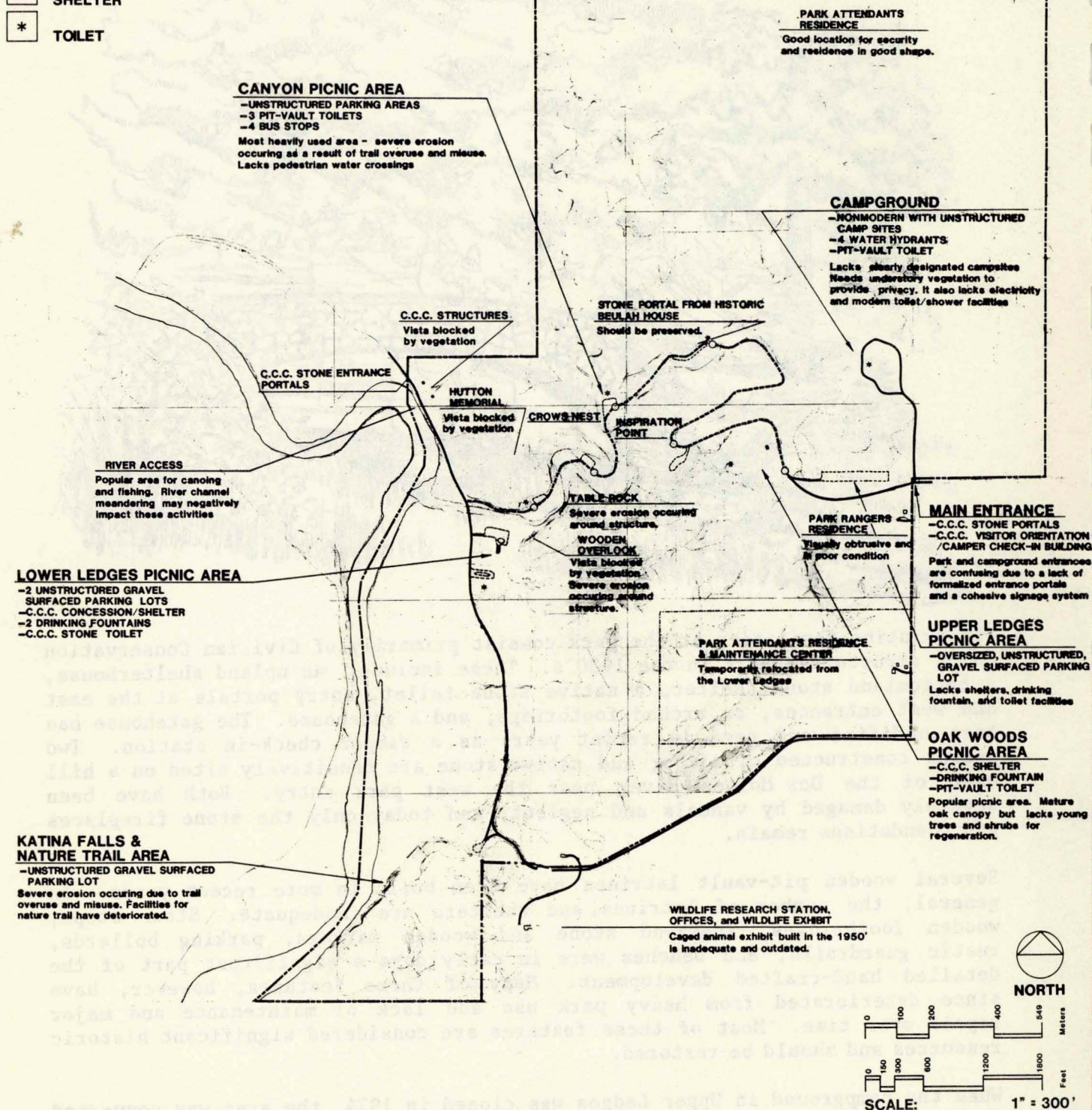
The existing facilities at the park consist primarily of Civilian Conservation Corps structures built in the 1930's. These include: an upland shelterhouse, a bottomland stone shelter, a native stone toilet, entry portals at the east and west entrances, an arched footbridge, and a gatehouse. The gatehouse has been modified and used in recent years as a camper check-in station. Two cabins constructed of timber and native stone are sensitively sited on a hill east of the Des Moines River near the west park entry. Both have been severely damaged by vandals and neglect, and today only the stone fireplaces and foundations remain.

Several wooden pit-vault latrines have been built in more recent years. In general, the number of latrines and shelters are inadequate. Stone steps, wooden footbridges, engraved stone and wooden markers, parking bollards, rustic guardrails, and benches were in early days a significant part of the detailed hand-crafted development. Many of these features, however, have since deteriorated from heavy park use and lack of maintenance and major repair over time. Most of these features are considered significant historic resources and should be restored.

When the campground in Upper Ledges was closed in 1974, the area was converted to a parking lot and picnic area to relieve some of the recreational pressure from the Canyon Area and the Oakwoods picnic area. The nearby nonmodern campground remained open. It contains a loop road, water hydrants, and one pit vault toilet.

# KEY

-  BUS STOP
-  BUS ROUTE
-  SHELTER
-  TOILET



## LEDGES STATE PARK REDEVELOPMENT MASTER PLAN

## EXISTING FACILITIES

IOWA  
CONSERVATION COMMISSION

SUMMER 1981

### Access and Circulation

The park is accessible to vehicular traffic at three points. The main or east entrance is located one and one-quarter miles west of the paved County Road R27. This is the only paved access and is entry to Upper Ledges picnic area, campground, and Lower Ledges canyon road. This entrance is awkwardly signed and can be confusing to the unfamiliar visitor. The campground entrance located outside the main gate creates traffic congestion. The original stone gate house serves as the camper check-in station and because of a modern road relocation, is oddly located as an entry feature. There is neither an orientation facility nor a concise signage system for the arriving visitor.

The unpaved State Road 164 south of Boone leads to the west entrance. This entrance road is used primarily as a local Boone area access to Lower Ledges and Des Moines River. This road parallels a portion of the Des Moines River in the park.

The southern entrance is an unpaved county road and provides access to the Wildlife Research Station and southern portion of the park. This road eventually merges with Highway 164 to form the only unrestricted through road in the park. This road, as a result of Pea's Creek flooding Highway 164, will be periodically closed to traffic. When the Canyon road is closed, the southern route is an important access to the Lower Ledges. Dust conditions in dry weather and steep grades in inclement weather create hazardous road conditions.

The main entrance road, roads in Upper Ledges, and the Canyon road are paved. All other roads are gravel. Designated parking areas exist throughout the park, but have never been well defined, paved, or marked for parking stalls. As a result, visitors park randomly throughout the Ledges on high-use days. This creates chaos, congestion, encroachment on natural areas, and is visually obtrusive.

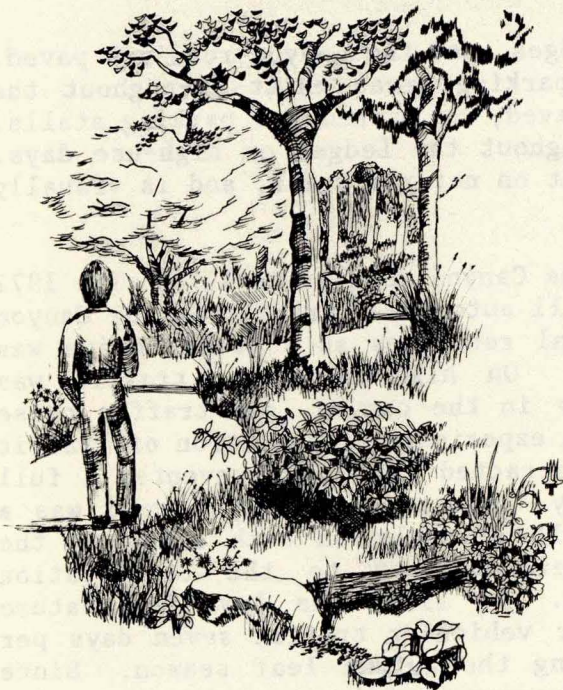
Vehicular traffic has been restricted on the Canyon road since 1974. The 1972 redevelopment plan recommended removal of all automobile traffic in the Canyon Area. Utilizing the Ledges' unique natural resources as a scenic drive was not deemed a wise and compatible use. On high-use days, traffic was bumper-to-bumper, exhaust fumes hung heavy in the canyon, and traffic noise and loud music totally dominated the canyon experience. Congestion of traffic and parked vehicles in the Canyon Area detracted from and prevented a full appreciation of the Ledges' natural beauty. Closing the Canyon road was a very controversial decision. Citizens felt strongly on both sides of the issue and there were hundreds of letters written to the Conservation Commission, legislators, and Governor Ray. In 1974, the Iowa Legislature mandated that the Canyon road be open for vehicular traffic seven days per week from September 15 to November 1 during the autumn leaf season. Since 1977, the Canyon road has been open to one-way traffic on weekdays, except holidays, and during the fall color season. The road is closed at all other times, and a shuttle bus provides access to the Canyon Area. Today, there is a good degree of acceptance and agreement with the limited access policy and

the canyon experience has indeed improved. An improved shuttle bus is needed to provide better access by all park visitors including the handicapped.

Boone County is providing and maintaining four miles of surfaced and one mile of unsurfaced access road leading to the south entrance. The State of Iowa is providing and maintaining four miles of unsurfaced, low-standard road to the west access. With restricted traffic on the Canyon road and periodic flooding problems on the western access, it is anticipated that there will be a major shift of public traffic and associated maintenance and improvement costs on the east/south access roads. This shift could produce an added financial burden to Boone County. A reassignment of park access road responsibilities between the state and county would be desirable and is recommended.

### Pedestrian Circulation






The pedestrian circulation system consists of an extensive trail network through woodland, prairie, and stream valley areas of the park. The Canyon road also serves as a major pedestrian avenue. Eleven miles of hiking trails are a major recreational feature of the park. The basic trail framework through the woodlands was established by the Civilian Conservation Corps in the 1930's. The stone footbridge and stone steps, cedar railing system, switchbacks, and stone trail edgers are products of their work.

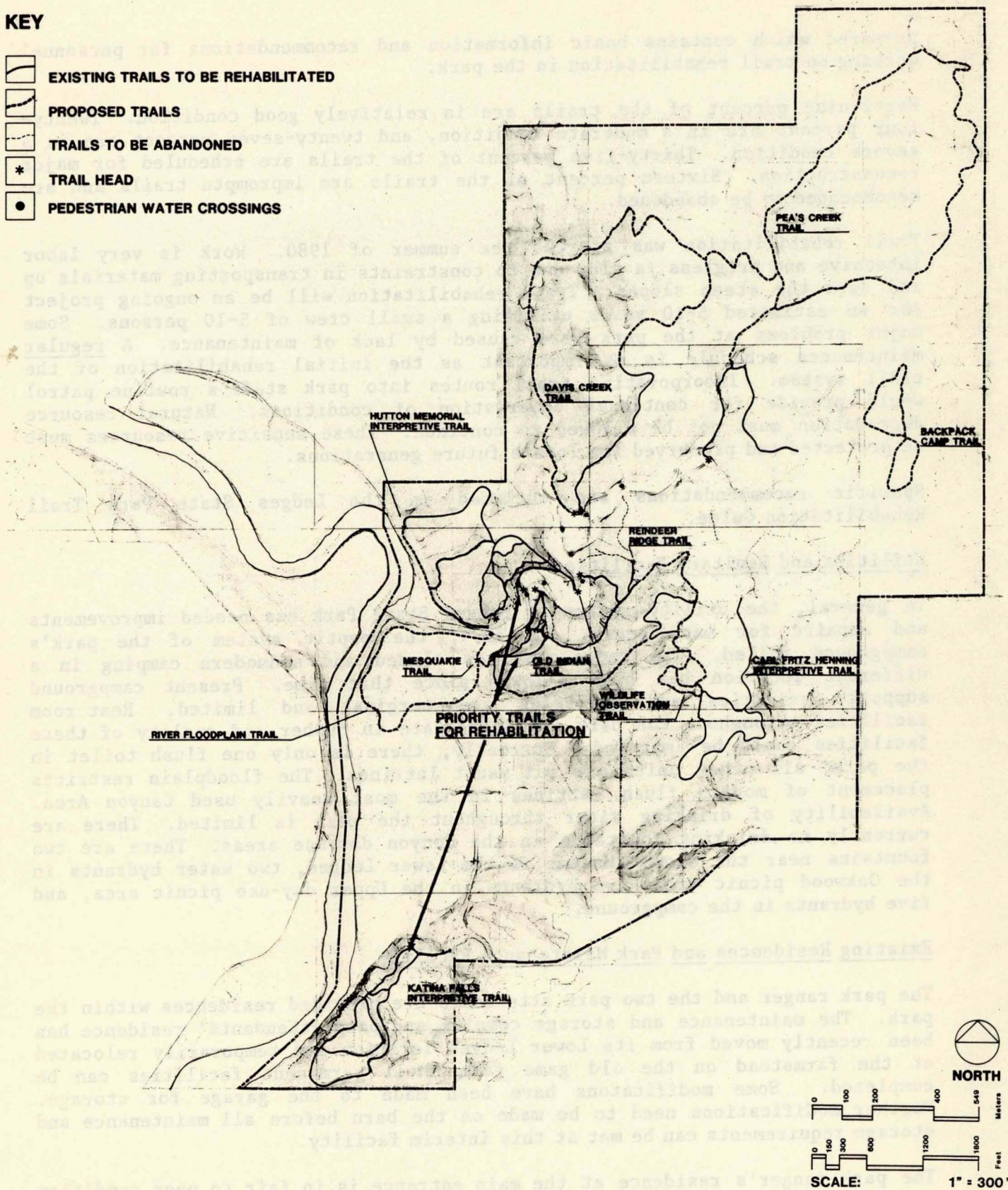


The current condition of Ledges' trail system is not capable of accommodating heavy use experienced in the park, especially levels experienced in the 1960's and early 1970's. Older trails have been allowed to deteriorate over the years due to lack of general maintenance and funds for major repair. Trail conditions are causing severe erosion which are affecting adjacent slopes, disrupting natural drainage patterns, and destroying vegetation. In some areas, erosion is causing irreparable damage to resources of the site, not to mention the diminishing scenic values important to trail recreation.

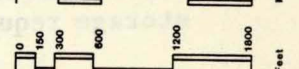
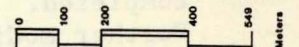
A trail study was conducted by the Iowa Conservation Commission during the fall of 1979 as part of this master plan study. Purpose of the study was to inventory and classify existing conditions of trails and to recommend rehabilitation measures and design standards for improving the trail system. The inventory included the impromptu trails, even though they are not part of the formal trail system. As a group, impromptu trails are causing some of the most severe erosion on the site. A trail guide was

# KEY

-  EXISTING TRAILS TO BE REHABILITATED
-  PROPOSED TRAILS
-  TRAILS TO BE ABANDONED
-  TRAIL HEAD
-  PEDESTRIAN WATER CROSSINGS



NORTH



SCALE: 1" = 300'

**LEDGES STATE PARK**  
**REDEVELOPMENT MASTER PLAN**

**EXISTING &  
PROPOSED  
TRAILS**

**IOWA  
CONSERVATION COMMISSION**

**SUMMER 1981**

prepared which contains basic information and recommendations for personnel working on trail rehabilitation in the park.

Forty-nine percent of the trails are in relatively good condition. Twenty-four percent are in a moderate condition, and twenty-seven percent are in a severe condition. Thirty-five percent of the trails are scheduled for major reconstruction. Sixteen percent of the trails are impromptu trails and are recommended to be abandoned.

Trail rehabilitation was started the summer of 1980. Work is very labor intensive and progress is slow due to constraints in transporting materials up and down the steep slopes. Trail rehabilitation will be an ongoing project for an estimated 5-10 years utilizing a small crew of 5-10 persons. Some major problems at the park were caused by lack of maintenance. A regular maintenance schedule is as important as the initial rehabilitation of the trail system. Incorporating trail routes into park staff's routine patrol would provide for continual observation of conditions. Natural resource degradation must not be allowed to continue. These sensitive resources must be protected and preserved for Iowa's future generations.

Specific recommendations are outlined in the Ledges State Park Trail Rehabilitation Guide.

#### Utilities and Sanitary Facilities

In general, the utility system at Ledges State Park has needed improvements and repairs for many years. In 1974, the septic system of the park's campground failed. The campground was closed and nonmodern camping in a different location has been allowed since that time. Present campground support facilities and utilities are marginal and limited. Rest room facilities throughout the park are inadequate in number and quality of these facilities could be improved. Currently, there is only one flush toilet in the park; all other units are pit vault latrines. The floodplain restricts placement of modern flush latrines in the most heavily used Canyon Area. Availability of drinking water throughout the park is limited. There are currently no drinking fountains in the Canyon day-use areas. There are two fountains near the stone shelter in the Lower Ledges, two water hydrants in the Oakwood picnic area, two hydrants in the Upper day-use picnic area, and five hydrants in the campground.

#### Existing Residences and Park Maintenance Facility

The park ranger and the two park attendants are provided residences within the park. The maintenance and storage complex and park attendants' residence has been recently moved from its Lower Ledges location and temporarily relocated at the farmstead on the old game farm until permanent facilities can be completed. Some modifications have been made to the garage for storage. Further modifications need to be made on the barn before all maintenance and storage requirements can be met at this interim facility.

The park ranger's residence at the main entrance is in fair to poor condition and is not adequate for modern needs. Its location at the entrance of the park is good for park security, but it is visually obtrusive and not an appropriate first impression of the park. Currently, majority of park

administration takes place out of the ranger's residence, with camper check-in being administered from the modified gatehouse structure.

The third residence is located at the north end of the park. This residence is in good condition but is costly to heat and cool. It provides needed security for the northern portion of the park.

### Mitigations

In December 1972, environmental concerns by area residents and organized environmental groups resulted in litigation against the Saylorville Lake Project. Resolution of this litigation involved a commitment by the Corps of Engineers to undertake actions to minimize adverse environmental effects to Ledges State Park.

In order to determine the best solution to reduce adverse effects, a critical review of the entire Saylorville Lake Project was made. This resulted in a mitigation agreement which was endorsed by the State of Iowa and approved by the U. S. Congress in late 1976.

The mitigation agreement included:

- a. Increased reservoir flood release rates to reduce severity of inundation at Ledges.
- b. The development of a floodway corridor from Saylorville Dam downstream to Des Moines to accommodate increased release rates.
- c. A management program at Ledges which includes relocation of affected facilities, acquisition of additional park land, and a vegetative management program. These are described below:

Relocation. The U. S. Army Corps of Engineers accepted responsibility for raising the existing Wildlife Research Station well and affiliated powerline to a height sufficient to withstand maximum flooding conditions. The Corps also provided funds (\$403,000) for the Conservation Commission to relocate and modify its recreation facilities. These proposed facilities included development of three picnic areas and an Interpretive Center above full flood pool level, construction of 7,500 feet of new roads, and modification of the existing park water supply system. The relocation agreement also required that a service building be constructed and the park attendants be relocated to an area above the flood pool. (The proposed locations for the picnic areas, interpretive center, new roads, and maintenance area were based on the 1972 conceptual redevelopment master plan and are modified to some degree in this plan.) It was agreed that if more extensive development or higher quality facilities were desired, the Commission could exercise this option by assuming the additional costs.

Acquisition/Easement. The Army Corps of Engineers purchased 385 acres of land adjacent to the park to assure available high-quality land to replace existing relocation areas inundated by the reservoir and to provide a buffer zone for redeveloped areas. The Conservation Commission assumed management responsibilities of land purchased by the Corps, but title of the property was not conveyed until 1981. The Commission conveyed approximately 128 acres of land which lies in the flood zone west of the Des Moines River by simple fee title to the U. S. Government. The Commission also granted a flowage easement over approximately 136 acres of park land lying on the east side of the Des Moines River. The flowage easement does not impair the Commission's usage of that area as long as permanent structures or vegetation (trees and shrubs) are not established in the easement zone.

Vegetative Management Program. The land management arrangement provides federal funds (\$387,000) for the Conservation Commission to remove the existing vegetation (trees and shrubs) and establish water-tolerant plant species in the flood-prone areas over a period of time. Specific implementation details are contained as a part of the land management chapter.

#### Future Studies

Special studies of the park's botany, geology, and archaeology are scheduled to be completed by professional consultants. These studies will be of the entire site with emphasis on areas to be impacted by proposed new facilities and uses. The studies will ensure that significant resources are known and protected and will provide an important data base for the park's interpretative and nature study programs.

In-depth geological and botanical studies are currently underway. The archaeological study awaits funding, as of July, 1981.



#### Site Analysis Conclusions

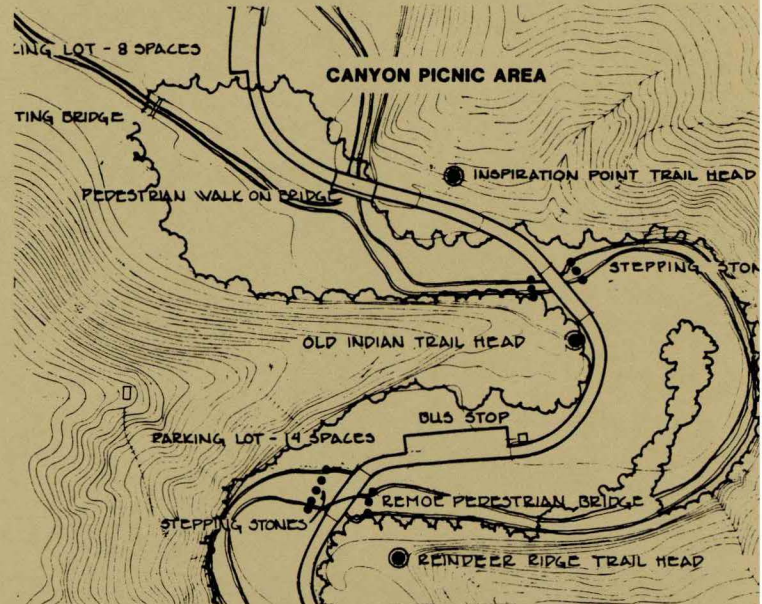
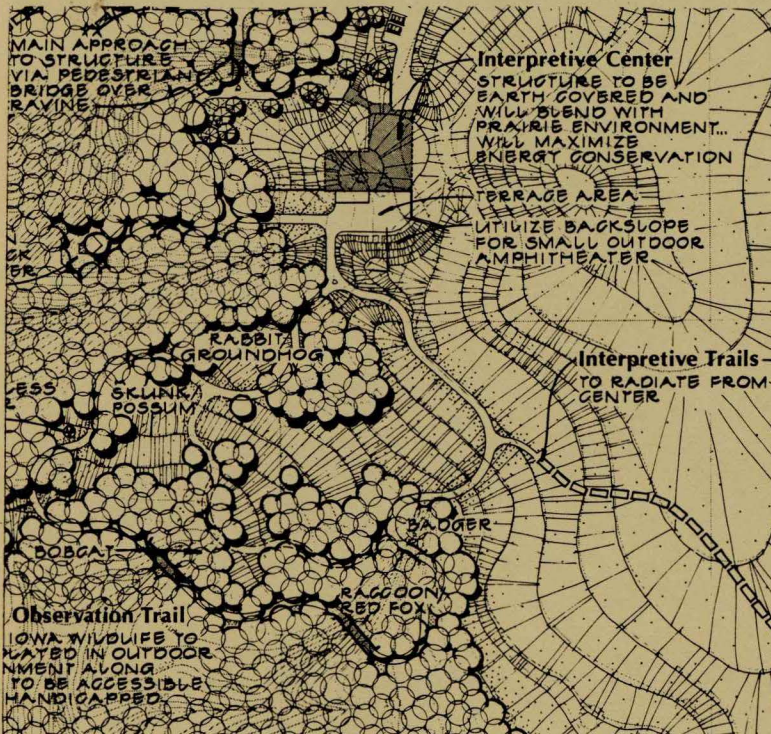
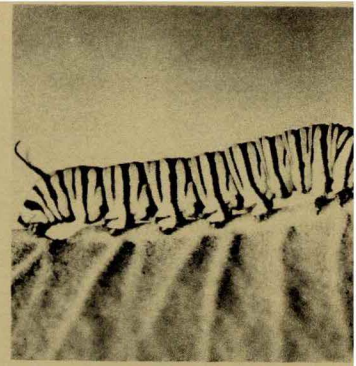
In general, the problems facing Ledges State Park are modern-day pressures resulting from overuse, outdated and inadequate facilities, and impacts from Saylorville Reservoir and its related flooding. More specifically, the park's principal facilities were constructed in the 1930's by the Civilian Conservation Corps. Many of these facilities have deteriorated, become outdated, and are no longer able to accommodate current users. Resource degradation has resulted. Trails need to be rehabilitated and circulation pattern improved and expanded. As much as possible, new trails should be accessible to the physically impaired. Toilet facilities and availability of drinking water are currently inadequate. Saylorville-related flooding coupled with heaviest use in the environmentally-sensitive canyon area has resulted in a need to improve, expand, and redistribute picnic/day-use facilities and activities to the upland areas.

Public desire for new and expanded programs has created demand for facilities and activities oriented toward environmental education, nature study, and interpretation. This includes the need for improved wildlife interpretation. The twenty-year-old caged animal wildlife exhibit operated by the Commission at Ledges was outdated and no longer considered an acceptable educational

facility. Although popular with local residents, this zoo-like facility is scheduled for replacement with a new modern, humane, and educational-type live animal display. The existing wildlife exhibit was closed on May 1, 1981 because of budgetary restrictions and in anticipation of a replacement facility as outlined in this plan.



Wildlife Containment Area



## Master Plan and Design Criteria



Des Moines River Valley Overlook



## KEY



BUS STOP



BUS ROUTE



TOILET



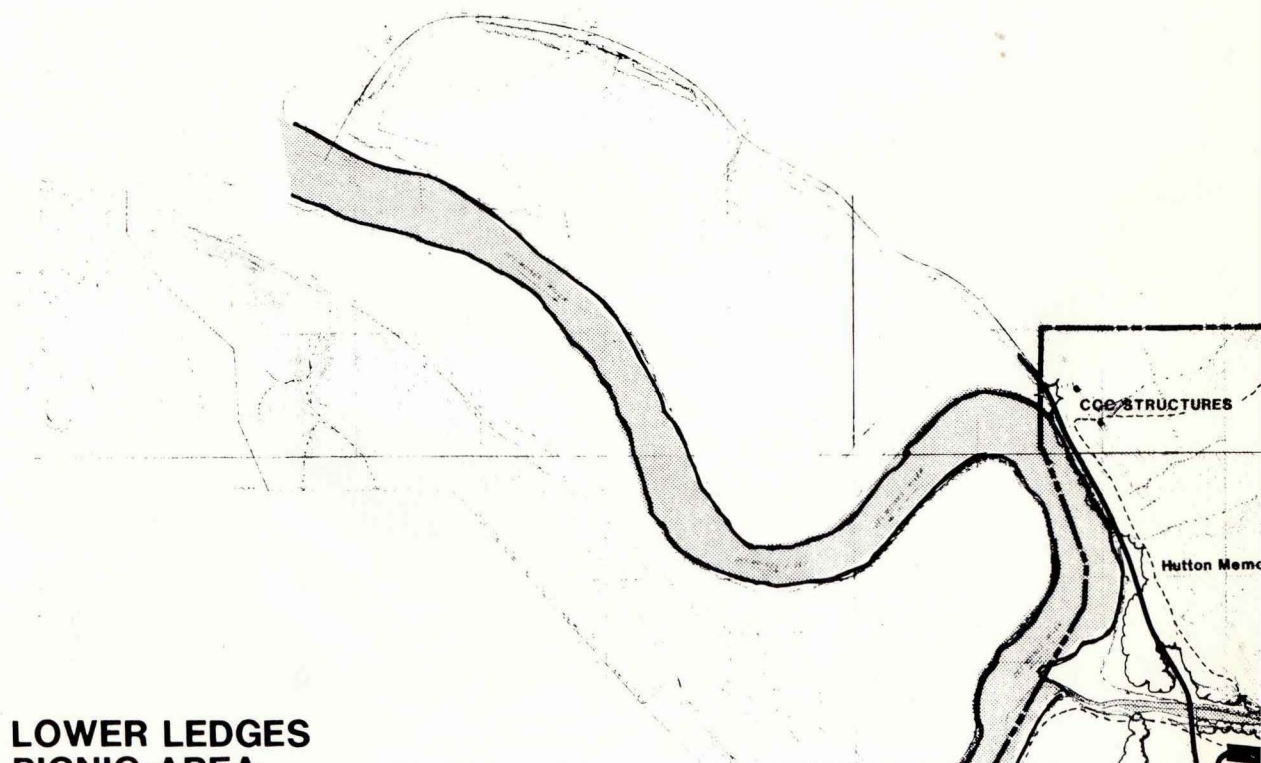
SHELTER



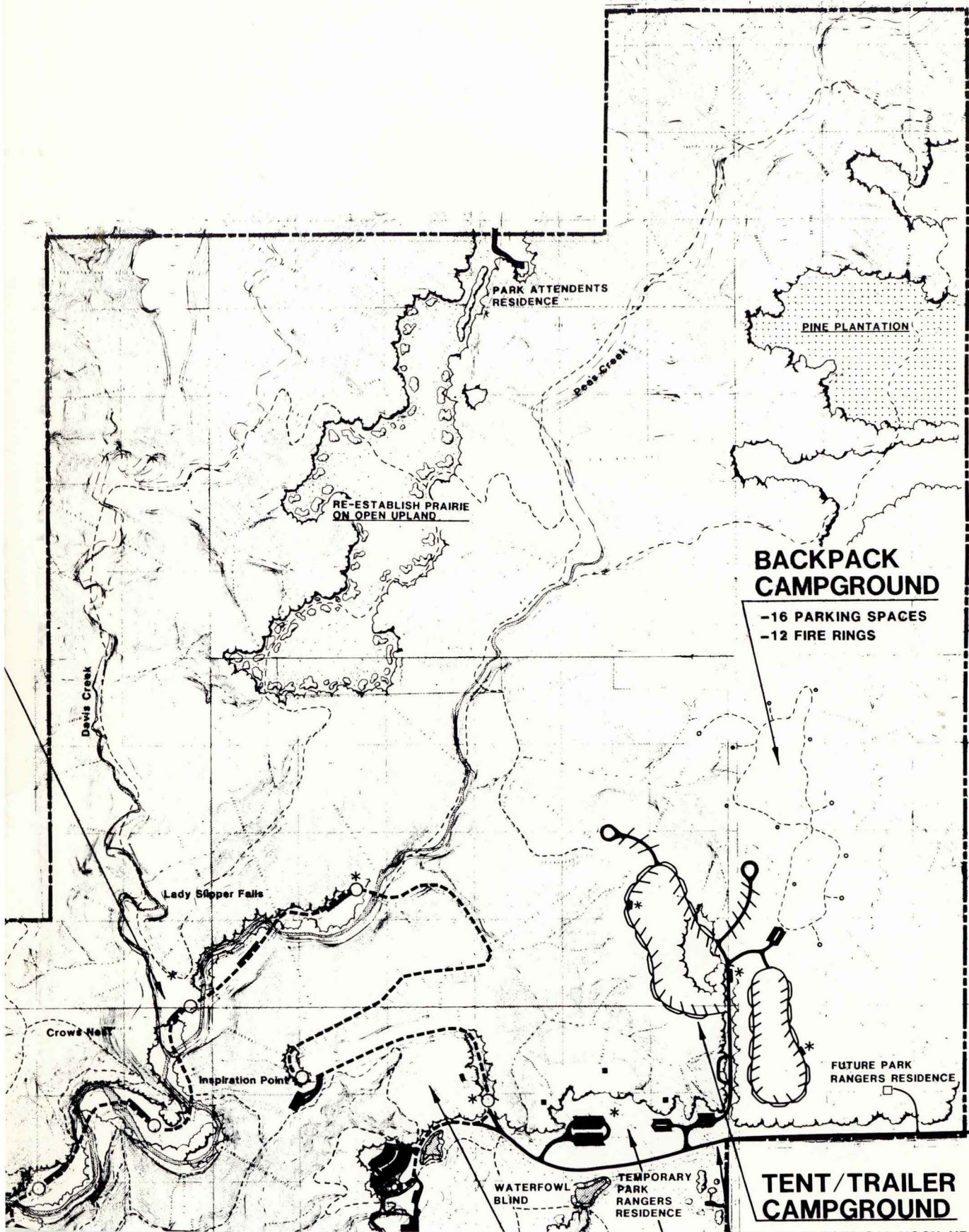
TRAIL

## CANYON PICNIC AREA

- 72 PARKING SPACES
- 4 BUS STOPS
- 2 PERMANENT PIT-VAULT TOILETS
- 1 TEMPORARY PIT-VAULT TOILET



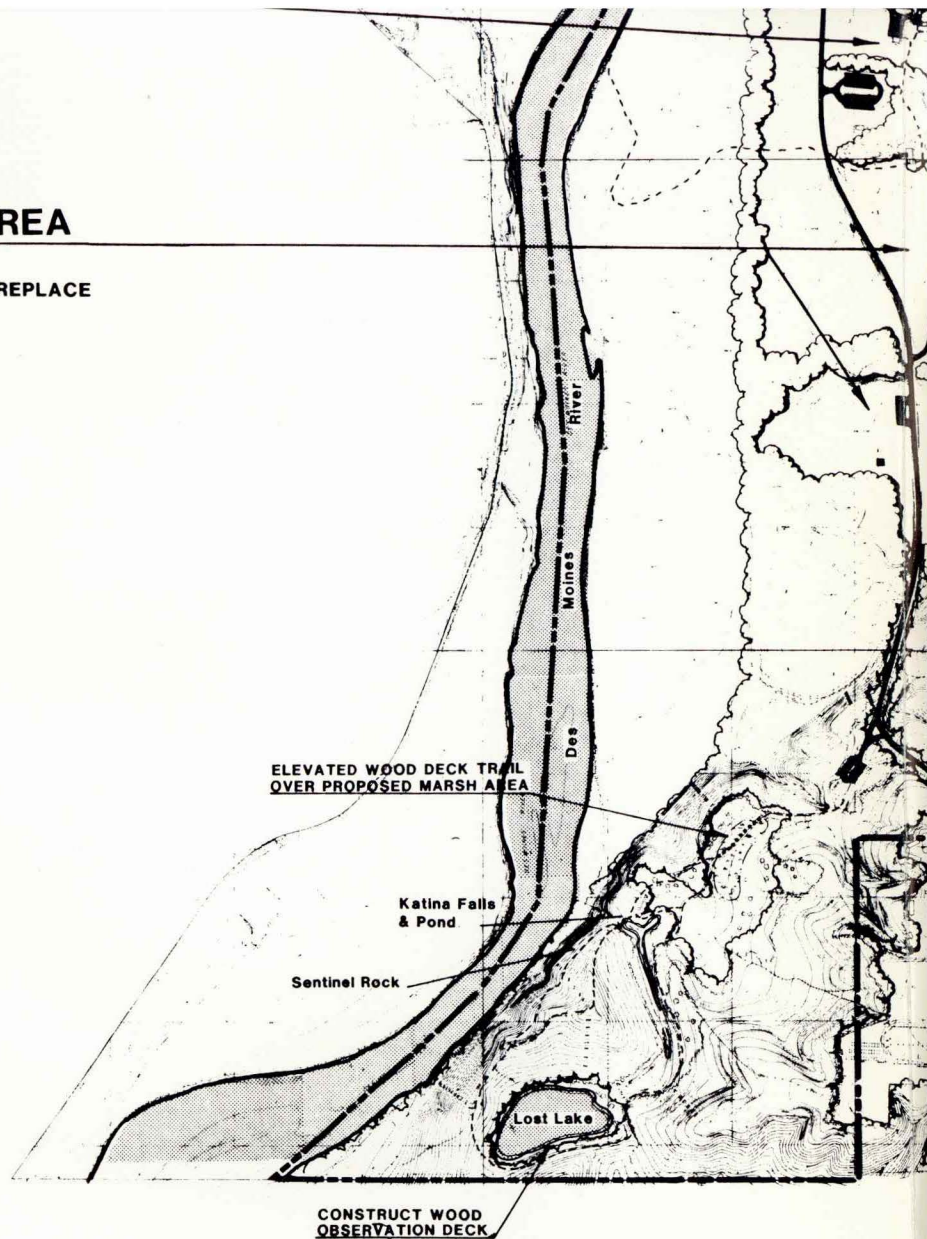
LOWER LEDGES  
PICNIC AREA



- 128 PARKING SPACES
- 1 CCC CONCESSION/SHELTER
- 1 PICNIC SHELTER
- 1 MODERN TOILET
- 1 DRINKING FOUNTAIN
- 1 BUS STOP

## MEADOW PICNIC AREA

- 32 PARKING SPACES
- 1 LARGE PICNIC SHELTER W/ FIREPLACE
- 1 PICNIC SHELTER
- 1 MODERN TOILET
- UNMOWN AREAS FOR  
VEGETATIVE SUCCESSION



STATE

# LEDGES STATE PARK REDEVELOPMENT MASTER PLAN

Reindeer Ridge Woods

PRAIRIE

## INTERPRETATION CENTER

VISITOR ORIENTATION  
INTERPRETIVE DISPLAYS  
AND EXHIBITS  
WILDLIFE OBSERVATION TRAIL  
ADMINISTRATIVE OFFICES

STATE WILDLIFE AREA

PARK ATTENDANTS  
RESIDENCE &  
TEMPORARY  
MAINTENANCE  
CENTER

- 35 TENT/TRAILER UNITS
- 3 RESTROOMS W/ SHOWERS
- CAMPER CHECK-IN STATION
- 12 VISITOR PARKING SPACES
- CHILDRENS PLAYGROUND
- TREE & SHRUB PRIVACY PLANTINGS
- SEWAGE DUMP STATION

## MAIN ENTRANCE

## UPPER LEDGES PICNIC AREA

- 68 PARKING SPACES
- 3 PICNIC SHELTERS
- 1 PIT-VAULT TOILET
- 1 DRINKING FOUNTAIN
- UNMOWN AREAS FOR  
VEGETATIVE SUCCESSION

## OAK WOODS PICNIC AREA

- 20 TEMPORARY PARKING SPACES
- 1 CCC PICNIC SHELTER
- 1 PICNIC SHELTER
- 1 MODERN TOILET
- 1 DRINKING FOUNTAIN
- 1 BUS STOP
- UNMOWN AREAS FOR  
VEGETATIVE SUCCESSION

## PARK MAINTENANCE CENTER & WILDLIFE RESEARCH STATION

E PERSONNEL  
ICE

E AREA

IOWA  
CONSERVATION COMMISSION

SUMMER 1981



## MASTER PLAN AND DESIGN CRITERIA

Following the analysis of the site conditions, natural resources, recreation needs, staff recommendations, past studies, and the themes expressed at public meetings, concepts for this master plan were developed. The following is a refined and detailed description of the master plan for Ledges State Park.

### Recreation Facilities

New and expanded recreation facilities are programmed to promote visitor experience of a full range of resource amenities at the Ledges (i.e. river, streams, lake, woods, prairie, as well as the sandstone bluffs). Picnic/day-use areas will be expanded and improved, especially in areas above the Saylorville Reservoir maximum flood level.

The following is a detailed description of the expanded and improved recreation facilities:

### Interpretation Program and Facilities



A major feature of the proposed master plan is development of interpretative programs and facilities. Interpretation/nature study is an integral element of the park's theme of "Rediscovery". The interpretative programs will attempt to explain the meaning of the site's rich diversity of cultural and natural resources in order to promote an understanding of and a sympathy for the complexities and interrelationships of the natural environment.

Interpretation commonly involves nature hikes, school tours, and animal exhibits, etc. Interpretation, however, involves more than presenting information--it involves discovery and appreciation. An interpretation program seeks not to instruct, but to provoke. Interpretation seeks to capture interest, encourage questions and curiosity, and to promote a real desire to understand and appreciate.

Many elements of the Ledges' 1,117 acres impress even the first-time visitor with possibilities for exploring, learning, and understanding a part of Iowa's natural heritage. In a state where so much of the natural environment has been severely man modified, opportunity for "rediscovery" of our natural systems is limited. That is why Ledges is such an important resource. It is in the recognition and perception of what Ledges has to offer that interpretation will play a major role.

Proposed interpretative programs will serve as a focal point of the park, featuring nature study and environmental education opportunities and activities. Programs are planned to address various audiences including campers, picnickers, and day-use visitors as well as sixth graders and university students and will address a complete range of environmental ecosystems as well as cultural and historic resources found at the park.

Interpretative programs and facilities will find their focus in the Interpretative Center Visitor Orientation Building.

The Interpretative Center will provide a place for orientation and for coordination of interpretive programs. It will be a hub of the major activity. The center will be an energy-efficient, earth-sheltered structure designed to fit comfortably with the surrounding prairie and woodland landscape. Skylights and a south-facing wall of glass will provide natural lighting to the interior. Inside the center, space will be provided for a small auditorium, exhibit space, library, rest rooms, other visitor services, and park and wildlife administrative offices. A shuttle bus will begin and terminate at the Center, transporting visitors to and from the Canyon, floodplain, and Lower Ledges area. Radiating from the Center will be interpretive trails, both guided and self-guided, which will link and provide access to various environmentally-interesting features of the site.

The following is a detailed description of the expanded and improved interpretive facilities:

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STATE LIBRARY COMMISSION OF IOWA  
Historical Building  
DES MOINES, IOWA 50319

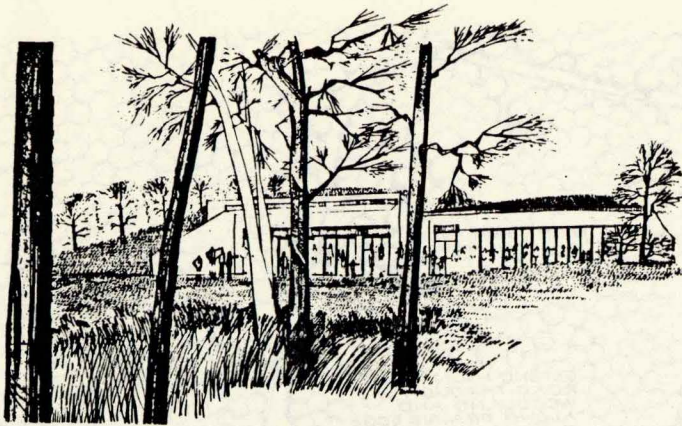
INTERPRETATION PROGRAM  
AND FACILITY PLAN  
LEDGES STATE PARK  
IOWA CONSERVATION COMMISSION

INTERPRETIVE CENTER  
AND  
SURROUNDING AREA

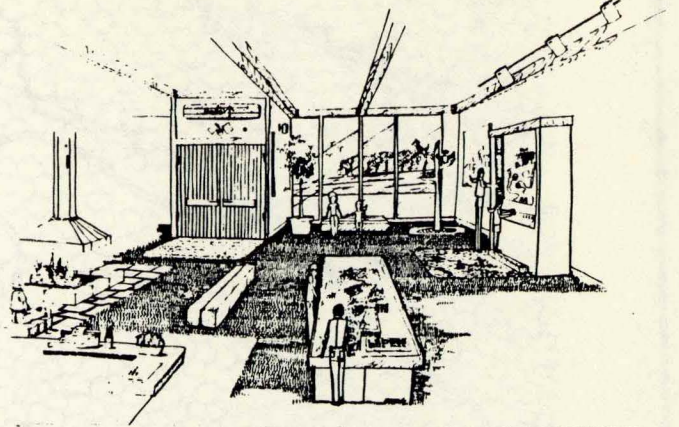
HARLAND BARTHOLOMEW AND ASSOCIATES, INC.  
PLANNING ENGINEERING LANDSCAPE ARCHITECTURE  
NORTHBROOK ILLINOIS

PLATE 8





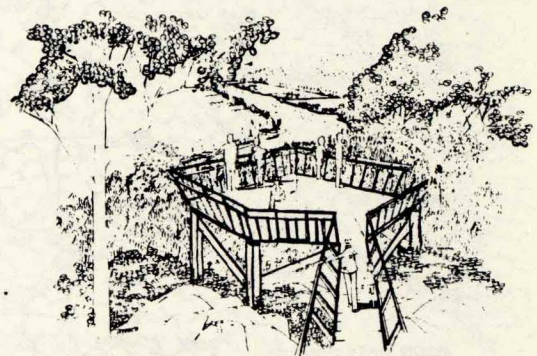
**Interpretive Center**



**Exhibit Area - Interpretive Center**



**Wildlife Containment Area**



**Des Moines River Valley Overlook**



**Lost Lake Marsh Walk**



**Wildlife Observation Blind**

### Wildlife Observation Trail

Incorporated into the prairie, forest, and woodland edge areas near the Interpretation Center will be a new Wildlife Observation Exhibit, replacing the exhibit that is located south of the park which was closed due to budget restrictions. The new exhibit will utilize contemporary approaches for observing and interpreting wildlife in their natural habitat. Rather than separating the animal from its environment for observation, the new trail will emphasize the interdependence of wildlife and habitat. Native wildlife confined in outdoor enclosures will include, but not be limited to: (1) rabbit, quail, and woodchuck; (2) skunk and opossum; (3) flightless raptors; (4) bobcat; (5) raccoon and red fox; (6) badger, and (7) coyote. Deer will be displayed in their current large enclosure at the southern boundary of the park. This Wildlife Observation Trail will connect with the Upland Prairie Trail. A bridge will cross the upland ravine through the tree canopy providing opportunities for observation of bird species. Bird feeders could be located on nearby trees to further enhance observation opportunities. The trails will be surfaced and accessible to the physically impaired.

### Day-Use/Picnic Areas

The intensity of day-use activities in the Canyon area will be reduced by their dispersal into expanded picnic day-use areas in both the upland and Lower Ledges areas. New shelters, drinking fountains, and latrines will be constructed. The architectural theme of the CCC era will be emphasized and all existing CCC structures will be repaired or restored. This will include the adaptive renovation of the two stone cabin foundations into open-type shelters overlooking the Des Moines River. Located on the east bank of the river, these two structures were once overnight cabins, but have been partially destroyed by vandals and neglect.

Emphasis will be placed on construction of new detailed outdoor accouterments such as pedestrian water crossings, steps, uniform signage, markers, benches, and guardrails. Quality and consistency of these details are important for park management and maintenance, visual blending with the sturdy rustic character of existing facilities and to provide high quality, durable facilities for park users.

A detailed description of day-use areas follows:

#### -- Upper Ledges Picnic Areas

Just northwest of the main entrance will be one of two upland day-use areas. Two parking lots in this area will accommodate 68 vehicles. A small 20-car parking lot will provide parking for the day-use area, and a 48-car parking lot will provide parking for the day-use area and for visitors utilizing the shuttle bus traveling through the Canyon to the Lower Ledges area. Three new picnic shelters, a modern toilet, and a drinking fountain will be located in the area.

A portion of this area is presently a large nonstructured parking lot. This area will be reestablished in grasses and converted to a picnic/day-use area.



Certain areas will be designated for vegetative succession and regeneration. These areas will not be mown to encourage natural vegetation. See Land Management chapter for a detailed description of the regeneration process.

-- Oak Woods Picnic Area

Mature oaks provide a canopy of shade for this popular upland area. It contains a large rustic picnic shelter which was constructed by the CCC and a pit-vault toilet. An additional modern flush toilet and drinking fountain will be located near the bus stop on the south end. The bus stop will be upgraded with special paving, an information bulletin board, benches, and trash receptacle. Other improvements include structuring two pull-off parking lots which will accommodate ten vehicles each. These parking lots and part of the loop road in the Oak Wood Area will be eliminated when the Interpretive Center road is completed. Parking for this area will then be provided by the large parking lot in the Upper Ledges picnic area and the Interpretive Center parking lot. An interpretive trail will link this area to the Interpretative-Visitor Center and the Wildlife Observation Trail.

Vegetation in this area currently consists primarily of even-aged shade trees with very few young tree species or shrub masses. Areas will be designated for vegetative succession and regeneration as described for the Upper Ledges Day-use Area. For details, see Land Management Chapter.

-- Canyon Picnic Area

Historically the most popular area in the park, the canyon contains magnificent sandstone bluffs and Pea's and Davis creekbeds which provide opportunities for picnicking, wading, sightseeing, nature study, hiking, and a variety of other activities. Trails emanate from all portions of the canyon connecting unique and interesting features in the park. These trails will be consolidated and major trailheads identified as part of the trail rehabilitation.

Overuse and misuse of the Canyon Area precipitated closing of the Canyon road during weekends and on holidays. A shuttle bus provides access to the canyon from the parking lots in the Upper and Lower Ledges when the road is closed. Four bus stops are located along the Canyon road. Each bus stop will be clearly signed and a park bench and trash receptacle provided.

Access to the canyon by passenger vehicles will be allowed according to an intermittent schedule. See Vehicular Circulation Section for more detail. Four parking lots will be structured and surfaced with a seal coat. These lots will accommodate approximately 65 vehicles.

Modern flush toilets cannot be provided in the canyon due to its location in the floodplain. Three pit vault latrines are currently located in this area. Two of the three pit vault latrines are located above the 890' Saylorville flood zone. The most northerly latrine needs to be replaced with a new pit vault facility early in the redevelopment process. The other latrine should be replaced when it wears out. It is not recommended that the third latrine (most southerly) be replaced because of its location in the flood zone.



-- Lower Ledges Picnic Area

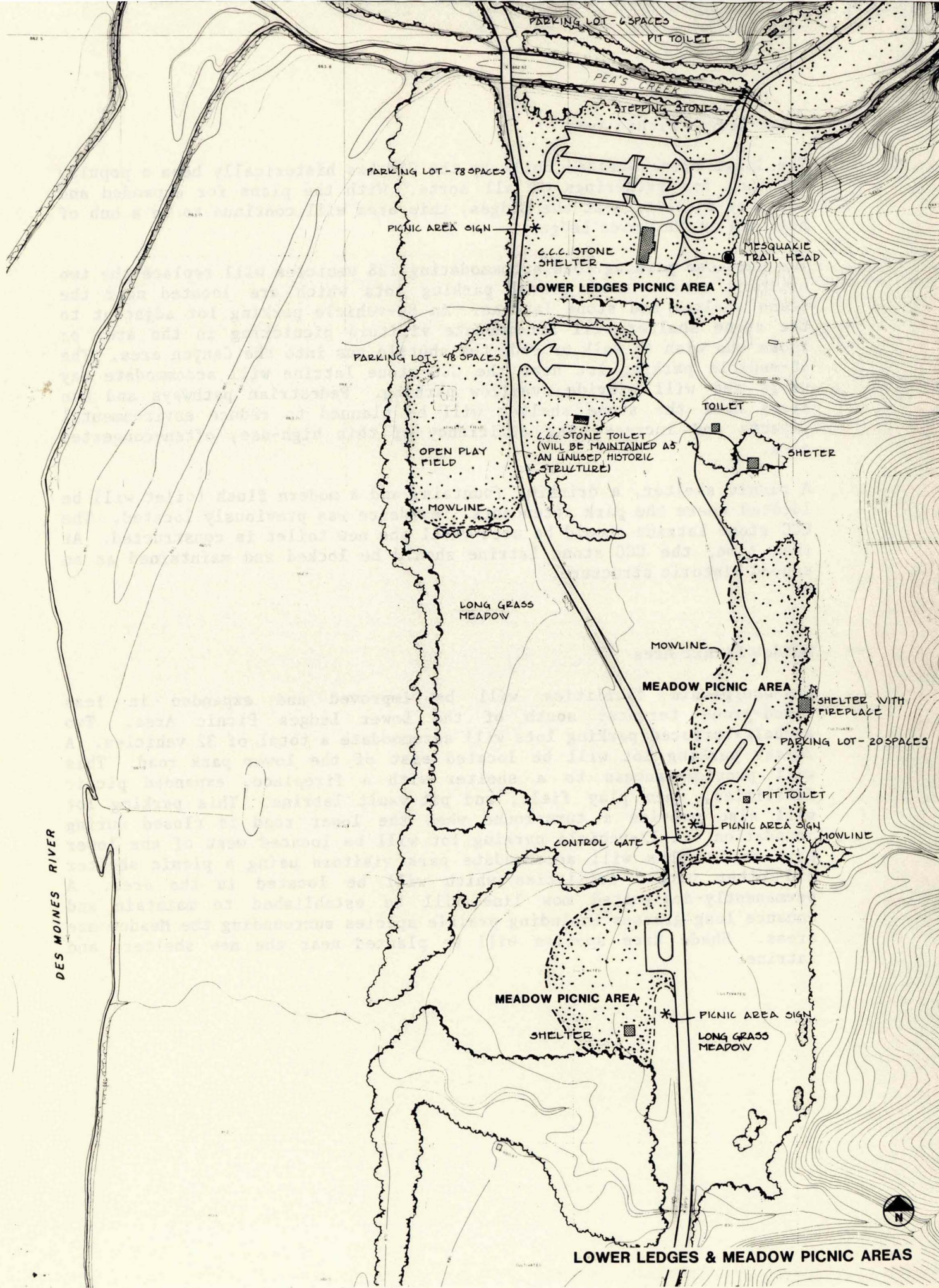
The large stone shelter built by the CCC has historically been a popular location for gatherings of all sorts. With the plans for expanded and improved facilities at the Ledges, this area will continue to be a hub of activity in the Lower Ledges.

Two surfaced parking lots accommodating 128 vehicles will replace the two existing unstructured gravel parking lots which are located near the stone shelter and stone latrine. An 80-vehicle parking lot adjacent to the stone shelter will accommodate visitors picnicking in the area or those who wish to walk or ride the shuttle bus into the Canyon area. The 48-vehicle parking lot near the CCC stone latrine will accommodate day users and will provide overflow parking. Pedestrian pathways and use areas near the stone shelter will be planned to reduce environmental impacts and increase the efficiency of this high-use, often-congested area.

A picnic shelter, a drinking fountain, and a modern flush toilet will be located where the park attendants' residence was previously located. The CCC stone latrine should be used until the new toilet is constructed. At that time, the CCC stone latrine should be locked and maintained as an unused historic structure.

-- Meadow Picnic Area

Day-use/picnic facilities will be improved and expanded in less flood-prone terraces south of the Lower Ledges Picnic Area. Two asphalt-surfaced parking lots will accommodate a total of 32 vehicles. A 20-car parking lot will be located east of the lower park road. This will provide access to a shelter with a fireplace, expanded picnic facilities, open play field, and pit vault latrine. This parking lot will also provide a turnaround when the lower road is closed during inundation. A 12-vehicle parking lot will be located west of the lower park road. This will accommodate park visitors using a picnic shelter and other picnic facilities which will be located in the area. A permanently-designated mow line will be established to maintain and enhance long grasses including prairie species surrounding the Meadow use areas. Shade tree species will be planted near the new shelters and latrine.



LOWER LEDGES & MEADOW PICNIC AREAS

### Camping Facilities

The existing campground will be expanded and improved. It will provide modern as well as primitive backpack campsites.

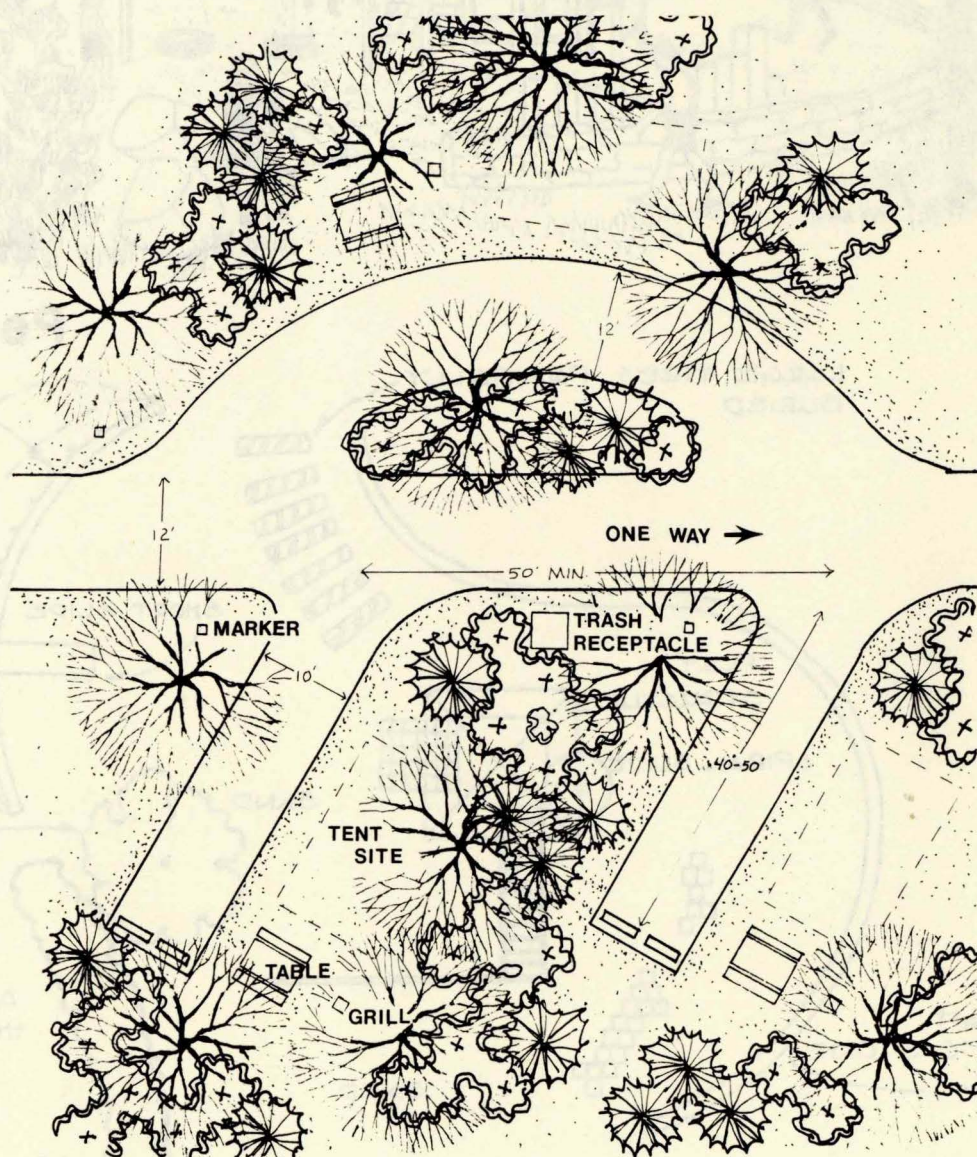
#### -- Modern Electric

The modern electrical campground will be in the location of the existing campground. The campground layout will contain a loop road with one-way traffic and two secondary roads with turnarounds for segregated group camping. Two types of camping spurs will be developed. Inside of the loop road will be a 10' x 50' back-in spur. The other type will be a pull-off loop spur. The loop spur is easy to maneuver for large vehicles and will be located in narrow areas where topography limits back-in spur type development. The spurs will be surfaced with compacted fine gravel and seal coated. Individual campsites will be sited approximately 50-60 feet apart to allow adequate space for privacy buffer plantings. Pull-off loop spurs will be spaced somewhat closer together. Each campsite will contain a picnic table and a grill. One anchored trash receptacle will be located for every two campsites. Electricity will be supplied in this portion of the campground with a weatherproof double outlet located at every two campsites. Two rest room/shower facilities will be provided. A water fountain, water hydrant with self-closing tap, and several trash receptacles will be located on the outside of each rest room facility. A structured children's playground will be provided. A sanitary dump station will be located near the entrance of the campground for convenient disposal of sewage materials. The central zone of the large loop space will be established as a no-mow area where natural revegetation and shrub plantings will create a privacy buffer and natural backdrop for individual campsites.

#### -- Nonelectric Campground

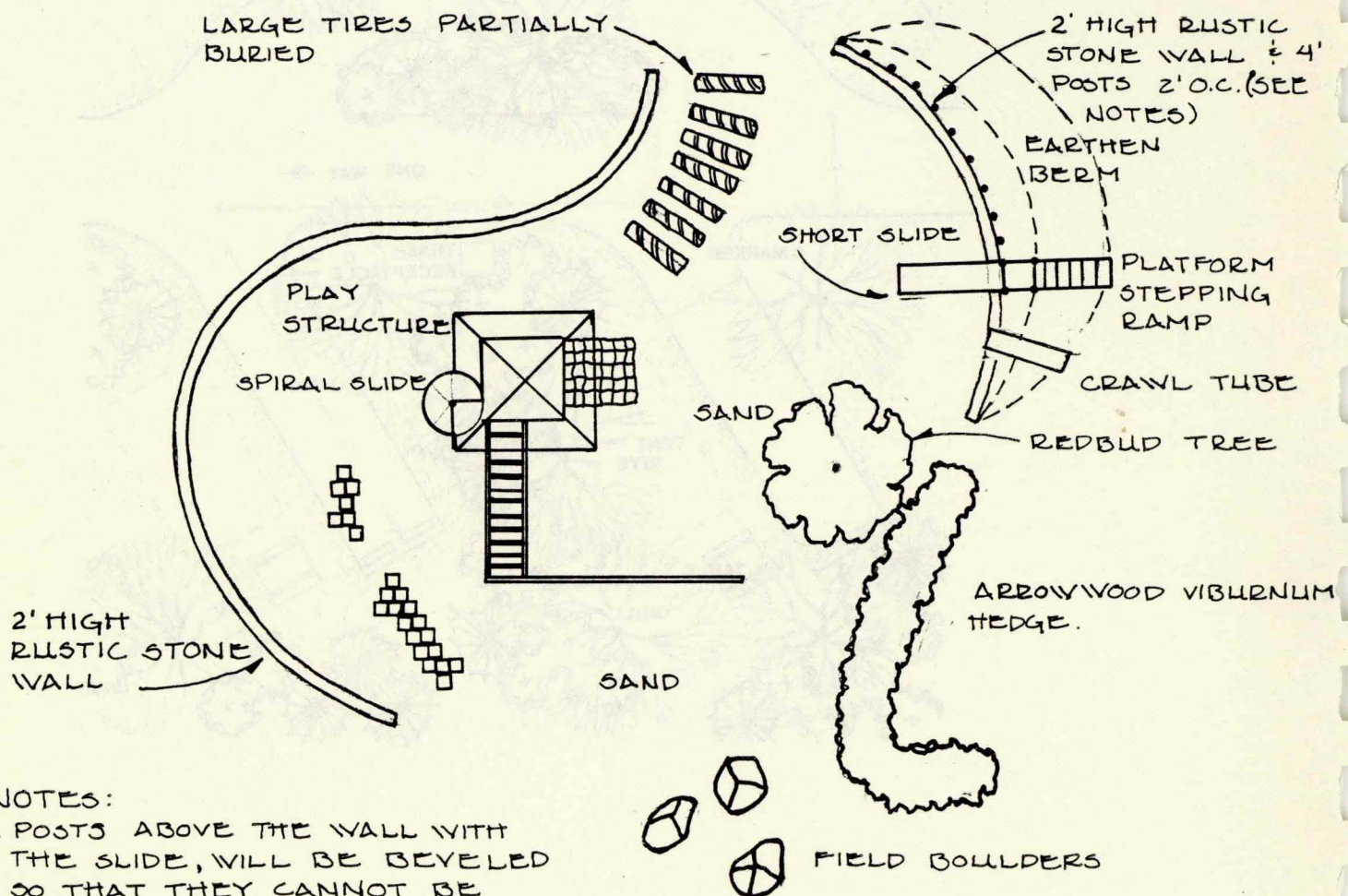
The nonelectric campground will be located on the newly-acquired land from the Army Corps of Engineers which is east of the modern electric campground. The area is heavily vegetated which will provide shade as well as natural privacy screens for the campers. Selective removal of plant material will be required in this area during road construction. This plant material will be replanted in natural groupings in the electrical campground which is lacking in understory growth. This will provide privacy between campsites. This campground will also contain a paved loop road with one-way traffic and two types of gravel-surfaced camping spurs. Back-in spurs in this campground will be 10' shorter than in the electrical campground. The shorter spurs are designed for car/tent camping while longer spurs in the electrical campground will accommodate vehicles with trailers and self-contained vehicles. One rest room/shower facility will be provided in this area. Pathways will provide for convenient pedestrian circulation to the rest room facility and to the children's playground located in the modern electric campground.

## CAMPGROUND LAYOUT





## Perspective



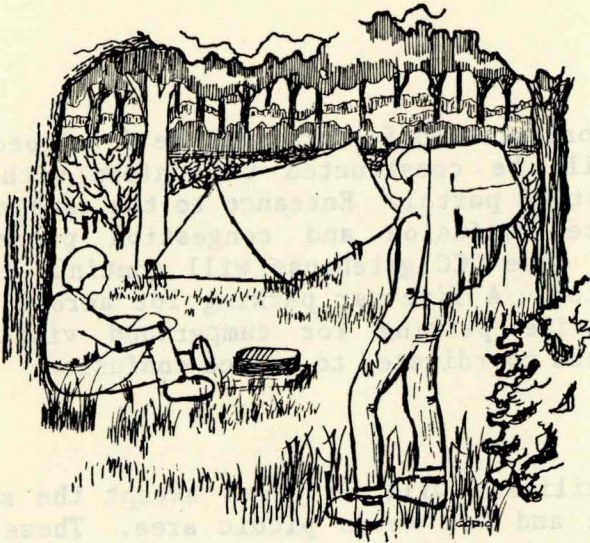
### NOTES:

1. POSTS ABOVE THE WALL WITH THE SLIDE, WILL BE BEVELED SO THAT THEY CANNOT BE WALKED ON.

## Plan

# Campground Playground

-- Primitive Backpack Campground



"primitive experience". Campfires will not be allowed in areas other than designated fire rings. A toilet/ shower facility located on the edge of the modern campground will be within hiking distance for use by the backpack campers.

Vehicular Circulation

There is a need for modification and improvement of the park's vehicular and pedestrian circulation system. A pedestrian-oriented experience is necessary to fully appreciate the natural splendor of the Ledges. To enhance the Canyon area experience and reduce negative environmental impacts, vehicular traffic will be restricted in the Canyon area. One-way automobile traffic will be allowed in the Canyon area only on weekdays (except holidays) and during the autumn leaf color season (September 15 until winter closure of the Canyon road). The Canyon road will be closed to all vehicular traffic during the winter season. A free shuttle service will provide access to the Canyon area during automobile-restricted periods. Presently, a school bus is being used as a shuttle vehicle. This vehicle will eventually be replaced with an open-air shuttle bus, accessible to the physically handicapped and persons carrying picnic gear. Operator of the shuttle bus will provide brief interpretative programs and orientation of points of interest for the users. Bus stops will be conveniently located, adequately signed, and park benches will be provided.

All roads within the park will be paved to accommodate heavy traffic and facilitate flood cleanup. Special Lower Ledges parking areas and turnarounds will be provided to accommodate modified circulation patterns during periods of inundation.

Control gates will secure the park or portions of the park during off hours, flooding, and winter conditions. The State Department of Transportation should negotiate with Boone County to trade road jurisdiction. This would result in the county assuming operation of the State Road 164 and the state

Due to an increasing demand for back-country camping opportunities, a special 21-acre wooded upland area will be designated for backpack campers. This area will be physically and visually separated from the main campground, roads, and vehicles. It will include a 15-vehicle trailhead parking lot which will be located at the periphery of the backpack area and a meandering loop hiking trail will lead to 12 designated dispersed campsites. The 12 camping sites will be designated by a fire ring and lantern pole and will be selectively located to provide a

assuming operation of the county roads leading from Highway 17 west to the east and south entrances. The DOT would provide maintenance of the entire east/south access road system and possibly pave the access road to the south entrance.

#### -- Main Entrance

A well-coordinated entrance and orientation feature will be developed. A new set of entrance portals will be constructed to conform with CCC construction details of the existing portal. Entrance to the campground will be relocated to alleviate confusion and congestion presently occurring at the main entrance. The CCC gatehouse will continue to be used as a camper check-in station. A five-car parking lot across from the check-in station will provide parking for campground visitors. Signage systems will be modified and coordinated to reduce confusion.

#### -- Parking

All present and new parking facilities will be paved except the small parking lots in the Canyon Area and Oak Woods picnic area. These are considered interim or will not receive enough use to be paved. Pavement allows for easy cleanup of flood debris in flood-prone areas. Curb stops, paint striping, and planter islands will clearly delineate parking spaces and circulation patterns. Island areas will be bermed to visually minimize the size of parking areas and will be planted with native vegetation as indicated in the parking lot details.

#### Pedestrian Circulation

A network of trails currently provides access to major facilities and natural features in the park. The trail system is undergoing a long-term rehabilitation effort. Trails in most serious condition are those in high-use and environmentally-sensitive areas such as the Canyon and Katina Falls areas. All trails in high-use areas will be surfaced with rock, wooden steps, or stone steps. This will provide a protective surface and will also provide visual identification as an official trail. New trails will be developed as needed, especially in the area acquired from the U. S. Army Corps of Engineers. These trails will provide for day hikes into this remote portion of the park.



The Canyon road now serves as a significant part of the pedestrian circulation system. The low water grade crossings which motorists enjoy driving through are difficult for a pedestrian to cross without getting wet. Permanent stream crossings constructed with concrete "stepping stones" are proposed rather than bridging. This alternative to footbridges is visually unobtrusive and cost efficient. Additionally, bridge construction in the Canyon area is not feasible due to the flood hazards and Iowa Natural Resource Council's floodplain regulations.

The Ledges State Park Interpretive Program and Facility Plan proposes five miles of additional trails. Most of the existing trails will be utilized by the staff interpreters to conduct guided nature walks. Self-guided trails will be developed in the popular Canyon area near the Hutton Memorial and in the Katina Falls area. The majority of interpretive trails will originate at the Interpretive Center; however the shuttle bus will also be utilized to reach trails a great distance from the Center. The Upland Prairie Trail developed in the 1970's will be surfaced and accessible to the physically impaired. Expansion of this trail is proposed to incorporate the new Wildlife Observation Feature.

#### Winter Circulation

Snowshoeing, sledding, and cross-country skiing occurs primarily in the upland and in the Canyon area. The Canyon road is closed to traffic during the winter months. Snowmobiling is allowed in the Des Moines River Corridor between the river and Highway 164 through the lower area of the park. It is not considered appropriate in the rest of the park. The lower road will continue to be maintained in the winter and the large parking lot near the stone shelter will provide access to the Canyon area and the Lower Ledges area. The pit vault toilets will accommodate winter users.

The large parking lot in the Upper Ledges Picnic Area and pit vault toilet in the Oak Woods Picnic Area will accommodate winter users until the Interpretive Center is in operation. This provides access to the Upland Prairie Trail and the Oak Woods Area.

#### Park Residences

The purpose of park managers residing in the park is to provide security and to improve the management of the site. The park ranger's residence, located adjacent to the main entrance, is the first impression for the park visitor. The residence and all associated buildings should be relocated to the portion of the property acquired from the Army Corps of Engineers on the north side of the entrance road. The windbreak and homestead plantings will eventually be removed and replaced by tall-grass prairie. Stock in the holding nursery should also be removed and seeded to prairie grasses. This will allow the splendor of the tall-grass prairie, forest, and woodland edge to be the first glimpse of Ledges State Park.

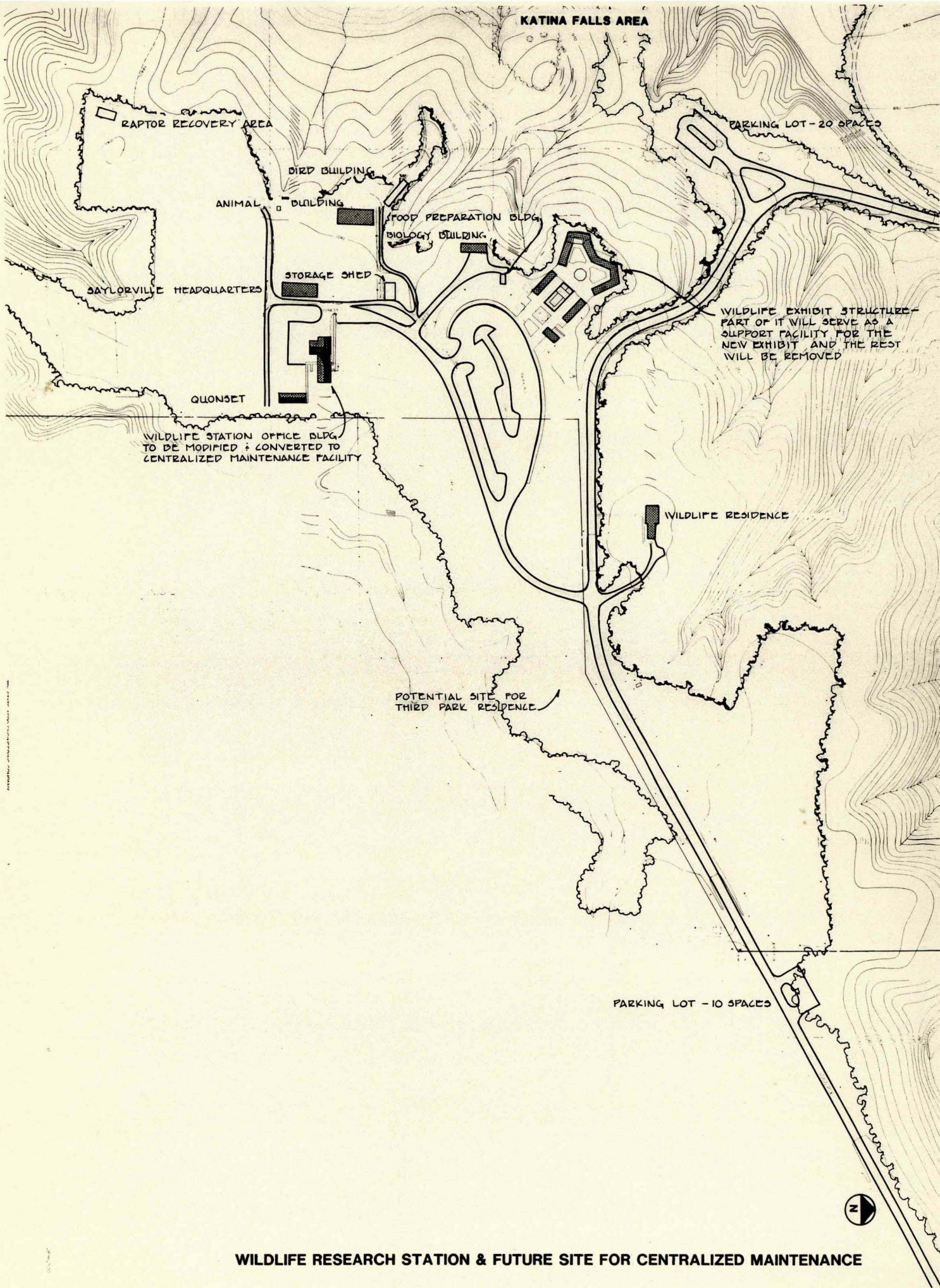
The park attendant's residence that was located in the Lower Ledges floodplain prior to 1981 has been relocated. This residence is south of the park ranger's residence and provides security for the southern portion of the park. It will be determined when the park staff vacates this residence if a new residence should be built. If so, it should be built near the Wildlife Research Station (future maintenance facility site). This is closer to the south access road and will provide better security for the maintenance facility. The attendant's residence and associated buildings vacated in the Lower Ledges will be removed. None of these structures are historically significant; and once this area is cleared, it will be developed into a picnic day-use area.

The third park residence, located on the northern edge of the park, needs to be winterized and better insulated for improved energy efficiency.

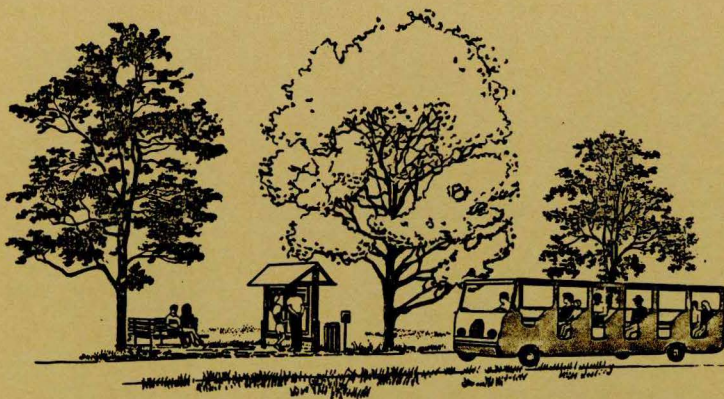
### Centralized Maintenance Facility

The existing maintenance facilities located in the Lower Ledges floodplain have been temporarily relocated to the farmstead at the old game farm as mentioned previously. One centralized maintenance facility is needed which will accommodate existing and additional maintenance and storage requirements. The facility will eventually be located at the Wildlife Research Station utilizing either the wildlife office building (the wildlife offices will be housed in the Interpretive Center) or a new building will be constructed. The existing small animal building will be used for winter storage of some of the animals. The existing bird building and food storage shed are inadequate and in poor condition. These two buildings will need to be replaced with a new facility. A small portion of the wildlife exhibit/display area will be retained for a support facility for the proposed Wildlife Observation Trail (see following map). The rest of the exhibit/display area will be removed.

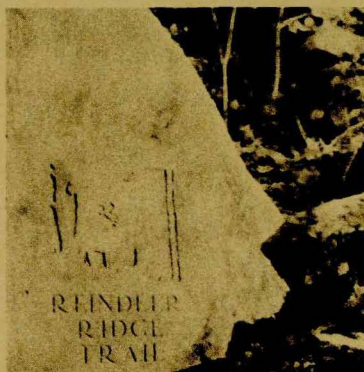
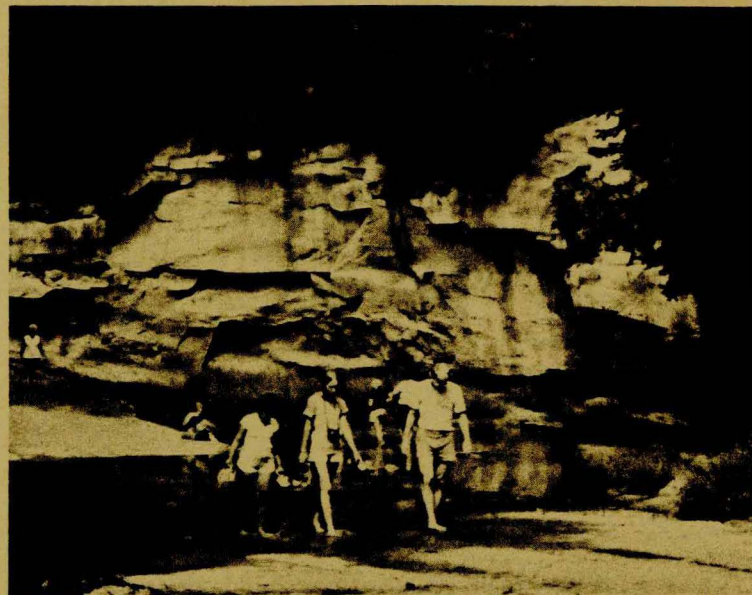
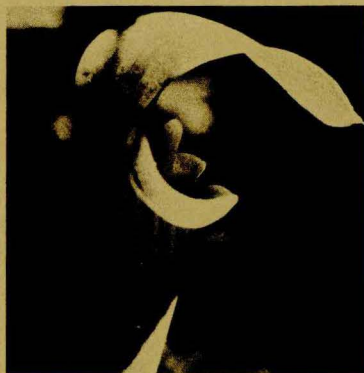
KATINA FALLS AREA



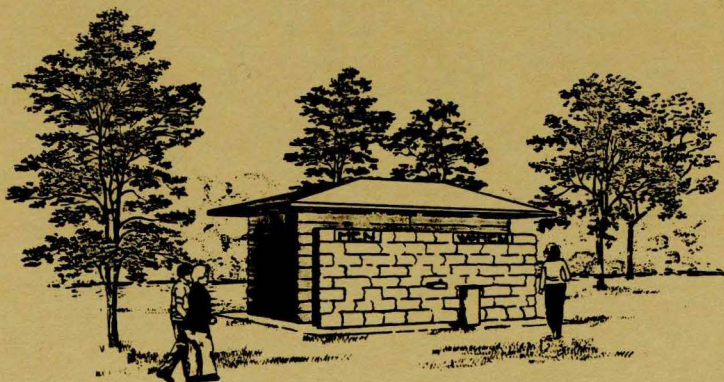
WILDLIFE RESEARCH STATION & FUTURE SITE FOR CENTRALIZED MAINTENANCE



Perspective



# Architectural Themes Signage, and Site Accessories



Perspective

## ARCHITECTURAL THEMES, SIGNAGE, AND SITE ACCESSORIES

The architectural features will harmonize with the landscape and conserve significant resources including scenic qualities and views. The Visitor Orientation/Interpretive Center will be an earth-sheltered (either with sidewall berming or earth covered), passive solar, energy-conserving structure designed to be visually unobtrusive. It will blend into the prairie landscape from one side and be hidden on another by the oak-hickory woods.

A handsome rustic quality is common to all of the CCC structures at the Ledges. These structures should be restored to their original condition and replaced as necessary. Additions of more common structures such as shelters and latrines will follow modified standards which will reflect modern materials and construction practices, but visually blend with that rustic character and forms of the CCC era.

The architectural features will be structurally straightforward with supporting post and beam construction and a simple hip roof design. Durable low-maintenance materials and selective use of texture and color will reflect the qualities of the site. Dye-impregnated concrete with textures of stone or tile will be used for pedestrian spaces around the lower stone and bus stops. Wood-type shingles will be used on the roofing of the shelters and toilets.

The following is a description of the various structures:

### -- Open Shelters

These structures will employ a standard picnic shelter (Type 4). The large double shelter will have a fireplace incorporated into its design.

### -- Rest Rooms

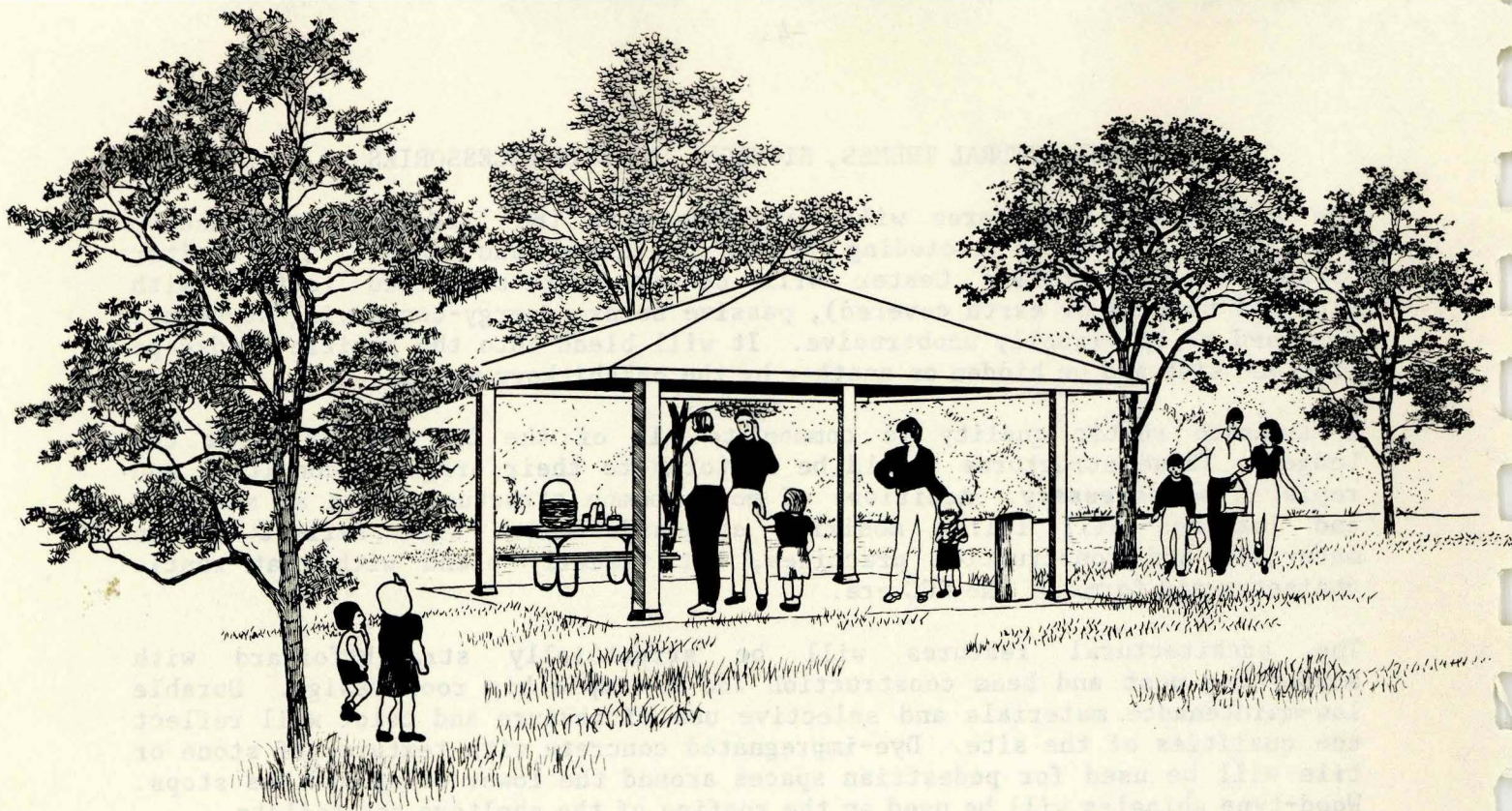
The pit vault toilet will employ a standard latrine design constructed of rustic stone block as exists at Pleasant Creek Recreation Area. The modern flush toilet will employ the standard latrine design with a modification of the privacy walls to reflect the same design of the pit vault toilets. This standard will also be modified by incorporating a simple hip roof to reflect the roof line of the new shelters. The modern toilets will also be constructed of rustic stone block.

### -- Residence and Maintenance Buildings

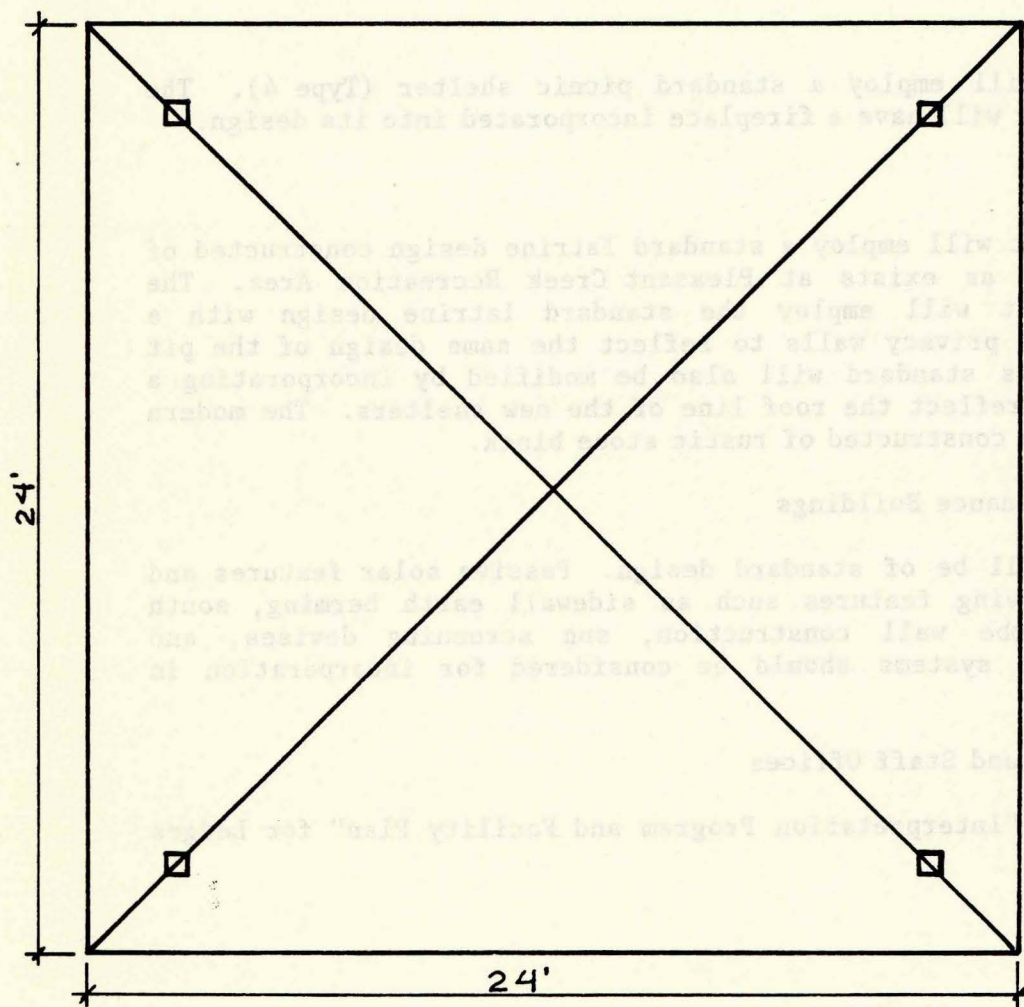
These structures will be of standard design. Passive solar features and other energy-conserving features such as sidewall earth berming, south wall glazing, trombe wall construction, sun screening devises, and natural ventilation systems should be considered for incorporation in these structures.

### -- Interpretive Center and Staff Offices

See description in "Interpretation Program and Facility Plan" for Ledges State Park.



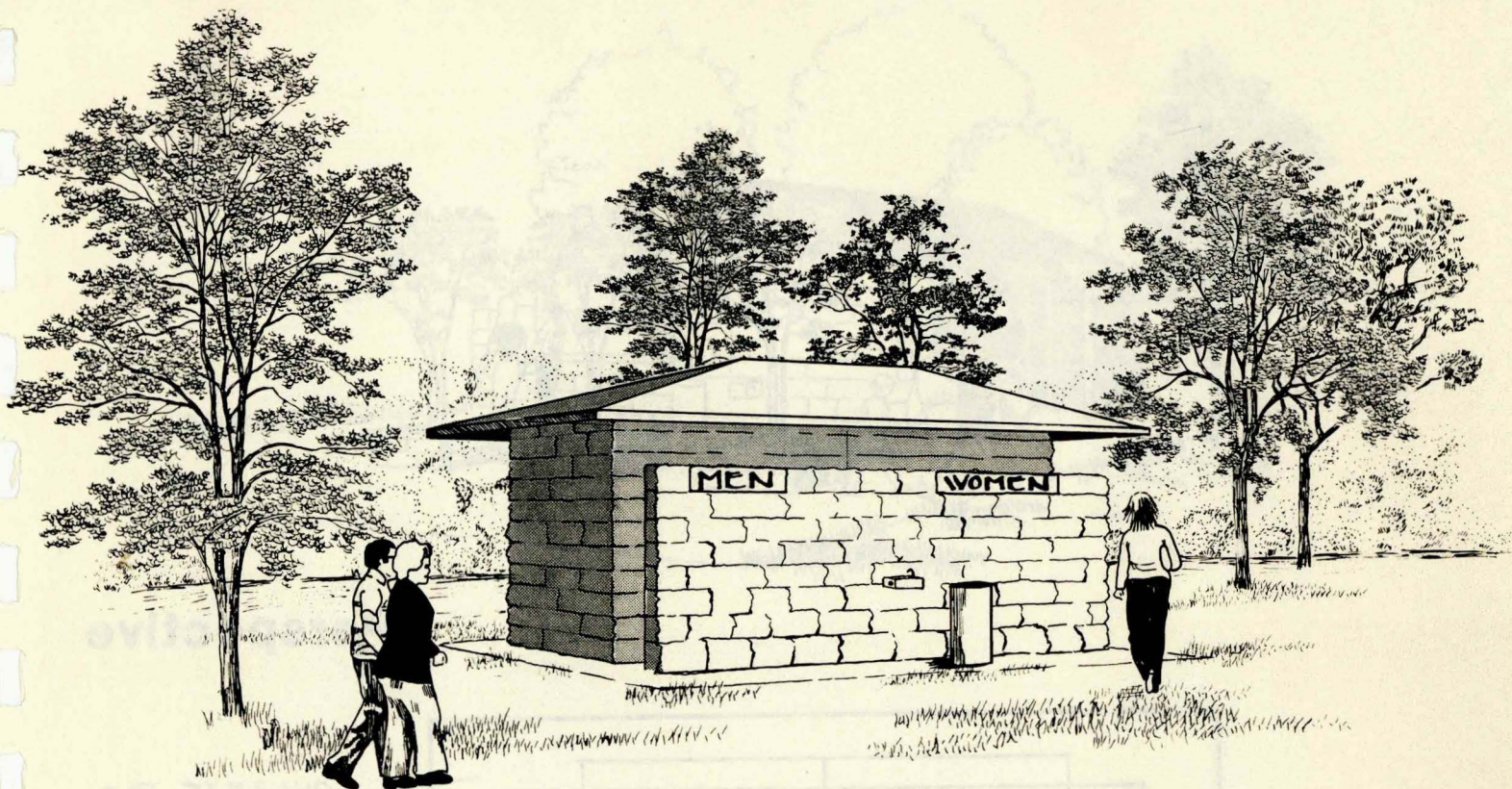
**Perspective**



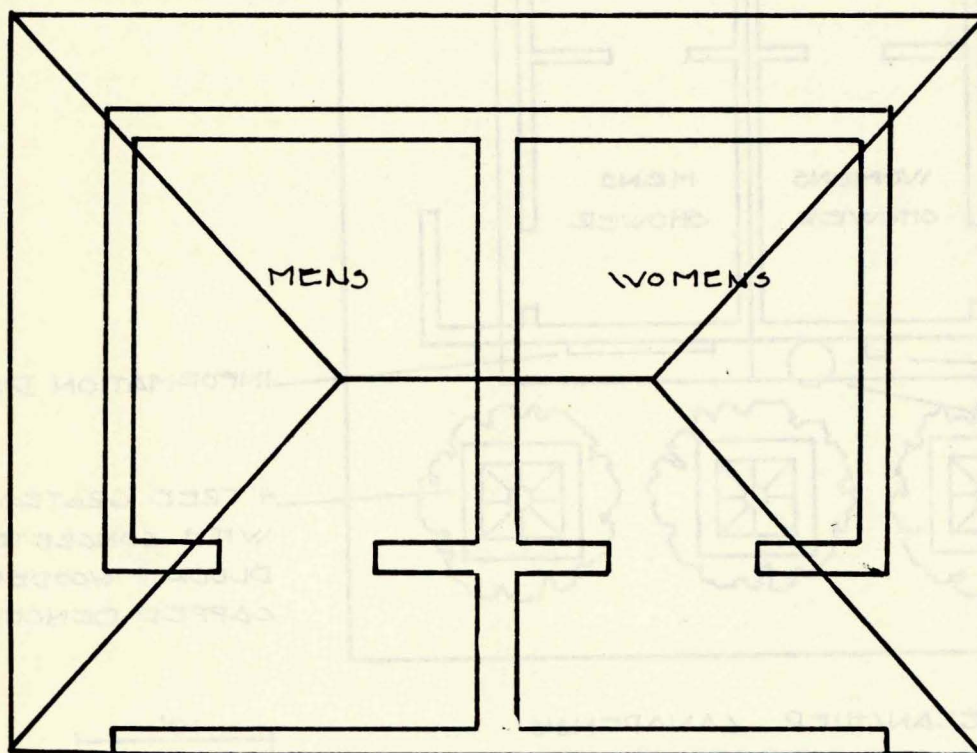
5 FEET

**Plan**

# **Picnic Shelter**



## Perspective



### NOTES:

#### PIT VAULT TOILET -

WILL EMPLOY STANDARD LATRINE DESIGN AND WILL BE CONSTRUCTED OF RUSTIC STONE BLOCK.

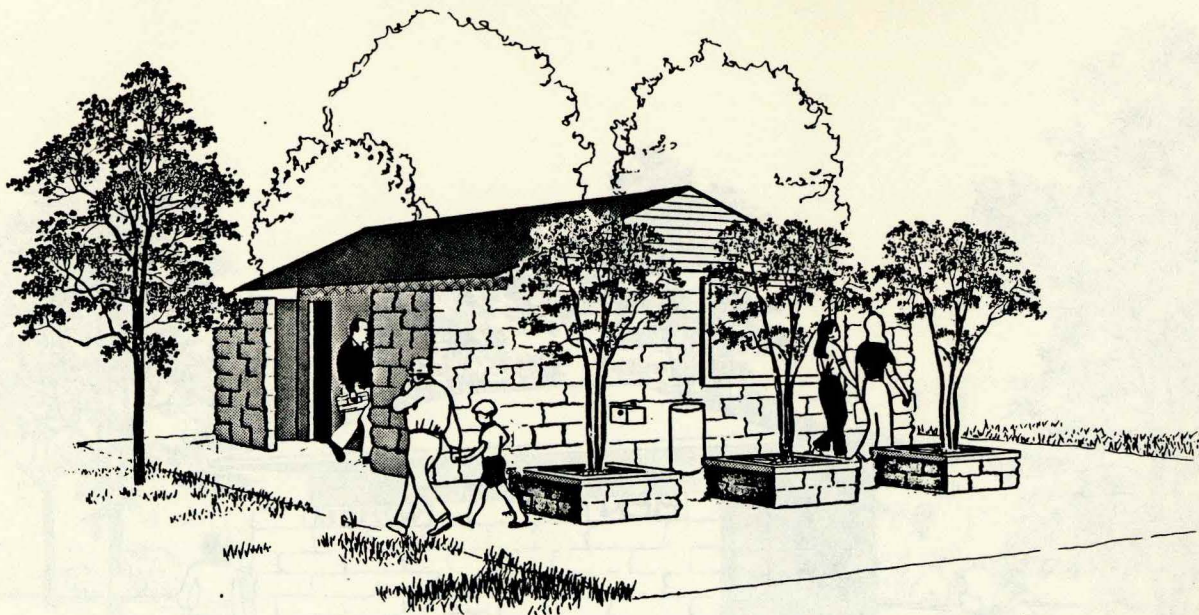
#### MODERN FLUSH TOILET -

WILL EMPLOY STANDARD LATRINE DESIGN WITH A MODIFICATION OF THE PRIVACY WALLS AND A SIMPLE HIP ROOF. IT WILL BE CONSTRUCTED OF RUSTIC STONE BLOCK.

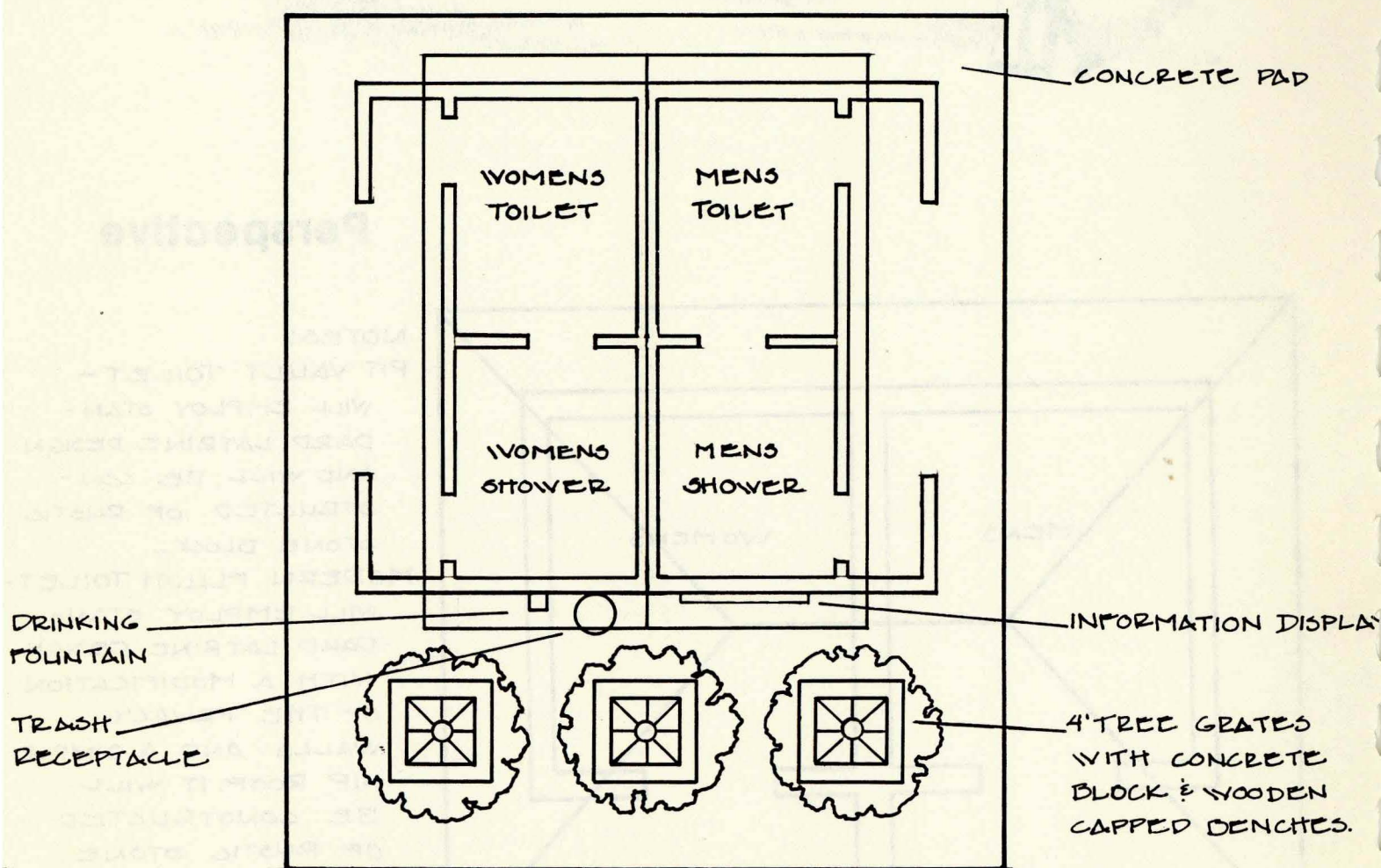
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## Plan

# Modern Flush Toilet



**Perspective**



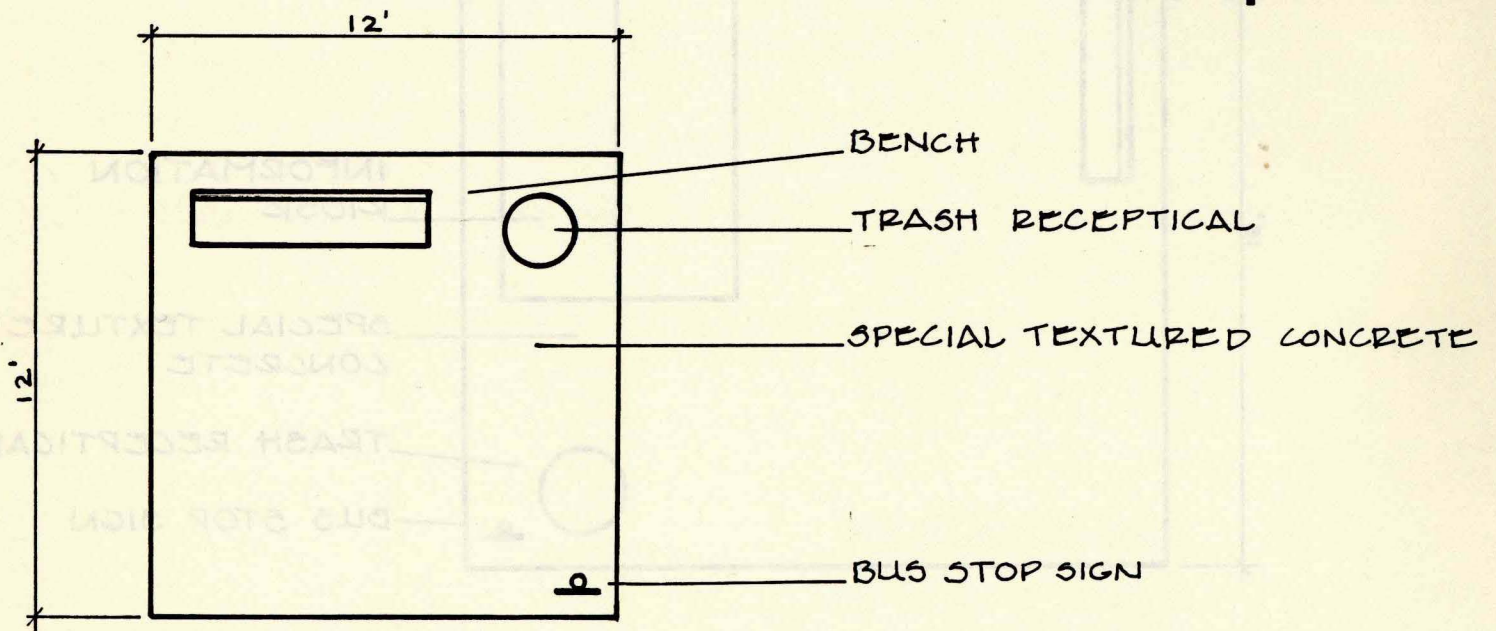
NOTE: AMELANCHIER CANADENSIS (SHADBLOW SERVICEBERRY) SHOULD BE USED IN PLANTERS.

**Plan**

# **Campground Toilet/ Shower**

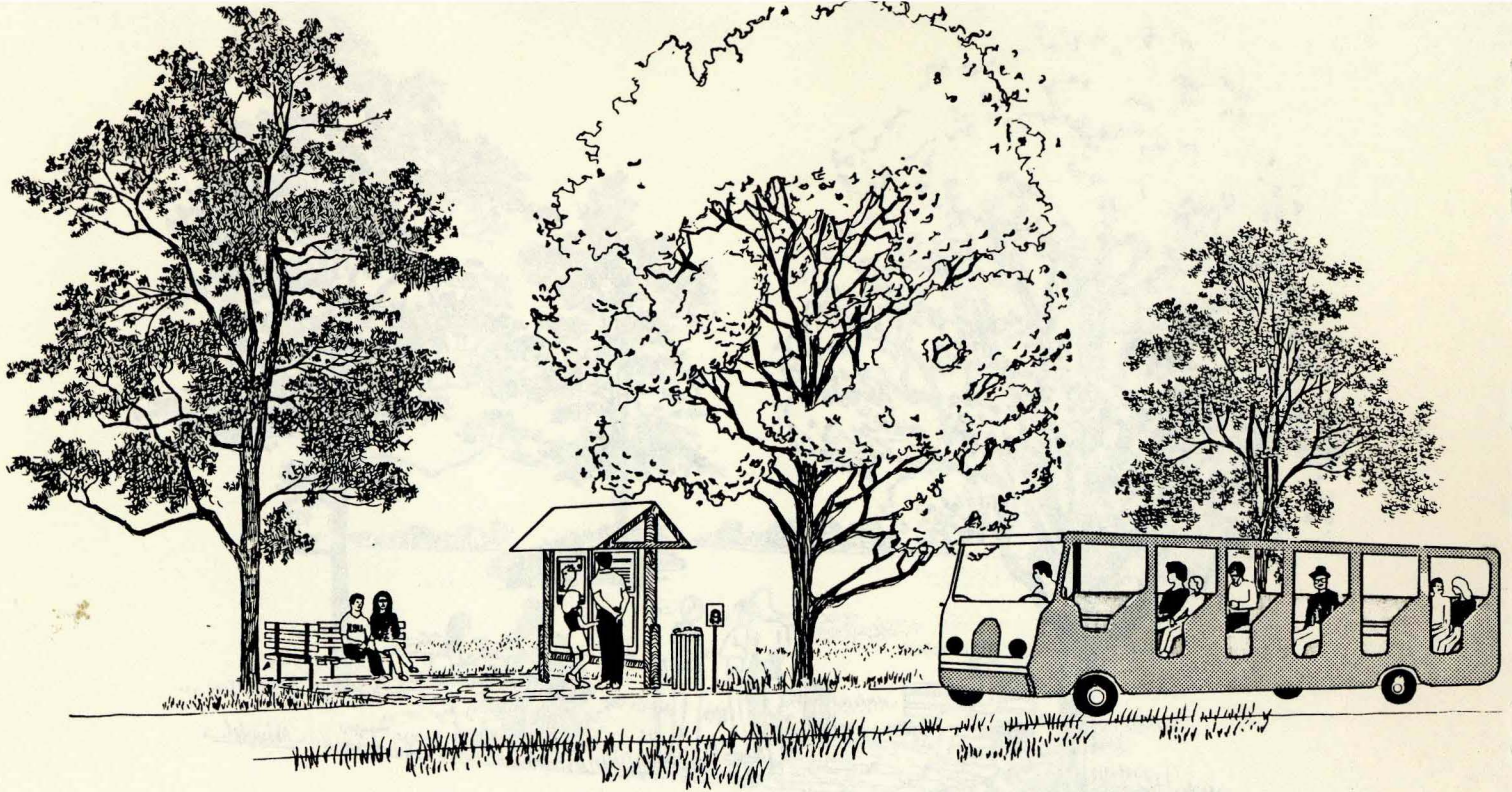


**Perspective**

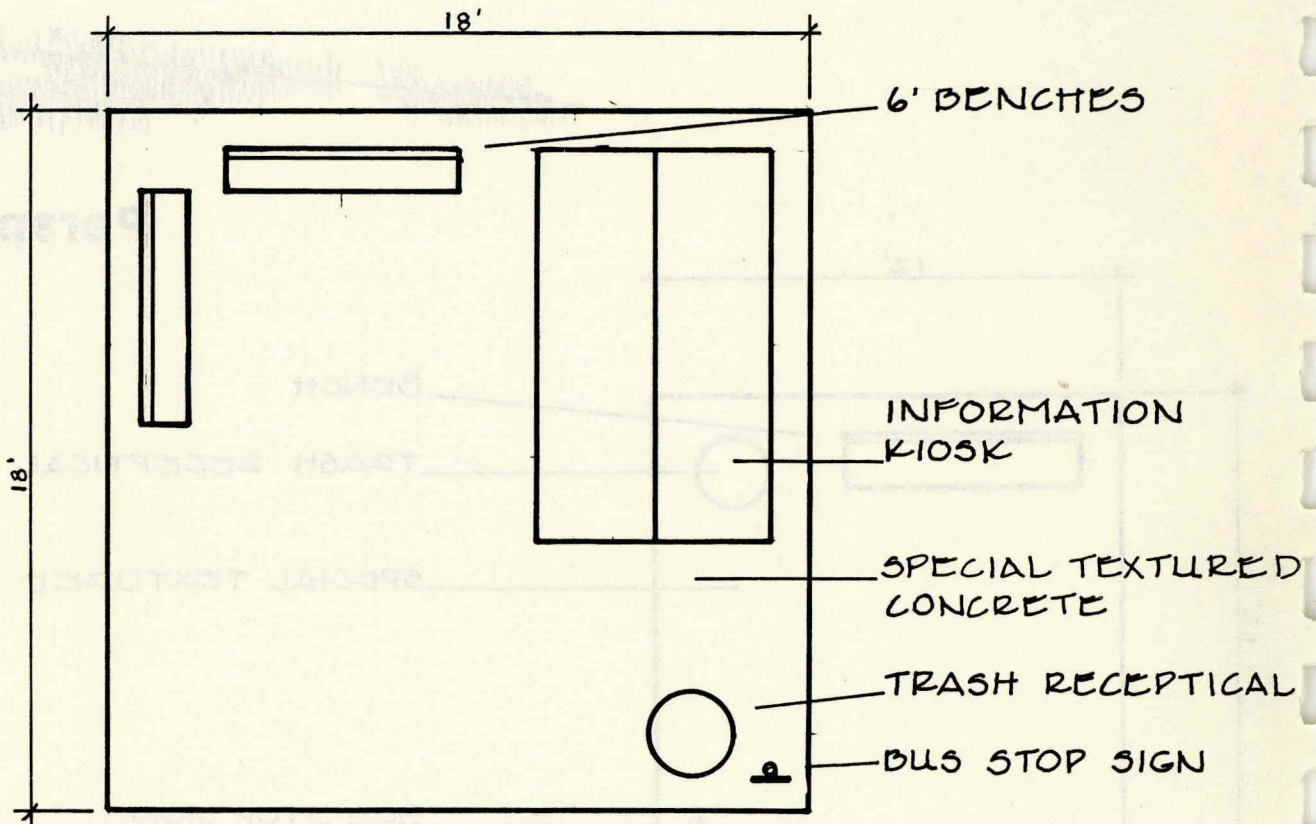


**Plan**

# **Canyon Bus Stop**



**Perspective**



10 FEET

**Plan**  
**Oak Woods Bus Stops**

## SIGNAGE AND SITE ACCESSORIES

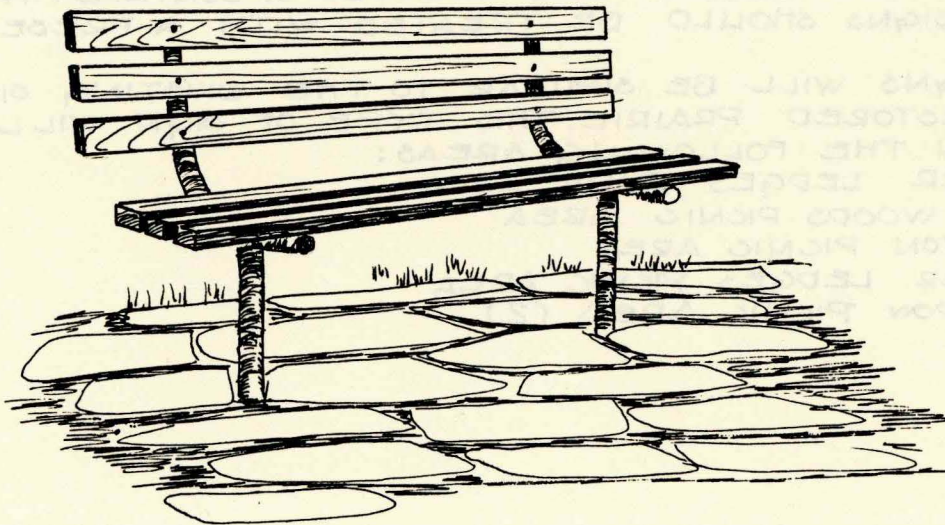
### Signage

A policy of limited signage marking activity areas and trails will be adopted. Straightforward signs of simple design and durable material will be used to make activity areas recognizable from the roads and to move people smoothly through the site. Signage at the main entrance will be consolidated to reduce confusion and present necessary information in a clear concise manner. Signs will be used on trails to assure safety of trail users and to avoid confusion. More frequent directional and interpretive signs will be appropriate on shorter trails near major use areas. Signs will be inspected and promptly replaced when vandalized. Stockpiles of frequently-used signs should be maintained to facilitate replacement.

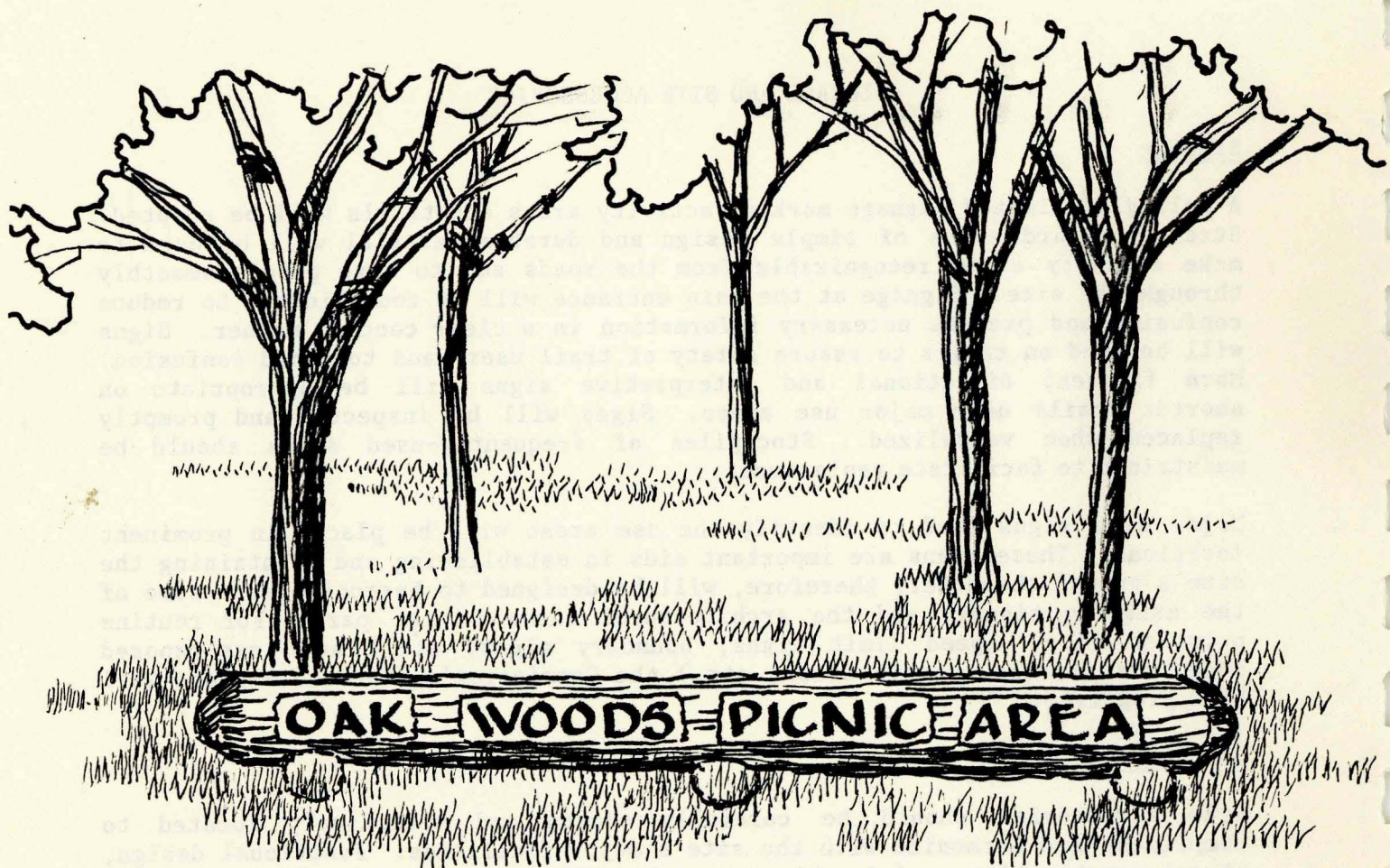
Major area signs used to identify the use areas will be placed in prominent locations. These signs are important aids in establishing and maintaining the site's visual character; therefore, will be designed to harmonize with some of the existing signage and the architectural theme in the park. For routine purposes (i.e. speed limit signs, boundary signs, etc.) and less-exposed locations (trails, remote areas, etc.) the Commission's standard signage will be appropriate.

### Site Accessories

Site accessories should be carefully chosen and selectively located to compliment and harmonize with the site's major facilities. Functional design, strong construction, and durable materials will insure long life and efficient usage of these features. A limited number of designs, materials, and finishes should be used to insure reproduction and aesthetic unity. A number of good factory-made site products are readily available at reasonable prices.



**WOOD BENCH**



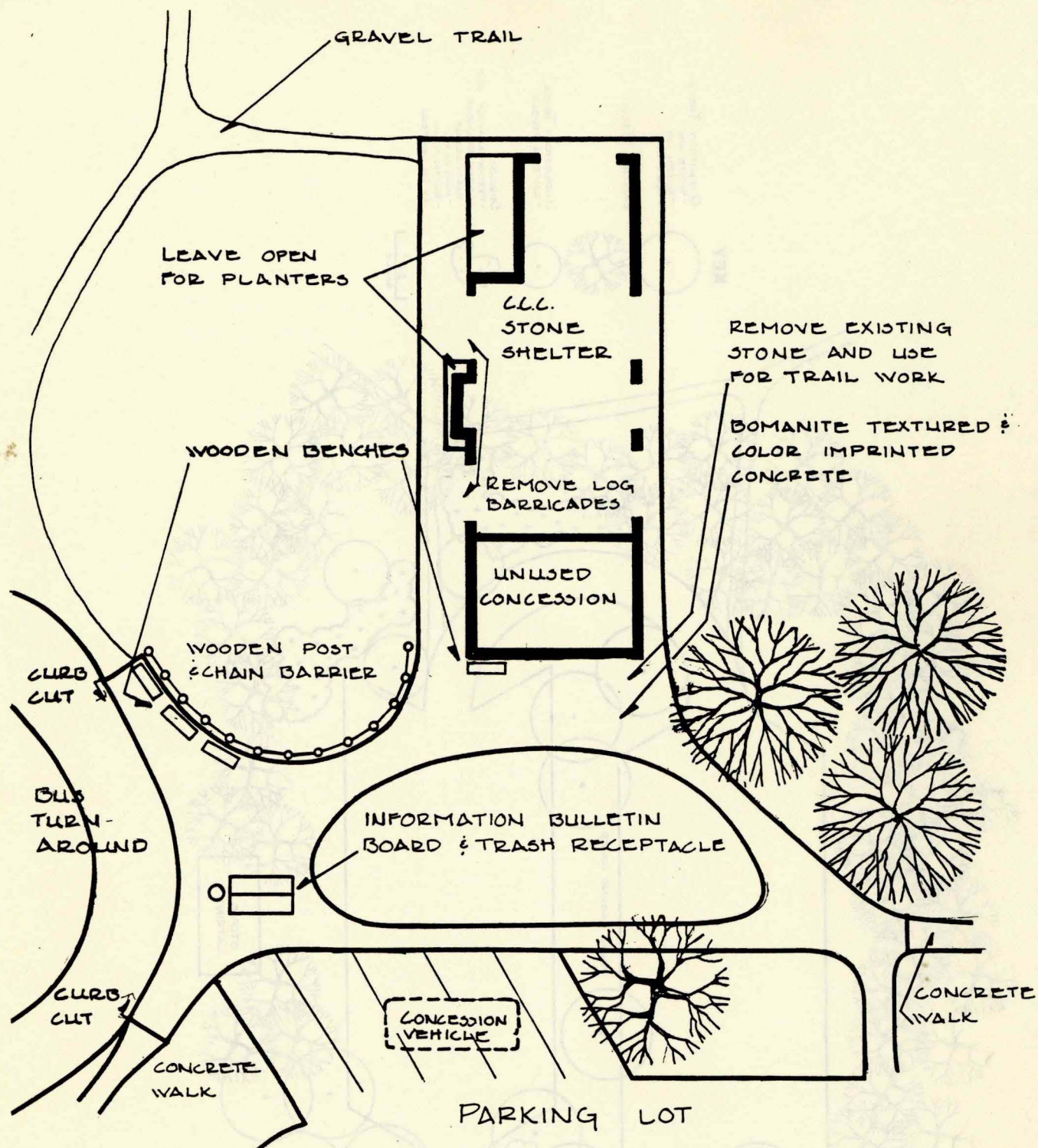
#### NOTES:

THE PICNIC/DAY USE AREA SIGNS WILL BE CONSTRUCTED OF A LARGE LOG WITH THE WORD SURFACE PLAINED AND THE LETTERS ROUTED AND PAINTED A CONTRASTING COLOR. THESE SIGNS SHOULD BE TREATED WITH A PRESERVATIVE.

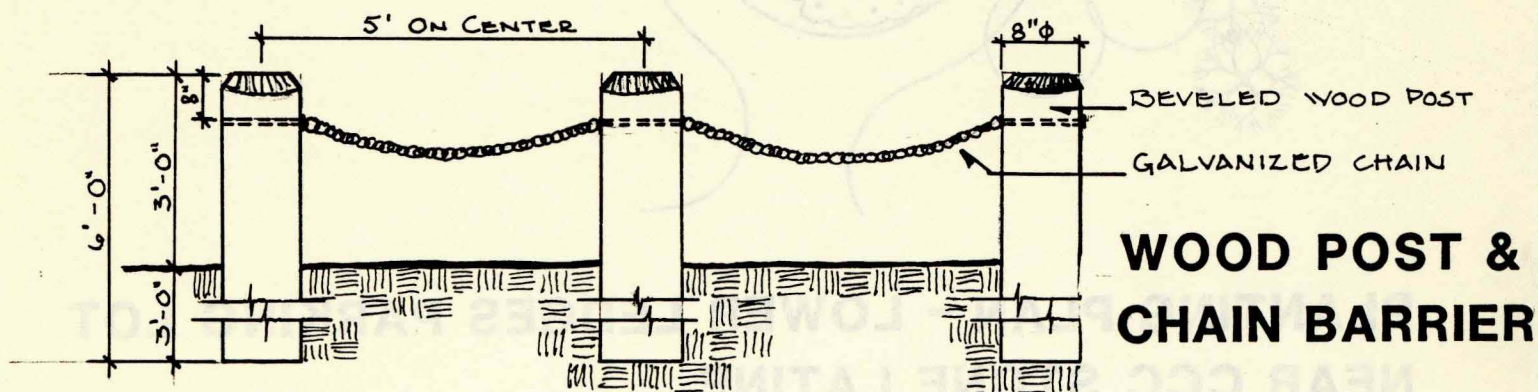
THE SIGNS WILL BE SIMILAR TO THE EXISTING SIGN FOR THE RESTORED PRAIRIE. THIS TYPE OF SIGN WILL BE USED IN THE FOLLOWING AREAS:

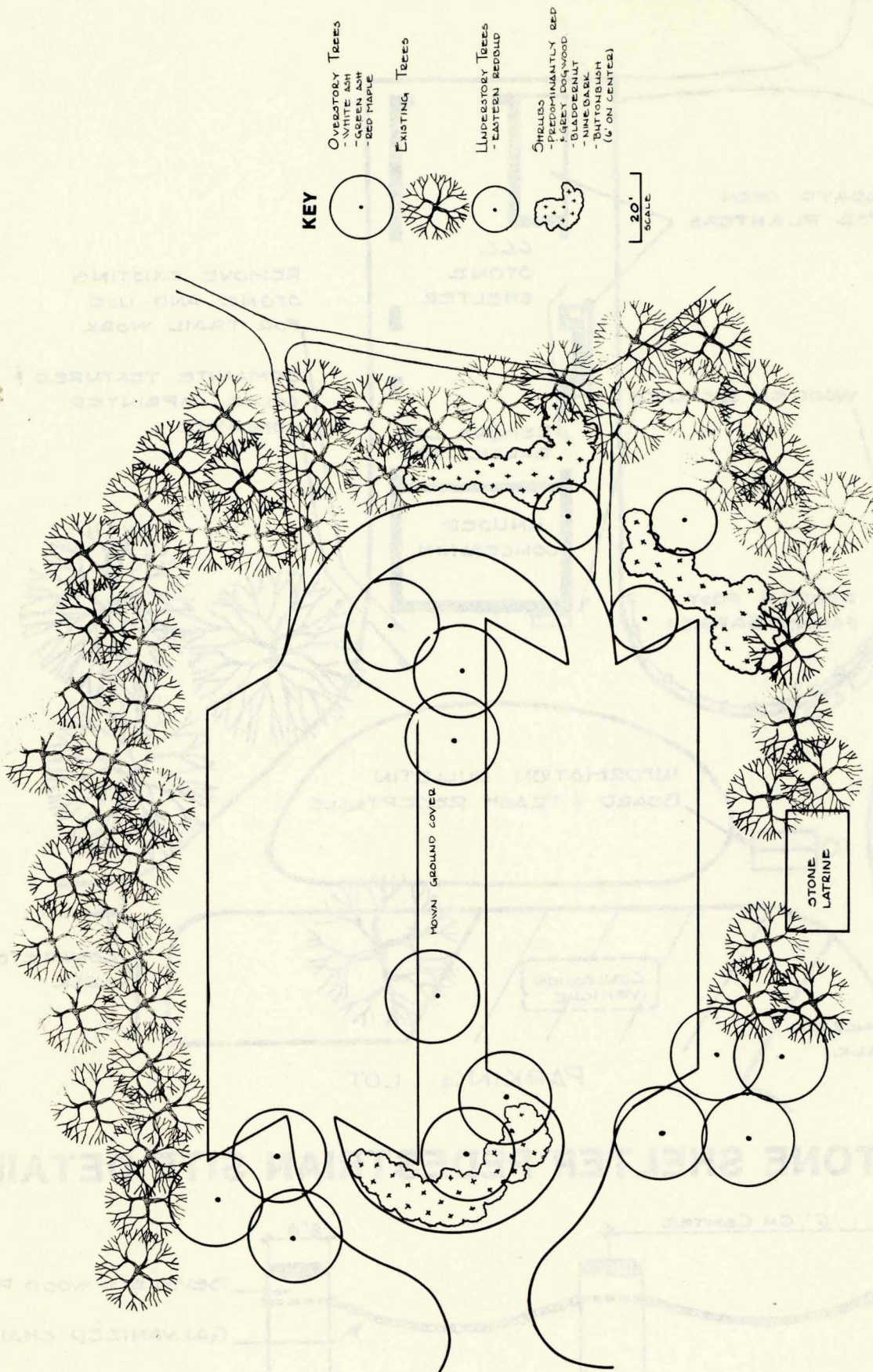
- UPPER LEDGES PICNIC AREA
- OAK WOODS PICNIC AREA
- CANYON PICNIC AREA
- LOWER LEDGES PICNIC AREA
- MEADOW PICNIC AREA (2)

## PICNIC/DAY USE AREA SIGNS

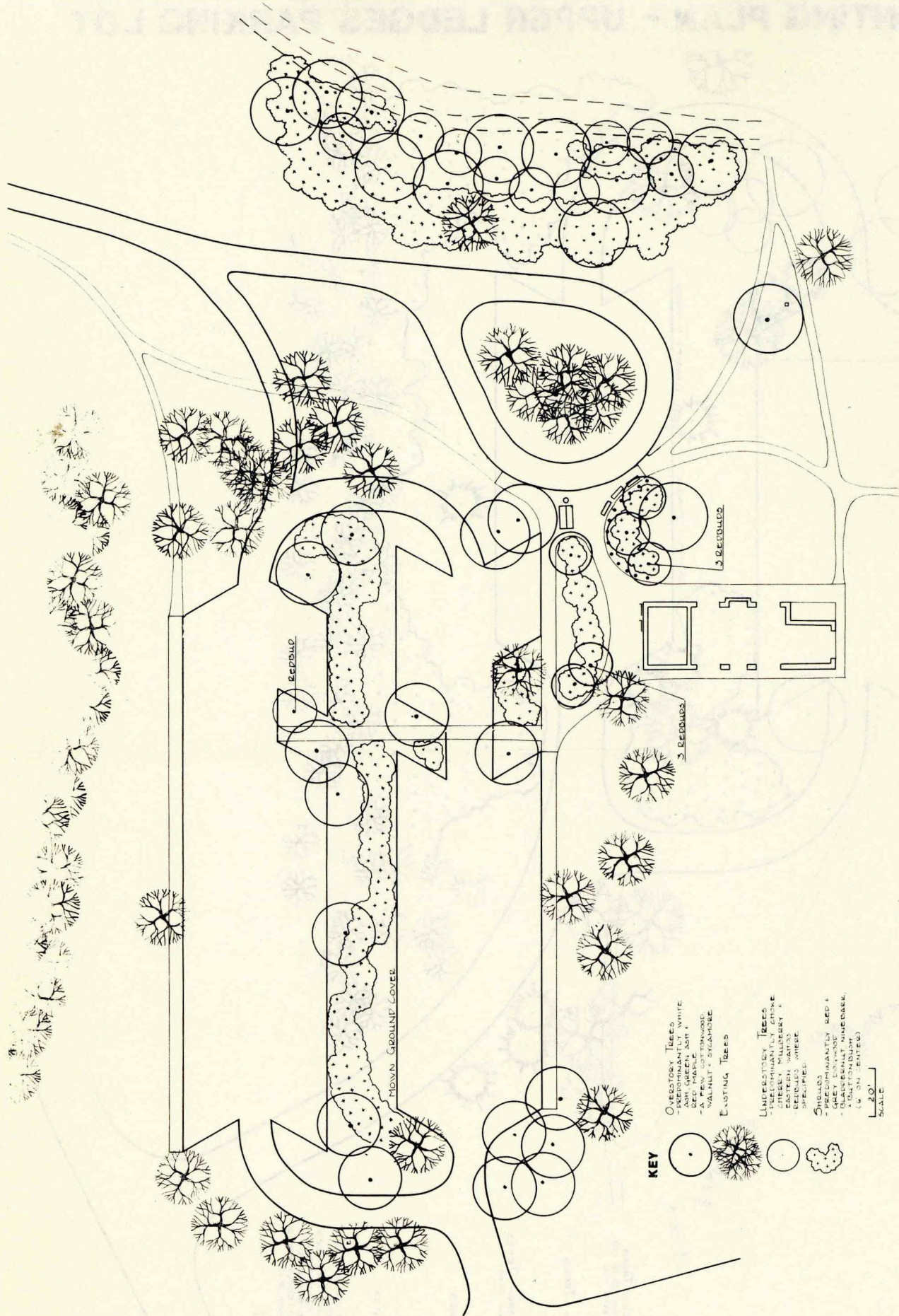


## CCC STONE SHELTER PEDESTRIAN SITE DETAIL



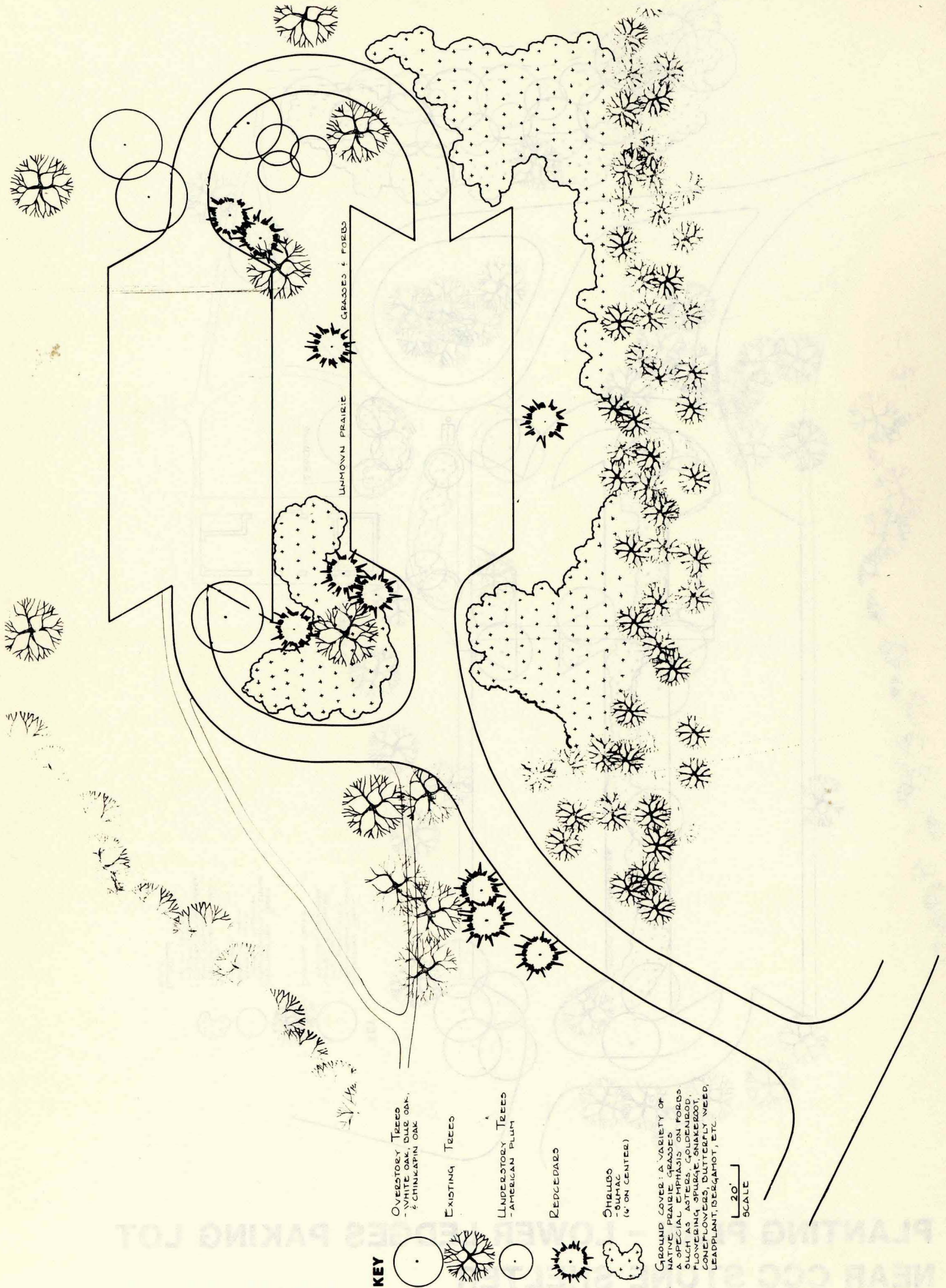


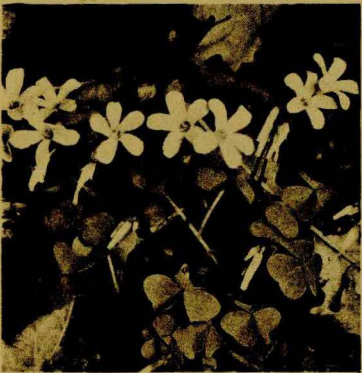
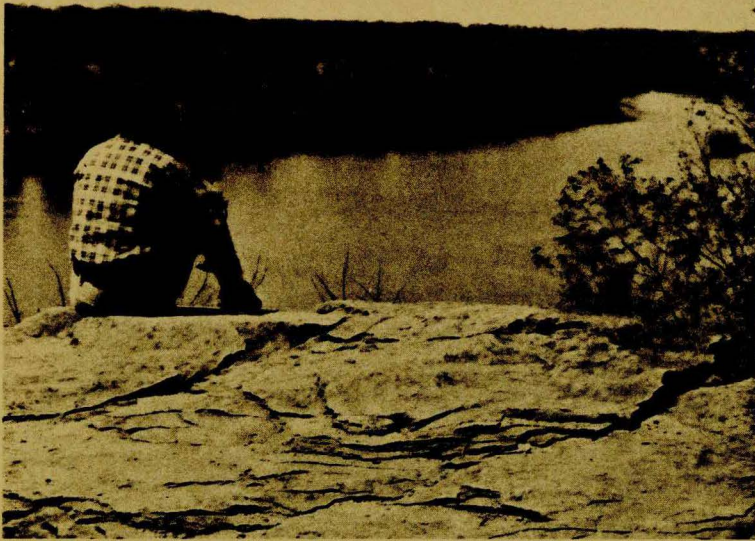
**PLANTING PLAN - LOWER LEDGES PARKING LOT  
NEAR CCC STONE LATINE**



**PLANTING PLAN - LOWER LEDGES PAKING LOT  
NEAR CCC STONE SHELTER**

# PLANTING PLAN - UPPER LEDGES PARKING LOT





# Land Management



## LAND MANAGEMENT

The purpose of the Ledges State Park Land Management is to achieve and maintain the conservation and enhancement of the site's natural resources. Active manipulation will take place only to reinforce, repair, or maintain a certain natural state of the existing resource. The majority of the park, not affected by the redevelopment features, will be maintained in its natural state. These areas will be preserved and managed according to their naturally-occurring conditions. Since these areas will serve as the basis for the interpretive programs, the land management program does not include the introduction of nonindigenous plant or animal species, or major wildlife, soil conservancy, and forestry demonstration projects.

### Objectives

The land management objectives are:

1. To maintain or restore the natural resource base of the site in a healthy condition; to protect, preserve, and enhance significant vegetative communities, wildlife species, and habitats.
2. To provide park visitors the opportunity to interpret, discover, and better understand the significance and interdependence of natural systems.
3. To use indigenous plant material to modify climatic factors and to aesthetically improve the quality of use areas.
4. To employ management techniques readily available to the ICC which are needed to provide quality recreational experiences.
5. To implement a management program to achieve maximum overall benefit at minimal cost.

### Land Management Guidelines

The following general guidelines were developed for the land management of the park.

#### -- Mowing

Mow only the areas physically used by people. See General Mow Patterns designated on Land Management Map and Use Area Maps. This gives areas a more natural quality and gives users a strong sense of form with regards to use patterns. It begins to integrate natural areas into the facility use areas, not isolate them to the periphery. The designated "tall-grass" areas should be mown annually or biennially as necessary to prevent woody invasion.

#### -- Tree and Shrub Plantings

Use only indigenous plant material. Tree and shrub plantings should be used to provide shade, visual screens, privacy buffers, and to reinforce planned circulation patterns. In general, avoid straight-line plantings,

but plant in naturalized groups. For recommended plant material, refer to the chart following.

-- Erosion

Erosion must be kept at a minimum. The highly-used areas are the most susceptible. Circulation patterns should be reinforced as necessary with vegetation, distinct mowlines, identifiable trails and trailheads, railings and wooden bollards, and chain if necessary.

Massive slope erosion is occurring as a result of excessive trail use and disrupted drainage patterns. Corrective measures for these areas include gabion structures, water bars, retaining walls, mulching, and seeding. Access must be discouraged with visual screens and physical barriers.

-- Composting

Leaves falling to the forest floor and slowly moldering are composting. The dead grass of the meadow seared by frost is composted by the dampness of the earth beneath. The fertility of all soils has been achieved and maintained principally by the decay of vegetable matter. Compost is a fine soil conditioner. The establishment of compost piles is recommended to provide a continual supply of humus and a rich soil builder. This "manufactured soil" could be spread on eroded areas void of topsoil to provide a rich growing medium for reestablishing vegetation. The compost bins could have interpretive possibilities. (See the Appendix for further details.)

-- Mulching

Mulch is a layer of material placed on the soil surface to conserve moisture, help stabilize soils, and ultimately improve soil structure and fertility. On disturbed slopes or soils, a light mulch may be applied to stabilize soil until vegetation becomes reestablished.

All new tree and shrub plantings should be mulched to conserve moisture and minimize the extremes of temperature change.

A variety of materials may be used for mulch. (See the Appendix for a list of materials.)

-- Prairie Restoration

Additional recommendations for prairie restoration in the park include the following:

1. The restoration of prairie in an old cultivated area in the northwestern part of Ledges,
2. The development of a small pothole or wet prairie area in the existing prairie plot, and
3. Enhancement of the existing restored prairie by introducing a greater variety of native forbs.

"The prairie ecosystem has been identified as the priority for statewide interpretive efforts in Iowa. At Ledges, interpretation of prairie restoration efforts will be a beginning step. The present restored prairie plot near the Interpretive Center has been carefully planned and managed for nearly 30 years and will offer invaluable opportunities for future programming.

Under the guidance of Dr. Rodger Landers, formerly of Iowa State University, restoration efforts, including establishment of grasses and forbs and a fire management program, have been very successful. Assistance from the University has also been offered for the new restoration effort. The fact that seed was obtained from Nebraska for the existing prairie plot indicates that it is not entirely characteristic of Iowan prairie. Obtaining seed for the early stages of restoration in the larger northern tract may be difficult especially if a "true-to-life Iowa prairie blend" is desired. In such a case, it may be advisable to develop a rather large site by a system of phases, in which an initial area is restored. Seeds could be collected from this initial area for future phases. Such an approach would allow for the development of a plot especially suited in species to the area. Obtaining the beginning seed could be done in several ways. It is most desirable to obtain seed that is within a 200-mile radius of the planting location. Seed can be gathered from large sites by combining; however, it may be necessary to recruit civic groups to help with handpicking seed from smaller remnant areas. One possible location might be the nearby Doolittle Pothole Prairie. A phasing program could be especially interesting in comparison of different areas, different management techniques, and rates of growth. If a phasing program is not desired, large amounts of seed can be obtained from professional prairie landscapers or other commercial sources. This alternative will rarely provide the native blend that could be gathered otherwise.

The site to be established should be prepared so that it is weed-free. Seeding can be through any of several means (drilling, broadcasting, or hydro-seeding), depending upon the size of the site to be worked, and on the available personnel and equipment. The relatively management-free condition of the prairie once established, makes the initial work invested even more worthwhile. However, as with any planting program, some initial management will be necessary, especially for weed control. Once the prairie is established, occasional burning will be necessary to protect the prairie grasses and forbs from woody plants invading the area." (Ledges State Park Interpretation and Facility Plan)

#### Land Management Actions

##### -- Upper Ledges.

Prairie will be established on the open upland in the northern portion of the park. The prairie at the entrance of the park will be expanded after the park ranger's residence is relocated and the windbreak and holding nursery have been removed. These plants should be transplanted where needed in other areas of the park. All prairie areas will be maintained by periodic burning.

Certain areas will be designated for vegetative succession and regeneration. These areas will not be mown to allow native trees and shrubs to regenerate naturally. They may be established for permanent cover or some may be moved to other use areas. After the desired amount of vegetation has been regenerated, the park staff may choose to resume mowing around the young vegetation. The regenerated vegetation will produce a more healthy, multi-aged, diverse woodland. The regeneration areas should be rotated periodically to allow younger native vegetation to become established in all heavily-impacted day-use/picnic areas. (Upper Ledges Picnic Area, Oak Woods Picnic Area, and inside the large loop of the proposed modern campground.)

The recommended overstory plantings for the campground, Upper Ledges picnic area, and Oak Woods include oak varieties as the dominant canopy trees. Oaks should comprise about one-half of all new trees planted. Planting of young hardy oaks will reduce loss due to stress-related oak diseases. Secondary overstory trees include a mixture of white ash, hard maple, American linden, and black cherry. Hard maples should be used sparingly because of heavy shade and related ground cover kill.

Understory trees and shrubs should be used for ornamental purposes, screening around campsites, and to create a large central buffer area in the campgrounds. Shade-tolerant species recommended are:

Shadblow serviceberry is a very attractive native understory tree/shrub with white flowers and red berries. It is a good plant to use near campsites, in the planters near shower buildings, and near picnic shelters.

Chokecherry, American plum, grey dogwood, eastern wahoo, bladdernut, arrowwood viburnum, American cranberry bush viburnum, and ninebark are good background plants. They should be used in masses as buffer plantings. Eastern redbud is a showy ornamental that should be planted around major use areas. This plant should be used sparingly.

#### -- Interpretive Facility

Plants used around the Interpretive Center should consist primarily of prairie and upland woodland edge species. Overstory trees should be predominantly white oak, bur oak, and chinkapin oak comprising one-half of all trees planted. Subordinate species include shagbark hickory, red oak, and green ash.

Understory trees and shrubs should be used for ornamental purposes, screening and buffer around and within parking areas, and to reinforce circulation patterns. These shade-tolerant species include:

Sumac is a colorful native plant with a sculptural form. Use freely in group plantings near parking areas and in woodland edge to reinforce circulation patterns. Downy hawthorn has white clustered flowers, a yellow-brown fall foliage, and dull red berries. Eastern red cedar is another prairie/forest edge successional plant. Use hawthorne and red cedar around parking lots and forest edge. American elder and dogwood should be planted in masses as buffer plantings. Unmown prairie grass species should be the dominant ground cover.

-- Lower Ledges

Trees and shrubs will be planted to modify climatic factors and to aesthetically improve the use areas. Shade trees will be transplanted in the open picnic areas, around the toilets, and shelters. Native shrubs and ground covers will be planted to minimize the visual impact, modify the circulation flow around the parking lots, and ornamental purposes.

The recommended overstory plantings for the Canyon, Lower Ledges, and Meadow picnic areas include flood-tolerant species such as red maple, maple, common hackberry, green ash, black walnut, cottonwood, and sycamore.

Understory trees and shrubs that should be used include shade and water-tolerant species such as: eastern wahoo, common ninebark, buttonbush, bladdernut, and red and grey dogwood.

In the Meadow Picnic Area, a permanent mow line will be established to maintain the tall grasses. (See the Land Management Map for mow line location.)

-- Vegetative Management Agreement with the Army Corps of Engineers

Under the agreement, the Iowa Conservation Commission removed all trees and shrubs within the flood control pool and planted new water-tolerant species in the 870'-885' zone. The water-tolerant species were to be planted annually over a five-year period so as to establish multi-aged vegetation.

The area between the river and the 870' elevation is to be maintained as an "open space" zone. This area will be periodically burned or mowed to keep out woody vegetation.

Land Management Action Categories

A range of actions or management functions will be utilized to implement the land management/facility development objectives. These actions fall into three general categories: initial or single occurrence, ongoing actions, and no action.

-- Initial or Single Occurrence Actions - A one-time management function, which, when it is completed need not occur again. Single occurrence management actions include:

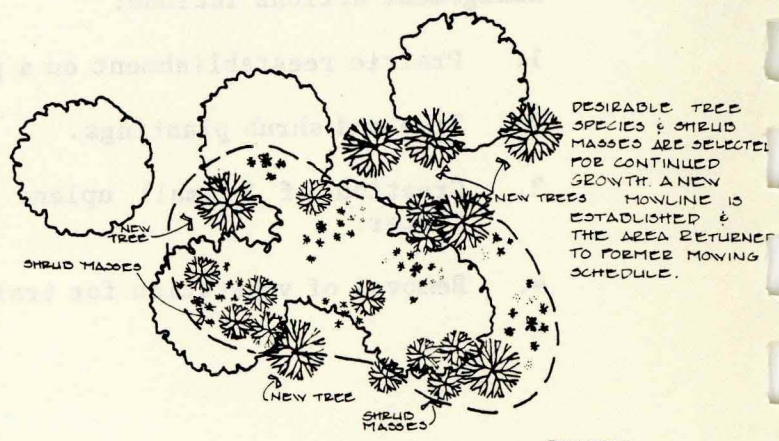
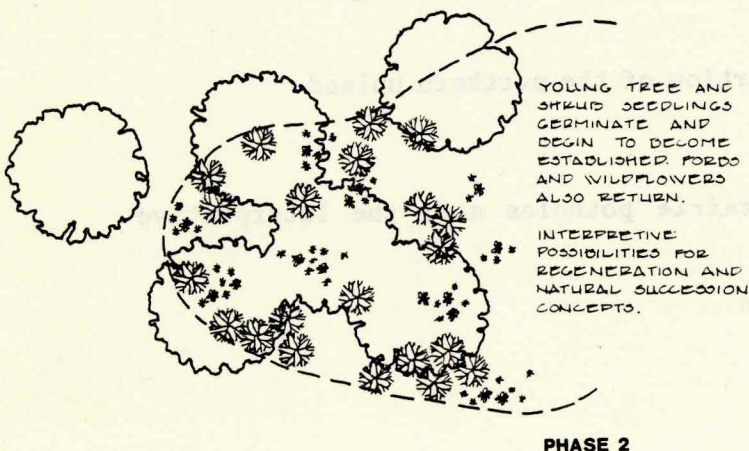
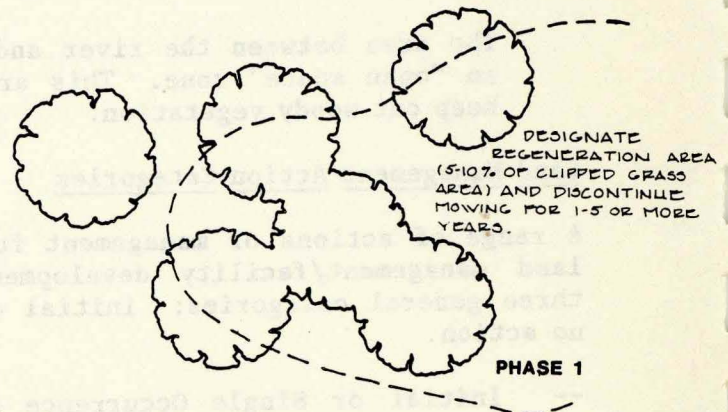
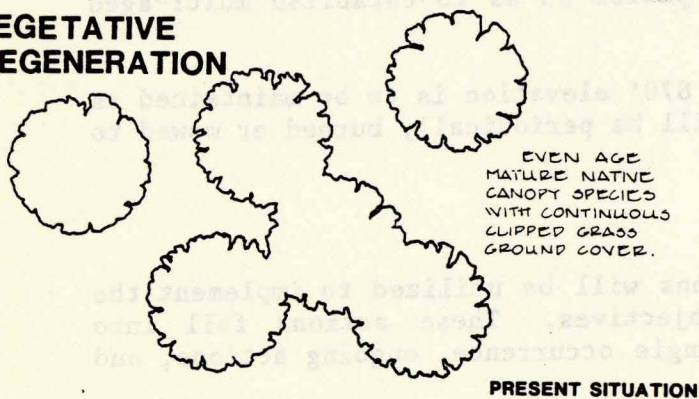
1. Prairie reestablishment on a portion of the northern upland.
2. Tree and shrub plantings.
3. Creation of 2 small upland prairie potholes near the Interpretive Center.
4. Removal of vegetation for trails.

-- Ongoing Actions - Actions that are required on a routine or periodic basis in order to assure that the desired management objectives are being achieved. Ongoing management actions include:







1. Burning and occasional mowing to control woody invasion in prairies and in the "open zone" in the floodplain.
2. Trails--there will be a continual need for trail maintenance. Even after the initial trail rehabilitation is completed, trails must be monitored for excessive wear and erosion and appropriate corrective action taken. Trails will also have to be cleared of windfall after major storms.
3. Mowing day use areas and campground.
4. Vegetation Regeneration - In regularly-mown areas such as the Oak Woods Picnic Area, and the Upper Ledges Picnic Area, areas will be designated to be left unmown. This will allow native tree species to regenerate and create a multi-aged woodland.
5. Remove vegetation to maintain certain vistas as specified on the Land Management Map.

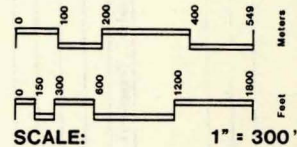
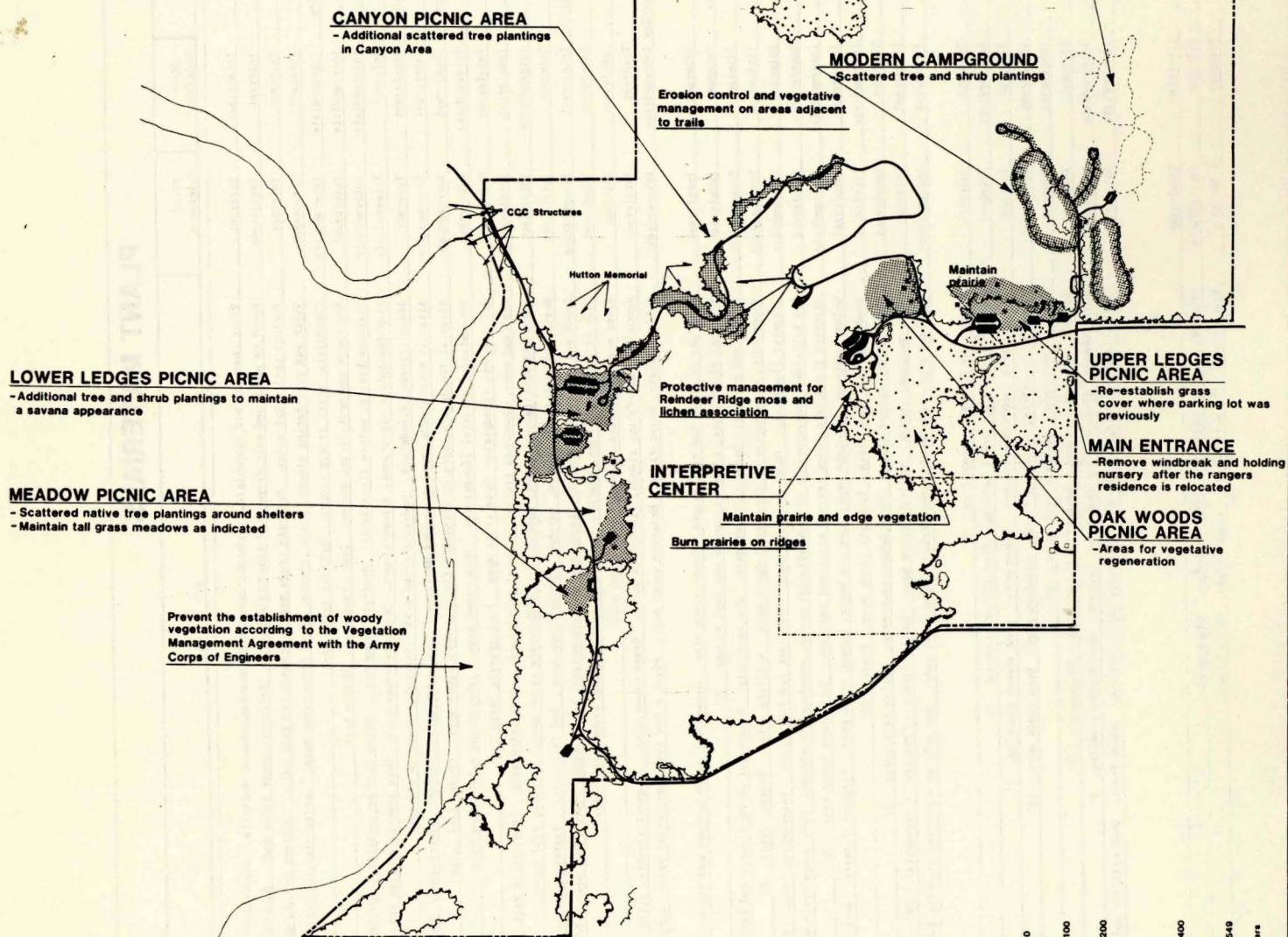
-- No action--A "no action" management function is a planned decision to avoid intervention or manipulation of the natural processes. Periodic observation is necessary to note any detrimental effects that could develop.

## VEGETATIVE REGENERATION



# KEY

-  SELECTIVE TREE REMOVAL TO ENHANCE VISTAS
-  TALL GRASS MEADOW
-  PRAIRIE
-  CLIPPED GRASS
-  WOODLAND
-  MOWLINE



## LEDGES STATE PARK REDEVELOPMENT MASTER PLAN

## LAND MANAGEMENT

IOWA  
CONSERVATION COMMISSION

SUMMER 1981

## PLANT MATERIALS

H A B I T A T					
Common Plant Name	Soil Requirements	Landscape Location	Shade Tolerance	Flood Tolerance	N O T E S
Overstory					
Box Elder	Wet	Lowlands	Intolerant	Tolerant	River channels and floodplain. Moderate crown mass becoming open at maturity. Short-lived weed specie.
Black Maple	Moist-Ave.	Upland Mesic	Tolerant	Intolerant	Found on north and east slopes and floodplain knolls. Extremely dense crown mass. Good fall color. Climax species.
Red Maple (soft)	Wet-Ave.	Lowland Mesic	Tolerant	Tolerant	Prefers cool moist sites. Moderate crown mass. Cromson red fall color. Subject to wind damage. Fast growing.
Sugar Maple	Moist-Ave.	Upland Mesic	Tolerant	Intolerant	North and east-facing slopes, mesic ravines. Very dense crown mass. Spectacular fall color. Climax species.
Bitternut Hickory	Wet-Dry	Lowland Mesic, Upland Mesic-Dry	Intermediate	Intermediate	Floodplain, moist or dry slopes. Moderate crown mass.
Shagbark Hickory	Wet-Dry	Upland Mesic-Dry	Intermediate	Intolerant	Dry south and west-facing slopes. Open crown mass. Unique bark.
Common Hackberry	Wet-Dry	Lowland and Upland Mesic-Dry	Intermediate	Intermediate	Drainage basins, mature floodplains. Moderate crown mass. Often used as substitute for American Elm.
White Ash	Moist-Ave.	Upland Mesic, Mesic-Dry	Tolerant	Intermediate	High floodplain elevations, upland slopes. Moderate crown mass. More symmetrical form than Green Ash.
Green Ash	Wet-Dry	Lowland Mesic, Upland Mesic-Dry	Intolerant	Tolerant	Along streams, floodplain. Moderate crown mass. Irregular shape in old age.
Common Honey Locust	Wet-Dry	Upland and Lowland Mesic	Intolerant	Intermediate	Alluvial bottomlands, open or wooded pastures. Open crown mass. Thorns. Successional species.
Black Walnut	Moist-Dry	Lowland Mesic, Upland Mesic-Dry	Intolerant	Intermediate	Alluvial floodplain, open or abandoned fields. Open crown mass. Golden fall color.
Sycamore	Wet-Ave.	Lowland Wet-Mesic	Intermediate	Intolerant	Bottomlands, alluvial floodplains. Open crown mass. Interesting exfoliating bark.
Cottonwood	Wet-Dry	Lowland Wet, Wet-Mesic	Intolerant	Tolerant	Wet ravines, floodplain. Open crown mass. Fast-growing large tree.
Black Cherry	Moist	Uplands, Alluvial Terrace	Intolerant	Intolerant	Woodland edge, abandoned fields, alluvial bottomlands. Open crown mass. Interesting bark.
White Oak	Moist-Dry	Upland Mesic-Dry	Intermediate	Intolerant	South and west-facing slopes, upland flats. Moderate crown mass. Burgundy fall color.
Northern Red Oak	Moist-Ave.	Upland Mesic, Mesic-Dry	Tolerant	Intolerant	North and east-facing slopes, ravines. Dense crown mass. Red fall color. Fastest growing of oak species.
Bur Oak	Wet-Dry	Lowland Wet-Mesic, Upland Mesic-Dry	Intolerant	Intermediate	South and west-facing slopes, floodplain, prairie margin, open fields. Open crown mass. Yellow-brown fall color.
Chinkapin Oak	Dry	Upland Dry	Intolerant	Intolerant	Clay or rocky ridgetops, bluffs. Open crown mass. Yellow-brown fall color.
Black Willow	Wet-Moist	Lowland Wet, Wet-Mesic	Intolerant	Tolerant	River margins, swales. swamps. Open crown mass.
American Linden	Moist-Ave	Upland Mesic	Tolerant	Intolerant	North and east-facing slopes, floodplain knobs. Dense crown mass. Fragrant flowers, often with multiple trunks.
American Elm	Moist-Dry	Lowland Wet-Mesic, Upland Mesic-Dry	Intermediate	Intermediate	Alluvial flats, moist flats. Moderate crown mass. Plant a few for interpretive value, subject to disease.
Understory					
Shadblow Serviceberry	Moist-Ave.	Upland Mesic	Tolerant	Intolerant	Shoulder of north and east slopes. Dense crown mass. Ornamental showy berries and flowers. 25'
American Hornbeam (Carpinus)	Moist-Ave	Lowland Wet-Mesic, Upland Mesic	Tolerant	Intolerant	Elevated floodplains, terraces, north and east slopes. 25'
Eastern Redbud	Moist-Dry	Lowland Mesic, Upland Dry	Tolerant	Intermediate	Slopes and ravines. Moderate crown mass. Use sparingly. Ornamental showy flowers and bark. Organic shape. 25'
Downy Hawthorne	Moist	Lowland Wet-Mesic, Upland Dry	Intolerant	Intermediate	Woods edge, open pasture. Very dense crown mass. Wildlife value. Thorns, fruit. 25'
Eastern Wahoo	Moist	Lowland Mesic	Tolerant	Intermediate	Alluvial floodplain. Moderate crown mass. Brilliant red fall color. Interesting fruit. 15'
Eastern Red Cedar	Dry	Uplands	Intolerant	Intolerant	Dry hillsides, occasionally in open alluvial woods, abandoned farmlands. Very dense crown mass. Only native conifer in central Iowa. 40'
Mulberry	Moist-Dry	Lowland Mesic, Upland Dry	Intermediate	Intermediate	Alluvial floodplain, open prairie hills and pastures. Very dense crown mass. 25'
American Plum	Ave.-Dry	Uplands	Intolerant	Intolerant	Upland pastures, woodland edge, open oak woods. Dense crown mass. Fragrant flowers. Best in groups. 15'
Choke Cherry	Moist-Dry	Uplands	Intermediate	Intolerant	Woodland edge, open field. Moderate crown mass. Fruit. 20'
American Hophornbeam (Ostrya)	Moist-Dry	Upland Mesic, Mesic-Dry	Tolerant	Intolerant	Moist to dry upland slopes. Very dense crown mass. Yellow fall color. 20'
Pussy Willow	Wet-Moist	Lowland Wet, Wet-Mesic	Intolerant	Tolerant	River margins, swales. Moderate crown mass. Unique flower - "Pussies" - Ornamental. 20'
Common Pricklyash	Ave.-Dry	Upland Mesic-Dry	Intolerant	Intermediate	Woodland edge, open woods, open fields. Open crown mass. Use only as a barrier planting (abandoned trails) 20'
Shrubs					
Buttonbush	Moist	Lowlands, Upland Mesic	Tolerant	Tolerant	Adverse to dryness. Loose form. 10'
Gray Dogwood	Moist	Lowland, Upland Mesic	Intermediate	Tolerant	Suckers profusely. Erect growing. Good screen planting. 12'
Common Ninebark	Moist	Upland Mesic	Tolerant	Tolerant	Upright with recurving branches. Dense mass. Good screen planting. 8'
Smooth Sumac	Ave.-Dry	Upland Dry	Intolerant	Intolerant	Invader of prairie, abandoned fields, woodland edge. Open crown mass. 12'
American Elder (Berry)	Moist	Upland Mesic, Lowland	Intolerant	Tolerant	Suckers profusely. Moderate crown mass. 10'
Bladdernut	Moist	Lowland, Upland Mesic	Tolerant	Tolerant	Upright, heavily branched. Suckers. Unique fruit - Ornamental. 12'
Arrowwood Viburnum	Ave.	Upland Mesic, Mesic-Dry	Intermediate	Intolerant	Multistemmed, dense arching character, suckers. Good screen planting. 8'
American Cranberry Bush	Ave.	Upland Mesic, Mesic-Dry	Intermediate	Intolerant	Upright and recurving. Adverse to extremely dry conditions. Showy fruit. Good wildlife value., Ornamental. 10'
Ground Cover					
Vines					
Common Trumpet Creeper	Ave.-Dry	Upland Mesic-Dry	Intolerant	Intolerant	
Virginia Creeper	Moist-Dry	Lowland Mesic	Tolerant	Intermediate	Plant on wildlife well tower in Lower Ledges. Quick grower.
Wild Grape	Moist	Lowland Mesic	Tolerant	Tolerant	Plant on wildlife well tower in Lower Ledges. Quick grower.

## PHASE ONE CONSTRUCTION

urfacing - 1.7 miles \$ 77,000  
urfacing - 1.4 miles 190,000

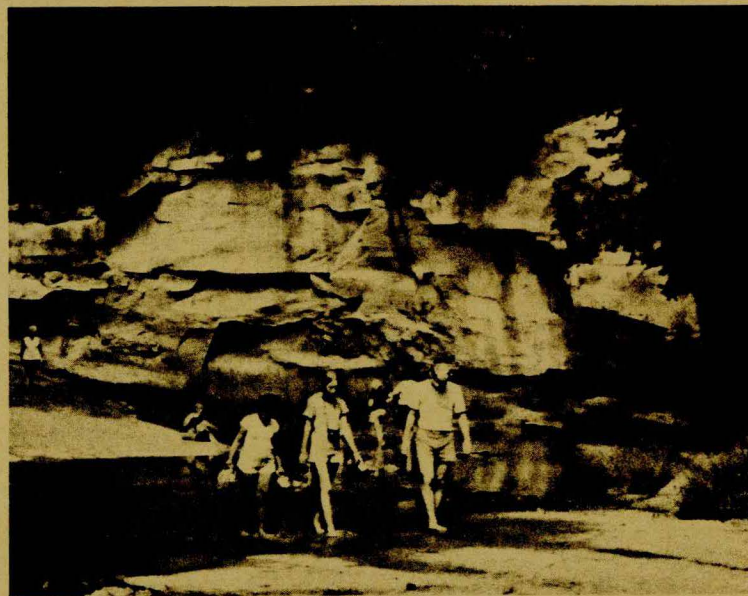
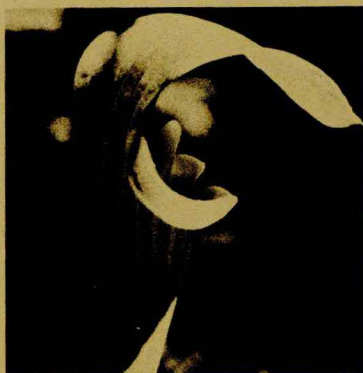
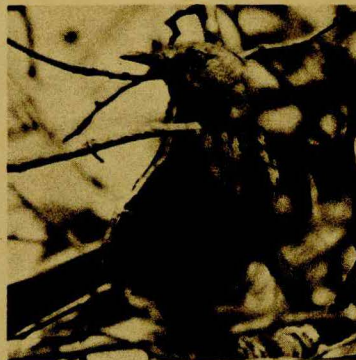
### ING ROADS:

, B2, B3, C1, D6, E, F 175,000

Asp. Conc. Surface  
, D4, D5 16,000

Double Seal Coat Surface  
ction 55,000

ing Blocks, Conc. Sidewalk,  
Pavement Marking, Traffic  
Gutter, Inlets, Manholes,



## Cost Estimates, Implementation Phasing

Stream Crossing 10,000

e, Double Seal Coat Surface 24,500

cking Lots D7, D8 70,000

e, Asp. Conc. Surface  
on 4,000

Buildings (2) 120,000

System (25) 10,000

scellaneous Site Accessories 4,500

Fertilizing, Erosion Control 40,000

pe, Inlets, Manholes, etc. 10,000

3,000



## FACILITY LIST AND COST ESTIMATES AND IMPLEMENTATION PHASING

### Facility List and Cost Estimate

On the following pages are a detailed listing of proposed facilities and estimates of cost for the redevelopment of Ledges State Park in accordance with this Master Plan. Estimates have been calculated for work based upon recent experience in the market area. Readers and users of this estimate must remember that it is based upon 1981 dollar costs and, therefore, must be revised at each using to reflect changes in the cost of materials and construction.

### Implementation Phasing

Construction of facilities must be phased in recognition of budgetary, administrative, and resource limitations. The quality and integrity of the resource must be protected from the impacts of an overly aggressive or disorganized construction program. Additionally, the needs of visitors must be balanced with the administrative and budgetary capabilities in establishing redevelopment priorities.

The following recommended phasing does not necessarily correspond to annual increments since certain phases may require several years for completion, depending on construction scope, user demand and funding availability. The phasing program is based upon a correlation of anticipated needs and a logical ordering for development of facilities starting with roads and utilities in Phase I with trail renovation continuing through several phases.

# PHASE ONE CONSTRUCTION

## 1. RESURFACE EXISTING ROADS:

2" Asphaltic Concrete Surfacing - 1.7 miles	\$ 77,000	
6" Asphaltic Concrete Surfacing - 1.4 miles	190,000	
		\$ 267,000

## 2. PARKING LOTS AND CONNECTING ROADS:

A. Lots A1, A2, A3, B1, B2, B3, C1, D6, E, F	175,000	
Crushed Stone Base, Asp. Conc. Surface		
B. Lots C2, D1, D2, D3, D4, D5	16,000	
Crushed Stone Base, Double Seal Coat Surface		
C. Appurtenant Construction	55,000	
Parking Posts, Parking Blocks, Conc. Sidewalk, Bomanite Walkways, Pavement Marking, Traffic Control, Curb and Gutter, Inlets, Manholes, Pipe Drainage, Seeding, Fertilizing, and Erosion Control		
D. Concrete Ford for Stream Crossing	10,000	
		256,000

## 3. TRAILER CAMPGROUND:

A. Camp Pads	24,500	
Crushed Stone Base, Double Seal Coat Surface		
B. Camp Roads and Parking Lots D7, D8	70,000	
Crushed Stone Base, Asp. Conc. Surface		
C. Sewage Dump Station	4,000	
D. Shower and Toilet Buildings (2)	120,000	
E. Camp Pad Electric System (25)	10,000	
F. Fire Rings and Miscellaneous Site Accessories	4,500	
G. Grading, Seeding, Fertilizing, Erosion Control	40,000	
H. Storm Drainage Pipe, Inlets, Manholes, etc.	10,000	
I. Concrete Sidewalk	3,000	
		286,000

## 4. BACKPACK CAMPGROUND:

A. Access Road and Parking Lot A4	16,000	
Grading, Cr. Stone Base and Asp. Surface		
B. 12 Fire Rings and 12 Lantern Posts	1,500	
C. Seeding, Fertilizing, Erosion Control	1,500	
		19,000

## 5. PIT VAULT LATRINE (NORTHERN MOST CANYON AREA)

15,000

## 6. TRAIL REHABILITATION:

A. Materials and Contracted Labor	50,000	50,000
3500 feet of step construction, retaining walls, drainage and erosion structures		

## 7. PERMANENT STEPPING STONES (STREAM CROSSINGS)

A. Molds and Concrete		900
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8. UTILITIES:

A.	Primary Electric Underground	10,000	
B.	Secondary Electric Underground	10,000	
C.	Water		
a.	Well, Pump House, Treatment	40,000	
b.	Water Distribution Lines, Valves, etc. 6200 feet, 2" through 4"	25,000	
D.	Sanitary		
a.	Sewer Collection Lines 8" Sanitary Sewer, Manholes, etc., 6200 feet	38,000	
b.	Sewer Pumping Station (2)	30,000	
c.	Sewage Lagoon	25,000	
E.	Appurtenant Construction Grading, Seeding, Fertilizing, and Erosion Control, Sidewalk	5,000	
			183,000

9. SURVEY, DESIGN, INSPECTION, TESTING:

	Outside Engineering Costs		
A.	Resurfacing--Iowa Department of Transportation--15%	40,000	
B.	Campgrounds--10%	30,000	
C.	Utilities--10%	18,000	
			88,000

PHASE I SUBTOTAL

\$1,164,900

PHASE TWO CONSTRUCTION

1. MODERN LATRINES

A.	Upper Ledges Picnic Area	22,000	
B.	Oak Woods Picnic Area	22,000	
C.	Lower Ledges Picnic Area	22,000	
D.	Sidewalk, Grading, Seeding, Utility Hookup	9,000	
			75,000

2. TRAIL REHABILITATION

A.	Materials and Contracted Labor 3,500' of Step Construction, Retaining Walls, Drainage and Erosion Structures		50,000
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3. PRAIRIE ESTABLISHMENT

A.	28.5 acres @ \$200/acre		5,700
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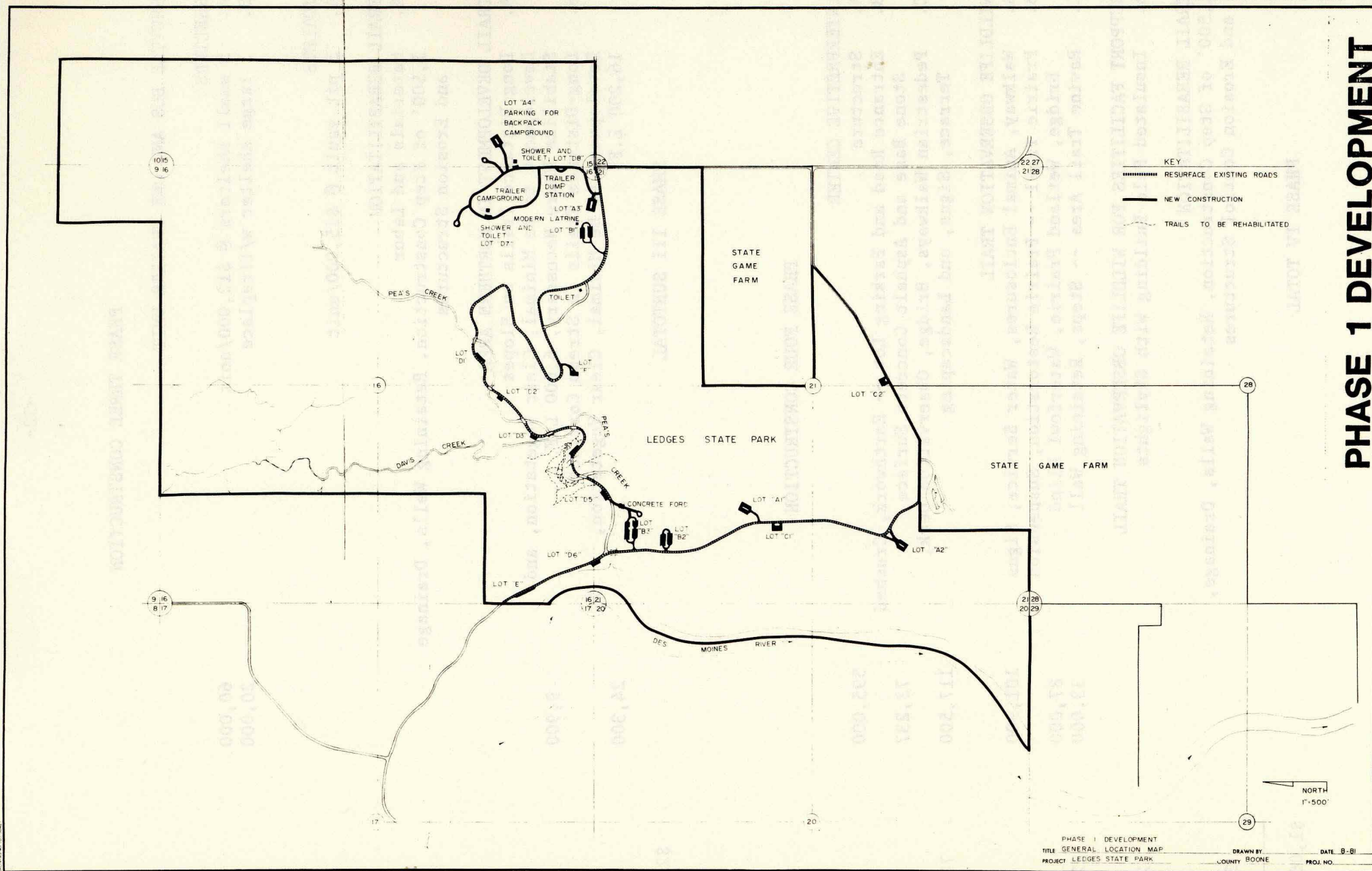
4. RESOURCE STUDIES

A.	Archaeology		9,000
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PHASE II SUBTOTAL

\$139,700

# PHASE 1 DEVELOPMENT



PHASE THREE CONSTRUCTION

1.	SHUTTLE BUS AND ONE TRAILER UNIT		45,000
2.	SHELTERS		
	A. 5 small shelters @ \$12,000/unit	60,000	
	B. 1 large shelter w/fireplace	20,000	
			80,000
3.	TOILETS		
	A. 3 pit vault @ \$15,000/unit		45,000
4.	TRAIL REHABILITATION		
	A. Materials and Labor		
	1,500' of Step Construction, Retaining Walls, Drainage and Erosion Structures		30,000
5.	TRAIL DEVELOPMENT IN NORTHERN AREA		
	A. Long-Distance Trails on Slopes		
	Development to be Minimal, Clear Vegetation, and Stabilize Where Necessary, 6,600 L.F.	9,900	
	B. Long-Distance Trails in Stream Corridor		
	Development to be Minimal, Clear Vegetation, 16,200 L.F.	24,300	34,200
	PHASE III SUBTOTAL		\$234,200

PHASE FOUR CONSTRUCTION

1.	INTERPRETIVE CENTER		
	A. Structure	595,000	
	B. Entrance Road and Parking Lot -- Earthwork, Crushed Stone Base and Asphalt Concrete Surface	73,237	
	C. Pedestrian Walkways, Bridge, Observation Deck, Terrace, Signs, and Landscaping	117,500	785,737
2.	WILDLIFE OBSERVATION TRAIL		
	A. Walkway, Animal Enclosures, Water Service, Signs	101,900	
	B. Prairie Trail -- Prairie Restoration, Suspension Bridge, Wetland Prairie, Waterfowl Blind	87,000	
	C. Ravine Trail Area -- Steps, Retaining Wall	33,000	221,900
3.	SUPPORT FACILITIES FOR WILDLIFE OBSERVATION TRAIL		
	A. Insulated Pole Building With Skylights		25,000
4.	TRAIL REHABILITATION		
	1,500' of Step Construction, Retaining Walls, Drainage, and Erosion Control Structures		30,000
	PHASE IV TOTAL		\$1,062,673

# PHASE FIVE CONSTRUCTION

1.	NEW PARK RANGER'S RESIDENCE	70,000
2.	REHABILITATE TWO CCC STRUCTURES	10,000
3.	PHASE II CAMPGROUND (IF NEEDED)	185,000
	PHASE V SUBTOTAL	\$265,000
	PROJECT TOTAL	\$2,866,473

## Implementation and Phasing

Construction of facilities and resource developments must be phased in recognition of budgetary, administrative, and staff limitations. The following recommended phasing does not necessarily correspond to annual increments because certain phases may require several years for completion.

### Preliminary Redevelopment (1980-1981)

- Trail rehabilitation (Hutton Memorial Trail)
- Tree, shrub and grass plantings in Canyon and Lower Ledges Area.
- Move assistant ranger from Lower Ledges to wildlife residence (Kestler) and remove park residence.
- Temporarily relocate the maintenance facility to the Kestler residence.
- Remove the old maintenance facility and convert to picnic/day use area.
- Repair age related deterioration occurring on Oak Woods shelter and Lower Ledges stone shelter.
- Contract resource studies - archaeology, geology, and botony for data base information.
- Begin project requests, engineering studies and funding appropriations for Phase 2 improvements.

### Phase I

- Continue trail rehabilitation
- Upgrade utility system (sewer, water and electricity)
- Upgrade roads and parking in Lower and Upper Ledges.
- Rehabilitate entry gate structures
- Develop Phase One of campground (roads and facilities for Modern Electric Campground)
- Construct parking lot for Primitive Campground and delineate with fire rings.
- Replace Canyon Area foot bridges (except stone bridge) with permanent cement "stepping stones".

- Replace the northern pit vault latrine in the canyon with a new pit vault facility.
- Begin project requests, engineering studies and funding appropriations for Phase Three improvements.

#### Phase II

- Reestablish prairie in old field on land acquired from the U. S. Army Corps of Engineers.
- Continued trail rehabilitation.
- Construct three new latrines in Upper Ledges, Oak Woods, and Lower Ledges Picnic Areas.
- Resource studies - Archaeology.

#### Phase III

- Purchase and begin operation of Canyon Road Shuttle Service.
- Continue trail rehabilitation.
- Construct five small shelters and one large shelter with fireplace.
- Develop long-distance trail in northern area.
- Construct three pit vault latrines to be placed in the Canyon Area (replace central toilet), the Lower Ledges Picnic Area, and replace the pit vault toilet in the Oak Woods Picnic Area if necessary.
- Begin project requests, engineering, and funding appropriation for Phase IV improvements.

#### Phase IV

- Interpretive center and wildlife observation trail and support facilities.
- Continue trail rehabilitation.

#### Phase V

- Rehabilitate two CCC cabins for adaptive reuse as open air shelters overlooking the river.
- Construct new park ranger's residence (demolish existing residence).
- Develop Phase II of campground (if need and demand justifies).

#### Personnel and Operations

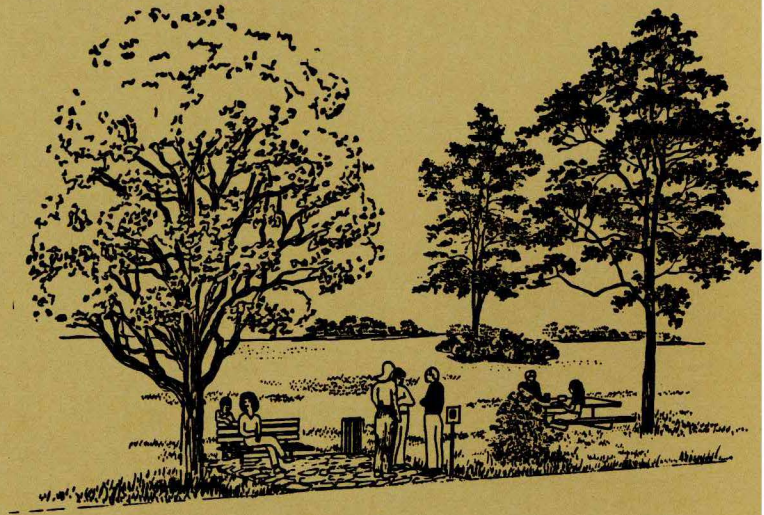
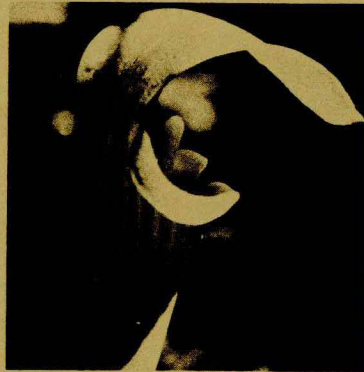
Administratively, the park will be staffed by the existing Parks Section staff of one ranger and two assistant rangers (attendants). The park staff will also include a number of worker level positions to ensure adequate area security and maintenance. Staffing for the interpretation program will be provided with expansion of current full-time equivalency levels by one position. Other interpretive staffing needs will be met by transferring and upgrading existing wildlife exhibit staff positions to the interpretive program. The proposed interpretive staff will consist of:

Senior Interpreter: This will be a professional position which will supervise the development of the Interpretive Program. (1 FTE)

Instructor: This position will be responsible for conducting programs and tours and assisting the senior interpreter in development in operation of Interpretation Program. A professional (college degree) position is desired, but not absolutely necessary. (1 FTE)

Wildlife Exhibit Care and Maintenance Staff: One permanent position would be required to care for and maintain the wildlife exhibit facilities. (1 FTE) Additional part-time (college student) positions would augment the care and maintenance staff during peak seasonal use. (2 FTE)

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## MULCHING

### Potential Mulching Materials Include:

#### -- Alfalfa Hay

It has a high nitrogen content and will slowly release that nitrogen. Rain-spoiled or moldy hay, unusable for livestock, may be used.

#### -- Corncobs

Ground corncobs may be used. Their sugar content will help increase the microorganisms in the soil and the material itself will improve soil structure. When using corncobs, however, a nitrogenous material such as blood meal, bone meal, or compost must be added to the soil first.

#### -- Grass Clippings

Readily available, grass clippings make a good mulch.

#### -- Leaves

Leaves are an excellent mulch. Shredded leaves do not mat down and enrich the soil more quickly than whole leaves. There is rarely a nitrogen deficiency in leaves; therefore it is not necessary to apply nitrogen. If unshredded, leaves should be mixed with straw or hay.

#### -- Sawdust

Sawdust makes a good mulch; however, a nitrogenous material must be added to the soil before mulching.

#### -- Straw

Straw is quick and easy to lay down. For best results, it should have a nitrogenous material turned under with it.

#### -- Wood Chips and Wood Waste

A good source of mulch that is sometimes available from power or phone companies. Or, if the park could purchase a shredder or chipper, this material could also be used on trails.

## COMPOSTING

### The Purpose of Composting

Composting in heaps is an extension of a process that is going on almost everywhere in nature.

Gardening and farming disrupt the natural pattern of the return of plant matter to the earth. Compost is the link between modern agriculture and nature's own method of building soil fertility.

In addition to returning rotting vegetable material to the soil, there are two major reasons for making compost: to render certain materials such as manure and garbage pleasant to handle, and to increase the nitrogen content of low-nitrogen materials such as sawdust, straw, and corncobs.

The high heat of composting rapidly "cooks" the smell out of manure and garbage. This is a significant gain because gardeners are often reluctant to use those materials fresh.

The composting process also increases the nitrogen content of the pile. Microorganisms "burn off" much of the carbon, reducing the cubic bulk of the heap but correspondingly increasing its nitrogen portion.

Organic matter is valuable to the soil only while it is decaying. Even finished compost is actually only partly decayed. It continues to break down in the soil, providing food for increasing populations of microorganisms. When building tilth on a farm, it is frequently more practical to spread fresh manure than make compost from it because a greater part of its decay will take place in the soil where it will do the most good.

Even though it may not be necessary to compost some materials, most organic gardeners prefer to compost almost all the organic matter they get. The compost heap is a convenient place to store leaves, weeds, and grass clippings until they are needed. Pound for pound, compost is the finest soil conditioner to be had.

### Bacterial Action in Compost

The microbiological processes that occur during composting are a form of rotting or decay, but without the unpleasant smell that often accompanies such decomposition. A well-made compost heap creates an environment in which decay-causing bacteria can live and reproduce at the highest rate of activity. As a result of this activity of microorganisms, fresh manure, garbage, leaves, weeds, and other compost materials are converted into dark humus.

There are two types of bacterial activity taking place in compost heaps: anaerobic breakdown (without air) and aerobic breakdown (with air). Some bacteria that cause decay function in a lack of air or oxygen. Others need plenty of air. Aerobic composting is more common and practical than anaerobic because it is faster and lacks the malodorous middle stage common in anaerobic decomposition.

During aerobic composting, the microorganisms convert the carbon in the heap materials into energy, creating heat. The temperature in an active heap can rise to 160°F. (71.11°C.). Nitrogen, phosphorus, and potassium are required in the nutrition of the microorganisms. Phosphorus and potassium are usually plentiful in all compost material, but there is quite often a lack of nitrogen. The relationship between the amount of carbon in compost material and the amount of nitrogen is called the carbon-nitrogen ratio, often stated as the C/N ratio. Raw garbage, for example, has 25 times as much carbon as it has nitrogen. Its carbon-nitrogen ratio is therefore expressed as simply the number 25. Sawdust has a C/N ratio of 400. Farmyard manure, which is much higher in nitrogen, has a C/N ratio of 14. The higher the number, the more carbon is present. It is generally stated that a carbon-nitrogen ratio of 30 is required for compost activity to take place at an optimum rate. By determining the C/N ratio of all materials placed in the heap, a good balance of carbon to nitrogen can be obtained. Such care is required for commercial composting operations, but for home or farm composting, only rough estimates of the C/N ratio need be made.

A heap that does not have sufficient nitrogen will compost very slowly. It may not heat up at all. A pile of ordinary sawdust will take several years to break down into dark humus. But if an organic nitrogen supplement is added in the form of dried blood, tankage or poultry manure, the composting of the sawdust will be much more rapid. A lack of nitrogen (represented as a high C/N ratio) is probably the chief cause of composting failures--heaps that fail to heat and decay quickly.

Actually, there are many factors other than the C/N ratio which influence composting, including moisture, air temperature, pH, absorbency of the material, and mineral content of the material.

It is readily seen that since all those factors are variable, no two compost heaps will be exactly alike unless they are made in the same place at the same time of the same materials. The chief effect of this variability is to vary the type of microorganisms that multiply in the pile and effect its breakdown. If the heap is made of acid materials, types of microorganisms that can live under acid conditions will multiply. This variability in compost heaps is one factor that makes it highly unlikely that a bacterial activator preparation would be useful. A bacterial activator or starter is supposed to introduce into the heap particular strains of microorganisms that are efficient composters. Controlled experiments with activators conducted at the Sanitary Engineering Project of the University of California and at Michigan State University have shown the activators did not influence composting results.

Moisture can have an important influence on microorganisms. A heap that is soggy can smother aerobic organisms--the type that work the fastest. The ideal heap is moist, not waterlogged. Some composters cover their heaps with a plastic sheet to help keep the moisture content constant. This can be a useful technique in very dry areas, also in times of heavy rainfall.

Because aerobic microorganisms are the most efficient composters, compost heaps are turned primarily to assure a continual supply of air. Even so, parts of a heap can become sealed from the air in a short time after being turned, and anaerobic decomposition sets in. Shredding or grinding of material being put in compost heaps creates a fluffier mass and enables

aerobic decomposition to take place for longer periods. Aerobic microorganisms convert the carbon in the heap into carbon dioxide, which is passed off into the air.

Anaerobic (airless) decomposition is generally carried on in tanks, bins, or silos. The chief advantages of this type of composting are that no turning of the mass is required and that the compost can produce methane gas for heating and lighting purposes.

Methane digesters have become a possible alternate energy source for the small farm and homestead.

### Digester Composting

Although the methane digester works for small farms, large garbage digesters for municipal use are primarily of the aerobic type, although Verdier and Beccari anaerobic digesters have been used for garbage composting in Europe. The anaerobic digesters are large concrete tanks which are filled and emptied at intervals.

The goal of designers of aerobic digesters is to make a machine that will convert garbage into compost in a period of hours instead of days. Compost has been made in pilot plants in as short a time as 48 hours. Basically, digesters are used instead of open heaps in the design of municipal compost plants because they enclose the raw wastes, cutting down odors and reducing fly and rodent problems. They also enable decomposition to take place under any weather conditions, an important consideration in northern areas. Digesters can make compost more quickly than any method using heaps. A fast composting process requires less space for storage of garbage and compost, a very important point when the high cost of real estate near cities is considered.

The basic function of digesters is to create those ideal conditions which make for fast growth of aerobic microorganisms. For ideal composting an ample supply of warm, moist air must be able to penetrate all parts of the compost mass at all times. Digesters either provide compressors to blow warm, moist air into the compost, or they accomplish the same means through continuous agitation or mixing.

The DANO process is apparently the most successful of the digester systems. Its main feature is a long, rotating drum, called a "Bio-Stabilizer", set at an angle of five degrees from the horizontal. Garbage is fed into the upper end of the drum. Two rows of air jets on the inside of the drum provide aeration. The garbage moves so slowly through the drum that it can be retained for three to five days. No grinding of the raw material is required, as the abrasive action of the sides of the drum reduces the particle size of the garbage.

Generally, home gardeners and small farmers have found the compost pile or heap more feasible for them and aerobic digesters have not been popular on the farm.

## How To Make Compost

Making compost is not difficult, and can be done easily at home. Essentially, the basic methods call for layering natural ingredients in heaps in mixed proportions, providing necessary air and moisture and turning the heaps to provide bacterial action on all parts of the heap. Just about any organic matter can be used.

## Materials To Use

Leaves are valuable fertilizer material since they are rich in minerals, and they should be chopped or finely shredded for best results--if not, they will impede aeration. Mix with weeds, lawn clippings, or plant residues for best results.

Green legume hay will break down quickly in a compost heap. Any hay or straw makes a worthwhile addition to the heap. Shredding hastens decomposition.

Garden residues--dried or green tomato or squash vines, cornstalks, flower stems, and weeds can be shredded or added whole to the compost heap. Grass clippings are already shredded, and can be used dry or green. Sawdust and wood chips, nutshells, peanut hulls, coffee wastes, and dried blood are all good compostable materials.

Garbage, which is high in nitrogen, can be used for green matter in the compost heap.

Unprinted paper and cardboard are suitable for composting if shredded. Animal manures are, of course, valuable additions to the pile.

In short, any decomposable organic material can be used for composting, except human feces, diseased animals, plant debris heavily impregnated with pesticides or herbicides, and other toxic materials.

## Indore Method

There are several methods of composting that can be used on the small farm or in the home garden. The first scientific method of composting was the Indore method, devised by Sir Albert Howard. This method became popular in many parts of the British Commonwealth, especially with farmers in preindustrialized countries who could compost materials that they had previously burned. The 14-day method is commonly used by small gardeners, and is quicker because the material to be composted is first shredded. Sheet composting is practiced on large farms. Some people compost with earthworms. There are advantages and disadvantages to each system.

Compost can be made by the Indore method either in open piles or in bins. Piles are more satisfactory when machinery is going to be used to turn the heaps. Bins are sometimes used by gardeners who dislike the unkempt appearance of an open pile; they have the advantage of affording better moisture and temperature control.

The average pile for Indore composting is six feet wide, three to five feet high, and ten to thirty feet long. First spread a six-inch layer of plant

wastes over the area to be covered by the pile. This layer can include spoiled hay, straw, sawdust, leaves, garbage, or wood chips. Then, add a two-inch layer of manure and bedding. Follow with a layer of topsoil approximately one-eighth inch thick. Urine-impregnated topsoil is particularly valuable. On top of this layer of earth spread a sprinkling of lime, phosphate rock, granite dust, or wood ashes to increase the mineral content of the heap. Lime is not added if an acid compost is wanted.

Water the pile and continue the process of layering in the same manner until the desired height is reached. Do not trample on the heap; if it is matted down, aeration will be impeded. Vertical ventilator pipes made of tubes of wire netting are placed along the center of the heap approximately 3½ feet apart.

Within a few days, the heap will begin to heat up and start shrinking in size. The heap is turned with a pitchfork two or three weeks after being made, and again about five weeks after being made. Care is taken during turning to place the outer parts of the heap on the inside, so they can decay fully. The heap heats up to almost 150°F. (65.56°C.) at the outset. After the first turn, the temperature will again rise, but it will then settle to a steady temperature of about 130°F. (54.44°C.). The compost is finished after three months.

#### The 14-Day Method

Out of the work of scientists in the Sanitary Engineering Department of the University of California evolved the "14-day method". This technique is suitable for garden, farm, and municipal use.

In the 14-day method, all material going into the compost pile is ground or shredded. Grinding has several effects on compost.

The surface area of material on which microorganisms can multiply is greatly increased, and aeration of the mass is improved because shredded material has less tendency to mat or pack down. Moisture control is improved. Turning of the heap is much easier.

No layering of material is used in the 14-day method. Material is mixed either before or after shredding, then piled in heaps no more than five feet in height. After three days, the heap is turned. Turning is continued at two- or three-day intervals. After 12 to 14 days, the heat of the pile has dropped, and the compost is sufficiently decayed to use on the soil.

If compost is being made for garden use, turning can be done easily by hand because the material is light and fluffy. For larger applications, turning is usually done by a manure loader or a machine especially designed for turning large compost piles.

Shredding the material prior to composting presents more of a problem, especially for large composting projects. A number of shredders are available for garden use, however. Horticultural shredders made primarily for potting soil preparation can be used as compost material grinders. Small rotary lawnmowers also shred compost material efficiently and easily. Weeds, leaves, straw, or stable manure to be cut up are piled on the ground and the lawnmower

is run over them. It is helpful to do this near a wall which can prevent the cuttings from spreading out too much.

Compost made by the 14-day method is often superior to compost that has been allowed to stand out in the weather for many months. Less nutrients are leached out when compost is made quickly.

#### When To Apply Compost

The main influence on timing, rate, and method of applying compost is its condition, age, and degree to which the composting process is complete. Fully mature compost resembles--indeed, it is--supersoil, a light, rich loam. If half completed so it still contains some fibrous material, it will continue to decompose and generate heat. Such compost should be permitted to finish decomposing. Never place it near growing plants. If you have unfinished compost in the fall of the year, it is safe to apply it. It will finish up in the soil and be ready to supply growth nutrients to the first spring plantings.

The preferred time to apply fully-matured compost is a month or so before planting--or, if you are a successive cropper, planting two or more crops to the same parcel of land each session, just before planting. The closer to planting time it goes on, the finer it should be shredded or chopped, and the more thoroughly it should be hoed or tilled into your soil.

If compost is ready in the fall but not intended for use until spring, it should be kept covered and stored in a protected place.

"We shall never achieve harmony with land, any more than we shall achieve justice or liberty for people. In these higher aspirations, the important thing is not to achieve, but to strive.

The problem, then, is how to bring about a 'striving' for harmony with land among a people many of whom have forgotten there is any such thing as land, among whom education and culture have become almost synonymous with landlessness. This is the problem of 'conservation education'.

When we say 'striving', we admit at the outset that the thing we need must grow from within. No striving for an idea was ever injected wholly from without.

When we say 'striving', I think we imply an effort of the mind as well as a disturbance of the emotions. It is inconceivable to me that we can adjust ourselves to the complexities of the land mechanism without an intense curiosity to understand its workings...

We can all see profit in conservation practice, but the profit accrues to society rather than to the individual. This, of course, explains the trend, at this moment, to wish the whole job on the government.

When one considers the prodigious achievements of the profit motive in wrecking the land, one hesitates to reject it as a vehicle for restoring land. I incline to believe we have overestimated the scope of the profit motive. Is it profitable for the individual to build a beautiful home? To give children a higher education? No, it is seldom profitable, yet we do both. These are, in fact, ethical and aesthetic premises which underlie the economic system. Once accepted, economic forces tend to align the smaller details of social organization into harmony with them.

No such ethical and aesthetic premise yet exists for the condition of the land these children must live in. Our children are our signature to the roster of history; our land is merely the place our money was made. There is as yet no social stigma in the possession of a gullied farm, a wrecked forest, or a polluted stream, provided the dividends suffice to send the youngsters to college. Whatever ails the land, the government will fix.

I think we have here the root of the problem. What conservation education must build is an ethical underpinning for land economics and a universal curiosity to understand the land mechanism. Conservation may then follow."

Round River from the Journals  
of Aldo Leopold, pp. 155-157