

# resources management plan

CHACO CANYON NATIONAL MONUMENT



Southwest Cultural Resources Center  
Division of Natural Resources Management  
Southwest Region · National Park Service  
Department of the Interior



RESOURCES MANAGEMENT PLAN  
FOR  
CHACO CANYON NATIONAL MONUMENT  
San Juan County, New Mexico

July  
1977

Prepared by: Chaco Canyon National Monument Staff; Navajo Lands Group Staff; Southwest Region Office of Natural Resources Management and Southwest Cultural Resources Center

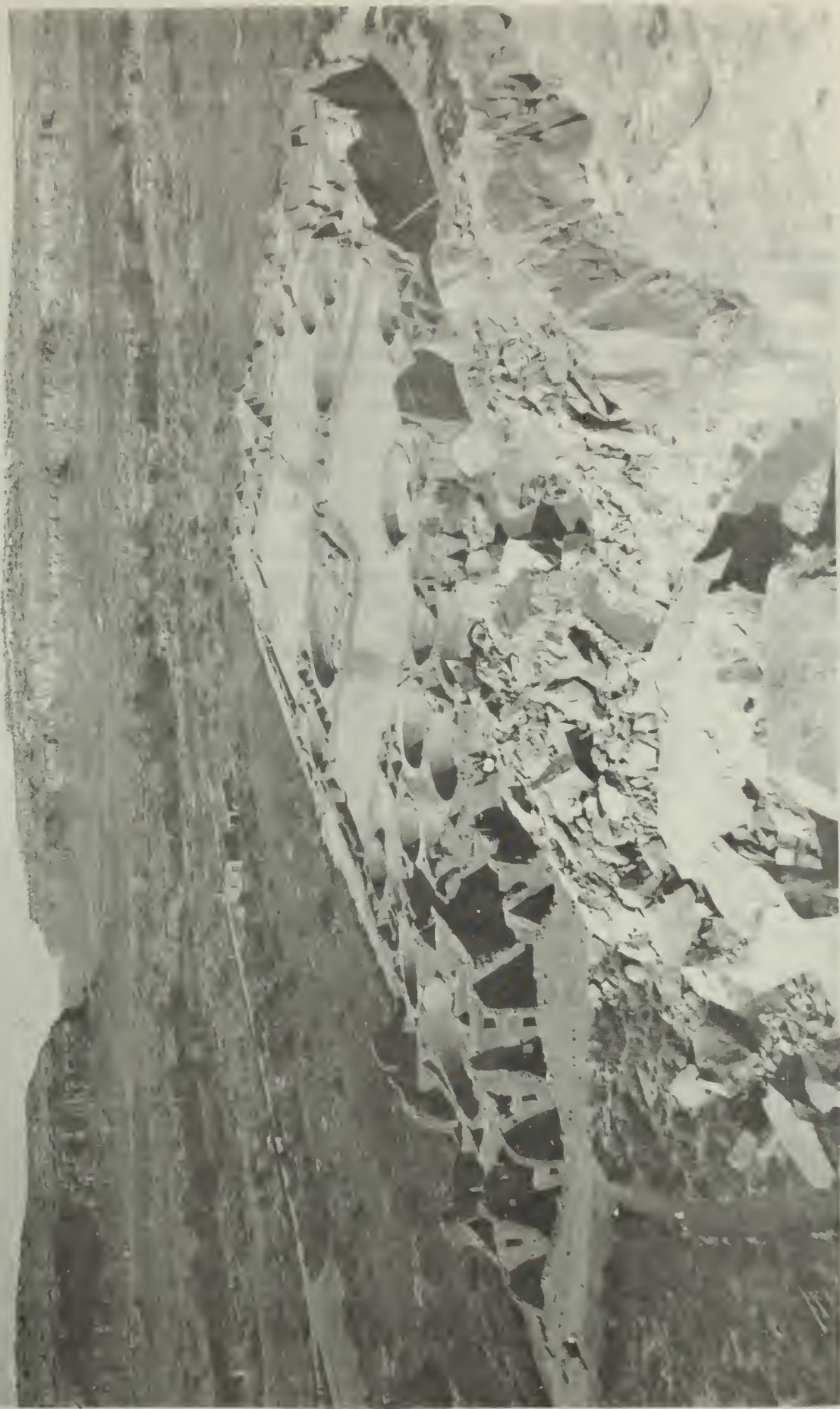
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PUEBLO BONITO

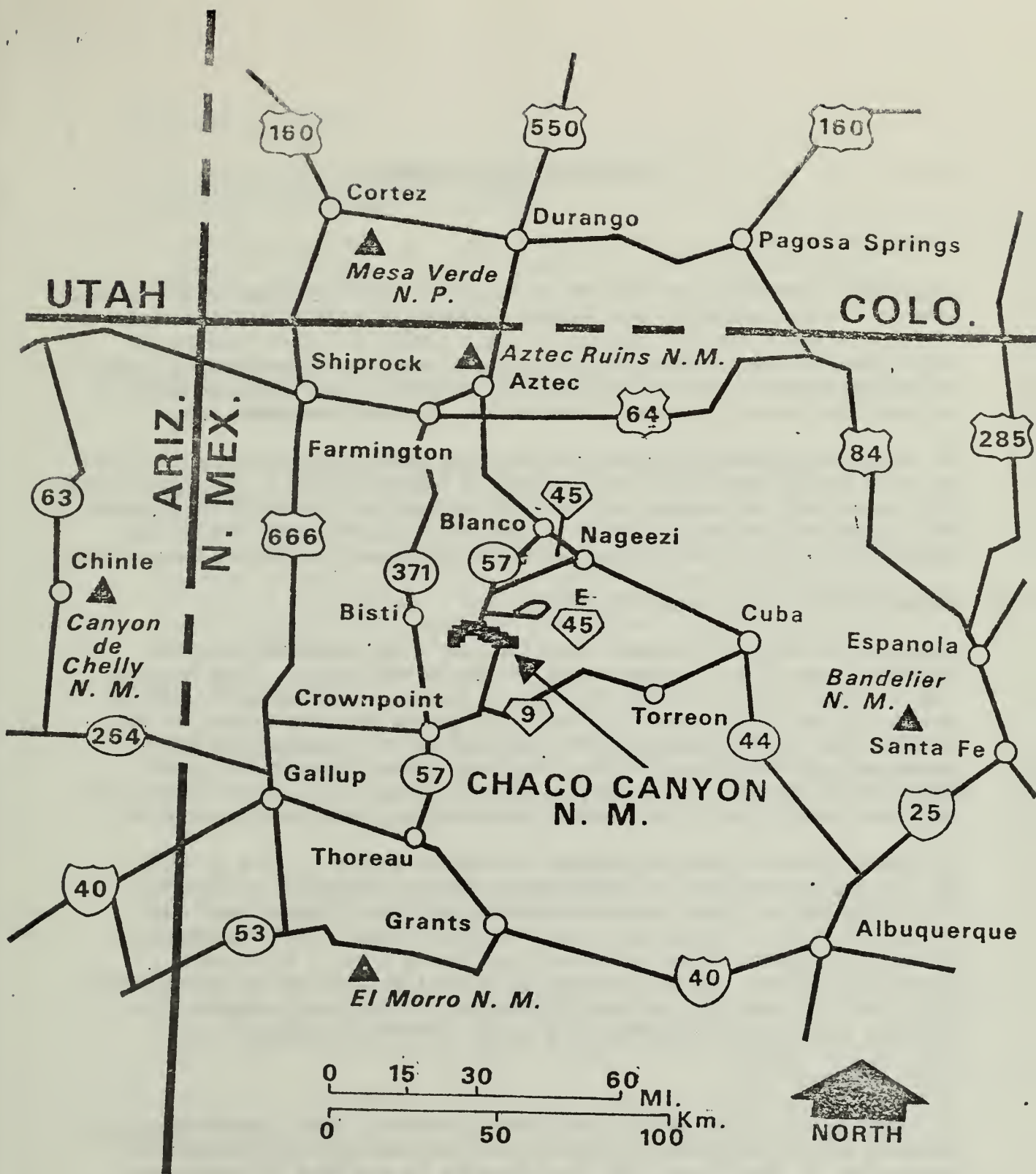
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## I. INTRODUCTION

A Resources Management Plan is a strategic planning document and a key factor in good management and preservation of the resources.

This plan is a set of project statements which include proposed actions for implementation as well as 5-year programming sheets for management and research actions. Other sections of the plan serve as an introduction and a set of guidelines. Project statements are determined on the basis of approved Management Objectives and Land Classification. Management Constraints and Completed Research serve as guidelines for projects. The Plan serves the Superintendent in two ways: 1) as a manual for management activities which will preserve the environment or achieve an environmental status quo to comply with Park Service Standards, and 2) a set of research projects and priorities that are designed to obtain additional information for management and interpretation.



# REGIONAL MAP CHACO CANYON NATIONAL MONUMENT NEW MEXICO

## II. STATEMENT FOR MANAGEMENT

### A. PURPOSE OF THE PARK

Presidential Proclamation No. 740 of March 11, 1907 (35 Stat. 2119), states that ". . . the extensive prehistoric communal or pueblo ruins . . . are of extraordinary interest because of their number and their great size and because of the innumerable and valuable relics of a prehistoric people which they contain, and it appears that the public good would be promoted by reserving these prehistoric remains as a National Monument. . . ."

In addition to "preserving the remains," the area's purpose is also delineated in the National Park Service Organic Act of 1916 as ". . . to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

### B. SIGNIFICANCE OF THE PARK'S RESOURCES

Chaco Canyon National Monument contains over 2,200 prehistoric sites, including some of the largest ruins in the United States. From examination of these remains, which represent a period of approximately ten centuries, it has been possible to trace the growth and development of the Anasazi from their simple primitive beginnings to a complex and highly urbanized peak-development. Thus, the area offers significant opportunities for not only preserving relics of the past, but also for studying and interpreting one of our country's significant prehistoric cultures.

Occupancy of the Chaco area extends from about 4000 B.C. to A.D. 1275 (or the the present day, if contemporary Navajo occupancy is included). The archeological sites range from simple one-room pithouse dwellings to complex pueblos containing several hundred rooms. Also included are ceremonial chambers known as "kivas" and "great kivas," pictograph sites, prehistoric stairways carved in the cliffs, several archeologically important trash-mounds, and over 300 miles of a large and complex prehistoric road-system, revealed by a study currently underway.

### C. LAND CLASSIFICATION

As a National Register of Historic Places property, Chaco Canyon National Monument and its lands are classified entirely as a historic zone, and are managed in compliance with the standards as outlined in Management Policies of the National Park Service (1975), which limit physical development to the minimum needed to preserve, protect, and interpret the historical, cultural, and archeological values, and which limit activities therein to sightseeing and the study of the cultural features.



#### D. MANAGEMENT OBJECTIVES

1. To protect and perpetuate the archeological and natural environments of Chaco Canyon National Monument.
2. To provide visitors with opportunities for meaningful park experiences, by offering a varied and balanced interpretive program and effective visitor information and other programs that offer insights into the monument's values.
3. To encourage a continuing research program, designed to help management improve resource preservation, and to increase visitor knowledge and enjoyment.
4. To achieve a harmonious integration of activities within and outside of the monument, through maintaining cooperation with other Federal agencies, the State of New Mexico, the Navajo Tribe, and local organizations, in regional programs for cultural and natural resource conservation, interpretation, and outdoor recreation; and also through promotion of understanding of the monument and the management techniques being used to carry out the National Park Service mission at Chaco Canyon National Monument.

#### E. ANNOTATED CONSTRAINTS

1. Proclamation No. 740 of March 11, 1907, established Chaco Canyon National Monument. The 160 acres that were set aside to preserve the Kin-Ya-a Ruin were erroneously described and the land containing the ruin is not yet owned by the National Park Service.
2. Proclamation No. 1826 of January 10, 1928, added a 40 acre tract which was intended to contain ruins omitted from the monument by the original survey. Kin Klizhen, however, is on land not yet owned by the National Park Service.
3. Cooperative Agreement between Department of Interior and the University of New Mexico relating to scientific research in Chaco Canyon National Monument. This agreement gave the university preferential rights to carry out all research in the monument for the time period 1969-1984.
4. Cooperative Agreement with the University of New Mexico establishing the Chaco Center. Pursuant to this agreement the Chaco Center will carry out all research in the monument for the time period 1969-1984.
5. Act of February 17, 1931. This act authorized owners of lands adjacent to the monument to maintain access to their lands and to drive cattle across the monument at locations designated by the Superintendent.

6. Outstanding Oil, Gas and Mineral Rights. Oil, gas and mineral rights on Sections 3 and 11, T.21N., R11W (except for that portion of Section 11 which was originally included in the Ackerly Tract) are still outstanding, as the owners retained these when they sold the land to the University of New Mexico. Efforts are currently being made by the National Park Service to obtain these rights.

The constraint documents for Chaco Canyon National Monument are at both the Park Headquarters and the Southwest Regional Office at Santa Fe, NM.

### III. RESOURCE MANAGEMENT PROGRAM

#### A. GENERAL PROGRAM

Many National Park Service Resource Management Plans more closely resemble research plans than management plans for the reason that basic data for proper management are lacking. Chaco Canyon National Monument is presently in the position of acquiring basic data through the research activities of the Chaco Center, which is engaged in a long-term program of multi-disciplinary research in conjunction with the University of New Mexico on the history of man and his environment in the Chaco Drainage. The results of this research are being, and are to be used as an information base on which to base sound management projects that will satisfy both the management objectives of the area and the National Park Service mandate under the Organic Act.

For the purpose of clarity, all actions included in the project discussions will be divided into five Natural Types and two Historical (Cultural) types.

The five Natural Types are:

1. Those actions whose implementation will have a significant and measurable effect on the natural environment. (Significant Action)
2. Those actions whose implementation will continue existing maintenance of the natural environment. (Continuing Maintenance)
3. Those actions which will initiate new maintenance of the natural environment. (New Maintenance)
4. Those actions which entail research into the natural environment. (Research)
5. Those actions which will not have an effect on the natural environment. (No Effect-Natural)

The two Historical (Cultural) Types are:

- A. Those actions whose implementation will have an effect on the historic resources. (Effect)
- B. Those actions which will not effect the historic resources. (No Effect-Historical)

## B. Cultural Resources

Chaco Canyon National Monument was established to preserve the area's archeological resources. The 32 square miles (8,288 ha) of the monument and its several detached areas have been surveyed by the Chaco Center. Over 2,000 sites have been recorded which represent civilizations from the Archaic Period through the Anasazi Occupation and up to the ancestors of the present day Navajos. The sites of the Anasazi occupation of A.D. 600 to 1250 are most numerous and attract the most interest. These remains consist of pithouse clusters, later small pueblos, large multistoried many-roomed towns built of sandstone masonry with associated ceremonial structures, roads, water control structures, pictographs and petroglyphs, etc.

Under the terms of the Memorandum of Agreement between the National Park Service and the University of New Mexico, the Chaco Center is carrying out a program to develop a comprehensive up-to-date history of man and environment in Chaco Canyon.





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Fred Mang, Jr.

## Project 1: Cultural Resources Inventory

The inventory of cultural resources for Chaco Canyon National Monument is essentially complete. There are three aspects to this project: 1) a complete literature search and synthesis of the known resources in the ecological system of which Chaco Canyon National Monument is a part, 2) an intensive field survey of the cultural resources in the confines of the monument itself, and 3) an assessment (field checked) of the resources in "catchment areas" surrounding the known Chacoan Outliers in the San Juan Basin. In addition, a list of classified structures has been prepared and an evaluation of the prehistoric resources by means of remote sensing techniques is being exhaustively carried out. There are but two elements of the National Park Service Historic Resource Study Standards for archeological areas that have not been met. These are: a Historic Resource Study and the completion of National Register forms.

Action (5. No Effect-Natural B. No Effect-Historical)

Part 2 above has been completed and a final report is in press at this time. Parts 1 and 3 are in progress by the Chaco Center, and a full report can be expected in the future. The landmark study should be enlarged and a report prepared. The data necessary to complete the Historic Resource study and National Register forms are present or are being gathered and only administrative action is required.

## Project 2: Determination of Paleoecosystem (Paleoenvironment)

Use of interdisciplinary research to determine the physiographic, vegetative, faunal, and human components of the environment for those time periods of major importance to the prehistory of Chaco Canyon is needed. Knowledge of the past environments is crucial to the proper interpretation and evaluation of cultural resources, and thus essential to their management.

### Action (5. No Effect-Natural B. No Effect-Historical)

One study, involving research on the palynology of the Chaco Wash, is complete and on file at the Chaco Center (Hall, 1975). Another study, on the alluvial stratigraphy of the Chaco is in progress. The Chaco Center is coordinating additional research on past environments through flotation and pollen analysis of excavated materials.



Project 3: Remote Sensing Study

A variety of remote sensing techniques, both airborne and surface, are involved to assist in the location of sites; prehistoric roads and visual communication networks; past arroyo channels, etc. Also included is the use of imagery in improving modern excavation and recording techniques as well as modern management needs.

Action (5. No Effect-Natural B. No Effect-Historical)

Research is in progress in the Remote Sensing Division of the Chaco Center. Much imagery (including multi-spectral) has been acquired and analyzed. A number of publications have been completed, while others are either in press or in preparation. A manual of remote sensing, as it relates to management needs, has been completed.



#### Project 4: Excavation of Archaic, Anasazi, and Navajo Sites

Although much is known about the late (Pueblo III) occupation of Chaco Canyon, little work has been done with the earlier time periods. In order to evaluate the evolution of cultures in the Canyon, as well as understand population growth as it relates to the Bonito Phase, it is necessary to excavate a series of sites from the Archaic, BM-III, P-I, and P-II time periods. In addition, information is lacking about the Navajo occupation of the Canyon, from the standpoint of both duration and intensity. Thus, Navajo sites should be excavated.

#### Action (5. No Effect-Natural B. No Effect-Historical)

Sites of the Archaic, Anasazi, and Navajo occupation have been excavated by the Chaco Center, and inventories of the data recovered have been stored on computer disks. Analysis of these data is underway, and full reports on all sites will be published by the Chaco Center.

## Project 5: Excavation of Pueblo Alto

Though several large Chacoan sites have been excavated, little is known about the relationship of these to the Chacoan road system and the extensive trade network which existed in classic Bonito Phase times. Nor have any data been acquired from large structures, using modern techniques. Pueblo Alto is being systematically tested, using modern excavation and recording techniques to derive data relevant to specific questions about the trade system.

### Action (5. No Effect-Natural B. No Effect-Historical)

Pueblo Alto is presently being studied by the Chaco Center. One season's work has revealed the volumetric extent of the pueblo and the time period occupied. A systematic, probabilistic sampling design will be implemented in order to acquire as much information as possible, with as little disruption of the prehistoric context as possible. A full report on the excavation will be forthcoming from the Chaco Center.



KIN BINIOLA RUIN

NPS Photo by  
Fred Mang, Jr.

## Project 6:      Evaluation of Cultural Resources for Management Needs

Not all cultural resources are equally significant, and thus not all possess equal management needs. Cultural resources in Chaco Canyon can be "ranked" into several categories, each with different management priorities. (Note that all cultural resources are non-renewable and thus merit protection. However, in terms of the pragmatics of protection and management budgets, priorities can and should be established to provide the manager with criteria for differential expenditure of funds.) Examples of possible categories follow:

1. "Critical Cultural Resources": Those which must be protected at all costs, and not disturbed at any cost. Equivalent to "endangered species" in natural resources, perhaps, or at least those threatened with extinction.
2. "Significant Cultural Resources": Those which occur rarely within the region as a whole, although they may be relatively common in the park. This category might also include those sites which were ecologically significant at a particular time period, culturally significant to the understanding of a particular system, such as trade, or those which are significant to the reconstruction of past environments.
3. "Other Cultural Resources": Those which are common throughout the region, or which were not especially significant in defining a past human component of an ecosystem.
4. "Non-Cultural Resources": Specific areas not set aside because of cultural value may nevertheless be crucial to the reconstruction of past environments. For example, visible portions of old stream channels which might yield palynological, alluvial, or hydrological data, or old trees (still living), which might be cored to yield climatological data, etc.

(Note: The categories suggested above are just that -- suggestions. Titles of the categories should be carefully evaluated and defined so as not to create confusion, e.g., No. 2 should not be confused with significance as regards 11593. No. 2 above refers to significance from management needs standpoint and not necessarily the National Register standpoint.)

Action    (5. No Effect-Natural    B. No Effect-Historical)

Evaluation such as that suggested is in progress by the Chaco Center. A full report, oriented specifically toward management needs, will result from this evaluation.



## Project 7: Reassessment of Protective Needs

A reassessment of protective priorities will be needed based on the results of evaluation of cultural resources (Project 6), projected visitor increases and known boundary problems. Following are specific components of the project:

A. Realignment of Protective Priorities: (5. No Effect-Natural B. No Effect-Historical)

Based on the results of Project 6, recommendations will be made concerning the closing of certain areas to visitor use, increased patrolling of certain areas, periodic monitoring of erosion in specific areas, ect. Actions are being taken by the Chaco Center.

B. Modification of Monument Boundary: (5. No Effect-Natural A. Effect)

Certain lands containing significant archeological sites and originally thought to be located within the monument boundary, are actually outside of the monument. Boundary adjustments must be made to ensure the protection of these reosurces.

C. Reassessment of Visitor Access and Circulation: (5. No Effect-Natural B. No Effect-Historical)

Due to increased visitation, access routes to Chaco Canyon and individual ruins need to be reexamined because they are the key to visitor enjoyment of the monument and to the effective management of its reosurces. The existing traffic problem needs to be resolved through the following proposed solutions.

1. Reroute traffic to bypass the central canyon area by routing the northern access road through Gallo Wash and connecting it to the existing southern access.
2. Eventually, reroute non-visitor traffic around Chaco Canyon, and provide visitor spur access through the Gallo Wash.

An Environmental Assessment has been prepared and public meetings have been held concerning the proposals.

D. Determination of Visitor Use Levels: (5. No Effect-Natural B. No Effect-Historical)

Due to increased visitor use of Chaco Canyon, a reexamination of existing methods of site viewing should be made. The following proposal has been selected to allow greatest visitor enjoyment while exerting maximum protection over the monument's resources. It is dependent upon implementation of C. above.

1. Continue the use of private automobiles in the main canyon during the off-season with improved parking at each ruin site.
2. Provide bus transportation to the ruin sites in the main canyon during peak visitor season, with terminal facilities at the visitor center and stops at each of the major ruins.

An Environmental Assessment has been prepared and public meetings held concerning these alternatives.

Two studies will be needed: A transportation study to determine the types of transportation feasible for the tour route and a carrying capacity study, based upon the various alternative means of transportation possible and their effect upon that capacity.

## Project 8: Reassessment of Interpretative Program

Suggested improvements, updating, modifications, etc., of the interpretive program, based on most recent local and regional scholarly research as well as most recent interpretive technical advances will be a result of this study. Interpretation here is taken in both a popular and professional sense, i.e., the park manager has an obligation to make the resource interpretation available to both the public (through lay-oriented publications, displays, and tours) and the scientific community (through distribution of professional publications).

### Action (5. No Effect-Natural B. No Effect-Historical)

Published research findings that affect monument interpretation will result from the Chaco Center project prior to its completion.

## Project 9: Maintenance of Museum Collections

Except for a small number of items for display and interpretive purposes, the museum collection of Chaco Canyon is being managed by the Chaco Center in Albuquerque, New Mexico. The monument has no adequate space in which to store this collection and neither do local, State or regional institutions. In approximately five years the Chaco Center will complete its operations and go out of existence. Ultimate disposition of these materials must be made in the near future.

Action (5. No Effect-Natural B. No Effect-Historical)

The Master Plan provides for a basement in the proposed laboratory building to be utilized for storage of these artifacts. Recommendations for the care and disposal of the collections will be made by Chaco Center.



## Project 10: Preparation of Historic Structures Reports

Historic Structures Reports present such findings from investigations of a prehistoric structure and its setting as are necessary to permit execution of preservation activities at standard.

Historic Structures Reports should be prepared for each ruin to be stabilized and maintained. There are 19 stabilized ruins at Chaco Canyon consisting of 7.13 miles of stabilized walls. There are 12 ruins, and possibly more depending upon the results of the on-going List of Classified Structures study that require initial ruins stabilization. Historic Structures Reports should be prepared for each of these structures or for groups of similar structures which can be grouped as a management unit.

Action (5. No Effect - Natural      A. No Effect - Historical)

Environmental and fabric research at each of the above sites should be initiated in order to determine: (1) causes of deterioration, (2) recommended nature and extent of repair, (3) estimated cost.

### Research:

Research to be undertaken in accordance with the above action should include surface and subsurface moisture conditions, soil stratigraphy, weather conditions, structural materials and design analysis, supply and work force logistics analysis, material and labor costs, and estimated stabilization costs.

## Project 11: Preparation of Preservation Guides

A comprehensive inspection and maintenance plan should be prepared to ensure the continued maintenance of ruins by area staff in accordance with accepted preservation procedures.

### Action (5. No Effect - Natural A. Effect)

After initial stabilization preservation guides will be prepared for each structure or group of similar structures which can be included in a maintenance unit.

### Research:

Most data will be available from Historic Structures Reports or project logs. Some research concerning appropriate methods of maintaining specific items or materials may be required.

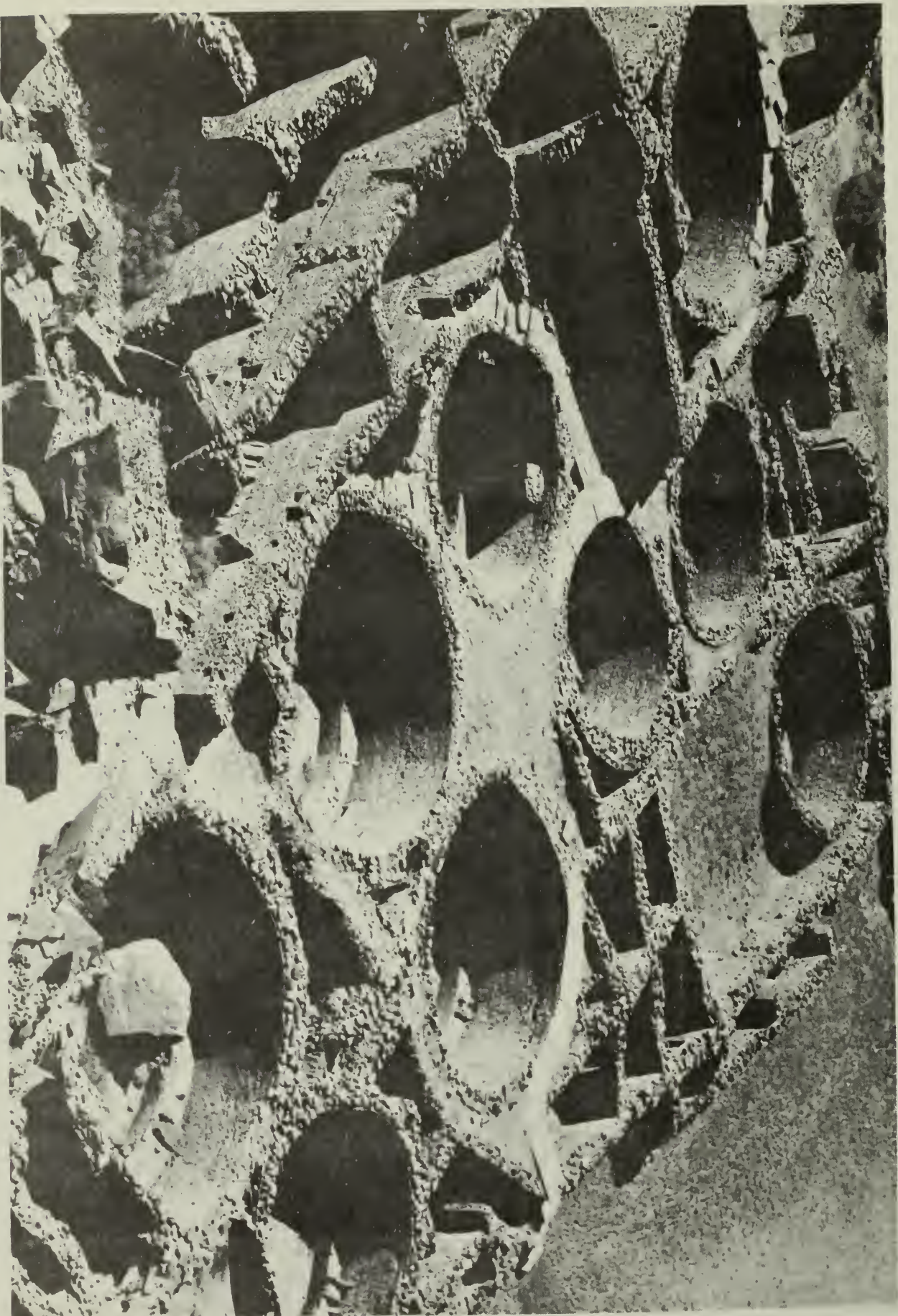
## Project 12: Research Into Ruins Preservation

Research is needed into the causes of ruins deterioration and into the discovery and development of new ways and means of stabilizing and maintaining ruins. Specific problems concern drainage, water seepage, sandstone deterioration, wall reinforcement, stabilization of adobe, and development of replacement mortar. At present, National Park Service research, laboratory study and field testing is being conducted at Chaco Canyon. The Western Archeological Center is drafting a ruin stabilization research plan.

Action (5. No Effect - Natural B. No Effect - Historical)

Conduct ruins preservation research in accordance with research plan developed by Western Archeological Center.





KIVAS OF PUEBLO BONITO



Project 13: Management Information System (Cultural Resources)

This project should include five components, as follows:

1. Establishment of computerized data bank, including storage of site location, type, size, time period, and significance rank, as well as other attributes deemed relevant. (To be done by Chaco Center.)
2. Integration of Cultural and Natural Resources: Insure computer data bank compatibility of cultural information with geomorphological, faunal, and vegetative data (both modern and past) stored by natural resources studies.
3. Production of Computer-generated Maps: Can be done by either line-printing or plotting methods, for cultural resources by time period, settlement type, site function, management protective priority, or any other management or scientific generated need. Incorporate potential of terminal access by Manager.
4. Reassessment Schedule: Specify management's role in periodic reassessment and re-evaluation of resource management priorities to provide continual updating. For instance, due to erosional events, cultural resources may become either exposed or buried, thus requiring management plan modifications. Or, as state of art in professional archeology changes, management needs may vary. Reassessment schedule and techniques (see 5 below) should be specified at this time.
5. Remote Sensing Monitoring: Schedule periodic monitoring of park by remote sensing techniques to continually update information on both direct and indirect impacts on cultural resources, as well as environmental changes. Revise and update computerized management information system accordingly.

Action: (5. No Effect-Natural B. No Effect-Historical)

Establishment of computerized data bank of cultural resources has been initiated by the Chaco Center, as well as solid basis for remote sensing monitoring. Remaining aspects of project are in progress and will be forthcoming.

#### Project 14: Completion of Historical Research

Some research into the Navajo, Spanish, Mexican, and American history at Chaco Canyon has been done. Further research is necessary so that a more effective interpretation of the monument can be provided.

#### Action (5. No Effect-Natural B. No Effect-Historical)

Historical and archeological background studies are being prepared by Chaco Center for areas not previously or adequately studied. In addition, interpretive narratives of the known historical and archeological structures, field schools, features, sites, objects, and past land use within monument boundaries should be compiled.

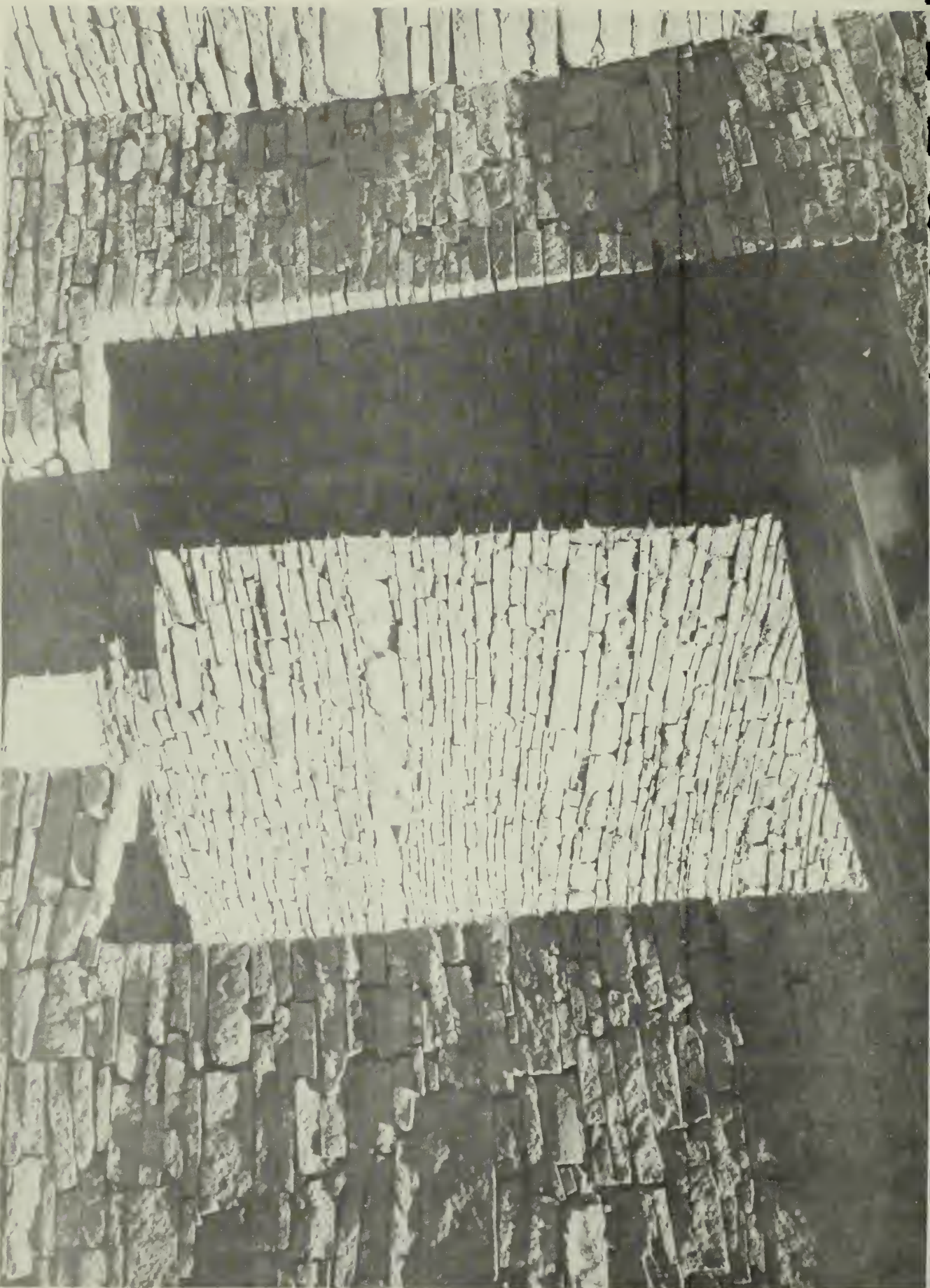
Project 15: Preservation of Ruins

In progress is a re-evaluation of the List of Classified Structures, The Development/Study Package Proposals (Form 10-238) for initial ruins stabilization, and the Ruins Maintenance Program including submission of Detail of Annual Operating Requirements (Form 10-237) to bring that program to standard. This re-evaluation is to result in a comprehensive plan for the stabilization and maintenance of all ruins on the Chaco Canyon List of Classified Structures.

Action: (5. No Effect-Natural B. No Effect-Historical)

This project is currently ongoing and is scheduled for completion by January 1, 1978.





T DOORWAY



CULTURAL RESOURCES  
ACTIVITIES AND 5-YEAR PROGRAMMING SHEET

Pkg. No.	Area Priority	RMP Ref. No.	Project Title	Year 1		Year 2		Year 3		Year 4		Year 5		Date Submitted
				NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	
	*OG	C1	Cultural Resources Inventory											
	OG	C2	Determination of Paleoecosystem											
	OG	C3	Remote Sensing Study											
	OG	C4	Excavation of Archaic, Anasazi, and Navajo Sites											
	OG	C5	Excavation of Pueblo Alto											
	OG	C6	Evaluation of Cultural Resources for Management Needs.											
	OG	C7A	Reassessment of Protective Priorities											
		C7B	Modification of Monument Boundary											
		C7C	Reassessment of Visitor Access and Circulation											
157		C7D	Determination of Visitor Use Levels		.5	10	(Transportation Study)							
	OG	C8	Reassessment of Interpretive Program	.1	1.4	.1	1.4	.1	1.4	.5	.5	.7		

Projects 1 through 6 accomplished or being accomplished by Chaco Center.  
No funds need to be programmed.

Administrative action based on recommendation of Chaco Center.

Administrative Action

Administrative action completed.

CULTURAL RESOURCES  
ACTIVITIES AND 5-YEAR PROGRAMMING SHEET

Pkg. No.	Area Priority	RMP Ref. No.	Project Title	Year 1		Year 2		Year 3		Year 4		Year 5		Date Submitted
				NPS M.Y. \$1000	Cost/ M.Y. \$1000	NPS M.Y. \$1000	Cost/ M.Y. \$1000	NPS M.Y. \$1000	Cost/ M.Y. \$1000	NPS M.Y. \$1000	Cost/ M.Y. \$1000	NPS M.Y. \$1000	Cost/ M.Y. \$1000	
OG		C9	Maintenance of Museum Collections	.1	1.4	.1	1.4	.2	3	.2	3	.2	3	10-237 10-238
		C10	Preparation of Historic Structures Reports											
			Pueblo Bonito											
			Pueblo del Arroyo	1	20									
			Tri-wall Structure at del Arroyo											
			Casa Chiquita Kin Kletzo			.5	10							
			Chetro Ketl Talus #1			.5	10							
			Casa Rincanada											
			BC 50 (Tseh So)					.5	10					
			BC 51											
			BC 56											
			BC 57											
			BC 58											
			BC 59											
			Kin Nahasbas Una Vida Hungo Pavi					.5	10					

CULTURAL RESOURCES  
ACTIVITIES AND 5-YEAR PROGRAMMING SHEET

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			NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000	NPS Cost/ M.Y. \$1000				
			<u>Project Title</u> (HSR cont.)										
			Old Alto										
			New Alto						.4	8			
			Penasco Blanco										
			Kin Klighin						.3	6			
			Trin Kletzin						.3	6			
			Wijiji										
			Site 288										
			Site 318										
			Site 347						.4	8			
			Kin Bineola									.4	8
			Kin Ya-a									.3	6
			Pueblo Pintado									.3	6

CULTURAL RESOURCES  
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C11			Preparation of Preservation Guides											
			Pueblo Bonito											
			Pueblo del Arroyo		1	20								
			Tri-wall structure at del Arroyo											
			Casa Chiquita					.5	10					
			Kin Kletzo					.5	10					
			Chetro Ketl											
			Talus #1											
			Casa Rincanada											
			BC 50 (Tseh So)							.5	10			
			BC 51											
			BC 56											
			BC 57											
			BC 58											
			BC 59											
			Kin Nahasbas							.5	10			
			Una Vida											
			Hungo Pavi											



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			Preservation Guides(cont.)												
			Old Alto												
			New Alto									.4	8		
			Penasco Blanco									.3	6		
			Kin Klighin									.3	6		
			Trin Kletzin									.3	6		
			Wijiji												
			Site 288												
			Site 318												
			Site 347												
			Kin Bineola											(Future years	
			Kin Ya-a											.4 8	
			Pueblo Pintado											.3 6	
														.3 6	
OG		C12	Ruins Preservation Research			.1	50	.1	50	.1	20	.1	20		
		C13	Management Information System												
			(Project to be accomplished by Chaco Center with operating funds already programmed)												
OG		C14	Completion of Historical Research			.1	5	.1	5						
1		C15	Preservation of Ruins												
			Revision in progress. To be completed by 1/1/78.												

(Future years)  
.4 8  
.4 8  
.3 6  
.3 6

### C. Natural Resources

The natural resources of Chaco Canyon National Monument are representative of the high mesa country of the Colorado Plateau. These resources are not particularly unique but are very important as they provide the setting for the canyon's impressive prehistoric Indian ruins. Typical of semi-arid regions, the lands of Chaco Canyon are slow to heal after being scarred. Vehicle tracks made 30 years ago are still visible and detract from the natural setting. The monument was completely fenced by 1946, eliminating grazing completely, but vegetative recovery is slow.

In many respects, management of the natural resources cannot be easily separated from the management of the archeological resources, as one affects the other. A good example of such a relationship is seen in the control of soil erosion where it threatens a prehistoric site.

A limited amount of research was accomplished prior to the establishment of the Chaco Center. Preliminary studies on geology, and the flora and fauna have been completed. A basic resource inventory was completed for the monument.

The Chaco Center's multi-disciplinary research program is designed to complete much of the needed research in the field of geology, paleontology, zoology, botany and others. Research in some of these fields has already begun.



AERIAL OF GALLO WASH

NPS Photo by  
Fred Mang, Jr.



## Project 1: Erosion Control

Next to ruins preservation, erosion control presents the greatest problem at Chaco Canyon National Monument. The Chaco River and its tributaries, the Fajada and Gallo Washes, drain a watershed of 398,240 acres (161,168 ha) most of which is outside the monument. Much of this land has been heavily grazed since the late 1800's. Grazing inside the monument terminated when the boundary was fenced in 1946. Although the BIA, Navajo Tribe and the BLM are making progress in improving range conditions, much of the watershed still is in poor condition.

Soils in Chaco Canyon and much of the Chaco drainage are clays. High concentrations of sodium salts washed from above have accumulated. These salts act as soil binders rendering the ground nearly impervious to water. Because of the high runoff in these areas, sheet erosion is common with gullies forming on steeper slopes. "Piping," or the dissolving of salts from the soil near the margins of gullies hastens erosion.

Widening of the Chaco and Fajada Washes, headward erosion in the Gallo Wash and formation of gullies at the mouth of ravines have destroyed several small sites and threatened two large classic ruins.

Runoff during summer storms washes out park roads and culverts. Advancing gullies threaten roads and could cause road closures.

### Action: (2. Continue Maintenance 4. Research B. No Effect-Historical)

The Soil Conservation Service completed a study on the Chaco drainage in September 1973. This study resulted in recommendations relating to the management of all of the resources in this drainage, but centered on steps necessary to control soil erosion and improve the range. The recommendations made in this report will be studied and priorities placed on implementation. Erosion control devices should be constructed as soon as practical, keeping in mind that the Environmental Review of 11/76 calls for a minimum of man-made structures. Several control devices are needed outside the monument boundaries. Efforts must be made to obtain permission from the Navajo Tribe and BIA and any Coal Companies proposing to strip mine the area for construction of these structures.

Further studies by the National Park Service are needed in addition to the SCS report on needed controls within the monument. Adequate control of headward erosion of several gullies within the monument is necessary before the loop road is paved. An erosion-control plan should be formulated as soon as possible. This will entail the combined efforts of the General Superintendent, Navajo Lands Group, regional specialists and the monument staff.

The National Park Service will continue to cooperate, through agreements and informal channels, with the SCS and other agencies on the overall resource management of the Chaco drainage.

### Research

A task force team made up of specialists from the SCS, Regional Office and NALA, supported by the park staff should be formed. This team should



analyze past recommendations, do additional field work and propose an action plan to be implemented.

This project could effect the archeological resources. A Section 106 consultation will be required.

## Project 2: Return the Vegetative Cover to a Natural State

Between 1890 and 1940 heavy grazing severely altered the vegetative cover of Chaco Canyon and its watershed. The monument was completely fenced in 1946. Since then the vegetation has shown recovery, especially during wet years.

### Action (2. Continue Maintenance 4. Research B. No Effect-Historical)

Continue to exclude grazing from the monument. Control any adverse impact on the vegetation, especially in high density use areas by requiring visitors to stay on the improved trails.

Because of the rough, broken terrain it is unlikely that vegetation manipulation such as seeding or controlled burning on a large scale would be of benefit. An exception might be in aiding regeneration of small disturbed areas, such as old roads or building sites.

### Research

Ongoing research is being conducted by the Chaco Center. Kirk Jones, UNM, completed a preliminary study of plant communities and set up permanent transect markers. This study will continue for some time, gauging the rate of vegetative recovery in selected areas.

### Project 3: Wildlife Management

- A. Mule Deer: Tentative estimates indicate that there are approximately 150 deer within the monument. The population is now increasing and could possibly present a management problem. However, at this time there is no evidence of over-browsing.
- B. Small Game and Other Wildlife: Cottontail rabbits and scaled quail populations are cyclic, but have not presented any management problem to date. Natural controls have been effective in the past for all species of birds and small animals.

#### Action (2. Continue Maintenance 4. Research B. No Effect-Historical)

Protection of wildlife from hunting or molestation will continue to be the main method of preserving native wildlife.

Mule deer populations should be monitored and the range checked yearly to determine if the carrying capacity is being exceeded. This is highly unlikely, however, since hunting immediately adjacent to the monument will probably keep the population in check.

An ecological study is underway by the University of New Mexico in an Atriplex-Oryzopsis plant community utilizing four study plots. Expected results will be: a determination of the population density of rodents, horned lizards, snakes, harvester ants, seed-eating birds and vascular plants; a determination of the food habits of the rodents and ants; an understanding of seed crop production rates; with a final quantitative model of the wildlife seed ecology in this plant community.

#### Research

Additional research should be done to check and update the wildlife map last done in 1937 prior to the phase-out of domestic grazing. Both interpretive and resource benefits would accrue from a comparative study of the effect of the cessation of domestic grazing on all monument wildlife. Such a study at this time will also provide a data base with which to monitor and compare the effect of probable strip mining coal activity in the immediate area and the upper watershed.

#### Project 4: Identification of Essential Habitat

Chaco Canyon, although set aside because of its spectacular prehistoric ruins, provides a refugium for both plant and animal species. Habitat for threatened and endangered species should be identified and managed in such a way as to provide an optimum opportunity for the retention of habitat of threatened, rare, or endangered species of plants and animals.

#### Action (4. Research B. No Effect-Historical)

Personnel in the regional office are planning this study. It will involve the identification of habitat which is suitable for endangered species, the amount and type of habitat available, an evaluation of the current status of each species which may have occupied Chaco both in the past and present and recommendations for the retention or renovation of habitat which is thought to be of potential value as essential habitat. Assistance and consultation will be requested from personnel from Chaco Center, Chaco Canyon National Monument, the Southwest Regional Office, and State and Federal agencies involved with endangered species.



## Project 5: Hydrological Resources

Water utilization in the monument and surrounding area will be of critical importance in the near future. Mining of coal and uranium with the attendant milling and processing of the product will require vast amounts of either ground or subsurface water.

### Action (4. Research 5. No Effect-Natural B. No Effect-Historical)

Identification must be made of the legal rights of the monument to surface and subsurface waters in order to protect ruins, wildlife and developments. An understnading of present water conditions is needed for base data to monitor the effect of water utilization by area mining upon monument resources.

Consultation should be made with the USGS to determine what, if any, research plans they have for hydrological studies in the Chaco watershed.

ACTIVITIES AND 5-YEAR PROGRAMMING SHEET

<u>Pkg. No.</u>	<u>Area Priority</u>	<u>RMP Ref. No.</u>	<u>Project Title</u>	<u>Year 1</u>		<u>Year 2</u>		<u>Year 3</u>		<u>Year 4</u>		<u>Year 5</u>		<u>Date Submitted</u>
				<u>NPS Cost/</u>	<u>M.Y. \$1000</u>	<u>NPS Cost/</u>	<u>M.Y. \$1000</u>	<u>NPS Cost/</u>	<u>M.Y. \$1000</u>	<u>NPS Cost/</u>	<u>M.Y. \$1000</u>	<u>NPS Cost/</u>	<u>M.Y. \$1000</u>	
1		N1	Erosion Control		2		120							
2		N5	Hydrological Resources		5		5							
3		N3	Wildlife Management		5		5							
4		N4	Critical Habitat		3		3							
5		N2	Natural Vegetation		2		2							

# D. SUMMARY OF PROJECT ACTIONS

## ACTION\*

PROJECT	NATURAL					CULTURAL	
	1	2	3	4	5	A	B
C1					X		X
C2					X		X
C3					X		X
C4					X		X
C5					X		X
C6					X		X
C7 A					X		X
B					X	X	
C					X		X
D					X		X
C8					X		X
C9					X		X
C10					X	X	
C11					X	X	
C12					X		X
C13					X		X
C14					X		X
N1		X		X			X
N2		X		X			X
N3		X		X			X
N4				X			X
N5				X	X		X
C15					X		X

### \*NATURAL:

1. Significant Action
2. Continuing Maintenance
3. New Maintenance
4. Research
5. No Effect-Natural

### CULTURAL:

- A. Effect
- B. No Effect-Historical

#### IV. OVERVIEW

The following is a review of all actions proposed within the Chaco Canyon National Monument Resources Management Plan and outlined within the seven types of action described within the plan.

##### Natural Types

1. Those Actions Whose Implementation Will Have a Significant and Measurable Effect on the Natural Environment. (Significant Action)

No such actions are planned. Each project included in the Resources Management Plan was considered on its own merit and, in every case, those actions planned do not have a significant and measurable effect on the environment. All of the actions fall into Natural Types 2, 3, 4, or 5 or Historical Types A or B.

2. Those Actions Whose Implementation Will Continue Existing Maintenance of the Natural Environment. (Continuing Maintenance)

Natural Resource Projects 1, 2 and 3 fall into this type.

3. Those Actions Which Will Initiate New Maintenance of the Natural Environment. (New Maintenance)

None of the actions planned fall into this category.

4. Those Actions Which Entail Research Into the Natural Environment. (Research)

Natural Resource Projects 1, 2, 3, 4 and 5 fall into this type.

5. Those Actions Which Do Not Have an Effect on the Natural Environment. (No Effect-Natural)

Cultural Resource Projects 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14; and Natural Resource Project 5 fall into this type.

##### Historical Types

- A. Those Actions Whose Implementation Will Have an Effect on the Historical Resources. (Effect)

Cultural Resource Projects 7B, 10A and 10B fall into this type.

- B. Those Actions Which Will Not Have an Effect on the Historical Resources. (No Effect-Historical)

Cultural Resource Projects 1, 2, 3, 4, 5, 6, 7A, 7C, 7D, 8, 9, 10C, 10D, 11, 12, 15; and Natural Resource Projects 1, 2, 3, 4 and 5 fall into this type.



DETERMINATION: It is determined that all actions outlined above are maintenance and research in character and do not significantly affect the natural environment. Therefore, in accordance with the following paragraph from "Environmental Assessments and Statements Guideline" (NPS, December 22, 1976, Chapter 3, pages 3 and 4),

"Routine maintenance and operation of parks, small changes in programs for managing resources and providing for visitor use, and similar continuously occurring minor actions . . . must be taken in ways that ensure protection and enhancement of environmental quality, but a written documentation of their environmental impacts is not required."

NO ENVIRONMENTAL ASSESSMENT WILL BE PREPARED.

Recommended by: Richard H. Warner July 21, 1977  
Chief, Natural Resources Management, SWR Date

Recommended by: Robert H. Giesse 7/21/77  
Chief, Southwest Cultural Resources Center Date

Concurred by: Arthur H. Tuttle 7/22/77  
General Superintendent, Navajo Lands Group Date

Concurred by: Douglas G. Warnock July 29, 77  
Associate Regional Director, Park Operations Date

Approved by: John E. Cook 7/29/77  
Regional Director, Southwest Region Date

APPENDIX A

Collections and Locations and  
Collection Policy Statement

## COLLECTIONS AND LOCATIONS

Archeological excavations have been carried out at Chaco Canyon from 1900 until the present. This work was done by numerous different organizations and institutitons. Collections from these excavations became the property of those who financed the work.

The Chaco Center is currently doing research on the location of all known Chaco Canyon collections. It is their hope to catalog and photograph each item, so that all material can be incorporated into their studies on Chaco artifacts.

Complete documentation on Chaco collections is a continuing project of the Chaco Center.

### COLLECTION POLICY STATEMENT, CHACO CANYON NATIONAL MONUMENT

Chaco Canyon National Monument was established to preserve and interpret the archeological remains of Chaco Canyon and certain nearby major ruins. The purposes of the park collection will at all times be consistent with the applicable provisions of the General Management Plan, Interpretive Prospectus and other documents governing management and interpretation. Such purposes are:

To acquire or collect, as appropriate--

- Original objects with documented provenience or association with the history and prehistory of the Chaco region, retaining only those objects needed for exhibition, interpreter training and reference by staff, visitors and researchers, placing the remainder on loan with appropriate cooperating institutions,
- Biologic and geologic specimens from within the monument boundaries insofar as needed for interpretive purposes; to place on loan with appropriate cooperating institutions any natural history collections made as a result of special research projects, excess to park needs,
- Historic and modern Indian arts and crafts only as needed for exhibit purposes,
- As appropriate and feasible, tapes of interviews with persons having knowledge of local Navajo history and culture, copies of all tapes to be placed in an appropriate oral history archive except as may be prevented by ethical requirements for informant confidentiality,
- Art and photographs relating to interpretive themes of the park; all original historic negatives and one copy of all historic photographs to be deposited with an appropriate archive.

To exclude--

- All original historic documents and to find appropriate archival repositories for all such materials as may become available to the park, copies of all materials needed for park purposes to be made for the park reference files,
- All reproductions or replicas that might be acquired for use in exhibits or living history demonstrations,
- Objects that needlessly duplicate materials already collected or that do not relate to the park.

To maintain--

- A library and reference files adequate to meet most needs for developing interpretive programs and documenting collections.

To recognize--

- The intrinsic and irreplaceable value of all original objects in the park collection; and never to use them as props for living history or other interpretive demonstrations and to take all necessary measures to document, conserve and safeguard the collection.



## APPENDIX B

### Information Base Checklist

## INFORMATION BASE CHECKLIST FOR CHACO CANYON NATIONAL MONUMENT

### LEVEL ONE

The following information is provided for planning purposes in the Outline of Planning Requirements (OPR) and for management use in day-to-day park operations.

### BASIC THEMATIC MAP FILE

Population Centers. This map is on the first page of a recently published document entitled "Environmental Assessment--Master Plan Development Concept"; July 1975, and is available at the Planning and Design Office, SWRO. New Mexico Statistical Abstracts 1972, p. 21.

Political Subdivisions. A map is available in the Resource Basic Inventory (RBI) files at the Natural Resource Office, SWRO.

Land Use. Information available in the "Environmental Assessment" p. 5A.

Outdoor Recreation Facilities. Available in RBI files, Natural Resources Office, SWRO.

Transportation, Communication, Utilities. No maps are immediately available.

Overnight Accommodations. No maps immediately available.

Land Ownership. Available in the "Environmental Assessment" p. 52.

### PARK SPECIFIC FILE

Topography. There is a U.S.G.S map available at the Chaco Center, University of New Mexico, Albuquerque, New Mexico. Also, 7.5 minute U.S.G.S. maps (1963) are available at the Natural Resources Office, SWRO. Additionally, Chaco Center has a complete file of aerial photographs of the Monument.

Geology. Geological maps are available at both the Chaco Center and the Natural Resources Office, SWRO.

Land Use and Ownership. There is a general land use map in the "Environmental Assessment" p. 5A. In addition, information regarding land use and ownership is available at the Navajo Lands Group Office in Farmington, New Mexico, and a Land Use and Ownership map is available at the Natural Resources Office, SWRO.

Soils. General soils map is available at the Natural Resources Office, SWRO. General soils maps also available in Soil Associations and Land Classification for Irrigation, San Juan County, NMSW Ag. Exper. Stat. Research Report 161 by Maker, Keetch and Anderson, Sept. 1969. Information also available at Chaco Center.

Hydrology. Most hydrological features can be determined from the U.S.G.S. topographical maps. Other than wells, there are no springs nor permanent water sources on the monument.

Vegetation. Vegetative maps are available at the Chaco Center, Natural Resources Office, SWRO, and in the "Environmental Assessment." A plant association map is also available in Jones, K.L., 1972, The Ecology of Chaco Canyon available at the Natural Resources Office, SWRO.

Wildlife. No wildlife maps, as such, are currently available. This lack is addressed in the Resources Management Plan.

Cultural. A map of cultural features is available at Chaco Center which includes some 2,200 sites. A generalized map is available in the "Environmental Assessment" p. 33.

Recreation, Development and Support Facilities. Although no specific maps are available, there is considerable information in the Narrative section.

#### NARRATIVE FILE

Climate. Information available at Chaco Center and in the "Environmental Assessment" pp 19-21.

Socioeconomic Environment. Information available in RBI files, Natural Resources Office, SWRO.

Business and Industry. Information available in RBI files, Natural Resources Office, SWRO.

Geology. Palentology on file (RBI) and Narrative available in RBI files, Natural Resources Office, SWRO.

Land Use and Ownership. Information in "Environmental Assessment" pp 6-7.

Soils. General inforamtion at Chaco Center. Information also available in RBI, Natural Resources Office, SWRO.

Hydrology. Brief in "Environmental Assessment" p. 18. And, information available at SWRO.

Vegetation. Information at Chaco Center, in "Environmental Assessment" pp. 22-25, and in RBI files, Natural Resources Office, SWRO.

Wildlife. Information available in RBI files, Natural Resources Office, SWRO.

Culture. Report in progress on 2,200 sites.

Recreation, Development and Support Facilities. Some information available in RBI files, Natural Resources Office, SWRO.

ANNOTATED BIBLIOGRAPHY

In Resources Management Plan.



## APPENDIX C

### Completed Major Ruins Stabilization

## RUINS STABILIZATION STATEMENT

Preserving the archeological resources is the principal mission of the National Park Service at Chaco Canyon National Monument. Therefore, all excavated and exposed ruins not required for interpretive purposes are to be backfilled, and all other excavated and excavated and exposed ruins or ruins with exposed standing walls are to be stabilized--not restored or reconstructed. To do this requires additional stabilization and maintenance crews and applied research into new techniques and materials for more effective and economical stabilization. Excavation of additional ruins for visitor interpretation is not needed. With the completion in three years of Chaco Center research program, additional excavations for research and interpretive purposes will not be needed for the foreseeable future.

## COMPLETED MAJOR RUINS STABILIZATION

### Pueblo Bonito

1924-1930	NGS	N.M. Judd
1938-1941	RSU	Gordon Vivian
1945-1946	RSU	Ted Soves
1954	RSU	Joel Skinner
1963	RSU	Charles Voll
1965-1969	RSU	C. Voll and M. Mayer
1972-1973	RSU	George Chambers

### Chettro Kettle

1920-1921	School of American Research and UNM	
1929-1934	School of American Research and UNM	
1947-1948	RSU	Gordon Vivian and Lancaster
1949-1950	RSU	Gordon Vivian
1963	RSU	Roland Richert and Charles Voll
1964	RSU	Charles Voll and Marty Mayer

### Pueblo del Arroyo

1939	RSU	Gordon Vivian
1949-1950	RSU	Gordon Vivian
1966	RSU	Don Morris

### Kin Kletso

1953	RSU	Gordon Vivian
1958	RSU	Gordon Vivian
1963	RSU	Charles Voll
1967	RSU	Charles Voll

### Casa Rinconada

1933	RSU	Gordon Vivian
1955	RSU	Gordon Vivian
1957	RSU	Roland Richart
1959	RSU	Joel Skinner
1967	RSU	Martin Mayer

### Talus Unit #1

1959	RSU	Roland Richart
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### Kin Ya-a

1956	RSU	Roland Richart
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Kin Klizhin

1938	RSU	Gordon Vivian
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Una Vida

1960	RSU	Gordon Vivian
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Casa Chiquita

1964	RSU	Charles Voll and Marty Mayer
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BC-50

1949	RSU	Gordon Vivian
1959	RSU	Joel Skiner
1964	RSU	Charles Voll
1967	RSU	Charles Voll

BC-51

1950	RSU	Gordon Vivian
1959	RSU	Joel Skiner

BC-59

1950	RSU	Gordon Vivian
1959	RSU	Joel Skiner

Kin Bineola

1963	RSU	Charles Voll
1966	RSU	Don Morris

Wijiji

1940	RSU	Gordon Vivian
1959	RSU	Joel Skiner

New Alto

1947	RSU	Gordon Vivian and Lancaster
1966	RSU	Don Morris and D.W. Hayser

Pueblo Pintado

1940-1941	RSU	Gordon Vivian
1967	RSU	Martin Mayer and Waggoner
1969	RSU	Marty Mayer and John Wiss



Hungo Pavie

1958	RSU	Gordon Vivian
1971	RSU	Sam Henderson

Penasco Blanco

1971	RSU	Marty Mayer
1972	RSU	Ed Suddreth

Gallo Cliff Dwellings

1966	RSU	Don Morris
1967	RSU	Marty Mayer

Chaco Canyon National Monument established a ruins maintenance program in 1970; once a ruin is comprehensively stabilized it is turned over to the monument's Ruins Maintenance Crew for yearly and/or emergency repairs. This crew has done repairs on all ruins which have had their initial stabilization completed.

## APPENDIX D

### Area Maintenance Stabilization Program

## AREA MAINTENANCE STABILIZATION PROGRAM

### Introduction

As presently designed, ruins maintenance is an area responsibility, to be funded from the area operating funds. Supervision costs for the area Maintenance Foreman, Group Archeologist, or Ruins Stabilization Unit Archeologist, are not included in these estimates, but the supervision costs for the Ruins Maintenance Foreman are a part of these funds. The cost estimates include the total cost for labor plus 40% for supplies, materials and equipment.

Annual preventive ruins maintenance is to be performed by the area maintenance staff and is to include an inspection of each maintenance ruin, at least once a year; the maintenance of drains and drainage systems, the removal of weeds, trash and wind-blown or water-borne sand, and major masonry repairs with tinted cement mortar or adobe. Time utilization records are to be kept as a record of the work performed.

Cyclic or periodic major ruins maintenance is also performed by the area maintenance staff, and is supervised by a trained Ruins Maintenance Foreman or Archeologist.

Major ruins maintenance, besides involving all the activities performed during preventive ruins maintenance, also makes those maintenance repairs necessary to maintain the ruin in the same condition as it was immediately after initial ruins stabilization. Time utilization records and a moderately detailed record, including photographs of work performed, is kept.

Technical assistance and supervision for preventive and major ruins maintenance is obtained from the Group Archeologist and Ruins Stabilization Unit.

### Justification

Ruins maintenance is the key to ruins preservation, as is the maintenance of any structure the key to its preservation. Some believe that ruins require little or no maintenance once they are initially stabilized. It is granted that a ruin requires less work than modern structures, for the ruins usually have no roofs, no floors, no heating or cooling systems, no utilities, ect., but they do require maintenance and frequently more maintenance, unit for unit, than modern structures. Ruins are usually open to the weather, they were constructed with impermanent materials and contain many structural faults. Also, their stabilization and maintenance involve conflicting objectives - authenticity (the preservation of irregular and relatively primitive construction), permanence (the requirements of sound building practice), and safety. Ruins are usually entered by people little acquainted with their nature, who frequently assume

that they are as safe or safer than modern structures when, in fact, the ruins are dangerous and when, in fact, the visitor's very actions actually increase their danger.

### Drainage

In most Pueblo sites, surface water within rooms is absorbed into the soil and presents little difficulty. Problems are encountered where adjacent rooms or small areas are at widely varying levels, and the problem is either surface washing from one level to another or moisture penetration through a wall.

To maintain a drainage system, the drains must be kept free and open. Obstructions must not be placed, or allowed to accumulate, at the entrance to drains, weeds which accumulate in the ruins, especially Russian thistle, must be removed annually, and the drainage gradient must be maintained. Settling basins and dry barrels must be cleaned periodically. Wind borne sand can accumulate against walls, and alter the drainage surface.

### Housekeeping

In addition, the accumulation of weeds, water and wind borne soil and trash covers ruins features, and creates an unsightly mess.

### Structural Repairs

During initial ruins stabilization, major structural faults are repaired or strengthened wall tops are re-set in tinted cement mortar and loose wall faces are respalled and grouted with tinted soil mortar. Usually, repairs to initial stabilization, and later occurring major work and deficiencies, are performed only during cyclic or periodic major ruins maintenance when a trained stabilization foreman or archaeologist is present to supervise and record the work. However, minor problems will arise from time to time. Small sections of wall caps may come loose, wall surfaces, especially about doorways and drains, loosen, and erosion may cause soil to bleed from beneath walls. These minor deficiencies, if left untended, will enlarge. They should be repaired annually with materials that match the materials used during initial stabilization or construction. Adobe soil mortar made from local matching soil, is the mortar of first choice. Tinted cement, never untinted, is the mortar of second choice or is to be used where strength is required.

### Safety

Ruins were not built to be national monuments, to survive forever. Safety engineering was unknown at the time of their construction. The visitor seldom recognizes these facts. Yet, the National Park Service must make sure that the ruins are safe for and from the visitor.

Unsafe conditions must be corrected, immediately. Where this can-

not be done without seriously compromising the authenticity of the ruin, that section must be closed. Where it can be done without compromising the authenticity of the ruin, it must be done.

Remember, one loose rock that falls on one visitor's head may result in a tort claim settlement, equal to or greater than the budget for ruins maintenance.

Keep the ruins safe for the visitor, but also keep the ruins safe from the visitor. We have to preserve both.

### PROGRAM STANDARDS

The standard of maintenance for a ruin is set at the time of its initial stabilization and is detailed in the initial stabilization report. In addition, two (2) sets of program standards have a bearing on the preservation of ruins. They are (1) standards for ruins maintenance stabilization, and (2) standards for ruins protection. These standards are defined as:

#### Standards for Ruins Maintenance Stabilization

- Standard A: Maintenance which is required to protect the ruins from natural and human erosion.
- Standard B: Maintenance which is required to protect the ruins from natural erosion and human vandalism.
- Standard C: Ruins which are naturally protected. Maintenance, if required, is limited to maintaining the natural protection.

#### Standards for Ruins Protection

- Standard A: Ruins of such a fragile nature that it is necessary to assure protection through immediate visual and verbal contact.
- Standard B: Ruins of such a nature that adequate protection can be provided by self-guide interpretation and ranger patrols.
- Standard C: Ruins closed to all visitation because they are either unsafe for the visitor or the visitor will irreparably damage the ruin by entering it.

Cost estimates must be reviewed annually for changes brought about by increased wages and costs for material.



## APPENDIX E

### Summary of Ruins Maintenance and Ruins Maintenance Descriptions

## AREA MAINTENANCE STABILIZATION PROGRAM

### Introduction

As presently designed, ruins maintenance is an area responsibility, to be funded from the area operating funds. Supervision costs for the area Maintenance Foreman, Group Archeologist, or Ruins Stabilization Unit Archeologist, are not included in these estimates, but the supervision costs for the Ruins Maintenance Foreman are a part of these funds. The cost estimates include the total cost for labor plus 40% for supplies, materials, and equipment.

Annual preventive ruins maintenance is to be performed by the area maintenance staff and is to include an inspection of each maintenance ruin, at least once a year; the maintenance of drains and drainage systems, the removal of weeds, trash and wind-blown or water-borne sand, and major masonry repairs with tinted cement mortar or adobe. Time utilization records are to be kept as a record of the work performed.

Cyclic or periodic major ruins maintenance is also performed by the area maintenance staff, and is supervised by a trained Ruins Maintenance Foreman or Archeologist.

Major ruins maintenance, besides involving all the activities performed during preventive ruins maintenance, also makes those maintenance repairs necessary to maintain the ruin in the same condition as it was immediately after initial ruins stabilization. Time utilization records and a moderately detailed record, including photographs of work performed, is kept.

Technical assistance and supervision for preventive and major ruins maintenance is obtained from the Group Archeologist and Ruins Stabilization Unit.

### Justification

Ruins maintenance is the key to ruins preservation, as is the maintenance of any structure the key to its preservation. Some believe that ruins require little or no maintenance once they are initially stabilized. It is granted that a ruin requires less work than modern structures, for the ruins usually have no roofs, no floors, no heating or cooling systems, no utilities, etc., but they do require maintenance and frequently more maintenance, unit for unit, than modern structures. Ruins are usually open to the weather, they were constructed with impermanent materials and contain many structural faults. Also, their stabilization and maintenance involve conflicting objectives--authenticity (the preservation of irregular and relatively primitive construction), permanence (the requirements of sound building practice), and safety. Ruins are usually entered by people little acquainted with their nature, who frequently assume that they are as safe or safer than modern structures when, in fact, the ruins are dangerous and when, in fact, the visitor's very actions actually increase their danger.

## Drainage

In most Pueblo sites, surface water within rooms is absorbed into the soil and presents little difficulty. Problems are encountered where adjacent rooms or small areas are at widely varying levels, and the problem is either surface washing from one level to another or moisture penetration through a wall.

To maintain a drainage system, the drains must be kept free and open. Obstructions must not be placed, or allowed to accumulate, at the entrance to drains, weeds which accumulate in the ruins, especially Russian thistle, must be removed annually, and the drainage gradient must be maintained. Settling basins and dry barrels must be cleaned periodically. Wind borne sand can accumulate against walls, and alter the drainage surface.

## Housekeeping

In addition, the accumulation of weeds, water and wind borne soil and trash covers ruins features, and creates an unsightly mess.

## Structural Repairs

During initial ruins stabilization, major structural faults are repaired or strengthened wall tops are re-set in tinted cement mortar and loose wall faces are respalled and grouted with tinted soil mortar. Usually, repairs to initial stabilization, and later occurring major work and deficiencies, are performed only during cyclic or periodic major ruins maintenance when a trained stabilization foreman or archeologist is present to supervise and record the work. However, minor problems will arise from time to time. Small sections of wall caps may come loose, wall surfaces, especially about doorways, and drains, loosen, and erosion may cause soil to bleed from beneath walls. These minor deficiencies, if left untended, will enlarge. They should be repaired annually with materials that match the materials used during initial stabilization or construction. Adobe soil mortar made from local matching soil, is the mortar of first choice. Tinted cement, never untinted, is the mortar of second choice or is to be used where strength is required,

## Safety

Ruins were not built to be national monuments, to survive forever. Safety engineering was unknown at the time of their construction. The visitor seldom recognizes these facts. Yet, the National Park Service must make sure that the ruins are safe for and from the visitor.

Unsafe conditions must be corrected, immediately. Where this cannot be done without seriously compromising the authenticity of the ruin, that section must be closed. Where it can be done without compromising the authenticity of the ruin, it must be done.

Remember, one loose rock that falls on one visitor's head may result in a tort claim settlement, equal to our greater than the budget for ruins maintenance.

Keep the ruins safe for the visitor, but also keep the ruins safe from the visitor. We have to preserve both.

### PROGRAM STANDARDS

The standard of maintenance for a ruin is set at the time of its initial stabilization and is detailed in the initial stabilization report. In addition, two (2) sets of program standards have a bearing on the preservation of ruins. They are (1) standards for ruins maintenance stabilization, and (2) standards for ruins protection. These standards are defines as:

#### Standards for Ruins Maintenance Stabilization

- Standard A: Maintenance which is required to protect the ruins from natural and human erosion.
- Standard B: Maintenance which is required to protect the ruins from natural erosion and human vandalism.
- Standard C: Ruins which are naturally protected. Maintenance, if required, is limited to maintaining the natural protection.

#### Standards for Ruins Protection

- Standard A: Ruins of such a fragile nature that it is necessary to assure protection through immediate visual and verbal contact.
- Standard B: Ruins of such a nature that adequate protection can be provided by self-guide interpretation and ranger patrols.
- Standard C: Ruins closed to all visitation because they are either unsafe for the visitor or the visitor will irreparably damage the ruin by entering it.

Cost estimates must be reviewed annually for changes brought about by increased wages and costs for material.



## RUIN MAINTENANCE DESCRIPTION

Name: Pueblo Bonito

Description: Pueblo Bonito is the largest of the Chaco Canyon pueblos. It lies on the north side of the canyon in the SW 1/4 Secion 12, T21 N, R 11 W, San Juan County, New Mexico. It contains well over 300 first floor rooms, and may have originally been four or five stories high. It contains at least 32 kivas and 2 great kivas. It is estimated that 1,200 people occupied its more than 800 rooms. Its tree ring dates run from A.D. 828 through 1126. The ruin is largely excavated.

Use: Pueblo Bonito is the primary interpretive site of the monument and visitation is heavy.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: Contains more than 300 ground floor rooms with walls rising to four stories, 32 kivas and 2 great kivas.

Linear feet of stabilized wall: 11,265 (3,436 m)

Square feet of stabilized wall: 70,000 (6,510 m<sup>2</sup>)

Special Problems: Pueblo Bonito's large size is a problem in itself. It contains all styles of Chaco masonry. It is a multi-level and multi-story structure with both good and bad aboriginal construction.

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 240 man-days

Man-days for annual maintenance: 120 man-days

Revised 7/75



# RUIN MAINTENANCE DESCRIPTION

Name: Site 50 (Bc 50 or Tseh So)

Description: Site 50 is situated almost directly opposite Pueblo Bonita on the south side of the canyon. Site 50 is a small house ruin composed of 26 ground floor rooms and 4 kivas. A few rooms may have stood two stories high. One controversial tree-ring date of A.D. 922 has come from Site 50. The ruin is excavated.

Use: An interpreted site with a self-guide trail. Heavy visitor use.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: Site 50 contains 26 rooms with walls standing to 5 feet, and four kivas.

Linear feet of stabilized wall: 700 (214 m)

Square feet of stabilized wall: 3,000 (279 m<sup>2</sup>)

Special Problems: Site 50 is lightly built. Many of its walls are but one stone wide. Erosion of soft yellow sandstone masonry is common. The ruin requires more care per square foot of wall than other Chaco Canyon ruins.

Last cyclic maintenance: N/A

Period for cyclic maintenance: 0

Man-days for cyclic maintenance: 0

Man-days for annual maintenance: 30 man-days

Revised 7/75

## RUIN MAINTENANCE DESCRIPTION

Name: Site 51 (BC 51)

Description: Site 51 is situated almost directly opposite Pueblo Bonito on the south side of Chaco Canyon, and 100 feet east of sites BC 50 and BC59. It contains 45 rooms and 6 kivas. The tree-ring dates from this site are A.D. 1043 and 1077. The site is excavated.

Use: Interpreted site with self-guide trail. Heavy visitor use.

	Present	Accepted
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: Contains 45 rooms with walls standing to 5 feet, and 6 kivas.

Linear feet of stabilized wall: 1,617 (493 m)

Square feet of stabilized wall: 5,200 (484 m<sup>2</sup>)

Special Problems: Site 51 is a lightly built ruin with single stone wide walls. Erosion of soft yellow sandstone is common. The ruin requires more care per linear foot of wall than the larger Chaco Canyon sites.

Last cyclic maintenance: N/A

Period for cyclic maintenance: 0

Man-days for cyclic maintenance: 0

Man-days for annual maintenance: 30 man-days

Revised 7/75

## RUIN MAINTENANCE DESCRIPTION

Name: Site 50 (BC 59)

Description: Site 59 is situated on the south side of Chaco Canyon, adjacent to sites BC 50 and BC 51. The ruin contains over 16 rooms and five kivas. All three tree-ring dates from this ruin are A.D. 1110. The ruin is ninety (90) per cent excavated.

Use: Interpreted site with self-guide trail. Visitation is heavy.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: 16 rooms with walls standing to five feet, and 5 kivas.

Linear feet of stabilized wall: 650 (.12 mile) (198 m)

Square feet of stabilized wall: 2,050 (191 m<sup>2</sup>)

Special Problems: BC 50 is a lightly built ruin with single or double stone wide walls. Erosion of soft yellow sandstone is common. The ruin requires more care per linear foot of wall than the larger Chaco Canyon sites.

Lasy cyclic maintenance: N/A

Period for cyclic maintenance: 0

Man-days for cyclic maintenance: 0

Man-days for annual maintenance: 30 man-days

Revised 7/75

RUINS MAINTENANCE DESCRIPTION

Name: Sites 288, 347 and 378

Description: Three small ruins in the Gallo, sites 288 and 347 are located under a cliff overhang about 100 feet from the Gallo Campground. Site 378 is located in a rock shelter one mile above the campground.

Use: Secondary interpretive sites. Heavy visitation at Sites 288 and 347. Light visitation at Site 378.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B'
<u>Protection Standard:</u>	B	B

Size:

Site 288: 4 rooms and 1 kiva  
Linear feet of stabilized wall: 140 (43 m)  
Square feet of stabilized wall: 420 (96 m<sup>2</sup>)

Site 347: 2 rooms with walls 8 feet high  
Linear feet of stabilized wall: 40 (12 m)  
Square feet of stabilized wall: 320 (30 m<sup>2</sup>)

Site 378: 1 room with walls 7 feet high  
Linear feet of stabilized wall: 23 (7 m)  
Square feet of stabilized wall: 161 (15 m<sup>2</sup>)

Speical Problems: Heavy use.

Last cyclic maintenance: N/A

Period for cyclic maintenance: 0

Man-days for cyclic maintenance: 0

Man-days for annual maintenance: 20 man-days

Revised 7/75

# RUIN MAINTENANCE DESCRIPTION

Name: Casa Chiquita

Description: Casa Chiquita is situated on the north side of Chaco Canyon, northwest of Pueblo Bonito and one mile downstream from it. Casa Chiquita is one of the smaller, moderate sized Canyon pueblos. Its walls may have stood four (4) stories high and the aboriginal population is estimated at 100 people. There is one tree-ring date of A.D. 1060 from the ruin. The ruin is unexcavated.

Use: Uninterpreted, moderately visited.

	<u>Present</u>	<u>Acceptable</u>
<u>Maintenance Standard:</u>	B	B
<u>Protective Standard:</u>	B	B

Size: Contains 20 plus rooms with walls standing to 15 feet above fill, at least one Kiva and a "moat".

Linear feet of stabilized wall: 600 (183 m)  
Square feet of stabilized wall: 2,000 (186 m<sup>2</sup>)

Special Problems: None

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 30 man-days

Man-days for annual maintenance: 10 man-days

Revised 7/75



## RUIN MAINTENANCE DESCRIPTION

Name: Casa Rinconada

Description: Casa Rinconada is a great kiva located across the canyon from Pueblo Bonito and adjacent to Bc 50, 51 and 59. The great kiva is 64 feet in diameter with walls standing to 20 feet. A controversial tree-ring date of A.D. 919 has been recovered from Casa Rinconada. The great kiva has been excavated.

Use: Interpreted site with self-guide trail; heavy visitation.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: Casa Rinconada is 64 feet in diameter with walls standing to 20 feet. It has a single antechamber at the south and a north antechamber containint 3 to 6 rooms.

Linear feet of stabilized wall: 600 (201 m)

Square feet of stabilized wall: 5,038 (469 m<sup>2</sup>)

Special Problems: Since the great kiva is partly below ground, water drainage is very important.

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 60 man-days

Man-days for annual maintenance: 30 man-days

Revised 7/75

## RUIN MAINTENANCE DESCRIPTION

Name: Chetro Ketl (Chettro Kettle)

Description: Chetro Ketl is situated on the north side of Chaco Canyon less than  $\frac{1}{2}$  mile due east and upstream from Pueblo Bonito. It once contained over 500 rooms and is second in size only to Pueblo Bonito. Its walls once may have stood 5 stories, and it is estimated that 1500 people once lived in Chetro Ketl. A total of over 400 tree-ring dates range in time from A.D. 930 through 1116. The ruin is about one-half excavated.

Use: A major interpretive site. Self-guide trail. Visitation is heavy.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: 150 ground floor rooms with walls to 3 stories high, 14 kivas and 1 great kiva.

Linear feet of stabilized wall: 5,050 (1540 m)  
Square feet of stabilized wall: 57,425 (5341 m<sup>2</sup>)

Special Problems: Like Pueblo Bonito, Chetro Ketl is a special problem because of its size, and many different levels, which make drainage a problem. The wash to the north and east of the ruin has aggraded to an elevation higher than the ruin and its channel must be kept open and clean or the ruin is flooded during heavy run-off causing major damage.

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 180 man-days

Man-days for annual maintenance: 80 man-days

Revised 7/75

## RUIN MAINTENANCE DESCRIPTION

Name: Hungo Pavi

Description: Hungo Pavi is situated on the north side of Chaco Canyon a little less than 2 miles upstream from Pueblo Bonito. Hungo Pavi is a medium size ruin of about 73 ground floor rooms and 2 kivas. Originally its walls may have stood 5 stories high and 700 people may have lived in Hungo Pavi. Its tree-ring dates range from A.D. 942 through 1077. The ruin is unexcavated.

Use: Closed. Uninterpreted.

	Present	Acceptable
Maintenance Standard:	B	B
Protection Standard:	B	B

Size: 73 ground floor ruins and 2 kivas with walls standing to 3 stories.

Linear feet of stabilized wall: 835 (255 m)  
Square feet of stabilized wall: 12,600 (1172 m<sup>2</sup>)

Special Problems: none

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 60 man-days

Man-days for annual maintenance: 30 man-days

Revised 7/75

## RUIN MAINTENANCE DESCRIPTION

Name: Kin Biniola

Description: Kin Biniola is about 10 miles to the south and slightly to the west of Pueblo Bonito on Bineola Wash, a tributary of the Chaco Wash. Kin Bineola lies in a detached section of the monument. The ruin is one of the six largest Chaco Canyon ruins with 10 kivas and over 100 ground floor rooms. Its walls may originally have stood four stories high and 800 people may have occupied the site. Tree-ring dates from Kin Bineola range from A.D. 921 to 1110. The ruin is unexcavated.

Use: Uninterpreted. Is in a detached section of the monument. Light visitation.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: Contains over 100 walls standing to three stories, and 10 kivas.

Linear feet of stabilized wall: 3,800 (1159 m)

Square feet of stabilized wall: 30,294 (2817 m)

Special Problems: Kin Bineola is in a detached section of the monument about 20 miles by road from headquarters.

Last cyclic maintenance: 1966

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 120 man-days

Man-days for annual maintenance: 5 man-days

Revised 7/75

## RUIN MAINTENANCE DESCRIPTION

Name: New Alto

Description: This site is on the north rim of the canyon, approximately  $\frac{1}{2}$  mile above Pueblo Bonito. The ground plan is that of a solid, plazaless square with 30-40 ground floor rooms, all of the same masonry type. There is evidence of 3 stories. There are no tree-ring dates from New Alto, but it is contemporaneous with Kin Kletso.

Use: Uninterpreted. Light, but increasing visitation.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: New Alto has 30 to 40 ground floor rooms.

Linear feet of stabilized wall: 600 (183 m)

Square feet of stabilized wall: 5,000 (465 m<sup>2</sup>)

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 90 man-days

Man-days for annual maintenance: 30 man-days

Revised 7/75



## RUIN MAINTENANCE DESCRIPTION

Name: Penasco Blanco

Description: Penasco Blanco is situated on the south mesa overlooking the Chaco River about 3 miles downstream from Pueblo Bonito. Penasco Blanco is one of the six largest of the Chaco Canyon pueblos. There are approximately 153 ground floor rooms and 9 kivas. The walls may have stood originally 3 stories high. Penasco Blanco may have housed 1,200 people. Tree ring dates range from A.D. 915 through 1088. The ruin is unexcavated.

Use: Uninterpreted with light visitation

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: 153 rooms and 9 kivas.

Linear feet of stabilized wall: 3,800 (1159 m)

Square feet of stabilized wall: 30,000 (279 m<sup>2</sup>)

Special Problems: The ruin is located in an area of relatively difficult access.

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 180 man-days

Man-days for annual maintenance: 50 man-days

Revised 7/75

## RUIN MAINTENANCE DESCRIPTION

Name: Pueblo del Arroyo

Description: Pueblo del Arroyo is situated on the north bank of the Chaco Wash less than 1/4 mile west of Pueblo Bonito. It is one of the 6 most extensive Chaco Canyon pueblos. Its walls stand to 3 stories and the aboriginal population is estimated at 800 people. Its tree ring dates run from A.D. 1052 through 1117. The ruin is largely excavated.

Use: Uninterpreted. Self-guide trail planned. Moderately visited.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: Contains more than 100 ground floor rooms with walls rising to 3 stories, and 16 kivas.

Linear feet of stabilized wall: 4,669 (includes tri-wall) (1,424 m)

Square feet of stabilized wall: 33,741 (includes tri-wall) (3,138 m<sup>2</sup>)

Special Problems: The south side and southwest corner lie dangerously near the north bank of the Chaco Arroyo.

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 120 man-days

Man-days for annual maintenance: 60 man-days

Revised 7/75

## RUIN MAINTENANCE DESCRIPTION

Name: Pueblo Pintado

Description: Pueblo Pintado, situated on the south side of the Chaco Wash, some 17 miles east of Pueblo Bonito, is the most easterly of the major Chaco Canyon pueblos. There are an estimated 4 kivas and 60 ground floor rooms, the walls of which may have stood four stories and 800 people may have lived in Pueblo Pintado. There are 7 tree-ring dates from the site dating from A.D. 1060 through 1109. The ruin is unexcavated.

Use: Uninterpreted, it lies in a detached section of the monument.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size:

Linear feet of stabilized wall: 2,000 (610 m)

Square feet of stabilized wall: 18,000 (167 m<sup>2</sup>)

Special Problems: Ruin lies in a detached section of the monument, 17 miles from headquarters.

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 90 man-days

Man-days for annual maintenance: 45 man-days

Revised 7/75

## RUIN MAINTENANCE DESCRIPTION

Name: Talus Unit (Talus Unit No. 1)

Description: Talus Unit is situated on a Talus mound at the base of the cliffs behind and to the northwest of Chetro Ketl. Talus Unit is classed as a small Chaco Canyon site, and it is estimated that it contained 30 rooms, rising to 2 stories, and a least 3 kivas. Its tree-ring dates run from A.D. 1008 through 1082. The ruin is excavated.

Use: Interpreted as part of Chetro Ketl self-guide trail; heavy visitor use.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: Contains 30 rooms, with some walls rising to the second story, and 10 kivas.

Linear feet of stabilized wall: 1,100 (336 m)

Square feet of stabilized wall: 12,596 (1,171 m<sup>2</sup>)

Special Problems: The masonry consists of sizable amounts of Chaco yellow sandstone, which deteriorates rapidly.

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 90 man-days

Man-days for annual maintenance: 50 man-days

Revised 7/75

## RUIN MAINTENANCE DESCRIPTION

Name: Tri-Wall Unit (Pueblo del Arroyo)

Description: The Tri-Wall Unit is directly associated with Pueblo del Arroyo. The structure is built against the back (west) side of Pueblo del Arroyo, with at least one row of rooms extending around the corner and along the south side. The ruin is dominated by a circular, triple walled building 73 feet in outside diameter. It is joined with various rooms and kivas which once extended to the south for a least 115 feet and hence to the east along the south side of Pueblo del Arroyo, for some 90 feet. Judging by the size of rooms that do remain, the original houseblock attached to the tri-wall structure probably contained 70 to 80 rooms. The walls stand to less than one story in height. One tree-ring date of A.D. 1109 has come from this ruin. The ruin is excavated.

Use: Uninterpreted. Light to moderate visitation.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protection Standard:</u>	B	B

Size: Contains about 20 rooms with walls standing to 5 feet, and 6 kivas.

Linear feet of stabilized wall: (included with Pueblo del Arroyo)

Square feet of stabilized wall: (included with Pueblo del Arroyo)

Special Problems: The ruin lies on the bank of the Chaco Wash and is build largely of easily weathered, soft, yellow sandstone.

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 30 man-days

Man-days for annual maintenance: 15 man-days

Revised 7/75



## RUIN MAINTENANCE DESCRIPTION

Name: Una Vida

Description: Una Vida is on the norht side of Chaco Canyon between Hungo Pavi and Wijiji. It is 1/4 mile west of the monument headquarters and 3 miles upstream from Pueblo Bonito. The north half of the site is built on a steep Talus slope. Una Vida is a medium sized, large Chaco Canyon pueblo. The ruin has bout 100 ground floor rooms and 6 kivas. Ten walls may have stood 4 stories high at one time. Tree ring dates from Una Vida run from A.D. 847 through 1093. The ruin is partly excavated.

Use: Uninterpreted with moderately heavy visitation.

	Present	Acceptable
<u>Maintenance Standard:</u>	B	B
<u>Protective Standard:</u>	B	B

Size: There are 24 stabilized rooms and 1 kiva, walls stand up to 2 stories high.

Linear feet of stabilized wall: 807 (246 m)

Square feet of stabilized wall: 11,206 (1,042 m<sup>2</sup>)

Speical Problems: The excavated rooms are of Type I masonry, which requires much labor to stabilize. The walls were not comprehensively grouted and respalled after excavation.

Last cyclic maintenance:

Period for cyclic maintenance: 10 years

Man-days for cyclic maintenance: 120 man-days

Man-days for annual maintenance: 30 man-days

Revised 7/75

SUMMARY OF RUINS MAINTENANCE  
CHACO CANYON NATIONAL MONUMENT

NUMBER OF MAINTENANCE RUINS: 19

TOTAL LINEAR FEET OF STABILIZED WALL: 37,656 (713 miles) (11,699 m)

TOTAL SQUARE FEET OF STABILIZED WALL: 298,781 (34,962 m<sup>2</sup>)

RUIN	MAN-DAYS ANNUAL	MAN-DAYS CYCLIC	CYCLE PERIOD
Site 50	30	0	0
Site 51	30	0	0
Site 59	30	0	0
Sites 288, 347, 378	20	0	0
Casa Chiquita	10	30	10
Casa Rinconda	30	60	10
Chetro Ketl	80	180	10
Hungo Pavi	30	60	10
Kin Biniola	5	120	10
New Alto	30	90	10
Penasco Blanco	50	180	10
Pueblo del Arroyo	60	120	10
Pueblo Bonito	120	240	10
Pueblo Pintado	45	90	10

RUIN	MAN-DAYS ANNUAL	MAN-DAYS CYCLIC	CYCLIC PERIOD
Talus Unit	50	90	10
Tri-Wall	15	30	10
Una Vida	30	120	10

## APPENDIX F

### Summary of Ruins Maintenance Costs

## SUMMARY OF RUINS MAINTENANCE COSTS

Name	Major costs/10 yr.	Preventative (9 yr.)
Casa Chiquita	\$1,470	\$ 882
Casa Rinconada	2,940	13,230
Chettro Kettle	8,820	26,460
Hungo Pavi	2,940	13,230
Kin Bineola	5,880	5,880
Kin Kletso	5,880	10,584
Kin Ya-a	2,940	6,615
New Alto	4,410	6.615
Penasco Blanco	5,880	5,880
Site 50 (Tseh So)	5,880	11,760
Site 51 (Bc 51)	5,880	11,760
Site 59 (Bc 59)	5,880	11,760
Site 288	980	4,410
Site 318	980	0
Site 347	735	2,205
Pueblo del Arroyo and Tri-wall Unit	5,880	26,460
Pueblo Pintado	4,410	4,410
Talus Unit (#1)	4,410	7,938
Una Vida	5,880	13,230
Pueblo Bonito	11,760	52,920
Old Alto	2,940	6,615
Kin Nahasbas	<u>2,940</u>	<u>2,940</u>
SUBTOTAL (Page 1)	\$99,715	\$245,784



## SUMMARY OF RUINS MAINTENANCE COSTS (Continued)

Name	Major costs/10 yr.	Preventative (9 yr.)
Wijiji	\$ 4,410	\$13,230
Tzin Kletzin	2,940	1,470
Site 628	5,880	11,760
Kin Klizhin	<u>2,940</u>	<u>2,940</u>
SUBTOTAL (page 2)	16,170	29,400
SUBTOTAL (page 1)	99,715	245,784
SUBTOTALS	\$115,885	\$275,184
GRAND TOTAL (10 yr.)	<u>\$391,069</u>	

## APPENDIX G

### Completed Research

# COMPLETED RESEARCH

Code: C = Complete  
 I = Incomplete  
 P = Published  
 S = Submitted  
 N = None

## Archeological Research (Excavation)

<u>Site</u>	<u>Year</u>	<u>Report</u>	<u>Code</u>	<u>Author</u>
Chettro Kettle	1920-21 1929-34	Excavation (Tree ring trash)	I-P	School of American Research, Hewett and Hawley
Casa Rinconada	1931-32	Excavation	C-P	G. Vivian and R. Vann
Una Vida	1959	Partial Excavation	C-S	
Kin Nahasbas	1935	Excavation	C-S	Luhrs
Kin Kletso	1934	Partial exca-	N	Ferdon
	1951-52	Excavation	C-P	Vivian & Mathews
Pueblo del Arroyo	1923-26	Partial exca- vation	C-P	N. Judd
	1950	Tri-wall ex- cavation	C-P	Ruppert
Penasco Blanco	1900 ?	Few rooms excavation	N	Pepper
Pueblo Bonito	1899	Partial exca- vation	C-P	Pepper
	1921-27	Excavation	C-P	N. Judd
BC-50 Tseh So	1936	Partial exca- vation	C-P	Brand et al
	1937		I-P	Glen
	1938		I-S	Clark
	1939		I-S	Setzler & Donovan
BC-51	1936	Excavation	I-P	Kluckhohn & Reiter

BC-52	193?	Excavation	N	Mulloy
BC-53	1940-41	Excavation	N	Roberts & Reiter
BC-54	1941	Partial exca- vation	N	Buggeln & Chandler
BC-55	1941	Partial exca- vation	N	Buggeln & Chandler
BC-56	1941	Excavation	I-S	Reiter
BC-57	1941-42	Excavation	N	Reiter
BC-58	1947	Partial exca- vation	N	Burroughs
BC-59	1947	Excavation	N	Matthews
BC-63	1934	Excavation	N	Unknown
BC-126	1934	Excavation	I-S	Kelley
BC-26 Leyit Kin	1934-36	Excavation	C-P	Dutton
BC-8	193?	Excavation	N	Hutchinson
Shabikeschee	1927	Excavation	C-P	Roberts
Arroyo Pithouse	194?	Excavation (Salvage)	N	Reiter
BC-64A	?	Excavation	N	Vivian Hollenbeck
Three-C Site	1939	Excavation	C-P	Vivian
	1949	Excavation (2 kivas)	C-P	Vivian
Judd's Pithouse #2	1924	Excavation	C-P	N. Judd
Talus Unit #1	1933-35	Excavation	I-P	Walter & Woods
BC-236	1958	Excavation	C-S	Bradley
BC-192	1963	Excavation (Salvage)	C-S	Maxon
BC-362	1962	Excavation	C-S	Voll
BC-364	1963	Test Salvage	C-S	Bromberg

BC-288	1967	Excavation	N	Abel
Half House	1947	Excavation	C-P	Adams
BC-114	1929	Excavation	N	Shepard
BC-263	1925	Partial excavation Excavation	N N C-S	Postelwaite Postelwaite Harding & Hayes
BC-61	?	Excavation	N	Hollenbach
BC-261	1926	Excavation	N	Roberts
BC-262	1926	Excavation	N	Roberts

<u>Subject</u>	<u>Year</u>	<u>Report</u>	<u>Code</u>	<u>Author</u>
Site survey and population study	1947	Prehistoric population of Chaco Canyon	C-P	Pierson
Navajo and refugee pueblo archeology	1960	Navajo archeology of the Chacra Mesa	C-P	G. Vivian
Tree-ring dating	1959	Part II, Kin Kletso	C-P	B. Bannister
Ceramic Sequence	1927	The ceramic sequence in Chaco Canyon	C-P	F.H.H. Roberts

#### NATURAL HISTORY RESEARCH

<u>Subject</u>	<u>Year</u>	<u>Report</u>	<u>Code</u>	<u>Author</u>
Flora	1944	Ethnobotany of the Navajo	C-P	Elmore
Ecology	1972	The ecology of Chaco	C-S	K. Jones
Reptiles and amphibians		An ecological survey of the reptiles and amphibians of Chaco Canyon		K. Jones
Geology	1954	The geology of Chaco Canyon	C-P	Bryan



EXCAVATIONS BY THE CHACO CENTER

<u>Site</u>	<u>Year</u>	<u>Excavator</u>	<u>Remarks</u>
SJ 126	1972	Stanford	SE rim of Clys Canyon. A lithic site producing Archaic Period points. Extensively trenched.
116	1973	Mathews	NW rim of Clys Canyon. A lithic site producing Archaic points, scrapers and rubbing stones. Ca. two-thirds excavated.
1156	1975	Mathews	Cave on mesa at head of first rincon below Casa Chiquita. Pictographs and midden deposits attributable to BM II and Archaic Periods. Produced dart points, part of an atl-atl and textiles.
1987	1973	Schelberg	In cut-bank of Gallo Wash near hqs. Bell-shaped baking pit containing saltbush charcoal dated at 145 BC. Completely excavated.
628	1973	Truell	Marcia's Rincon. Six pithouses and six storage cists were undated but architectural style should indicate range from BM III into early P I, probably between 600 and early 700's. Ca. 80% excavated.
299(a)	1973	Loose	At tip of ridge north of Fajada Butte. Three typical BM III pithouses excavated, 2 of which were tree-ring and/or archeo.-mag. dated in early 600's. Several storage cists in assoc. An unlined early P II kiva w/burials probably assoc. w/298 just up the ridge. W/site 299(b) it was ca. 90% dug.
423	1973	Windes	Mesa above Penasco Blanco. BM III village where a great kiva and a pithouse were tree-ring dated at circa AD 500. A large arc-shaped P III shrine also dug. Site ca. 15% excavated.
1659	1973	Thrift	Shabikeshchee. Two of Robert's undug pithouses excavated (in part) and yielded dates around 537.
721	1973	Windes	Near mouth of Heritos Rincon. Two BM III pithouses with assoc. cists. A P III kiva, lined w/ masonry but probably not completed was probably assoc. w/ nearby pueblo. Several baking pits were post-BM III. Completely excavated.

299(b)	1974	Windes	Four adobe-jacal storerooms fronted by 2 open ramadas and unlined proto-kiva were undated but were typical of early P I. Ca. 700-725. W/ 299(a) site 90% excavated.
724	1974	Windes	Near mouth of Weritos Rincon. Six P I storerooms fronted by 2 ramadas and a proto-kiva. No dates but trait assemblage suggest AD 700-750. 80 % excavated.
SJ 1360	1974	Morrison	N foot of Fajada Butte. Complex site where an arc of P I rooms were overlaid (in part) by a series of adobe and masonry rooms in P II. One of two unlined P I proto-kivas was still in use, with remodelling, in early P II. 75% excavated.
SJ 627	1974-5	Truell	Marcia's Rincon. Complex site where a small P I jacal house had a masonry and adobe structure superimposed in P II. A P I proto-kiva was remodelled in early P II. A masonry kiva was build in P III, when a few rooms were evidently still occupied. Ca. 80% excavated.
SJ 626	1975	Windes	Ridge S of Marcia's Rincon. P I village. Test trench only.
Mc 184	1975	Windes	East of road 7 miles S of monument. P I village. Limited test only.
SJ 629	1975	Windes	Marcia's Rincon. Early P II house. Continuing excavation.
SJ 630	1975	Powers	Marcia's Rincon. P III house. Limited test prior to anticipated excavation.
SJ 410	1974	Loose	Penasco Blanco. Roadways S and E of pueblo. Extensive tests.
SJ 1928	1974	Loose	Chetro Ketl fields. Test trenches through bordered garden plots.
SJ 387	1974	Windes	Pueblo Bonito. Five rectangular masonry fire boxes or ovens below Hillside Ruin. Completely re-excavated.
SJ 389	1974	Loose	Pueblo Alto. Gate and walls NE of House-block. Tested.
SJ 389	1972	Gumerman	Pueblo Alto. Test trenches in roads north of the houseblock.

SJ 1118	1973	Mathews	NW rim of Clys Canyon. A rock quarry. 50 % excavated.
SJ 1010	1975	Lyons	On Pictured Cliff Mesa N. of park. An esoteric site connected w/ road system. Tested only.
SJ 1088	1975	Windes	West end of West Mesa. P III ceremonial site or shrine. Tested.
Sj 692, 866, 919, 1419, 1505, 1533, 1565, 1572, 1660, 1976	1974	Windes	19 "stone circles" at ten sites on benches and the rim above the canyon--all but one were on the N side. Tested and/or excavated.
SJ 389, 390	1976	Judge/ Windes	Pueblo Alto, "Rabbit Ruin." Stripping and capping of walls in room blocks to determine site plan. Excavation of 2 rooms at Alto.
SJ 1613	1975	Brugge	Bench on Chacra Mesa across from Wijiji. Eight hogans excavated and two more tested. Late 18th century Navajo.

## APPENDIX H

### Bibliography

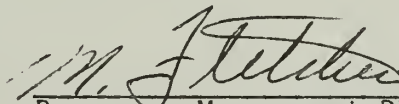
## BIBLIOGRAPHY

An exhaustive, computerized bibliography ("Interdisciplinary Bibliography, Chaco Canyon Region, New Mexico") of all known published and unpublished references to Chaco Canyon is available at the Chaco Center and at the National Park Service Southwest Region Office, Santa Fe, New Mexico.



ANNUAL REVIEW, CHANGES AND DATES

The Resources Management Plan will be reviewed annually by the Superintendent and the Regional Resource Management Plan Coordinator. Necessary changes will be initiated at the park area for approval by the General Superintendent and the Regional Director.



Resources Management Plan  
Coordinator

11/1/77

Date

## APPENDIX I

Annual Review, Changes and Dates



