DOLORES ARCHAEOLOGICAL PROGRAM TECHNICAL REPORTS

Report Number: DAP-058

Fieldwork and Systematics

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Allen E. Kane

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David A. Breternitz, Senior Principal Investigator

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PREFACE

"Fieldwork and Systematics" is an interim report that describes the status of Dolores Archaeological Program fieldwork efforts and provides an update on the program's interpretive framework. Although this document is included in the 1980 Dolores Archaeological Program report series and is intended to reflect the status of the program at the end of the 1980 field season, some sections, particularly those that pertain to spatial systematics, reflect a post-1980 point of view. Concepts that have been formulated or modified since 1980 are presented; one of the main purposes of this report is the documentation of these changes to promote the consistent use of terms in all project reports.

Portions of the discussion of 1980 fieldwork are adapted from an earlier "letter report" submitted to the Bureau of Reclamation by the Dolores Archaeological Program staff on 24 March 1981.

ABSTRACT

The University of Colorado and its subcontractor, Washington State University, completed the third year of Dolores Archaeological Program fieldwork in 1980. During the first three seasons of work, the research approach was adapted to meet the changing requirements of a program with a large and complex data base, and modifications of the approach were documented in a series of program reports. Also during this period, program systematics (the spatial and temporal systems and the site typology) were reviewed and modified, and different dating methods were employed and evaluated. Specific fieldwork programs during 1980 included inventory of areas to be impacted by construction or related activities, probability survey to gain more comprehensive information concerning areas not included in the inventory survey, magnetometer survey of selected sites, and excavation of potentially impacted sites. The latter program included intensive investigation of 14 sites and testing of 24 other sites.

INTRODUCTION

From 1978 through 1980, the University of Colorado conducted fieldwork, analysis, and report preparation necessary for successful completion of the Dolores Project Cultural Resources Mitigation Program, an archaeological data recovery effort sponsored by the Bureau of Reclamation. The goal of the DAP (Dolores Archaeological Program) is to alleviate impacts on cultural resources resulting from construction and operation of the dam, reservoir, and water distribution system centered on the Dolores River in southwestern Colorado (fig. 1). During the 1978, 1979, and 1980 field seasons, the university and its subcontractor, Washington State University, conducted fieldwork in priority impact areas (usually construction locations) as determined by the Bureau of Reclamation. By the conclusion of the 1980 season, the university had completed approximately two-thirds of the fieldwork necessary to meet the goal of the first six years of the program; that is, investigation of sites in the main impact areas, including the damsite itself, the reservoir or pool area, borrow areas, recreation areas, and access roads.

The practical rationale for conducting fieldwork is that the construction scheduled for the river valley and surrounding areas will destroy a significant portion of the public cultural heritage. The most effective and worthwhile means of mitigating these destructive impacts is through a comprehensive fieldwork program linked to a research design that addresses the research potential of the affected sites. The preliminary research design included in the original university proposal (Breternitz and Kane 1978) has been refined; the result is a comprehensive document that reflects the strengths of the potential data base of the Dolores

type, and row column totals should indicate the strength of that particular phase unit.

To more accurately assess the archaeological resource base, the DAP has developed a complementary concept: the FSE (full site equivalency) (Knudson et al. 1981:43-44). Because the size and complexity of DAP sites vary, it is often misleading to describe the archaeological resource in terms of numbers of sites. For example, it might be stated that 31 of 93 sites (33 percent) in a particular impact area were excavated during a mitigation program. The casual reader might assume that a high percentage of the resource had been investigated and that the program was successful in mitigating scheduled impacts, when, in fact, that might not be the case. The excavations might have been conducted only at small limited activity sites, or the excavations might have been confined to small portions of large sites, leaving the bulk unexcavated. Thus, the true recovery rate might be 1 or 2 percent rather than 33 percent.

The FSE concept allows for a true estimate of the potential resource and of the adequacy of the recovered sample. FSE is an expression of potential research or excavation effort in terms of estimated labor required to completely investigate the site (Knudson et al. 1981:43). The labor unit employed by the DAP staff is the crew-week: this is the amount of labor expended by a 10-person crew during a 5-day work-week (400 person-hours). For nonarchitectural sites, FSE estimates are based solely on size; the baseline estimate is that nonarchitectural sites with surface areas of less than 2000 m^2 require approximately two crew-weeks for full investigation (FSE = 2). Sites of 2000 to 5000 m^2 necessitate three crew-weeks for full investigation and larger sites require an additional crew-week for each additional 5000 m^2 of area. Architectural sites are

characterized by increased contextual and stratigraphic complexity and greater densities of cultural materials; consequently, the baseline labor estimate for small architectural sites is 10 crew-weeks. For larger architectural sites, increments of five crew-weeks are added for estimated additional roomsuites or pitstructures. These estimates are based on recorded surface architecture, approximate site size and layout, and suspected occupational longevity (Knudson et al. 1981:43-44).

Dolores Archaeological Program field investigations involve a variety of techniques, such as magnetometer survey, limited testing, and full excavation. Using the FSE as an objective standard for measuring the total archaeological resource, the DAP can efficiently distribute the workload to adequately sample the variety of sites in the project area. Implementation of the FSE measurement in describing sample populations permits objective assessment of the archaeological resource and provides an equalizing factor that can minimize sampling bias.

Development of the Field Manuals

A primary consideration when developing field programs for large-scale archaeological mitigation efforts is data comparability; the types of data recorded for all excavated sites must be comparable, just as similar information must be recorded for all sites identified during survey. The DAP relies on the use of computer data files rather than on manual compilation and analysis of information for inclusion in site and survey reports; therefore, the conventions employed to complete the computer forms must be uniform and must be consistently applied. The most efficient means of accommodating this need has been to develop manuals that present standard procedures. The need for comparability was one of

the main justifications for the development of separate manuals for excavation and for inventory survey.

The "Dolores Archaeological Program Field Manual" (Kane, Hewitt et al. 1981) was developed after the 1978 field season. This first season served as a test for excavation, sample collecting, and recording procedures; a number of different approaches were implemented in the field and evaluated. Seminars were held in the fall of 1978 to determine which procedures were most effective in terms of labor efficiency and information return and to present the standardized procedures in a field manual. It was agreed that the conventions set forth in the manual would form the bases for continued discussion of field techniques, and that modifications and improvements would be incorporated in a later version of the manual; that is, the manual was viewed as a flexible tool that could be changed to meet the demands of changing data recovery priorities and available labor. Individuals were then assigned to draft the various chapters. The major headings included in the 1978-1980 version of the field manual (Kane, Hewitt et al. 1981) were as follows: (1) Preliminary Operations, (2) Records, (3) Sampling Techniques, (4) Mapping Procedures, (5) Special Excavation Procedures, (6) Administration, and (7) Recovery of Materials. Also included in this version of the manual were a glossary of field terms and an appendix presenting project standards for stratigraphic description.

The field manual was used during the 1979 and 1980 field seasons. Experience with applying the standard techniques presented in the document resulted in many proposed modifications. In response to the need for procedural changes, the project staff is currently undertaking a major

revision of the field manual; the interim document, which itself is still in the process of being revised, is called the "Dolores Archaeological Program Excavation Manual" (Kane and Robinson 1982). This manual reflects new emphases in project data collection.

Another major task completed by the field and laboratory staff from 1978 to 1979 was the development and implementation of a set of standard field forms. The set included forms to record information regarding field provenience, architecture, dating and botanical samples, and field photography; forms for describing the synthetic intrasite units included in the DAP spatial system were also devised. Dolores Archaeological Program field forms usually include space or spaces for verbal descriptions and summaries and a series of boxes where descriptions and measurements are recorded according to standard computer codes. Additional space is provided for a plan or profile map and a sketch. Thus, each DAP field form is a package consisting of the form itself, a list of standard numerical codes with corresponding verbal descriptions, and guidelines for completing the form and using the codes. A comprehensive discussion of the set of forms, coding, and guidelines is presented in the excavation manual (Kane and Robinson 1982); a list of DAP field forms and a description of each type of form are presented in table 2.

The DAP staff has also developed a survey field manual, again based on fieldwork conducted in 1978 and 1979 (Bohnenkamp et al. 1982). The survey manual contains three major sections. The first describes the personnel assigned to a survey field crew and discusses the responsibilities of the different crew members. The second details the steps necessary to prepare for fieldwork, including assembly of the survey

Table 2. Standard DAP field forms

Form	Description
Activities Recording	Provides for description of activity areas; provenience, internally associated artifacts and features, externally associated use areas, and other activity areas are recorded
Architecture Form - Structure Description	Provides for architectural description of structures; provenience, dimensions, shape, wall dimensions and materials, roof materials, and evidence of remodeling are recorded
Architecture Form - Integration and Inference	Provides for an interpretation of structures; external associations, dates of use, construction history, remodeling, functions, and postabandonment processes are recorded
Burial	Provides for recording human and animal burial information; provenience, grave characteristics, post-use disturbance, and physical characteristics of the skeletal remains are recorded.
Feature	Provides for recording of small architectural furniture or "features"; provenience, specimens recovered, architectural form and construction, and associations are recorded
Field Inventory	Provides a record of all materials and samples that are transferred from the field to the laboratory
Household Cluster	Provides for recording of dwelling units; internal associations, description of activities, temporal placement, and external associations are recorded
Photographic	Provides for recording of field photographs, including provenience information and description of photographic content
Point Location Catalog	Provides for recording of point-located artifacts
Field Provenience Description	Provides for recording field provenience, including location, type of provenience, mode of collection, and materials collected

Table 2. Standard DAP field forms--Continued

Form	Description
Sample Catalog	Provides for recording of all samples collected, including dating and botanical samples
Stratigraphic Description	Provides for description and recording of stratigraphic profiles
Surface Description	Provides for description of surfaces; provenience, dimensions, construction, samples recovered, point locations, features, and activity areas are recorded

equipment kit and a literature review to identify previous pertinent work in the area to be surveyed. The third section contains a presentation of standards for field operations; this section provides instructions for examining the area to be surveyed, for completing the project site form and site map, for conducting artifact collection, and for photographically recording the site. Also included are standard safety precautions and first aid procedures for minor injuries. This version of the survey manual is currently planned to serve as a basic guideline for survey operations for the remainder of the project.

DAP SYSTEMATICS: REVIEW AND MODIFICATION

Development of standard project terminology was early regarded as a necessity by the DAP staff. Therefore, in 1978 and 1979, standard spatial, temporal, and functional systematics were developed, and the articulation between the various units that comprised each system was outlined. The development of standard systematics has facilitated the recording of comparable survey and excavation data, has permitted staff discussion of spatial relationships and culture process, and has encouraged the presentation of comparable information in DAP site reports. Each of the DAP systems is a model based on ethnographic and archaeological analogies, inferences from pertinent project excavation and survey data, and logical derivations regarding the "fit" between the project data and the more general analogies. It was intended that these models would be expanded and modified based on the availability of additional project data and pertinent literature. The original description of the series is presented by Kane (1981b); in the following sections the series will be summarized, and modifications that have been developed since 1979 will be presented.[2]

DAP Spatial Systematics

Dolores Archaeological Program research is focused on lifeways and process in prehistoric Dolores communities; the DAP spatial series consists of hierarchical units at the intracommunity and intercommunity levels.

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[2]Some of the concepts presented in this section (e.g., dwelling unit, roomblock cluster, roomblock unit) are being introduced for the first time, although some of the evidence upon which they are based became available as early as the fall of 1980. It should be noted that in this report the new terms are being applied retroactively to sites investigated in 1980 (refer to "Summary of Fieldwork"), although these terms do not appear in most of the site reports cited in this document.

Definitions of units are based on social space; that is, the space and facilities used by human groups for activities (domestic, economic, and integrative) necessary for livelihood. Intracommunity units recognized by the DAP were based on the use-of-space model developed by Flannery (ed. 1976) in his study of Formative communities in Mesoamerica; the key unit at the intracommunity level is the household. The definitions of intercommunity units were based on results of earlier efforts to devise regional spatial systematics for southwestern Colorado (cf. Bullard 1962; Lehmer 1971; Gillespie 1976). Because it is difficult to model prehistoric organization and use of space at an intercommunity level, intercommunity units are administrative divisions that have been defined on the basis of environmental characteristics rather than on models of prehistoric behavior. Intracommunity and intercommunity units are summarized in the following section.

Intracommunity Units

Activity area. According to Kane (1981b:34), an activity area is a location where an activity or series of activities was performed. It is often a location where an individual household member carried out a task, but it is possible that an intrahousehold task group comprised of several individuals, or individuals representing several different households used the activity area. The activity area concept is basically unchanged since 1978-1979.

Use area. A use area is defined as a space used by individuals and task groups for multiple activities; use areas consist of several or even numerous activity areas (Kane 1981b:34) and are often either enclosed spaces or spaces defined by the limits of surfaces or artifact scatters. Activities performed within use areas are usually functionally related and

reflect the general purpose of the group in using that space (for example, storage, processing of animal and plant materials, domestic tasks, refuse discard, or group integration). Houses usually consist of several use areas where maintenance, resource processing, and other domestic activities were conducted; this is a modification of the original concept of use area as defined by Kane (1981b:37).

Dwelling unit. This is a new DAP term; it refers to the architectural component of a household cluster (refer to following discussion). In the original DAP system, the specific terms "roomsuite" or "pithouse" were usually used to describe such components. The dwelling unit represents the central architectural facilities used by a family unit or household. In the DAP area, the types of dwelling units used by the Anasazi changed through time. During the early part of the Dolores area Anasazi sequence (Tres Bobos and Sagehill Subphases [A.D. 600-780]), and perhaps during the Grass Mesa Subphase (A.D. 880-925), dwelling units consisted of domestic pithouses. During the middle portion of the sequence (Dos Casas and Periman Subphases [A.D. 760-900]), dwelling units consisted of roomsuites (one front living room and one or two rear storage rooms) in surface pueblos. There were overlap periods (A.D. 760-780 and A.D. 880-900) during which both forms were present. Dwelling units in their classic forms are not as easily identifiable in the DAP archaeological record after A.D. 900 (i.e., the Cline Subphase, the last part of the Grass Mesa Subphase, and the Sundial Phase), perhaps indicating changes in basic organization at the household level.

Dwelling units incorporate sets of use areas and activity areas that reflect domestic activities. These include facilities and space for the following activities: raw material processing (animal, plant, and miner-

al); pottery manufacture; stone and bone tool manufacture and maintenance; food preparation, cooking, and eating; heating and ventilation; sleeping; and temporary and permanent storage of tools and foodstuffs. Spatial patterning of these activities within the dwelling units is noted; however, some temporal and spatial variation is also observed. For example, rear rooms in Dos Casas and Periman Subphase roomsuite dwelling units were used primarily for storage, but perhaps occasionally served as tool maintenance and mealing areas as well (Wolf 1983).

Household cluster and interhousehold cluster. Because the household cluster and interhousehold cluster concepts are closely related, they will be discussed together in this section. As originally defined for the DAP (Kane 1981b:37), a household cluster referred to all space, bounded and unbounded, used by a household. This definition was based on the household cluster concept as presented by Flannery (1976a:5) and Winter (1976:25-31) in their study of Formative Mesoamerica. As originally presented by Kane (1981b:38), an interhousehold cluster consisted of a "spatially or otherwise related grouping of household clusters." The DAP interhousehold was conceived as being similar in content and organization to what Flannery terms the "courtyard group"; that is, "groups of 3 to 4 households, all sharing the same courtyard or open work space" (1976b:75).

The Formative Mesoamerican households investigated by Flannery and his coworkers seem to closely resemble "independent households" as defined by Wilk (1981:9) based on his work among the Kekchi Maya. "Independent households" usually are made up of a nuclear family (a married couple and their children); an odd relative, such as a widowed grandparent, might be absorbed into the group as well. The members of this unit are responsible

for and perform the activities necessary for meeting the basic survival needs of the household. These activities can be broadly grouped into functional categories, including production, distribution, transmission, and reproduction (Wilk and Rathje 1982:621-631). The household clusters and the spatial patterning of household clusters in the Formative communities investigated by Flannery are suggestive of independent household organization. The dwelling units (simple one-room, thatched roof, wattle and daub houses) possess facilities that suggest that they were used by nuclear families. The dwelling units are clustered in loosely arranged courtyard groups (Flannery 1976b:75) perhaps reflective of formal organization above the household level; however, no shared structures or facilities were documented by Flannery. This suggests that most household functions were being performed by the nuclear family.

Wilk (1981:9-11) also describes "household clusters," although his use of the term differs from the concept defined by Flannery and used by the DAP. Wilk's "household clusters" consist of several family units that usually are related through one of the parents (e.g., a married man and his married sons, two sisters and their husbands); each family lives in a separate dwelling unit. Household tasks (production, distribution, transmission, and reproduction) are generally shared by the family units (Wilk 1981:6-11).

The Flannery household cluster model (Wilk's "independent household" model) was used by the DAP in the initial years of the project because it appeared to provide an appropriate framework for describing and explaining DAP architectural data. After reviewing the data recovered during the 1978 through 1980 field seasons, it appears that the Flannery model is valid for interpreting early DAP architecture (Tres Bobos and Sagehill Subphases

[A.D. 600-780]), and perhaps for interpreting some units assigned to the Grass Mesa Subphase (A.D. 880-925). However, for sites assigned to the Dos Casas, Periman, or Cline Subphases (A.D. 760-975), it appears that Wilk's "household cluster" model may provide a more appropriate explanatory framework. (Refer to the discussion of DAP temporal systematics in this report for an explanation of the DAP phase scheme.) This is based on the presence, at sites that date to the A.D. 760-975 period, of architectural facilities that apparently were shared by more than one nuclear family. These facilities include storage rooms, processing rooms, and domestic/integrative pitstructures. This apparent shift in basic social and economic organization was not clearly recognized until after examination of the field data from the 1980 season. Field personnel and other project staff involved with analysis of 1978 through 1980 excavation data based their interpretations on the assumption that Flannery's household model (Wilk's "independent household") was valid for the entire Anasazi sequence; consequently, use of the terms "household cluster" and "interhousehold cluster" in project reports reflects the original DAP concepts. The DAP staff has made a decision to continue use of these two terms in their original meaning to preserve continuity and consistency in descriptive reporting: "household" refers to the social group that is responsible for most domestic functions and that uses a dwelling unit and extramural space for these purposes; "interhousehold" refers to a group of cooperating households that usually share a pitstructure and extra dwelling unit space within a roomblock. During some periods of the Dolores sequence, an interhousehold may be equivalent to Wilk's "household cluster." Specific definitions for the spatial units that correspond to the social units are as follows.

Household cluster: In DAP descriptive site reports, "household cluster" is synonymous with the space used by a household or a nuclear family; it includes a dwelling unit and surrounding outside use space. During the Tres Bobos and Sagehill Subphases, and perhaps during the Grass Mesa Subphase, a household cluster represents the space used by an independent household; it consists of a pithouse dwelling unit, outdoor work areas, small storage rooms or cists, and a refuse area. During the Dos Casas and Periman Subphases, household clusters consist of roomsuite dwelling units and extramural work areas representing a household cooperating in a larger group (Wilk's "household cluster").

Interhousehold cluster: This unit represents the space used by a group of cooperating households. The space may include one or several dwelling units, processing rooms and extrahousehold storage rooms, a plaza area, a shared pitstructure (termed a "protokiva"), peripheral extramural work areas, and a midden.

Roomblock unit or roomblock cluster. This is a new spatial unit that refers to aggregated groups of interhousehold clusters. The typical arrangement of these clusters during the Dos Casas, Periman, and Cline Subphases consists of from 2 to 25 dwelling units, arranged linearly in a single roomblock, and 2 to 8 pitstructures located in front of the roomblock. These roomblock clusters can be characterized as small "annexes" (two to seven dwelling units and two to three pitstructures, which together constitute two to three interhousehold clusters) or larger "central units" (10 or more dwelling units and 5 to 8 pitstructures, which together constitute 4 to 8 interhousehold clusters). The central units are sometimes associated with oversized pitstructures that might have served as integrative structures for the entire roomblock unit.

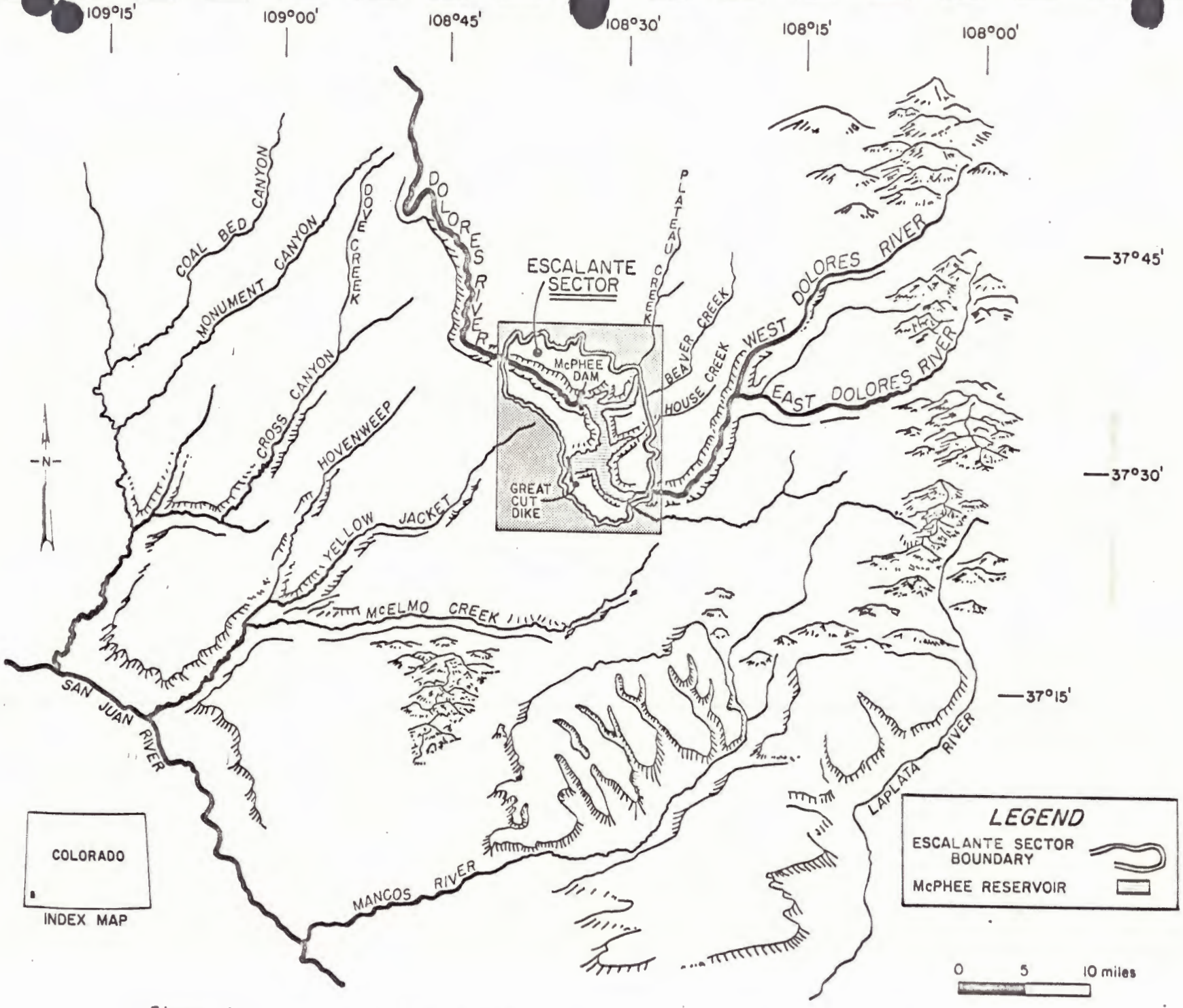

Figure 1. Location of the Dolores Project area in southwestern Colorado.

Project (Kane, Lipe et al. 1981). This research design has been combined with an implementation design which articulates fieldwork and research concerns; together, the research and implementation designs constitute the basic planning document, or mitigation design, for the project (Knudson et al. 1981).

In this report, fieldwork approaches adopted by the DAP since the initial 1978 effort are discussed. In addition, DAP systematics (the spatial and temporal series and the site typology) are reviewed, and modifications that were made after examination of the 1979 and 1980 field data are discussed. An evaluation of dating methods employed by the DAP and a summary of fieldwork conducted during 1980 are also presented.

PROGRAM APPROACHES TO FIELDWORK

Since the inception of the project in 1978, the DAP staff has devoted much effort to developing a comprehensive and coordinated approach to fieldwork. By the spring of 1981, a series of documents had been developed that presented this approach; this series represented current program policy, and the stances contained therein were expected to remain static for the remainder of the project. These documents are the "Dolores Project Cultural Resources Mitigation Design" (Knudson et al. 1981), the master fieldwork plan for 1982-1983 (Kane 1981a), the excavation manual (Kane and Robinson 1982), and the survey field manual (Bohnenkamp et al. 1982).

The mitigation design is the basic planning document for the project and includes a research design and an implementation design. The former is a set of general questions about the behavior of prehistoric human groups--questions that might be addressed by the data obtained through fieldwork and analysis. The ultimate goal of the DAP is to answer those questions that are most amenable to investigation using the project data base; a comprehensive treatment is not feasible (Knudson et al. 1981:4-5). The implementation design is a general strategy for determining the amount of fieldwork necessary for addressing the research design questions and for assessing sample size adequacy (Knudson et al. 1981:41). Based on the approach described in this general planning document, and based on survey and mitigation priorities established by the Bureau of Reclamation, specific field plans have been developed.

The master fieldwork plan for 1982-1983 (Kane 1981a) is a site-specific schedule of operations and accompanying rationale for the

remaining project fieldwork. The plan was developed after an assessment of the 1978-1980 field programs and the identification of strong and weak points in the data base. The research design problems were evaluated in light of current applicable data and the potential for recovering additional data. The conventions set forth in the implementation design were used as guidelines in formulating the fieldwork plan.

The excavation and survey manuals present specific project field investigation and documentation procedures. These procedures are designed to provide guidelines in collecting the site- and area-specific data necessary to address the research design questions.

Development of the Research Design

Development of this document was a difficult and time-consuming task. The original project research design was included in the University of Colorado proposal to the Bureau of Reclamation (Breternitz and Kane 1978). As no comprehensive survey information was available to prospective bidders, the original design was merely a framework of general questions relevant to then-current interests in Southwestern archaeology. Two of the highest priorities during the first years of the project, therefore, were to expand and better define the research design questions according to the known survey data and to provide a scientific framework for the study of the archaeological resources of the project area. To this end, week-long seminars were held in the fall of 1978 and in the spring of 1979. The approximate current form of the design was completed after additional meetings in the summer and fall of 1979. The revised document is entitled the "Dolores Archaeological Program Research Design" (Kane, Lipe et al. 1981) and consists of five major problem domains; these are (1) Economy and

Adaptation, (2) Paleodemography, (3) Social Organization, (4) Foreign Interactions, and (5) Culture Process.[1]

Each major problem domain serves as a logical structure of inquiry. The initial procedures in addressing each question are to conduct a literature search and to develop appropriate models and specific test implications. These hypotheses are then tested with the Dolores field and laboratory data, evaluated, and revised on the basis of the results. The model is expanded to the study area as a whole (the Escalante Sector), based on probability survey results and statistical inference. The final step is synthesis of the results, including assessment of the adequacy of the models and grouping/comparison of models where appropriate.

During the spring and summer of 1981, the research design was assessed after completion of the interim synthetic report (Dolores Archaeological Program 1981). The background work necessary for production of this report spotlighted the strengths and weaknesses of the accumulated data base. After an evaluation based on this document, on fiscal considerations, and on the results of 1978 through 1980 fieldwork, it became apparent that the research design needed revision or supplementation. The results of the 1978-1980 fieldwork programs demonstrated that most of the archaeoogical resources in the project area date to the A.D. 750-950 period (fig. 2). This 200-year span apparently represents a growth-climax-decline cycle of Anasazi culture that is well represented at habitation, seasonal, and limited activity sites. Archaeological resources that date to outside this 200-year span are not well represented. Assessment of the data base

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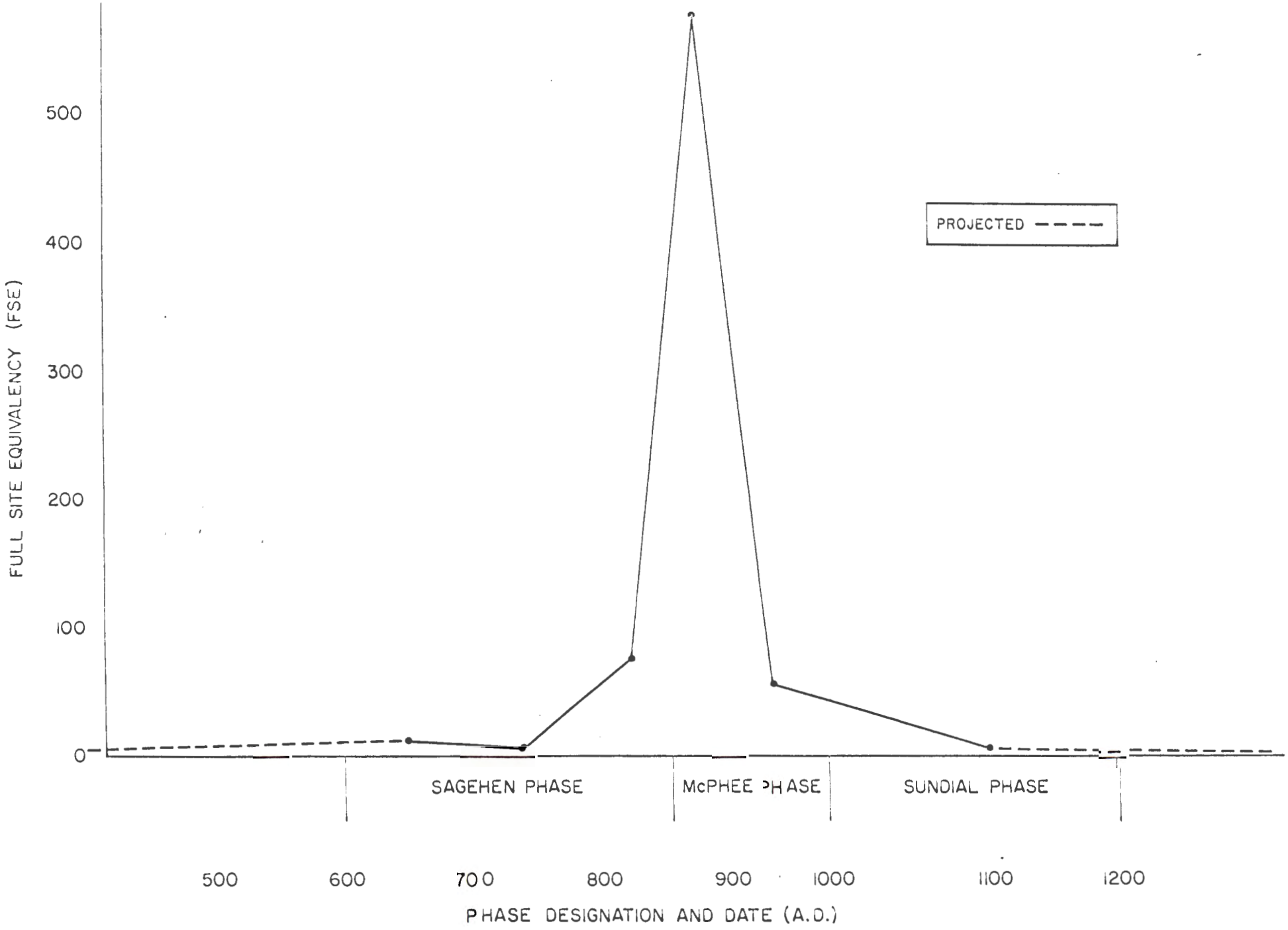
[1]The specific names of the five problem domains have been slightly modified since their initial presentation in Kane, Lipe et al. (1981). Refer to Kane (1981b) for a listing of the new titles.

Figure 2. Quantified expression of the archaeological resources of the Dolores Project area, by time period. Estimate is based on total FSE per phase, divided by temporal length of phase. The strength of the data base in in the A.D. 750-950 period.


FULL SITE EQUIVALENCY (FSE)
500
400
300
200
100
0
PROJECTED
SAGEHEN PHASE
McPHEE PHASE
SUNDIAL PHASE
500
600
700
800
900
1000
1100
1200
PHASE DESIGNATION AND DATE (A.D.)

also revealed weaknesses in some problem-specific data categories such as human skeletal remains and dating samples for nonarchitectural sites.

Given the nonnormative project approach to investigation and the emphasis on recovery of statistically adequate data samples, it was decided to supplement the general research design with more limited and directed research goals. Because the period for which the resource base appeared to be the strongest apparently represented a period of growth and decline, it was decided that explanation of cultural process should be a central theme in the proposed supplement. To this end, during the spring and summer of 1981, the project staff began to develop processual models of prehistoric Dolores communities for the A.D. 650-950 period. The intent of this initial effort was to identify primary variables of culture change; to clarify intervariable relationships; to generate test implications; and to test the models, which entailed collection of field data. A preliminary version of the model was included in the program's interim synthetic report (Lipe 1981). The official staff viewpoint in the summer of 1981 was that the modeling effort would stand as the main synthetic effort of the program and that the results of data analysis necessary for testing and refinement of the model would be used in an attempt to address the concerns of the general research design. Data recovery efforts in the field would be affected by requirements associated with the modeling effort.

Development of the Implementation Design

The implementation design (Knudson et al. 1981), the section of the mitigation design that describes project fieldwork and reporting procedures, has undergone refinement and elaboration since 1978. The goal of

the initial season of fieldwork was to determine the time periods represented at project area sites and to gather data regarding architecture and portable material culture at these sites (Kane 1981b). This approach was necessary in order to focus the original research design and project goals included in the proposal by the University of Colorado. In 1979, this initial investigation was completed and more detailed investigation of portions of the field data base was begun. The latter work included surface collection and test excavation at Grass Mesa Village (Site 5MT23)--one of the most significant archaeological resources in the project area--and excavation in an area west of the river valley, at a group of habitation sites thought to represent an early Anasazi dispersed community (the West Sagehen Neighborhood [Kane 1981b]). After the 1979 field season, the results of the first two years of work were evaluated and new concepts were developed to help bridge the gap between fieldwork and the research design. Although inventory survey in the McPhee Reservoir pool area was not completed until the 1980 season, it was still possible to construct a preliminary temporal-functional matrix for this important project feature and for the borrow areas adjacent to the pool. Survey information was compiled and organized in a manner that permitted evaluation of the total resource base in terms of research potential (table 1). In table 1, DAP matrices are ordered vertically by temporal or cultural categories and horizontally by functional (site-type) categories. Sites are placed in the appropriate cell and the total number of sites assigned to each cell should approximate the research potential of that particular category. The total number of sites per vertical column should be an indication of the distribution of that particular functional site

Table 1. DAP temporal-functional matrix for the McP[illegible] Reservoir pool area*

Formal assignment \ Functional assignment	Limited activity site	Seasonal site	Small habitation	Large habitation	Total
Indeterminate aceramic	Sites: 39 FSE: 174	Sites: 3 FSE: 14	Sites: 0 FSE: 0	Sites: 0 FSE: 0	Sites: 42 FSE: 188
Indeterminate with ceramics	Sites: 26 FSE: 95	Sites: 2 FSE: 8	Sites: 0 FSE: 0	Sites: 0 FSE: 0	Sites: 28 FSE: 103
Archaic or Basketmaker II	Sites: 2 FSE: 3	Sites: 12 FSE: 48	Sites: 0 FSE: 0	Sites: 0 FSE: 0	Sites: 14 FSE: 51
Tres Lobos Subphase	Sites: 0 FSE: 0	Sites: 0 FSE: 0	Sites: 10 FSE: 108	Sites: 0 FSE: 0	Sites: 10 FSE: 108
Sagehill Subphase	Sites: 3 FSE: 8	Sites: 0 FSE: 0	Sites: 7 FSE: 69	Sites: 0 FSE: 0	Sites: 10 FSE: 77
Dos Casas Subphase	Sites: 4 FSE: 12	Sites: 0 FSE: 0	Sites: 41 FSE: 668	Sites: 3 FSE: 55	Sites: 48 FSE: 735
Subtotal	Sites: 7 FSE: 20	Sites: 0 FSE: 0	Sites: 58 FSE: 845	Sites: 3 FSE: 55	Sites: 68 FSE: 920
Perican Subphase	Sites: 4 FSE: 8	Sites: 11 FSE: 47	Sites: 27 FSE: 986	Sites: 7 FSE: 1,980	Sites: 49 FSE: 3,021
Cline Subphase	Sites: 5 FSE: 13	Sites: 1 FSE: 3	Sites: 10 FSE: 217	Sites: 1 FSE: 45	Sites: 17 FSE: 278
Grass Mesa Subphase	Sites: 4 FSE: 10	Sites: 2 FSE: 7	Sites: 1 FSE: 14	Sites: 1 FSE: 56	Sites: 8 FSE: 87
Subtotal	Sites: 13 FSE: 31	Sites: 14 FSE: 57	Sites: 38 FSE: 1,217	Sites: 9 FSE: 2,081	Sites: 74 FSE: 3,386
Marshview Subphase	Sites: 14 FSE: 39	Sites: 8 FSE: 26	Sites: 3 FSE: 34	Sites: 0 FSE: 0	Sites: 25 FSE: 99
Escalante Subphase	Sites: 0 FSE: 0	Sites: 0 FSE: 0	Sites: 1 FSE: 4	Sites: 0 FSE: 0	Sites: 1 FSE: 4
Subtotal	Sites: 14 FSE: 39	Sites: 8 FSE: 26	Sites: 4 FSE: 38	Sites: 0 FSE: 0	Sites: 26 FSE: 103
Shoshonean/ Early Historic	Sites: 2 FSE: 4	Sites: 2 FSE: 4	Sites: 0 FSE: 0	Sites: 0 FSE: 0	Sites: 4 FSE: 8
Grand total	Sites: 103 FSE: 366	Sites: 41 FSE: 157	Sites: 100 FSE: 2,100	Sites: 12 FSE: 2,136	Sites: 256 FSE: 4,759

* Adapted from Knudson et al. 1981:table 1.

NOTE: FSE - Full site equivalency; an expression of potential research or excavation effort in terms of estimated labor required to completely investigate a site. Refer to text for more detailed discussion.

Habitation. The DAP definition of habitation is virtually unchanged since its development in 1978: the habitation (or settlement) is the home base of the community and contains the majority of household or interhousehold clusters, integrative structures, and other shared use areas integral to the community cluster (Kane 1981b:38). The habitation contains domestic and integrative architecture. Dispersed communities consisting of isolated household clusters are characterized by a habitation zone or core settlement area in which the isolated household clusters are located; each individual household cluster can be considered a habitation. Aggregated communities usually consist of a large "central habitation" with multiple roomblock units, plus several "satellite" habitations of one or two roomblock units located 1 to 3 km from the central habitation.

Community cluster. The definition of community cluster is basically the same as the original DAP concept: it is the "space, facilities, and architecture normally used by a community" (Kane 1981b:38-39). Three distinct types of community clusters have been recognized in the DAP archaeological record: dispersed, dispersed/aggregated, and aggregated. A dispersed community cluster, or "neighborhood," (refer to Kane 1981b:39-44) consists of about four to eight habitations, separated by approximately 100 to 150 m, and a complement of seasonal use and limited activity sites. The constituent habitations exhibit little or no tendency toward aggregation; each habitation consists of one household cluster (or occasionally two) with only domestic facilities present. Special sites that served to integrate the various constituent sites within the dispersed community cluster probably existed but have not yet been documented in the Dolores area. Dispersed community clusters are characteristic of the A.D. 600-780 period (Tres Bobos and Sagehill Subphases of the Sagehen Phase).

In a dispersed/aggregated community cluster, also called a neighborhood, household clusters are aggregated, but interhousehold clusters usually are not. Habitations consist of one roomblock unit with two to six household clusters and one to two pitstructures. These household clusters and their shared pitstructures usually constitute one, sometimes two, interhousehold clusters. Dispersed/aggregated community clusters also contain a complementary set of seasonal and limited activity sites. Dispersed/aggregated community clusters have been documented in the DAP area at sites that date to A.D. 760-820 (early Dos Casas Subphase).

After A.D. 820, DAP community clusters can be described as "villages." These villages include central habitations consisting of 5 to 20 roomblock units (including annexes and central units), and sites located at some distance from the central habitation. The villages may contain a large pitstructure or "great kiva" that apparently served to integrate groups in the community. The distant sites include one or two roomblock unit habitations (satellites), seasonal sites (including agricultural field houses), and limited activity loci. These distant sites were used for a variety of economic and social purposes. Apparently, aggregated community clusters developed directly from dispersed/aggregated clusters as the result of internal growth and the influx of foreign groups.

Community clusters defined for the Dolores area archaeological record are listed in table 3. The relationship of dwelling units, household clusters, interhousehold clusters, roomblock units, and central habitations is shown in figure 3.

Intercommunity Units

Intercommunity units (localities, sectors, and districts) form a nested hierarchical series above the level of community. These units are

Table 3. Community clusters defined in the Dolores Project area

Community cluster*	Occupation span	Location	Excavated sites with elements assigned to the community cluster†
Dispersed and dispersed/aggregated			
West Sagehen Neighborhood	A.D. 600-780	Sagehen Flats Locality and environs; on slopes north of Sagehen Flats marsh and in river valley east of marsh	Habitation sites: 5MT4545, 5MT4614, 5MT2162 5MT2198, 5MT2192, 5MT2194, 5MT4684, 5MT2236 5MT2848, 5MT2853 Seasonal site: 5MT2844
Milhoan Neighborhood	A.D. 650(?)-820	Sagehen Flats Locality; on plateau west of river canyon, north and east of West Sagehen Neighborhood	Habitation sites: 5MT4640, 5MT4644, 5MT2854 5MT2858
Big Bend Neighborhood	A.D. 680(?)-800(?)	Dolores Locality; west of the town of Dolores, near the historic town of Big Bend	Habitation site: 5MT4613
Zwicker Neighborhood	A.D. 650-800(?)	House Creek Locality; on slopes of House Creek drainage and on highlands adjacent to drainage	None
Lucero Neighborhood	A.D. 750(?)-820(?)	Periman Locality; in river valley north of Sagehen Flats	Habitation sites: 5MT2181, 5MT2182 (Area 1), 5MT4671 (Areas 1, 4, and 7)
LeMoc Neighborhood	A.D. 700(?)-820(?)	Grass Mesa Locality; in river valley north of Lucero Neighborhood in Dry Canyon and Beaver Creek areas	Habitation sites: 5MT2151, 5MT4651, 5MT2161 5MT23, 5MT2170, 5MT2165
Marshview Neighborhood	A.D. 1000(?)-1200(?)	Sagehen Flats, Periman, Escalante, and Dolores Localities; southern portion of river valley and on western highlands	Habitation sites: 5MT4654, 5MT4541 Seasonal sites: 5MT2235, 5MT2241

Table 3. Community clusters defined in the Dolores Project area--Continued

Community cluster*	Occupation span	Location	Excavated sites with elements assigned to the community cluster†
Aggregated			
McPhee Village	A.D. 800-975	Portions of Periman, Sagehen Flats, and Dolores Localities; centered on McPhee Village proper	Habitation sites: 5MT4475, 5MT4477, 5MT4479 5MT4480, 5MT4725 Seasonal sites: 5MT2205, 5MT2203, 5MT2191 5MT4512, 5MT4682 Limited activity sites: 5MT2202, 5MT2199
May Canyon Village	A.D. 800(?)-900(?)	May Canyon Locality; on a high plateau west of river valley and north of town of Dolores	None
House Creek Village	A.D. 800(?)-900(?)	House Creek Locality; on slopes of House Creek drainage	Habitation site: 5MT2320 Seasonal site: 5MT4683
Rio Vista Village	A.D. 800(?)-920(?)	Periman Locality; centered on river valley north of McPhee community cluster	Habitation site: 5MT2182 (Areas 1,2,3, and 4) Seasonal sites: 5MT2181, 5MT4671 (Area 4)
Cline Crest Village	A.D. 800(?)-900(?)	Cline Crest Locality; on highland mesas west of river valley and north of Sagehen Flats	None
Grass Mesa Village	A.D. 800(?)-925	Grass Mesa Locality; centered on river valley and Dry Canyon and Beaver Creek drainages	Habitation sites: 5MT23 (Areas 1-8), 5MT2151, 5MT2161, 5MT2381 Seasonal sites: 5MT2160, 5MT2174
Windy Village	A.D. 800(?)-900(?)	Cline Crest Locality; on highlands south and west of river valley, north of Cline Crest Village	None

Table 3. Community clusters defined in the Dolores Project area--Continued

Community cluster*	Occupation span	Location	Excavated sites with elements assigned to the community cluster†
Lone Dome Village	A.D. 800(?)-900(?)	Willow Draw and Cabin Canyon Localities; in river valley downstream (west) of Grass Mesa Community Cluster	None
High View Village	A.D. 800(?)-950(?)	Dolores and Escalante Localities; in river valley and on western highlands south of Sagehen Flats area	None
Escalante Village	A.D. 1125-1175	Escalante and Periman Localities	Habitation site: 5MT2215
Reservoir Village	A.D. 1050-1200	Reservoir and Dolores Localities	Habitation site: 5MT4450 Seasonal or limited activity site: 5MT4447
Other			
North Marsh Band (tentative assigment)	3000(?)B.C.-A.D. 500(?) Archaic Tradition	Project area	Seasonal or limited activity sites: 5MT2199, 5MT2242, 5MT4690, 5MT2202
Dry Creek Band (tentative assignment)	A.D. 1(?)-500(?) Basketmaker II	Project area	Seasonal or limited activity site: 5MT4797
Beaver Point Band (tentative assignment)	A.D. 1700(?)-1900 protohistoric and historic use by Numic groups or late (Pueblo IV-Pueblo V) peoples	Project area	Seasonal or limited activity sites: 5MT4654, 5MT5380, 5MT5399, 5MT4541

* Neighborhoods are dispersed and dispersed/aggregated community clusters; villages are aggregated community clusters.

† Through 1982.

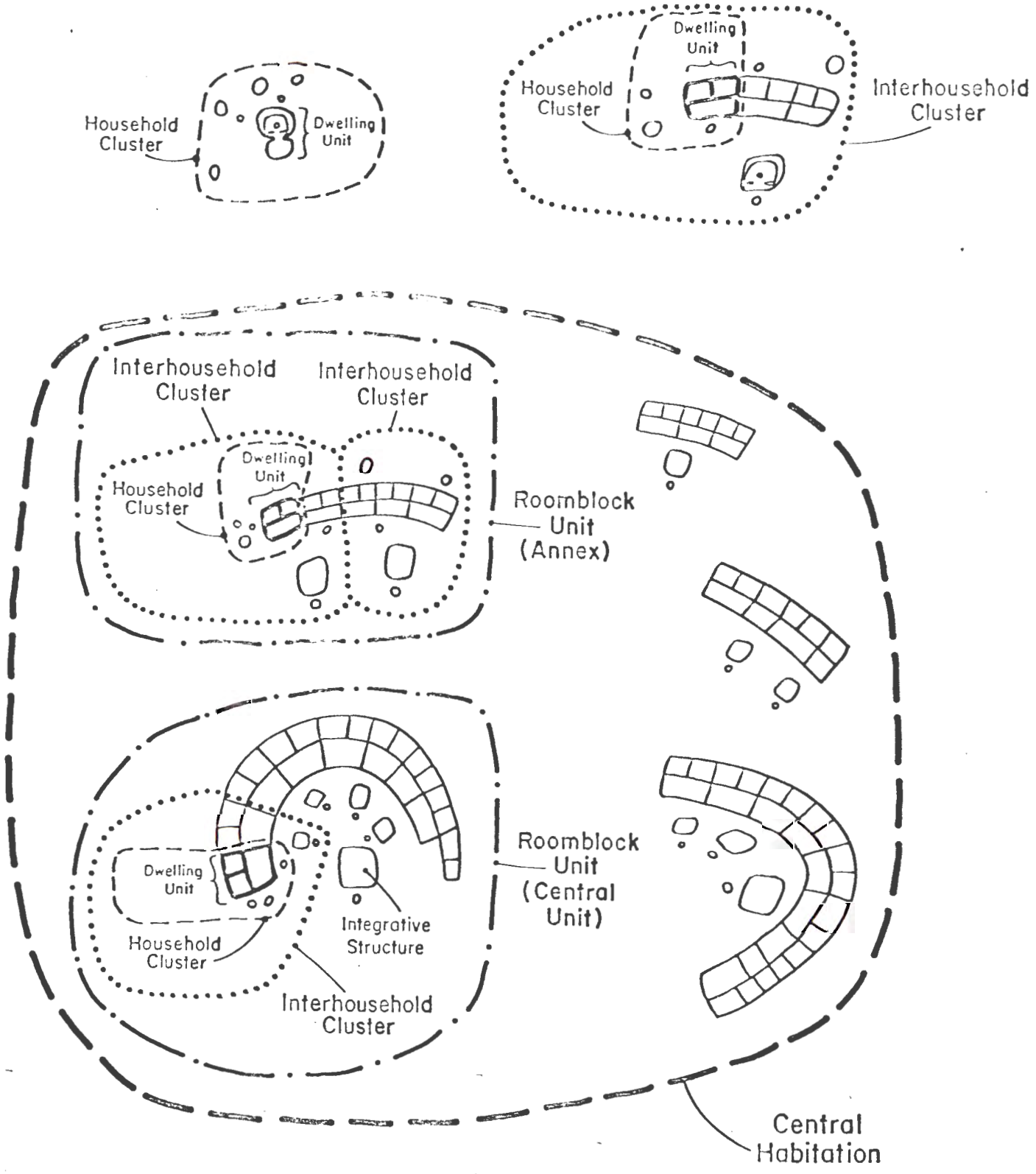


Figure 3. Relationship of major intracommunity spatial units. Top left, typical dwelling unit and household cluster during Tres Bobos and Sagehill Subphases. Top right, typical dwelling unit, household cluster and interhousehold cluster during the Dos Casas and Perican Subphases. Bottom, a typical central habitation with its constituent parts.

administrative divisions based on topographic features; they do not reflect prehistoric use of the project area. However, some of the locality boundaries may reflect approximate limits of McPhee Phase (A.D. 850-975) community clusters, at least for the community area containing habitation sites and adjacent agriculture plots. Sectors are spatial units intermediate between locality and district and may reflect social ties or ethnic identity above the community level. Because recognizing the presence or absence of intercommunity social units in Anasazi culture is currently a very difficult problem, assigned sectors in the DAP area represent spatially contiguous groups of localities.

The district is the largest unit in the DAP spatial series; this concept originally was developed by Morris (1939) and Bullard (1962) and was later modified by Gillespie (1976). Districts were established to correspond approximately with recognizable general differences in cultural patterns or to define areas in which archaeological work had been concentrated. To remove this ambiguity, Eddy et al. (1983) have suggested that the term "drainage unit" be used to approximate general cultural similarities, and that "district" be used to describe administrative archaeological areas. Using the scheme developed by Eddy et al. (1983), most of the Dolores Project area is contained in the Dolores Drainage Unit, with some portions in the adjacent McElmo and Monument Drainage Units. Dolores Archaeological Program site reports written from 1978 through 1982 incorporate the broader district concept; in this scheme, Dolores sites are, for the most part, in the Yellowjacket District. A detailed discussion of DAP spatial units above the community level is provided by Kane (1981b:44-62); table 4 summarizes currently defined DAP intercommunity units.

Table 4. DAP intercommunity units

Drainage unit	Sector	Localities
Dolores	Escalante	Willow Draw, Salter Canyon, Yellowjacket Crest, Hoppe Point, Grass Mesa, Trimble Point, Beaver Point, Cline Crest, Periman, Sagehen Flats, House Creek, Escalante, Dolores, May Canyon, Reservoir, and Windy Ruin
	Haycamp	Haycamp Mesa, Carver, and Grouse Point
	House Creek	Hatchery, Stump, Tucker, Bean Canyon, Railroad, and Carlyle Point
	Narraguinnep	Hinchman, Summers, Long Park, Ferris, Ormiston, Lost Park, and Narraguinnep Canyon
	Doe Canyon	Five Pine and Clydia
	Bradfield	Cabin Canyon, Lone Dome, Ryman, and Williams Draw
McElmo	Totten	Ritter Draw, Simon Draw, Lakeview, Sunset, Cash Canyon, Camp Ditch, East Lakeview, and Kernan Canyon
	Hartman	Mildred, Corkscrew, Cedar Grove, Leavell, and Lebanon
	Yellowjacket	Lone Pine, Brumley, Koskie, Wilson, Lanier, Ives, Suraouro, Emmanuel, Gai, and Dove Roost
	Sandstone	Pipeline and Sandstone
Monument	None assigned	None assigned

DAP Site Typology

The development and implementation of a site classification system based on formal site attributes and content was necessary to describe settlement patterns and to design field sampling programs. The DAP site

typology is based on a simple model of the relationship between the behavior of prehistoric groups when establishing and using sites and the formal attributes of those sites. It is assumed that the frequency of site use and the duration of each use can be viewed as a continuum, from constant, continuous use at one extreme, to sporadic, temporary use at the other. Frequency and duration of use are related to the number of different activities performed at a site; sites that were occupied continuously usually served as bases for a wide range of activities, while those that were used only sporadically and for short periods often were used for very specific activities. This range of use intensity is reflected in the archaeological record and can be recognized from surface evidence. In developing the project typology, this continuum of use intensity and activity diversity was divided into three segments, which formed the basic units of the system:

1. Habitations. Habitations are continuously occupied sites where a wide range of activities were performed. They are equivalent to the habitation units discussed in the section on spatial systematics. For the Anasazi Tradition, habitations consist of one or more household clusters during the earlier periods and one or more interhousehold clusters during the later periods. For other traditions, habitations might consist of base camps used for periods of several months rather than continuously.

2. Seasonal loci. Seasonal loci are sites that were occupied on a short-term basis, usually by household or interhousehold groups. "Seasonal" suggests that use of these sites might have been related to domestic or economic seasons (e.g., "harvest season" or "spring planting season"). Seasonal sites were established with a specific purpose in

mind and most activities performed at these sites reflect this purpose. Seasonal sites might have been used for a few days to several weeks; use of these sites was periodic (e.g., used annually or perhaps several times a year).

3. Limited activity loci. Limited activity loci were occupied for only a short period by individuals or small groups. Activities performed at limited activity loci were limited in number and reflected a specific purpose; the sites were probably used for only a very brief period--a few hours to a few days--though perhaps repeatedly. Limited activity sites tend to yield artifact and feature assemblages consistent with the interpretation of short-term use and a narrow range of activities.

Subcategories of the three basic types were developed according to function; these are presented elsewhere by Kane (1981b:65-76) and are listed in table 5.

Recent (1980-1981) DAP efforts have focused on refinement of the original site typology as presented here and on generation of test implications so that the typology can be applied to field data. Schlanger and Harden (1983:29-55) have suggested that the original model can be made more suitable for field application by addition of related concepts developed by Binford (1980). Binford suggests that prehistoric settlement system organization can be characterized as "logistical" (resources are moved to consumer locations) or as "foraging" (consumers move to food and other resource locations); however, an alternative that is more likely is a compromise organization between these extremes. The organizational strategy adopted by the community will determine the site type set and the artifact and feature complement (personal gear, site furniture, and

Table 5. DAP site typology*

I. Habitations

A. Base camps
B. Hamlets (one to three dwelling units or household clusters)
C. Large hamlets (usually four to eight dwelling units and several pitstructures arranged in two to four interhousehold clusters)
D. Villages (usually more than 20 dwelling units in 5 or more roomblock clusters)
E. Function-specific habitations

II. Seasonal loci

A. Economic or technical

1. Procurement/processing seasonal loci
2. Agricultural camps or field houses
3. Reservoirs and irrigation systems

B. Social/ceremonial

1. Towers
2. Forts
3. Isolated kivas or great kivas

C. Communications

III. Limited activity loci

A. Economic or technical

1. Procurement loci: specific types include quarries, kill sites, gathering stations, garden plots, modified springs
2. Primary processing loci: specific types include butchering and timber reduction stations
3. Secondary processing (manufacturing) loci: specific types include kilns, chipping stations
4. Maintenance loci
5. Storage loci
6. Consumption loci
7. Discard loci

B. Social or ceremonial loci: specific types include shrines, petroglyph and pictograph panels, cemeteries

C. Communications loci: individual types include trails and roads, signal fire locations

* Adapted from Kane 1981b:65-76.

situational gear [Binford 1979:262-266]) that is used for each particular social unit. Based on the implicit assumptions in the original DAP model and on the concepts proposed by Binford (1980) and Schlanger and Harden (1983), the DAP has developed test assumptions that can be analyzed using survey and excavation data. These assumptions are summarized as follows.

1. Habitations. Habitation site artifact assemblages should include more artifact types than assemblages from limited activity and seasonal sites; there is less intersite variability in number of artifact types per assemblage and number of items assigned to each type. Habitation sites contain the greatest quantities of site furniture. Wornout items of personal gear, manufacturing debris, and repair debris should also be found at habitation sites.
2. Seasonal loci. Number of artifact types in the artifact assemblage and the degree of intersite variability in number of artifacts per artifact type should be intermediate when compared to limited activity and habitation sites. Artifact assemblages at seasonal loci should include site furniture that is worn but serviceable (recycled from habitation sites). There should be less situational gear when compared to limited activity sites.
3. Limited activity loci. These sites should have relatively few artifact types per site assemblage and relatively great variability when comparing assemblage content among sites. Artifact assemblages from limited activity sites should contain relatively large percentages of personal and situational gear and low amounts of site furniture (e.g., containers, cooking equipment). The collections should also contain some debris from the expedient manufacture of situational gear.

The DAP is currently evaluating the site typology model through measurement of intersite and intrasite variability in site artifact assemblages (number of artifact classes represented and number of items in each class) and through analysis of variance. A number of different artifact data sets, including whole collections from excavated sites, surface collections from excavated sites, and surface collections from surveyed sites, are being analyzed. The goal of this evaluation is to verify or modify the site classification model and to develop a method for classifying survey sites based on surface evidence and model "fit."

DAP Temporal Systematics

A comprehensive and standardized system of temporal units is a necessary tool for large-scale archaeological research or mitigation programs. Implementation of such a system facilitates grouping survey and excavation data for studies relating to the explanation of cultural process and ensures comparable temporal description in site and analytic reports. In 1978 and 1979, the DAP developed such a system. The DAP formal series was originally reported by Kane (1981b), and the phase system was further discussed in the DAP interim synthetic report (Kane 1981c). In the present report, changes in the basic system through 1983 are described and the phase system is summarized.

The DAP formal series consists of three types of units: basic units (episode and element), synthetic units (phase, subphase, and tradition), and integrative units (component, local sequence, and sector sequence). The episode and element concepts are the building blocks upon which the remainder of the system rests, and they represent discrete intervals of

site use. An episode is the smallest unit of time recognizable in the archaeological record. It represents brief (a few hours to a week or two), transitory use of a site by an individual or small task group for a specific purpose, often economic in nature. In contrast to an element, an episode is not associated with construction and use of major architectural facilities; however, architectural facilities that have been abandoned by their original builders may be used during subsequent episodes. Episode assignments generally have been made for occupations at limited activity sites (in which case, the episode may reflect multiple periods of short-term use). Episodes have been assigned to more specific instances of short-term use such as intrusive burials in postabandonment deposits at architectural sites, temporary structures and living surfaces in structure fills, and ceramic assemblages in postabandonment fills or from surfaces that represent later use.

The second building block in the system, the element, is also a discrete time interval, but it represents a period during which a structure or related group of structures was built and used. This unit was developed in part because of its applicability to the archaeological record in the Dolores area, where most of the excavation data can be provenienced by structure. Elements usually reflect the social groups that used architectural spaces; these groups are assumed to be the same groups, i.e., households or interhouseholds, responsible for economic production. Because the element is linked to architecture, assignment of these units is limited to habitation sites and to seasonal sites with structures. The duration of an element corresponds to the uselife of its constituent structures: this is estimated to range between 10 and 30 to 40 years and

probably reflects the durability of the roof of a structure (Kane 1981c:93). Roofing material consists of timber, other perishable vegetal matter, and earth; most of these materials apparently will deteriorate beyond repair after about 30 years, necessitating replacement. Remodeling may extend the uselife of certain structures to 50 or 60 years; extensive remodeling is usually justification for the assignment of a new element.

The definitions of the synthetic units (phase, subphase, and tradition) have not changed significantly since the development of the original formal series in 1978-1979. The DAP phases and subphases are defined on the basis of broad similarities in cultural patterns (economic practices, architectural styles and layouts, and social organization) among communities; in terms of the DAP spatial series, phases usually include community clusters within a sector or across sectors. Phases and subphases are defined by archaeological content and hence are not strictly units of time, although all defined phases and subphases have a distribution in time. The time spans of some phases and subphases overlap.

Traditions are also defined as cultural units (Kane 1981b:85); traditions are similar to "full cultural traditions" or "cultures" as described by Willey and Phillips (1958:47-78) and Willey (1966:4). Traditions are defined on the basis of general similarities in adaptations, social patterns, and lifeways and are assumed to represent ethnic groups; hence, they are not strictly temporal in nature.

Integrative units (component, local sequence, sector sequence) have also retained their original meanings. The term "integrative units" refers to combinations of basic units that can be used for spatial or temporal comparison. For example, temporal trends in local areas can be examined by comparing local sequences (sequences of components at specific community

clusters), while more regional trends can be investigated through comparison of sector sequences (sequences of phases within a sector). The component is a key analytical unit; it refers to the manifestation of a phase or subphase at a community cluster; it consists of a set of elements and episodes assigned to a defined time span at habitations, seasonal loci, and limited activity loci used by the community. Single components ideally represent broadly similar behavioral patterns over a community "life span" or over a period of social and political integrity (Kane and Phagan 1981). Community clusters that demonstrate marked occupational discontinuities or major architectural remodeling (e.g., evidence of razing of roomblock units, rebuilding) are assigned several components depending on the number of these events. For example, the McPhee Community Cluster has been assigned three components: the first represents the original building event and subsequent use of the original roomblock units (probably dating to A.D. 780-840/850); the second represents major realinement and addition of roomblock units about A.D. 850; and the third represents post-A.D. 900 use of the site, again after major architectural change. The component concept in its present use is an expansion of the original definition presented by Kane (1981b:81).

Defined phases, subphases, and traditions for the occupational sequence in the DAP study area are combined heirarchically to form the DAP phase system. This system, which was originally developed in 1978 and 1979 and reported by Kane (1981b), was later expanded in the 1981 DAP interim synthetic report (Kane 1981c). An outline of the current system incorporating recent changes is presented in table 6 for easy reference.

Table 6. Current version of the DAP phase system

I. Paleo-Indian Tradition (prior to 5000 B.C.?). Prehistoric use of the project area by Paleo-Indian peoples is suspected, but not convincingly demonstrated. One fragment of a parallel-flaked projectile point was recovered by a DAP survey crew in 1979; however, curation of this particular item by later groups cannot be ruled out. No phases have been assigned to the Paleo-Indian Tradition.

II. Archaic Tradition (5000 B.C. - A.D. 500). Early Archaic occupation of the project area is undocumented and no phase or subphase designations have been made for the early part of the tradition. There is more substantial evidence for use of the project area by prehistoric groups beginning about 2000 B.C.

A. Great Cut Phase (2000 B.C. - A.D. 500). Nine sites in the project area (5MT2173, 5MT2199, 5MT2202, 5MT2235, 5MT2242, 5MT4513, 5MT4681, 5MT4682, and 5MT4640) contain deposits that are believed to be Archaic. Proveniences thought to represent Archaic occupations consist of ephemeral use surfaces and a few pit features, including small hearths. Burned cobbles or pebbles and stone artifacts, including flaked lithic tools and debitage

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NOTE: The phases and subphases outlined in this table reflect interpretation of the program data base as of the spring of 1983. Therefore, some differences between the system presented in this document and that presented in the interim synthetic report (Dolores Archaeological Program 1981) will be noted (e.g., the definition of the Cougar Springs Phase and the assignment of new date ranges to some of the later phases).

and ground stone tools, are often found in the pit features. From the scant evidence, it is tentatively suggested that the project area was used as a seasonal hunting and gathering area by Archaic groups. A major problem in this regard is that it is very difficult to separate Archaic contexts from aceramic Anasazi and post-Anasazi Numic Tradition occupations. The DAP Reductive Technologies Group has conducted several studies in attempts to resolve this problem (Phagan 1981); a comprehensive report on aceramic sites is scheduled for a future date.

III. Anasazi Tradition (A.D. 1-1200). Anasazi groups apparently began using the Dolores area soon after the beginning of the first millenium. Early use probably was seasonal and transitory, with permanent settlement of the river valley and the adjacent highlands occurring in the A.D. 600's. The transition from Archaic to Anasazi is thought to have occurred via colonization rather than via direct transition. Anasazi population densities reached maximum levels in the late A.D. 800's, and permanent settlement of most of the area ceased soon after A.D. 900. The river valley and northern highlands were used as a seasonal resource procurement zone by Anasazi groups based south and west of the project area in the A.D. 1000's and 1100's.

A. Cougar Springs Phase (A.D. 1-600). This is a provisional unit established to represent use of the project area during the

Table 6. Current version of the DAP phase system--Continued

Basketmaker II period. Basketmaker II deposits have been encountered at only one site: Cougar Springs Cave (5MT4797); the material remains and context suggest seasonal, short-duration use (Gross 1983).

B. Sagehen Phase (A.D. 600-850). The Sagehen Phase is a period of large-scale immigration and population growth by the Anasazi. Settlements are dispersed over the landscape, and locations with good farming soils are favored. Economic and demographic strategies were based on small group organization. Each settlement was occupied by one or two households that, for the most part, probably functioned independently.

1. Tres Bobos Subphase (A.D. 600-700). The Tres Bobos Subphase is the period of initial Anasazi colonization and use of the Dolores area as a permanent settlement zone. Habitation sites are dispersed and consist of single household clusters representing independent households; household organization appears to have been based on the nuclear family. Habitation sites may have been affiliated with other small adjacent settlements; together, these sites consititute dispersed communities or "neighborhoods" in the DAP system. Tres Bobos architecture appears to exhibit less investment in materials and labor than during later time periods. Pitstructures are relatively shallow, D-shaped, and have an antechamber to the south. They incorporate a bench and a vertical slab wingwall with storage bins built into the southern corners. These

pitstructures apparently served as the living quarters for a domestic household and hence can be termed "pithouses." The pithouse is accompanied by a complement of surface facilities arranged in an arc west and north of the pithouse. These include ramadas, extramural activity areas, and small, round, or oval storage rooms with dome or "beehive" roofs. Material culture and architectural styles conform to regional Basketmaker III patterns (Hayes and Lancaster 1975; Birkedal 1976).

2. Sagehill Subphase (A.D. 700-780). During this subphase, the area continued to be used by small agricultural groups. The economic, demographic, and organizational strategies remain unchanged from the Tres Bobos Subphase (nuclear family household organization, dispersed settlements that have single household clusters, and loose ties at the community level). Architectural styles, however, undergo several major changes: pitstructures are deeper, subrectangular rather than D-shaped, and lack benches. The Basketmaker antechamber has been replaced with a ventilator system. Surface structures include rectangular rooms with a four-post roof support system; these rooms are noncontiguous and are arranged in an arc west and north of the pithouse.

3. Dos Casas Subphase (A.D. 760-850). During this subphase, the Tres Bobos-Sagehill pattern of simple nuclear family households was replaced by economically dependent households.

Settlements remain dispersed, but habitations contain two to six household clusters and associated pitstructures that form one to two interhousehold clusters. It is unknown whether this shift in basic economic and productive organization was a direct transition involving indigenous groups or whether the shift represents a second wave of immigrants. Habitation sites consist of one or two pitstructures that were shared by several family groups and that apparently were used for integrative as well as domestic functions; a double-row roomblock containing living, storage, and processing rooms; outside work areas; and a midden. The large aggregated villages characteristic of the succeeding McPhee Phase apparently were in the incipient stage during the Dos Casas Subphase.

C. McPhee Phase (A.D. 850-975). The McPhee Phase is the period during which the growth/aggregation trends initiated during the previous Sagehen Phase culminated. The population in the project area peaked in the late A.D. 800's and then swiftly declined in the early decades of the 10th century. By A.D. 1000, the river valley itself and the plateau areas to the east and west were abandoned as settlement zones; only the Reservoir and Escalante Localities on the southern margin of the project area remained permanently inhabited into the 11th and 12th centuries. McPhee Phase settlements were aggregated villages, with most of the population based in large, central habitations consisting of multiple roomblock units. The villages are fairly evenly

distributed along the flood plain of the river valley and on the highland mesa areas to the east and west.

1. Periman Subphase (A.D. 850-900). The interhousehold continues to be the basic unit of resource procurement and economic production; it usually consists of two to four households based in surface roomsuites and sharing a plaza area, pitstructure, and midden area. Roomblocks contain storage and processing facilities for the interhousehold as well as serving as the residential base for the constituent nuclear families. Central habitation units consist of groups of roomblock units that exhibit considerable variability in numbers of architectural units: the smaller units (annexes) contain 5 to 15 surface rooms and 2 to 3 pitstructures that represent 2 to 3 interhousehold clusters; the larger units (central units) contain 30 or more surface rooms and 5 to 8 pitstructures that represent 5 to 8 interhousehold clusters. The larger roomblock units may incorporate oversized pitstructures that might have functioned as integrative facilities; apparently these occur only at the central units. Periman Subphase site sets also include permanent satellite habitations at some distance away from the central habitation and seasonal loci usually established for economic purposes (field houses and resource procurement camps). The Periman Subphase settlement pattern reflects a logistically organized system (cf. Binford

1980:10-12). Periman Subphase villages might have included or been associated with a separate facility (i.e., a great kiva) that served as a location for integrative activities involving intravillage or intervillage groups.

2. Cline Subphase (A.D. 900-975). The Cline Subphase appears to be restricted to the McPhee Community Cluster. Architectural patterning consists of roomblock units constructed above previous Periman Subphase units; the Cline Subphase units may incorporate portions of the earlier architecture. The fairly consistent pattern of front living rooms and back storage rooms (representing family dwelling units), plus interhousehold processing and storage rooms evident during the Periman Subphase, is no longer discernible. Room locations reflect more of an emphasis on interhousehold organization rather than on function; back rooms may be used as processing rooms, front rooms may be used as storage rooms. Pitstructures seem to correspond to the "kiva" definition (Gillespie 1976:85-98): they are round and incorporate a bench; the floor area is uncompartmentalized and includes relatively few floor features or economic activity areas. The Cline Subphase apparently represents one organizational response to a period of less favorable climate after A.D. 900. The Cline response is believed to be an intensification of Periman Subphase organization, including increased reliance on cooperative agriculture, on the interhousehold as a unit of economic

production and social interaction, and on formalized exchange with other groups.

3. Grass Mesa Subphase (A.D. 880-925). Grass Mesa Subphase archaeological units have been excavated at Grass Mesa Village and at Rio Vista Village. Considerable architectural variability is noted. Dwelling units may be domestic pit-houses, roomsuites similar to those characteristic of the Periman Subphase, or "reverse" roomsuites in which the back room functions as a living room and the front room as a storage facility. Dwelling units often do not exhibit regular or consistent spatial patterning. Some are dispersed and apparently represent separate household clusters, while others are grouped in interhousehold clusters similar to those of the Periman Subphase. Pitstructures that appear to have functioned as integrative facilities for Grass Mesa Subphase groups have been recorded. The Grass Mesa Subphase apparently represents a contrasting response to post-A.D. 900 climatic and demographic stress when compared with the contemporaneous Cline Subphase. The Grass Mesa Subphase response is viewed as one that includes organizational simplification and economic adaptive diversity. Many groups apparently reverted to nuclear family organization as single households became the unit responsible for economic and domestic production.

GM Subphase sites probably are earlier than Cline sites; ? Subphase sites No evidence for contemporaneity!

GM Subphase is probably a late Periman Subphase expression; possibly a response to stress which led to abandonment of the valley around AD 900

Table 6. Current version of the DAP phase system--Continued

D. Sundial Phase (A.D. 1050-1200). Use of the project area north of the Escalante and Reservoir Localities after A.D. 900 apparently was seasonal and function-specific. Large communities were based on the mesa tops south and west of the valley; these might have served as bases for groups seasonally exploiting the northern river valley and adjacent highland areas for particular resources. The entire project area apparently was abandoned by Anasazi groups by approximately A.D. 1200.

1. Marshview Subphase (A.D. 1050-1200). During the Marshview Subphase, the project area was used seasonally by Anasazi groups. Marshview sites are classified as seasonal or limited activity sites and apparently were used for economic purposes. For example, the latest occupations of LeMoc Shelter (5MT2151) and Singing Shelter (5MT4683) apparently reflect use of these locations as camps, perhaps as bases for hunting and seasonal horticulture. Marshview Subphase architectural remains at both shelters consist of rooms without pitstructures. Open-air Sundial Phase sites with pitstructures have been investigated (e.g., 5MT2235, 5MT5106); these sites apparently are also seasonal. Architecture at open seasonal sites consists of a small domestic pitstructure (Anasazi pitstructures constructed in other areas during the A.D. 1000's and 1100's usually possess attributes characteristic of kivas; however, these attributes are not present at most Sundial Phase sites in the project area), surface structures

Table 6. Current version of the DAP phase system--Continued

(either one to two rooms or ramadas), and outside work areas. These sites are believed to have been used by household groups based at villages located to the south or west.

2. Escalante Subphase (A.D. 1125-1200). During the Escalante Subphase, the project area was used by the Escalante and Reservoir Communities. These are centered at the Escalante and Reservoir Ruins (5MT2149 and 5MT4450, respectively) located on the south mesa overlooking the river valley. The Escalante Ruin is believed to be a Chaco outlier (Powers et al. 1983:168-169) associated with the regional Chacoan system. The ruin consists of a large, E-shaped roomblock with a Chacoan-style kiva in the central plaza (Hallasi 1979); the central pueblo is surrounded by a loose aggregation of small hamlets (Reed 1979). Reservoir Ruin, located a few hundred meters east of the Escalante complex, consists of a roomblock-kiva complex and a triwall structure (Eddy and Kane 1981); its cultural affiliation is unknown. Groups from these communities are believed to have used the northern portion of the project area. Site 5MT2215 in particular is believed to reflect an abortive attempt by these groups to establish an architectural complex a few kilometers north of the main community centers (Harriman 1983a).

Table 6. Current version of the DAP phase system--Continued

IV. Numic (Shoshonean) and Late Pueblo Traditions (A.D. 1500-1870).

Shoshonean use of the project area is documented but not well understood. Interpretable artifact assemblages and datable material are lacking in Shoshonean site contexts thus far investigated. Post-Sundial Phase use of the project area by Puebloan groups is based on the presence of Hopi sherds in a few survey collections.

A. Beaver Point Phase (A.D. 1500-1800). Use of the project area by Shoshonean and Puebloan peoples after the Anasazi abandonment and before historic contact is assigned to the Beaver Point Phase. Shoshonean site components suggest that post-Anasazi use of the river valley and surrounding highlands was seasonal in nature; to date, no structures have been recorded. Late Pueblo use of the project area appears to have consisted of sporadic visits by small groups.

B. Protohistoric Phase (A.D. 1776-1870). The Protohistoric Phase represents modified lifeways and adaptations of indigenous native peoples; these changes were brought about as the result of historic contact. Two sites (5MT5399 and 5MT5380) with protohistoric components have been investigated by the DAP staff; both sites were single burials with associated historic artifacts (refer to "Summary of 1980 Fieldwork" section).

1978-1980 DAP DATING METHODS: RESULTS AND EVALUATION

Accurate dating of site occupations was recognized as a critical need during development of the original project research design and was discussed in the initial proposal to the Bureau of Reclamation (Breternitz and Kane 1978). Dates for Anasazi habitation sites were to be obtained using tree-ring samples (from structures with wooden members) or archaeomagnetic samples (from burned hearths); carbon-14 dating was to be used when the other methods could not be applied. University of Colorado field programs in the past had experienced good return from tree-ring samples, and archaeomagnetic dating was envisioned as a promising supplementary technique that could be used to date the use of a structure rather than its construction. During the first three years of the program, it became evident that, because of problems with the three original methods, additional dating methods would have to be developed if high resolution was to be obtained. Thus, work was initiated on alternative methods, including ceramic type dating (Blinman 1982), neckbanded vessel dating (Blinman 1981), and architectural seriation dating (Hewitt et al. 1983). These methods ultimately depend on correlation with tree-ring-dated structures and associated architectural styles or artifacts; consequently, the recovery of tree-ring samples has assumed primary importance in the dating program. This section summarizes the results of DAP dating methods and evaluates the methods in the overall context of the mitigation program.

Tree-ring Dating

Although basically successful, the DAP's tree-ring dating program has not been without problems. The major drawback has been the low proportion

of samples yielding dates compared to the total number of samples submitted. This is partly the result of prehistoric peoples in the area frequently having used young ponderosa pine for construction timbers; in such cases there often are too few rings present to obtain a date. Extensive use of deciduous wood such as cottonwood and aspen has also resulted in fewer samples yielding reliable results, because these species exhibit complacent or nonvariable and undatable tree rings (Michels 1973:117-119). (Deciduous wood is usually recognized in the field; however, some deciduous specimens are submitted for analysis, either because a positive identification could not be made in the field or because a species identification is desired.) Two other problems involve interpretation of the dates when they are obtainable. First, DAP sites have yielded few clusters of cutting dates for particular structures; therefore, the person responsible for interpretation must deal with only one or a few cutting dates or with "v" dates (dates thought to be within a few years of the cutting date). The difficulties and potential pitfalls of basing inference on these sorts of data have been demonstrated (Berry 1982). The DAP approach has been to assume that the date in question represents the construction date of the associated structure if the specimen represents construction wood, if the occupation at the site is of relatively brief duration, and if the date is consistent with other sources of dating inference (e.g., archaeomagnetic samples, ceramic types, architectural characteristics). The second problem involves the prehistoric salvaging and reuse of construction timbers, a phenomenon that has been documented in the project area. This practice apparently was fairly common at village sites with long occupation spans, especially during the Periman Subphase (A.D. 850-900). Reuse has created a major interpretive problem at Grass Mesa Village, one of the largest

prehistoric population centers in the project area. The site was first intensively used in the late A.D. 700's and occupation was continuous into the early A.D. 900's. Structures built after A.D. 850 characteristically are composed of a high proportion of scavenged wood; in fact, post-A.D. 850 cutting dates for structures are very rare, even though stratigraphic relationships and in situ ceramic types indicate an intensive and architecturally complex use of the site during this period. Thus, it has been necessary to rely on less exact dating methods.

Table 7 presents all tree-ring dates obtained for specimens submitted between 1978 and 1980 and interpretations of the available dates for each structure.

A total of 1524 tree-ring samples was submitted to the Laboratory of Tree-ring Research (Tucson, Arizona) between 1978 and 1980; of these, 160 specimens (10.5 percent) yielded dates. Of the 160 dates obtained, 110 (68.8 percent) were relatively ambiguous vv, +vv, or ++vv dates; 28 (17.5 percent) were v, +v, or +r dates (thought to be within a few years of a cutting date); and 22 (13.8 percent) were cutting dates (r, rB, or B).[3] Only seven structures in the project area have yielded fully interpretable "clusters" of dates (five or more dates in the span of a few years) that represent construction events. Thus, the return from submitted samples has been below expectations.

To improve the level of inference possible from the tree-ring dates, the DAP has conducted additional analysis. The objective of the study was

[3]Refer to note at end of table 7 for a more thorough explanation of tree-ring date symbols.

Table 7. DAP tree-ring dates, 1978-1980

Provenience	Laboratory No.	Taxon	Inside date (A.D.)	Outside date (A.D.)	Interpretation
Site 5MT23					
Pitstructure 1	DAR-68	Ponderosa	668fp	0780vv	Stratigraphically late structure; probably reused timber
Pitstructure 2	DAR-89	Ponderosa	592p	693vv	Stratigraphically late structure; samples 89 and 90 are probably reused timber
	DAR-90	Ponderosa	552p	722+vv	
	DAR-87	Pinyon	528fp	827++vv	
Pitstructure 3	DAR-278	Juniper	694fp	802vv	The A.D. 852 date is consistent with the ceramic assemblage and architecture; consequently, A.D. 852 is thought to be the construction date for the structure
	DAR-288	Juniper	619+p	852r	
Pitstructure 4	DAR-84	Douglas-fir	762	858+vv	Late structure; construction probably after A.D. 880
Pitstructure 5	DAR-79	Ponderosa	579p	650+vv	Salvaged timber
Pitstructure 6	DAR-82	Ponderosa	743fp	798vv	Stratigraphically late structure; the specimens may represent reuse
	DAR-83	Pinyon	759	828vv	
Pitstructure 10	DAR-93	Juniper	692+fp	867+r	Architecture and ceramics are consistent with a construction date during the A.D. 850-870 period
	DAR-305	Juniper	569p	820vv	
	DAR-311	Juniper	582	856+r	
Pitstructure 13	DAR-294	Juniper	373	522vv	A stratigraphically late structure; probably all specimens represent salvage, with the possible exception of sample 283
	DAR-263	Juniper	478fp	570vv	
	DAR-289	Juniper	436fp	631+vv	
	DAR-282	Juniper	446+p	637vv	
	DAR-290	Juniper	572p	712vv	
	DAR-291	Juniper	695fp	761vv	
	DAR-267	Juniper	632p	794rB	
	DAR-287	Juniper	652+p	795+vv	
	DAR-283	Pinyon	732p	850vv	
Pitstructure 14	DAR-260	Juniper	435fp	551+vv	Probably a salvaged timber
Pitstructure 16	DAR-295	Pinyon	536fp	595vv	All specimens appear to represent reuse
	DAR-297	Pinyon	528+fp	649vv	
	DAR-279	Pinyon	657fp	724+vv	
	DAR-303	Pinyon	545fp	737vv	
	DAR-310	Pinyon	592fp	740vv	
	DAR-296	Pinyon	621fp	786vv	

Table 7. DAP tree-ring dates, 1978-1980--Continued

Provenience	Laboratory No.	Taxon	Inside date (A.D.)	Outside date (A.D.)	Interpretation
Site 5MT23 (continued)					
Pitstructure 17	DAR-304	Pinyon	671p	882++vv	Stratigraphically late structure; the outside date of the single specimen suggests construction later than A.D 900
Pitstructure 59	DAR-261	Juniper	730p	804vv	Stratigraphically late structure; samples 256 and 261 may be from salvaged timbers
	DAR-256	Juniper	548p	759vv	
	DAR-255	Juniper	698fp	834vv	
Surface Structure 3	DAR-69	Douglas-fir	733fp	831+vv	Interpretation difficult; possibly reused timber
Surface Structure 9	DAR-70	Pinyon	740fp	785vv	Interpretation difficult; possibly reused timber
Site 5MT2151					
Pitstructure 1	DAR-52	Juniper	609fp	803+vv	The structure probably dates to between A.D. 800 and 850; only use of this timber was probably in this structure
Pitstructure 2	DAR-144	Pinyon	407fp	482vv	The structure probably dates to the middle to late A.D. 700's; sample 144 probably represents reuse; sample 146 probably represents original use
	DAR-146	Pinyon	562fp	700++vv	
Surface Structure 12	DAR-147	Juniper	557	702vv	Building of structure may be contemporaneous with Pitstructure 2
Site 5MT2161					
Pitstructure 1	DAR-166	Ponderosa	821fp	862vv	The A.D. 862 date is probably within 10 years of the construction date
Site 5MT2162					
Pitstructure 1	DAR-153	Juniper	289+p	634+vv	Architecture and ceramics suggest a pre-A.D. 700 construction date; the A.D. 691 and 692 dates probably represent an approximate construction date
	DAR-154	Douglas-fir	635p	691vv	
	DAR-152	Douglas-fir	628p	692vv	

Table 7. DAP tree-ring dates, 1978-1980--Continued

Provenience	Laboratory No.	Taxon	Inside date (A.D.)	Outside date (A.D.)	Interpretation
Site 5MT2181					
Pitstructure 1	DAR-205	Ponderosa	726p	779vv	An A.D. 780-785 construction date is consistent with architecture and ceramic assemblage
	DAR-206	Ponderosa	713p	780v	
Site 5MT2182					
Pitstructure 1	DAR-232	Ponderosa	743p	780r	A construction date of approximately A.D. 790 is consistent with other evidence
	DAR-237	Ponderosa	734p	780r	
	DAR-239	Ponderosa	735p	781v	
	DAR-230	Ponderosa	697p	789vv	
	DAR-229	Ponderosa	737p	790r	
	DAR-234	Ponderosa	694p	790r	
	DAR-238	Ponderosa	736p	790r	
	DAR-241	Ponderosa	716p	790r	
	DAR-242	Ponderosa	740fp	790r	
	DAR-225	Pinyon	722p	793vv	
	DAR-246	Pinyon	734p	793v	
	DAR-249	Pinyon	724p	793r	
Pitstructure 102	DAR-252	Ponderosa	503p	593vv	Sample 252 probably represents reuse; ceramics and architecture indicate use during the late eighth or early ninth centuries
	DAR-251	Ponderosa	714p	760vv	
	DAR-253	Ponderosa	706p	776vv	
Site 5MT2193					
Pitstructure 1	DAR-4	Juniper	641p	737vv	Stratigraphically earlier than Pitstructure 2; the A.D. 759 date is probably close to a construction date
	DAR-17	Juniper	587p	759vv	
Pitstructure 2	DAR-36	Juniper	660p	732vv	The A.D. 765-770 dates are probably from original construction timbers; the construction date is probably A.D. 770
	DAR-29	Ponderosa	706p	742vv	
	DAR-31	Juniper	670p	759vv	
	DAR-20	Ponderosa	731p	763vv	
	DAR-19	Juniper	676+p	764vv	
	DAR-24	Ponderosa	718p	765vv	
	DAR-33	Juniper	711p	765vv	
	DAR-34	Juniper	707+p	765vv	
	DAR-128	Ponderosa	735p	765vv	
	DAR-3	Ponderosa	714p	766vv	
	DAR-32	Juniper	702+p	766vv	
	DAR-126	Ponderosa	714p	767vv	
	DAR-18	Ponderosa	724p	768vv	
	DAR-39	Ponderosa	721fp	768vv	
	DAR-35	Juniper	641+p	769vv	
	DAR-30	Ponderosa	720p	769vv	
	DAR-25	Ponderosa	721p	769vv	

Table 7. DAP tree-ring dates, 1978-1980--Continued

Provenience	Laboratory No.	Taxon	Inside date (A.D.)	Outside date (A.D.)	Interpretation
Pitstructure 2 (continued)	DAR-22	Ponderosa	705p	769vv	
	DAR-127	Ponderosa	724p	769vv	
	DAR-28	Ponderosa	730fp	769v	
	DAR-129	Ponderosa	732fp	769v	
	DAR-130	Ponderosa	724p	769v	
	DAR-133	Juniper	676p	770vv	
Site 5MT2198					
Pitstructure 1	DAR-57	Juniper	496fp	550vv	Architecture and ceramics suggest original construction in the late A.D. 600's or early A.D. 700's
	DAR-58	Juniper	528p	634vv	
	DAR-56	Juniper	581fp	655vv	
Site 5MT2235					
Pitstructure 1, Feature 11 (hearth)	DAR-59	Juniper	909fp	988+vv	Architecture and material culture suggest use of this pitstructure during the A.D. 1050-1150 period
Pitstructure 1, Stratum 2	DAR-60	Juniper	912fp	1102vv	The stratum is above roof fall; the A.D. 1102 date suggests that the pitstructure may have been built before A.D. 1100
Site 5MT2236					
Pitstructure 1	DAR-142	Ponderosa	728p	758vv	The cluster of dates at A.D. 700-765 suggests construction about A.D. 765
	DAR-137	Ponderosa	725	760vv	
	DAR-141	Ponderosa	728p	761vv	
	DAR-138	Ponderosa	718	762vv	
	DAR-139	Ponderosa	720p	762v	
	DAR-134	Ponderosa	727p	765vv	
	DAR-140	Ponderosa	729p	765vv	
	DAR-135	Ponderosa	722p	765r	
Site 5MT2848					
Pitstructure 1	DAR-172	Ponderosa	717p	783vv	The A.D. 783 and 784 dates probably represent an approximate construction date; this interpretation is consistent with the other evidence
	DAR-156	Juniper	693p	784r	
Pitstructure 2	DAR-158	Juniper	370	617vv	Construction in the A.D. 680's or 690's is consistent with architecture and ceramics
	DAR-173	Juniper	468+p	635vv	
	DAR-157	Ponderosa	632p	684v	

Table 7. DAP tree-ring dates, 1978-1980--Continued

Provenience	Laboratory No.	Taxon	Inside date (A.D.)	Outside date (A.D.)	Interpretation
Site 5MT4475					
Pitstructure 3	DAR-190	Ponderosa	564p	685vv	The A.D. 874 and 875 dates probably represent an approximate construction date; this interpretation is consistent with the other evidence
	DAR-188	Douglas-fir	744fp	805vv	
	DAR-189	Ponderosa	836fp	874vv	
	DAR-191	Douglas-fir	766p	874v	
	DAR-187	Ponderosa	806fp	874r	
	DAR-186	Douglas-fir	786	875v	
Pitstructure 4	DAR-50	Douglas-fir	752p	874+r	
Pitstructure 5	DAR-196	Pinyon	785fp	825vv	Interpretation difficult; structure should date to late A.D. 800's
Surface Structure 4	DAR-42	Ponderosa	837p	877v	Ceramics and architecture are consistent with a construction date of approximately A.D. 800
	DAR-43	Ponderosa	812p	879v	
Surface Structure 10	DAR-47	Ponderosa	802p	861v	Ceramics and architecture are consistent with a construction date in the early A.D. 870's
	DAR-45	Ponderosa	822p	862v	
	DAR-46	Ponderosa	812p	872r	
Site 5MT4477					
Pitstructure 2	DAR-220	Ponderosa	572p	659vv	The cluster of dates at A.D. 870-871 probably represents construction; sample 220 may represent salvage
	DAR-219	Juniper	690p	791vv	
	DAR-214	Juniper	728p	841+vv	
	DAR-215	Ponderosa	807	845vv	
	DAR-223	Ponderosa	786	848vv	
	DAR-221	Ponderosa	788p	856vv	
	DAR-224	Juniper	651+p	870+vv	
	DAR-217	Ponderosa	805p	870+v	
	DAR-209	Ponderosa	815p	871v	
	DAR-222	Ponderosa	832p	871v	
	DAR-210	Ponderosa	831	871r	
	DAR-218	Ponderosa	818fp	871r	
	DAR-216	Ponderosa	810p	871B	
Site 5MT4480					
Pitstructure 1	DAR-181	Ponderosa	793p	864B	Architecture and ceramics suggest use in the late A.D. 800's; the A.D. 864 date may represent reuse
	DAR-178	Ponderosa	804p	868+vv	
	DAR-180	Ponderosa	812p	874vv	

Table 7. DAP tree-ring dates, 1978-1980--Continued

Provenience	Laboratory No.	Taxon	Inside date (A.D.)	Outside date (A.D.)	Interpretation
Site 5MT4545					
Surface	DAR-148	Juniper	432fp	552vv	Architecture and ceramics suggest use between A.D. 600-700; this could perhaps be narrowed to A.D. 600-650 on the basis of the A.D. 552 and 598 dates
Structure 1	DAR-149	Pinyon	457fp	598vv	
Site 5MT4644					
Pitstructure 1	DAR-123	Ponderosa	730p	787v	A construction date in the A.D. 790's is consistent with the architectural and ceramic evidence
	DAR-124	Ponderosa	723p	793vv	
Pitstructure 2	DAR-120	Ponderosa	688p	747vv	The cluster of dates at A.D. 755-776 probably represents construction
	DAR-110	Ponderosa	713p	758vv	
	DAR-101	Ponderosa	684p	768vv	
	DAR-107	Ponderosa	701p	768vv	
	DAR-114	Ponderosa	723p	775vv	
	DAR-116	Ponderosa	725p	775vv	
	DAR-117	Ponderosa	725p	775vv	
	DAR-113	Ponderosa	728p	776vv	
	DAR-115	Ponderosa	716p	776vv	
	DAR-118	Ponderosa	714p	776vv	
	DAR-121	Ponderosa	734p	776vv	
	DAR-102	Ponderosa	720p	776v	
	DAR-105	Ponderosa	720fp	776v	
	DAR-109	Ponderosa	737fp	776v	
	DAR-119	Ponderosa	726p	776v	
	DAR-103	Ponderosa	722p	776r	
Site 5MT4684					
Pitstructure 1	DAR-163	Juniper	377fp	559vv	Architecture and ceramics are consistent with a construction date in the late A.D. 600's
	DAR-161	Ponderosa	575p	669v	
Site 5MT4725					
Pitstructure 1	DAR-201	Ponderosa	583p	656vv	An A.D. 845 construction date is consistent with ceramics and architecture; sample 201 may represent salvage
	DAR-200	Ponderosa	817p	845v	
	DAR-204	Ponderosa	811p	845v	
	DAR-197	Ponderosa	806p	845r	
	DAR-199	Ponderosa	822p	845r	
	DAR-202	Ponderosa	809p	845r	

NOTE: DAR numbers, taxa, dates, and the following tree-ring symbols were provided by the Laboratory of Tree-ring Research, University of Arizona, Tucson:

Inside date

year - No pith ring present.

p - Pith ring present.

fp - The curvature of the inside ring indicates that it is far from the pith.

±p - Pith ring present, but due to the difficult nature of the ring series near the center of the specimen, an exact date cannot be assigned to it. The date is obtained by counting back from the earliest dated ring.

± - The innermost ring is not the pith ring and an absolute date cannot be assigned to it. A ring count is involved.

Outside date

B - Bark present.

r - Less than a full section is present, but the outermost ring is continuous around available circumference.

v - A subjective judgment that, although there is no direct evidence of the true outside on the specimen, the date is within a very few years of being a cutting date.

vv - There is no way of estimating how far the last ring is from the true outside.

+ - One or more rings may be missing near the end of the ring series whose presence or absence cannot be determined because the specimen does not extend far enough to provide an adequate check.

++ - A ring count is necessary due to the fact that beyond a certain point the specimen could not be dated.

to improve the resolution possible with vv dates (those dates for which the Laboratory of Tree-ring Research could not estimate the relationship between the present and original outside rings). The analytical procedure consisted of plotting the distribution of cutting ages (outside ring minus pith ring) for tree-ring samples with cutting dates B, G, L, c, r, and v (for the last, an arbitrary figure of 3 years was substituted for the laboratory's "a very few years," except when a cluster of cutting dates was present for a date slightly later than the v date) and pith dates (p or ±p).[4] The sample universe included project data through 1981 and "contemporaneous" (seventh, eighth, and ninth century) data from southwestern Colorado (Robinson and Harrill 1974; Birkedal 1976). If the resulting distributions appeared to resemble a normal curve, then means, medians, and standard deviations were calculated. Separate graphs were constructed for juniper, ponderosa pine, and pinyon pine specimens. The distributions of noncutting ages (outside "vv" ring minus pith ring) were graphed and examined for correspondence with the cutting age distributions. The distributions of cutting ages and noncutting ages for all three species types appeared similar. Parametric statistics were then applied to individual project samples with noncutting dates. For example, for Pitstructure 1 at Site 5MT2198, sample DAR-57 was determined by the Tree-ring Laboratory to have an inside ring date of A.D. 496fp and an outside (noncutting) date of A.D. 550vv; the mean cutting age for juniper construction timbers,

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[4]The tree-ring symbols B, r, v, p, and ±p are explained in the note at the end of table 7; the symbols G, L, and c (used with outside dates) are explained by the Laboratory of Tree-ring Research (University of Arizona, Tucson) as follows: G - beetle galleries are present on the surface of the specimen; L - a characteristic surface patination and smoothness, which develops on beams stripped of bark, is present; c - the outermost ring is continuous around the full circumference of the specimen (this symbol is used only if a full section is present).

according to the study, is 103 years with a standard deviation of 48 years. Given that 95 percent of the population should fall within two standard deviations of the mean, and assuming that the true pith ring is close to the inside ring dated at A.D. 496, there is a high probability that the tree was felled no later than the A.D. 690's.

Two critical assumptions were made during this study.

1. Populations of tree-cutting ages approximate normal distributions, samples yielding cutting dates and those yielding vv dates represent the same population, and these distributions can be described by applying statistical treatments developed for normal populations. This assumption appears to be valid after inspection of graphic presentations of the data sets; one difficulty is that the distributions for all these species exhibit "tails" on the right ("long") side of the normal curve. This probably reflects prehistoric behavior; a tree would have to be of a certain minimum size (in terms of this study, accrue a minimum number of rings) to be suitable as a construction timber. Once this minimum level was reached, any tree meeting this criterion might be selected for construction. The normal distributions were derived only for construction timbers; different distributions almost certainly exist for firewood.

2. The selection of trees of a particular age did not vary significantly within the A.D. 650-900 period and across local areas in southwestern Colorado. This is a more dangerous proposition because it assumes that the form, size, and construction of Anasazi structures did not change significantly over the A.D. 650-900 period and that architectural styles exhibit little spatial variability. Hence, it is assumed that structural requisites for timbers were probably stable. Local

environmental variablility and depletion of available construction wood (cf. Kohler et al. 1981) might have dictated changes or local variation in the procurement of construction wood. The ponderosa pine distribution is probably most reliable because the sample universe included only project areas dated within a 123-year time span. For juniper and pinyon pine distributions, the DAP samples were augmented with other dates from southwestern Colorado; thus, these graphs were made with the assumption that tree-cutting behavior was fairly consistent on a regional scale.

Results of the study are presented in tables 8 and 9. Table 8 summarizes the derived normal distributions, and table 9 lists some applications of the DAP tree-ring date study.

Table 8. Summary of normal distributions for ponderosa, juniper, and pinyon cutting ages

	Ponderosa	Juniper	Pinyon
N	51	209	32
N needed for 90-95 percent confidence level	37-149	86-346	65-263
Kurtosis (3 = normal)	11.68	3.32	2.69
Skewness (.5 = normal)	2.01	0.89	0.63
Mode (age in years)	35.6	60	57.7
Mean (age in years)	51.0	103.3	77.7
Variance	243.53	2303	971.1
Standard deviation	15.6	48.1	31.5
Range (age in years)	28-122	36-222	29-156

Table 9. Applications of the results of the DAP noncutting tree-ring date study

1. 5MT2151, Pitstructure 1: DAR-52 (609fp-803+vv).

   Assuming that the true pith ring for this juniper specimen dates to approximately A.D. 600, the cutting date is probably before A.D. 820. Only 4 of the 209 specimens in the study yielded cutting spans in excess of 100 years. Two standard deviations from the mean cutting age of 103 years would be 199 years, or probably between A.D. 800-810. This lends support to the inference that the structure was built between A.D. 805 and 820.

2. 5MT2182, Pitstructure 102: DAR-251 (714p-760vv) and DAR-253 (760p-776vv).

   These are ponderosa pine specimens; 95 percent of the true cutting ages should be less then 83 years; therefore, the cutting dates of these two specimens should be in the A.D. 770's-790's.

3. 5MT2198, Pitstructure 1: DAR-57 (496fp-550vv), DAR-58 (528p-634vv), and DAR-56 (581fp-655vv).

   Two standard deviations from the mean cutting age for juniper is 199 years. This suggests that the cutting date for sample DAR-57 is before A.D. 700. This inference, plus the outside date of A.D. 655vv for sample DAR-56, suggests a construction date for the structure between A.D. 660 and 700.

4. 5MT2235, Pitstructure 1, Feature 11: DAR-59 (909fp-988+vv); and Pitstructure 1, Stratum 2: DAR-60 (912fp-1102vv).

   These are juniper specimens. Applying the 199-year, two-standard-deviation figure to sample DAR-59 suggests a cutting date no later than the A.D. 1100's or 1110's. This is compatible with the interpretation of sample DAR-60, a stratigraphically later specimen with a probable cutting date no later than the A.D. 1110's. It is noted, however, that the later specimen is probably firewood rather than construction material.

5. 5MT4480, Pitstructure 1: DAR-178 (804p-868+vv) and DAR-180 (812p-874vv).

   These are ponderosa specimens; applying the two-standard-deviation figure (82 years) for cutting ages suggests that both specimens were cut before the A.D. 890's or 900's.

Table 9. Applications of the results of the DAP noncutting tree-ring date study--Continued

6. 5MT4545, Surface Structure 1: DAR-148 (432fp-552vv) and DAR-149 (457fp-598vv).

   Applying the 199-year figure as the likely cutting age for juniper and the 156-year figure for pinyon suggests a cutting date of no later than A.D. 631 for sample DAR-148 and A.D. 613 for sample DAR-149. This leads to an estimated construction date during the A.D. 600-650 period for this structure.

7. 5MT4644, Pitstructure 1: DAR-124 (723p-793vv).

   Applying the maximum likely cutting age of 82 years for ponderosa suggests a cutting date for this specimen in the A.D. 790's or 800's. This inference is compatible with the v date of 787 obtained from sample DAR-123.

Archaeomagnetic Dating

In the original plan for dating DAP sites (Breternitz and Kane 1978), tree-ring analysis and archaeomagnetic analysis were to serve as complementary methods; tree-ring dating would be employed to date architectural construction episodes, while archaeomagnetic dating would be employed to date use of hearths and conflagrations of individual structures. This general plan remains in effect; however, because of problems in developing accurate field collection and laboratory analysis procedures for the program, and because of difficulties in applying the paleopolar trace developed by DuBois (DuBois 1975; Eighmy et al. 1980), the archaeomagnetic program has not been as effective as originally anticipated. It is hoped that the implementation of several new sample collection and laboratory procedures (discussed later in this section) will result in an increase in the efficiency and accuracy of this dating method.

From 1978 through 1980, field collection of samples was accomplished by a limited number of project personnel trained by J. Eighmy of Colorado State University. Field collection was supervised by J. Hathaway of the DAP. During the 1978, 1979, and 1980 field seasons, 160 samples from 32 sites were collected. Samples were inventoried at the DAP laboratory and were processed at the paleomagnetic laboratory at the University of Colorado. Final analysis and interpretation were undertaken by J. Eighmy and J. Hathaway, using Colorado State University facilities. Summary data for the archaeomagnetic program are presented in tables 10 and 11. Table 10 shows that over the years there has been an increase in the

percentage of samples yielding plots.[5] This probably can be attributed to increased selectivity and precision in field collection.

Table 10. Administrative summary of the DAP archaeomagnetic dating program, 1978-1980

Year	Sites yielding samples	Total samples collected	Samples yielding plots	Percent of samples yielding plots
1978	6	36	17	47.2
1979	17	67	44	65.7
1980	15	57	43	75.4
Total	*32	160	104	65.0

* Samples collected from some sites in more than one year.

Table 11 presents all archaeomagnetic dates recovered from project excavations in 1978-1980. These dates are revisions of the originals obtained by applying the Southwest master curve (DuBois 1975); Hathaway et al. (1983) have proposed a modification of the DuBois curve based on Dolores data. To obtain the modification and the set of revised dates in table 11, a subset of Dolores archaeomagnetic samples was used to obtain a new tract for the A.D. 700-900 period. This subset included samples that were judged to be reliable because the structures from which they came were securely dated by tree-ring dates. The dates from the samples within that subset are not reported in table 11 to avoid circularity problems.

The Dolores modification is one means employed by the DAP to improve the resolution and reliability of archaeomagnetic dating. Several refinements were also instituted during 1979-1980 field operations. These included, first, implementation of a priority system for collecting samples. Proveniences from which samples were collected (e.g., hearths, burned walls and floors) were assigned a priority based on a prediction of

[5]Plots are obtained from tightly clustered readings from individual samples; the clusters are then compared to paleopolar tracings.

Table 11. Dates for DAP archaeomagnetic samples collected from 1978 through 1980*

Site No.	Sample No.	Provenience	Archaeomagnetic dates (A.D.)
5MT23	2	Pitstructure 1, central hearth	875±45 or 1010±45 or 1320±45 or 1425±45
	3	Pitstructure 1, west wall	Used for Dolores modification
	4	Room 12, hearth	725±35 or 1000±35 or 1460±35
	5	Room 6, hearth	700±50 or 880±50
	6	Room 4, hearth	700±35 or 875±35
	7	Pitstructure 6, hearth	Used for Dolores modification
	8	Pitstructure 4, hearth	Used for Dolores modification
	9	Pitstructure 2, hearth	Used for Dolores modification
	10	Pitstructure 5, east wall	Falls off curve
	11	Pitstructure 3, north wall	790±40 or 850±40
	12	Pitstructure 11, central hearth	1415±25
	13	Pitstructure 3, central hearth	Used for Dolores modification
	14	Pitstructure 3, central hearth	Used for Dolores modification
	15	Pitstructure 13, floor	Used for Dolores modification
	16	Pitstructure 13, west wall	1525±45

Table 11. Dates for DAP archaeomagnetic samples collected from 1978 through 1980*--Continued

Site No.	Sample No.	Provenience	Archaeomagnetic dates (A.D.)
5MT23 (continued)	18	Pitstructure 16, central hearth	725±50 or 875±50 or 1000±50 or 1450±50
	19	Pitstructure 17, west wall	Used for Dolores modification
	20	Pitstructure 19, central hearth	760±40 or 875±40 or 1000±40 or 1440±40
	21	Pitstructure 10, north wall	Used for Dolores modification
5MT2151	9	Room 1, floor	1050±55 or 1265±55
	12	Room 11, west wall	875±50 or 1060±50 or 1320±50 or 1440±50
	13	Pitstructure 2, central hearth	Used for Dolores modification
5MT2181	1	Pitstructure 1, central hearth	Used for Dolores modification
5MT2182	1	Room 3, hearth	780±50 or 860±50 or 900±50
	2	Room 3, hearth	890±40 or 1520±40
	3	Pitstructure 1, bench	Used for Dolores modification
	4	Pitstructure 2, central hearth	700±40 or 865±40 or 890±40 or 1490±40

Table 11. Dates for DAP archaeomagnetic samples collected from 1978 through 1980*--Continued

Site No.	Sample No.	Provenience	Archaeomagnetic dates (A.D.)
5MT2182 (continued)	2003	Room 202, hearth	700±35 or 800±35 or 1475±35
5MT2191	1	Exterior work area, hearth	1150±55
5MT2192	4	Room 1, hearth	1400±50
5MT2193	1	Room 2, hearth	735±75 or 875±75 or 1090±75 or 1425±75
	2	Room 1, floor	Used for Dolores modification
	18	Pitstructure 1, southeast wall	735±50 or 885±50 or 1490±50
5MT2198	1	Exterior work area, hearth	1400±45
	2	Pitstructure 1, central hearth	875±70 or 1100±70 or 1280±70 or 1410±70
5MT2235	1	Hearth in fill of Pitstructure 1	1125±55 or 1390±55
	3	Second hearth in fill of pitstructure 1	1100±65 or 1225±65 or 1340±65
	4	Pitstructure 1, central hearth	1140±45 or 1370±45
5MT2236	1	Exterior work area, hearth	1140±45
	2	Pitstructure 1, hearth	Used for Dolores modification
5MT2320	1	Pitstructure 1, central hearth	Used for Dolores modification

Table 11. Dates for DAP archaeomagnetic samples collected from 1978 through 1980*--Continued

Site No.	Sample No.	Provenience	Archaeomagnetic dates (A.D.)
5MT2848	1	Exterior work area, hearth	735±50 or 875±50 or 1000±50 or 1320±50 or 1440±50
	2	Pitstructure 1, floor	Used for Dolores modification
	3	Pitstructure 1, central hearth	780±40 or 860±40 or 900±40
5MT2853	1	Pitstructure 1, central hearth	780±20 or 855±20
5MT2854	1	Exterior work area, hearth	1100±55 or 1400±55
	2	Pitstructure 2, central hearth	700±40 or 880±40 or 1475±40
5MT2858	1	Exterior work area, hearth	700±45 or 875±45 or 1000±45 or 1460±45
	2	Pitstructure 1, central hearth	700±25 or 875±25 or 1000±25 or 1460±25
5MT4475	1	Pitstructure 1, central hearth	1120±55 or 1365±55
	3	Pitstructure 3, south wall	735±40 or 880±40 or 1000±40
	4	Pitstructure 1, south wall	1120±55 or 1255±55 or 1360±55
	5	Pitstructure 2, subfloor bin	780±45 or 860±45

Table 11. Dates for DAP archaeomagnetic samples collected from 1978 through 1980*--Continued

Site No.	Sample No.	Provenience	Archaeomagnetic dates (A.D.)
5MT4475 (continued)	8	Courtyard 1, hearth	1415±50
	9	Courtyard 1, hearth	735±40 or 875±40 or 1000±40 or 1450±40
	10	Room 10, hearth	735±50 or 885±50 or 1475±50
	11	Room 7, hearth	1100±60 or 1360±60
	14	Pitstructure 3, central hearth, remodeled portion	Used for Dolores modification
	15	Pitstructure 3, central hearth	Used for Dolores modification
	16	Pitstructure 3, east wingwall	Used for Dolores modification
	18	Pitstructure 3, floor	Used for Dolores modification
	19	Pitstructure 4, hearth in fill	1090±50 or 1350±50
	20	Pitstructure 5, central hearth	Used for Dolores modification
5MT4477	1	Pitstructure 2, central hearth	750±50 or 870±50 or 1010±50 or 1450±50
	2	Pitstructure 2, west wall	Used for Dolores modification
5MT4479	1	Pitstructure 1, central hearth	700±20 or 880±20 or 1475±20
	2	Pitstructure 2, central hearth	765±30 or 890±30 or 1490±30

Table 11. Dates for DAP archaeomagnetic samples collected from 1978 through 1980*--Continued

Site No.	Sample No.	Provenience	Archaeomagnetic dates (A.D.)
5MT4479 (continued)	3	Room 7, hearth	700±45 or 880±45 or 990±45 or 1480±45
5MT4480	1	Pitstructure 4, central hearth	Used for Dolores modification
5MT4512	2	Exterior use area, hearth	1090±55 or 1340±55 or 1420±55
	3	Exterior use area, hearth	Falls off curve
5MT4545	2	Room 1, north and northwest wall	Used for Dolores modification
	3	Pitstructure 2, north wall	750±50 or 870±50 or 1000±50 or 1440±50
	4	Pitstructure 1, central hearth	700±45 or 1475±45
	5	Exterior work area, hearth	1400±50
	6	Room 3, floor	Used for Dolores modification
5MT4614	1	Pitstructure 1, central hearth	Used for Dolores modification
	2	Pitstructure 2, central hearth	Used for Dolores modification
5MT4644	1	Pitstructure 1, west wall	Used for Dolores modification
	2	Pitstructure 2, central hearth	Used for Dolores modification
	3	Pitstructure 2, north wall	Used for Dolores modification

Table 11. Dates for DAP archaeomagnetic samples collected from 1978 through 1980*--Continued

Site No.	Sample No.	Provenience	Archaeomagnetic dates (A.D.)
5MT4644 (continued)	5	Pitstructure 1, north wall	Used for Dolores modification
	6	Pitstructure 2, central hearth	700±50 or 880±50 or 980±50 or 1460±50
	7	Exterior use area, hearth	875±50 or 1400±50
	8	Pitstructure 3, central hearth	Used for Dolores modification
	9	Room 5, central hearth	1100±50 or 1325±50 or 1420±50
5MT4650	1	Pitstructure 1, central hearth	765±35
5MT4671	1	Exterior use area, hearth	775±30 or 865±30 or 890±30
	2	Exterior use area, hearth	775±35 or 860±35 or 900±35
	3	Pitstructure 2, central hearth	785±25 or 850±25
	4	Pitstructure 1, central hearth	785±30 or 860±30 or 900±30
	5	Pitstructure 4, central hearth	735±35 or 880±35
5MT4684	1	Pitstructure 1, central hearth	Used for Dolores modification
	4	Pitstructure 4, central hearth	735±40 or 880±40 or 1485±40

Table 11. Dates for DAP archaeomagnetic samples collected from 1978 through 1980*--Continued

Site No.	Sample No.	Provenience	Archaeomagnetic dates (A.D.)
5MT4684 (continued)	5	Pitstructure 5, central hearth	Used for Dolores modification
5MT4725	2	Pitstructure 1, central hearth, first remodeling	Used for Dolores modification
	3	Pitstructure 2, central hearth	700±50 or 890±50 or 1505±50
	5	Pitstructure 6, central hearth	785±35 or 855±35 or 900±35
	6	Pitstructure 5, central hearth	Used for Dolores modification

* Based on the Dolores refinement (Hathaway et al. 1983) and the McGuire and Sternberg modification (McGuire and Sternberg 1982) of the Southwest master curve.

success. Factors used in this evaluation were degree of oxidation, hardness, amount of erosion, clay content, amount of intrusions, and collection quality (Hathaway 1982). The priority system was used in developing a plan of field operation and in analysis. Second, a sun compass was used in addition to a Brunton compass to determine magnetic orientation; and, third, supplementary soil samples were recovered with each archaeomagnetic sample when feasible. These soil samples were later analyzed for particulate and chemical content to determine which soil types are most likely to yield reliable dates.

Also conducted in 1980 was an experimental firing program. This involved the construction and burning of 12 pits that were modeled after Anasazi hearths in the project area (Hathaway 1982:39-110). Archaeomagnetic samples were later collected from the pits and analyzed; the results were used to evaluate the effects of different soil and firing conditions on sample quality.

Laboratory refinements initiated at the University of Colorado or Colorado State University included, first, experimentation with various demagnetization methods (i.e., procedures designed to remove magnetization that is not the result of prehistoric firing) to determine the best techniques. Second, once plots were obtained, an analysis was conducted on outliers to determine their probable course (Hathaway 1982) and the extent to which they should be considered when estimating the "spread" of the sample plot.

Radiocarbon Dating

In the original plan for dating project archaeological sites (Breternitz and Kane 1978), radiocarbon analysis was conceived as a

supplementary dating method to be implemented in the event that collection and analysis of tree-ring and archaeomagnetic specimens was not possible. Hence, radiocarbon dating was viewed as a "fail-safe" expedient for architectural sites and as the primary dating method for nonarchitectural sites. Because of this approach, many radiocarbon specimens were collected in the field, but few have been analyzed. At most project sites, especially those assigned one or more Anasazi components, tree-ring and archaeomagnetic analysis have proven adequate to date site contexts.

An administrative summary of the radiocarbon dating program is shown in table 12. The table illustrates that, in keeping with the original concept, few radiocarbon specimens have been submitted for analysis; all specimens submitted have yielded dates. Table 13 summarizes all radiocarbon dates obtained for DAP field proveniences for 1978-1980. The dates recovered represent both Anasazi and probable Archaic Tradition occupations. The radiocarbon dates obtained from the Anasazi components apparently are inaccurate when compared to dates based on associated architecture and ceramic types; the discrepancy is often as much as 500 to 600 years. Several factors, including collection of unsuitable materials, may have contributed to this problem; an evaluation of DAP radiocarbon sampling is included in this report (appendix A). The Archaic Tradition dates seem more reliable; however, accuracy within 50 to 100 years is not as important in interpreting these sites as it is in interpreting the Anasazi Tradition components.

Architectural Sequencing

A recently implemented supplementary dating method employed by the DAP is architectural seriation or sequencing. This approach is based on the

Table 12. Administrative summary of the DAP radiocarbon dating program, 1978-1980

Year	Total samples collected	Total samples submitted for analysis	Laboratory	No. of dates obtained
1978	183	4	Center for Applied Isotope Studies, University of Georgia, Athens	3
		1	Beta Analytic, Inc., Coral Gables, Fla.	1
1979	112	18	University of Texas Austin Radiocarbon Laboratory, Austin	18
1980	144	6	Beta Analytic, Inc., Coral Gables, Fla.	6
		3	Dicarb Radioisotope Co., Gainsville, Fla.	3

Table 13. Radiocarbon dates obtained for DAP field proveniences, 1978-1980

Site No.	Provenience	Laboratory No.	Date
5MT2191	Exterior use area, charcoal in pit (Feature 12)	BETA-1932	1310±70 B.P. (A.D. 640)
5MT2192	Pitstructure 1, Surface 1	TX-3882	1510±70 B.P. (A.D. 440)
	Pitstructure 1, roof fall	TX-3881	1990±160 B.P. (40 B.C.)
5MT2199	Exterior use area, burned pit (Feature 2)	TX-3872	5680±2350 B.P. (3730 B.C.)
5MT2235	Exterior use area, hearth (Feature 5)	UGa-2771	1145±65 B.P. (A.D. 805)
	Pitstructure 1 fill, charcoal concentration (Feature 10)	UGa-2772	1545±170 B.P. (A.D. 405)
	Pitstructure 1, central hearth (Feature 11)	UGa-2773	1065±100 B.P.
5MT2241	Exterior use area, charcoal in hearth fill (Feature 1)	BETA-2938	690±50 B.P. (A.D. 1260)
5MT2242	Exterior use area, hearth (Feature 3)	TX-3876	3710±90 B.P. (1760 B.C.)
5MT2854	Pitstructure 1, refuse deposit in fill	TX-3884	1620±20 B.P. (A.D. 330)
	Pitstructure 3, support post (Feature 65)	TX-3883	1680±60 B.P. (A.D. 270)

NOTE: BETA - Beta Analytic, Inc.
TX - University of Texas Austin Radiocarbon Laboratory.
UGa - Center for Applied Isotope Studies, University of Georgia.
DIC - Dicarb Radioisotope Co.
n.a. - Not applicable.

Table 13. Radiocarbon dates obtained for DAP field proveniences, 1978-1980

Site No.	Provenience	Laboratory No.	Date
5MT2191	Exterior use area, charcoal in pit (Feature 12)	BETA-1932	1310±70 B.P. (A.D. 640)
5MT2192	Pitstructure 1, Surface 1	TX-3882	1510±70 B.P. (A.D. 440)
	Pitstructure 1, roof fall	TX-3881	1990±160 B.P. (40 B.C.)
5MT2199	Exterior use area, burned pit (Feature 2)	TX-3872	5680±2350 B.P. (3730 B.C.)
5MT2235	Exterior use area, hearth (Feature 5)	UGa-2771	1145±65 B.P. (A.D. 805)
	Pitstructure 1 fill, charcoal concentration (Feature 10)	UGa-2772	1545±170 B.P. (A.D. 405)
	Pitstructure 1, central hearth (Feature 11)	UGa-2773	1065±100 B.P.
5MT2241	Exterior use area, charcoal in hearth fill (Feature 1)	BETA-2938	690±50 B.P. (A.D. 1260)
5MT2242	Exterior use area, hearth (Feature 3)	TX-3876	3710±90 B.P. (1760 B.C.)
5MT2854	Pitstructure 1, refuse deposit in fill	TX-3884	1620±20 B.P. (A.D. 330)
	Pitstructure 3, support post (Feature 65)	TX-3883	1680±60 B.P. (A.D. 270)

NOTE: BETA - Beta Analytic, Inc.
TX - University of Texas Austin Radiocarbon Laboratory.
UGa - Center for Applied Isotope Studies, University of Georgia.
DIC - Dicarb Radioisotope Co.
n.a. - Not applicable.

Table 13. Radiocarbon dates obtained for DAP field proveniences, 1978-1980--Continued

Site No.	Provenience	Laboratory No.	Date
5MT5361	Charcoal in post-abandonment deposits	DIC-1922	1600±90 B.P. (A.D. 350)
	Same provenience as DIC-1922	BETA-1931	2185±100 B.P. (235 B.C.)
n.a.	Sagehen Flats marsh	BETA-3824	5560±90 B.P. (3610 B.C.)
n.a.		BETA-3058	1350±60 B.P. (A.D. 600)
n.a.		BETA-2937	250±50 B.P. (A.D. 1700)
n.a.		DIC-2287	30±45 B.P. (A.D. 1920)

assumptions that architectural styles are regional phenomena with little local spatial variability, and that temporal variations in styles are consistent across wide areas, in this case, sectors or even districts (Kane 1981b). These assumptions appear to have superficial validity based on comparisons of architectural styles within the Mesa Verde Region; characteristics of domestic architecture (pithouses and surface rooms) for the A.D. 600's, 700's, and 800's appear to be similar for the Dolores Project area, for the Yellowjacket District to the south and west (Martin 1939; Rohn 1975), for Mesa Verde (Hayes and Lancaster 1975; Birkedal 1976), and for the Mancos Canyon and La Plata areas (Gillespie 1975; Farmer 1977; Morris 1939).

A formal study of Dolores area architectural temporal variability was undertaken in 1980-1981 (Hewitt et al. 1983). This study was confined to pitstructures, and architectural characteristics of these structures were quantified in the expectation that a typology based on temporal variation could be developed. A matrix of architectural variables was constructed (37 project area pitstructures; 9 metric and 10 binary variables), and the matrix was manipulated using cluster and discriminant analysis. The cluster analysis proved unsuccessful, perhaps because the cluster program adopted (HCLUS) (Wood 1974) gives equal weight to all variables. The discriminant analysis was undertaken using five temporal groupings: A.D. 600-700, A.D. 700-760, A.D. 760-840, A.D. 840-880, A.D. 880-900. These groupings are thought subjectively to reflect the temporal variability in the data set. The strength of this subjective typology was verified by applying the discriminant analysis; over 90 percent of project area pitstructures were assignable to the correct temporal grouping by

only architectural characteristics. These dating assignments were cross-checked with other dating evidence such as tree-ring dates, archaeomagnetic dates, and ceramic type dates.

Appendix B provides a quick reference for those interested in dating inferences that might be drawn on the basis of architectural patterning. It is emphasized that this method assumes "normal" distributions and that exceptions to the normal distributions can be expected.

Ceramic Dating

A second relative dating technique being developed by the DAP is ceramic dating. The goal of this program is similar to that of architectural sequencing; that is, to permit more accurate dating of Anasazi occupations that cannot be placed temporally by tree-ring or archaeomagnetic analysis. Two different approaches are being pursued based on subjective perceptions of temporal trends in certain characteristics of DAP ceramic assemblages. One technique is the dating of neckbanded ceramics based on characteristics of the neckbands and calibration with tree-ring dated specimens (Blinman 1981). Neckband characteristics thought to potentially exhibit consistent temporal change were rim height, coil height, coil width, coil juncture depth, and clapboarding (Blinman 1981:table 29). Analyses employing these variables suggested that coil height was the measurement most suitable for dating purposes. Neckband dating has since been applied to many ceramic assemblages recovered from DAP sites. Table 14 summarizes the results of neckbanded ceramic analysis for one specific project provenience, the floor of Pitstructure 1 at Site 5MT4479. The most recent neckband dates from a provenince are interpreted to be the best estimate for the date of the provenience (Blinman

Table 14. Dates for neckbanded ceramics from the floor of Pithouse 1, Site 5MT4479

Vessel identification no.	Coil height (mm)	Style date (A.D.)
903	10.70	841
903	11.62	794
903	12.27	761
903	13.07	721
903	13.10	719
903	13.53	698
903	13.90	679
904	9.25	868
904	10.02	861
904	10.10	861
904	10.13	860
904	10.30	859
904	10.45	853
904	10.63	844
904	10.78	837
904	10.84	834
904	10.95	828
904	11.00	825
904	11.05	823
904	11.12	819
904	11.62	794
904	11.90	780
904	11.92	779
904	12.33	758
904	12.37	756
905	9.62	865
905	9.78	863
905	9.97	862
905	11.52	799
905	11.55	798
905	11.72	789
905	12.10	770
905	13.00	725
fragment	11.35	808
fragment	12.18	766
fragment	13.00	725
fragment	13.22	713
fragment	13.30	709
fragment	14.18	665
fragment	14.62	643

Source: data from Blinman (1981:table 31).

1981:368-369), and the dating inference in this case is that the floor assemblage represents use of the structure in the A.D. 860's.

The second approach is ceramic type dating (Blinman 1982). Currently, progress in this area is not as advanced as the neckband calibration method. Basically, the technique involves correlating the presence of ceramic types with tree-ring dated proveniences, establishing a date range for DAP ceramic types, and then dating field proveniences by the presence or absence of types; this is a traditional technique applied in Southwest archaeology (Breternitz 1966; Breternitz et al. 1974). An extension of this technique is to calculate ratios between certain ceramic types in the assemblage and compare them to assemblage ratios from tree-ring dated sites. For example, Blinman (1982:3) believes that pre-A.D. 800 assemblages are characterized by a Moccasin Gray to Mancos Gray ratio of less than 0.95 while post-A.D. 800 ratios are greater than 2.09. This type of argument should provide greater precision to mere presence/absence type dating. Both ceramic dating approaches are currently in a preliminary stage, but appear to be feasible in applications and have inherent potential for enhancing project dating programs.

SUMMARY OF 1980 FIELDWORK

Dolores Archaeological Program 1980 field operations began on 15 May and continued until 15 November. These investigations can be described according to the four investigatory "tracks" presented in the DAP Implementation Design (Knudson et al. 1981:42-43). Most survey work conducted by the project can be classified as Track 4 work, which involves selective collection of surface materials and other data recovery procedures (e.g., magnetometer survey of selected areas at sites can probably be considered a Track 4 investigation). Track 3 investigation involves more thorough examination of the site surface, including detailed mapping and controlled artifact collection. Excavations can be considered Track 2 or Track 1 investigations depending on whether they are designed as primarily testing operations (Track 2) or as more thorough documentation efforts (Track 1). The specific fieldwork operations carried out by the DAP are summarized in the following sections.

Inventory Survey

Dolores Archaeological Program inventory survey operations in 1980 were directed toward recording the locations of cultural resources located in high priority impact areas (the latter also termed "project features"). The impact areas included in the 1980 survey were the McPhee Reservoir pool area, the wildlife mitigation lands, the McPhee recreation area, the People's Natural Gas gasline relocation, the Dolores tunnel and canal, borrow area B, and the lands within the takeline (i.e., lands purchased by the federal agency, although they are not subject to primary impacts).

Inventory survey is conducted by the DAP Survey Group, which is primarily responsible for the identification and recording of prehistoric and historic cultural resources. In 1980, the Survey Group recorded 54 prehistoric sites, 13 historic sites, and 1 combined prehistoric-historic site. Total labor expended during 1980 was approximately 460 person-days; total labor expended during the 1978, 1979, and 1980 field seasons was approximately 3125 person-days. Total area surveyed by the DAP inventory crews in 1980 was 516.4 ha; the grand total for 1978 through 1980 was 2250.9 ha.

Probability Survey

The probability survey was a supplementary data recovery program conducted by Washington State University; field operations were financed by field school revenues rather than by the government. The objective of the program was to augment the inventory survey data base to achieve more even and widespread coverage. For this purpose, the project area and vicinity (the Escalante Sector; refer to Kane 1981b) were stratified according to administrative localities and a random sample of 200 m^2 and 400 m^2 quadrats. Each quadrat was completely surveyed in transects. Once a site was identified, it was recorded using standard inventory survey procedures (Bohnenkamp et al. 1982). In 1980, probability survey was conducted in four upland localities: Cline Crest, Hoppe Point, Trimble Point, and Beaver Point. Results of the 1980 survey are presented in table 15; a comprehensive discussion is presented in Schlanger and Harden (1983).

In the Cline Crest Locality, one 200 m^2 and ten 400 m^2 quadrats were surveyed. Cline Crest is an upland area just west of the Dolores

Table 15. Results of Washington State University probability survey of eastern upland localities, 1980

	Elevation and locality				
	Below 7500 ft (2286 m)	Above 7500 ft (2286 m)			
	Beaver Point	Beaver Point	Trimble Point	Hoppe Point	Total
Total sites					
No.	21	4	2	20	47
Per km^2	26.25	5.00	2.08	12.50	11.29
Limited activity					
No.	17	3	2	20	42
Per km^2	21.25	3.75	2.08	12.50	10.09
Field house					
No.	2				2
Per km^2	2.50				.48
Habitation					
No.	2	1			3
Per km^2	2.50	1.25			.72
Lithic sites					
No.	16	3	2	18	39
Per km^2	20.00	3.75	2.08	11.25	9.37
% of total sites	76.19	75.00	100.00	90.00	82.99
Ceramic sites					
No.	5	1		2	8
Per km^2	6.25	1.25		1.25	1.92
% of total sites	23.81	25.00		10.00	17.02

River valley. Vegetation consists predominantly of pinyon pine, scrub oak, and sagebrush. In 1980, 22 sites were found and 28 were found in 1979, for a total of 50 in the locality. Preliminary analysis of results from the two seasons suggests that sites are numerous throughout the locality, and that the majority of sites appear to date to the Pueblo I period (i.e., middle Sagehen through middle McPhee Phases). Small habitation sites are fairly common and tend to be located close to the Dolores River valley rim. However, the large McPhee Phase Cline Crest Village (5MT2663) is located more nearly in the center of the locality. Most other ceramic-bearing sites located away from the valley rim appear to be field houses, or at least do not have the size and architectural complexity of the habitation sites found closer to the rim. A number of lithic scatters were also found; they tend to occur on the edges of washes. It appears likely that some of these lithic scatters date to the Archaic Tradition.

On the east side of the Dolores River valley, the Hoppe Point, Trimble Point, and Beaver Point Localities display a gentle elevational gradient from the high, ponderosa pine-forested Hoppe and Trimble Points down through southern Beaver Point, which in places is below 2286 m (7500 ft) in elevation. Although there is a tendency for ceramic-bearing sites to occur more frequently at the lower elevations (table 15), lithic scatters are the most common type of site in all localities. In striking contrast to the Cline Crest upland area, the eastern upland localities have a much lower site density, even at comparable elevations. The occurrence of certain diagnostic projectile points in some lithic scatters in the three eastern upland localities suggests that Archaic components are present. To what degree the lithic scatters also represent Anasazi limited activity sites is unknown. In general, the survey results suggest that in this area

the Dolores River valley represents the eastern and northeastern boundary of intensive Anasazi occupation in the Escalante Sector.

Magnetometer Survey

The main objective of the DAP magnetometer survey program is to collect magnetometer data from sites to be impacted by construction. The magnetometer data can be used to estimate the number, locations, and characteristics of archaeological structures and features. This information can then be used to develop general field programs and to formulate site-specific excavation designs (Kane 1981b:21). Early in the 1978 field season, a pilot magnetometer program was implemented; subsequent analysis was done by NEBCAR (Nebraska Center for Archaeophysical Research). The results of this program indicated that mapping of magnetic fields was useful in predicting archaeological phenomena; therefore, comprehensive magnetometer programs continued through the 1979 and 1980 field seasons (Kane 1981b:20-21; Huggins and Weymouth 1978, 1981; Burns et al. 1981; Bennett and Weymouth 1982). Ten of the sites at which magnetometer survey was conducted were later tested or more fully excavated (Track 2 or Track 1).

An assessment of the magnetometer survey program was carried out in 1980 (Burns et al. 1981) using the data from the 1980 field season. Table 16 provides a summary of the 1980 magnetometer program. The study also addressed the adequacy of the 1978-1979 procedures in terms of the original goals developed for the program. Specific areas evaluated included the accuracy of the predictions made by NEBCAR; the adequacy of the priority system (an overall ranking of the anomalies at each site according to

Table 16. Summary of DAP magnetometer program, 1980

Site No.	No. of blocks surveyed	Possible structural anomalies	Other anomalies of archaeological interest
5MT2182	7.50	7	13
5MT2215	1.00	3	0
5MT2322	3.00	2	10
5MT4475	0.75	4	8
5MT4477	3.20	7	5
5MT4478	1.50	4	3
5MT4479	1.50	4	5
5MT4514	2.00	3	4
5MT4541	2.50	0	3
5MT4571A*	8.00	0	0
5MT4613	2.00	0	0
5MT4621	1.50	3	0
5MT4624	3.00	0	2
5MT4684	2.50	5	2
5MT4689	1.50	0	3
5MT4690	1.50	1	0
5MT4692	3.00	0	4
5MT4725	2.00	0	1
5MT5106	2.00	3	0
5MT5107	1.50	3	2
5MT5121	1.50	0	2
5MT5154	1.50	2	2
Total (22 sites)	54.45	51	69

* Site 4571A is a historic site; a residential section of the town of McPhee. Magnetometer operations were undertaken at the site to determine whether the former locations of structures could be estimated by magnetometer mapping; no anomalies are reported for this site because those that were detected are believed to have been caused by the presence of historical iron artifacts.

suspected archaeological source); the application of "filtering" or computer manipulation of magnetic SYMAPS (Dougenik and Sheehan 1977) or line contour maps to improve resolution of certain anomalies; and the value of the analysis in predicting certain characteristics (size, depth, shape, degree of oxidation) of possible structures. The authors concluded that the magnetometer program was reasonably accurate in predicting the presence of prehistoric structures (13 of the 20 predicted locations, or 65.0 percent, were verified through excavation as being structures) but was not accurate in predicting smaller archaeological phenomena such as hearths and burned surfaces (Burns et al. 1981:67-71). The problem with predicting these smaller features is that many noncultural sources produce small anomalies similar to those produced by prehistoric hearths and burned pits; however, identification of smaller phenomena can be improved through convolution filtering (Burns et al. 1981). Much information can be gained about unexcavated structures, especially pitstructures, from subsurface magnetic data. It is possible to estimate the approximate limits, size, and orientation of most pitstructures; these estimates can be made more accurate if the structure is moderately or severely oxidized. Information regarding locations of interior features such as hearths, ventilator shafts, and antechambers also can be recovered. Intensities of oxidation from catastrophic or postabandonment burning of pitstructures can also be estimated from magnetic information (Burns et al. 1981:151-152).

Excavations

During the 1980 field season, University of Colorado and Washington State University excavation crews conducted investigations at 37 sites (33

prehistoric, 2 historic, 1 protohistoric, and 1 mixed prehistoric/protohistoric); total labor investment was approximately 155.3 crew-weeks (1 crew-week equals 400 person-hours). The goal of the 1980 field program was to recover an adequate sample of archaeological data from priority project features; adequacy is defined in terms of the recovery of sufficient data for descriptive reporting and ultimate syntheses. Most fieldwork during 1980 was conducted in three project features: borrow area E, the construction haul road, and the McPhee Reservoir pool area. Work accomplished in each of these areas is summarized in table 17. The DAP also evaluated construction impacts in two other project features (the People's Natural Gas gasline relocation and the Bradfield bridge replacement); the consensus was that there would be no harm to cultural resources as a result of the proposed activity in these two features.

Table 17. Summary of 1980 DAP excavations, by project feature

Project feature	No. of excavated sites	Labor expended (crew weeks)
Outside McPhee Reservoir pool		
Borrow area E	2	9.6
Haul road	1	0.1
Total	3	9.7
Within McPhee Reservoir pool		
Borrow area B	7	5.3
Haul road	4	34.3
McPhee Dam	1	4.7
Other	20	100.9
Total	32	145.2
Other		
Takeline	2	0.4
Total	2	0.4
Total	37	155.3

prehistoric, 2 historic, 1 protohistoric, and 1 mixed prehistoric/protohistoric); total labor investment was approximately 155.3 crew-weeks (1 crew-week equals 400 person-hours). The goal of the 1980 field program was to recover an adequate sample of archaeological data from priority project features; adequacy is defined in terms of the recovery of sufficient data for descriptive reporting and ultimate syntheses. Most fieldwork during 1980 was conducted in three project features: borrow area E, the construction haul road, and the McPhee Reservoir pool area. Work accomplished in each of these areas is summarized in table 17. The DAP also evaluated construction impacts in two other project features (the People's Natural Gas gasline relocation and the Bradfield bridge replacement); the consensus was that there would be no harm to cultural resources as a result of the proposed activity in these two features.

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Outside McPhee Reservoir pool		
Borrow area E	2	9.6
Haul road	1	0.1
Total	3	9.7
Within McPhee Reservoir pool		
Borrow area B	7	5.3
Haul road	4	34.3
McPhee Dam	1	4.7
Other	20	100.9
Total	32	145.2
Other		
Takeline	2	0.4
Total	2	0.4
Total	37	155.3

The general research objective during 1980 was to augment the effective data bases for defined prehistoric communities in the impacted areas. The targeted communities were the West Sagehen, Lucero, and LeMoc Neighborhoods, and the McPhee, Rio Vista and Grass Mesa Villages. A secondary objective was to add to the comprehensive reconstruction of occupational history and use being developed for the project area. Specific objectives in terms of the project research design and planned project synthesis were as follows:

1. Recovery of additional data relating to acquisition, processing, use, and discard of resources (resource use and adaptation). Fulfilling this objective requires the recovery of archaeological remains of these activities and information regarding the spatial context in which the activities were performed.
2. Recovery of demographic data (including information on the physical characteristics of the populace and on population densities and fluctuations). This objective requires the recovery of information regarding the number of dwelling units present at each excavated habitation site; information should be gathered for several 30 year intervals (or elements) during the occupation of the site. This type of information is necessary to estimate variability in residential architecture and its probable relationship to population flux, and to permit extrapolation of the data to unexcavated sites. Specific excavation designs also emphasize the controlled collection of burial data because many types of demographic inference are based on such information.

3. Recovery of information regarding structure layout and function. This information is necessary for reconstruction of social organization. At the DAP, organizational variability is being investigated on two levels: (1) the household (or unit of domestic production and consumption) and (2) the settlement (or community) levels. Therefore, investigation of the archaeological manifestations of households and structures/areas that were shared by households for economic and integrative purposes is essential. This investigative strategy should also allow the recovery of data useful in reconstructing trade and foreign relations. Presence/absence of trade items and frequencies of such items can be examined at the household and community levels.

4. Recovery of data pertaining to culture change. Field strategies employed during 1980 to realize this goal included selection of a large number of sites that date to the A.D. 800-900 period (when culture change seems to be most evident) and implementation of site-specific programs to recover comprehensive sets of dating samples.

Summaries of the work accomplished at each site selected for Track 1, 2, and/or 3 investigation constitute the remainder of this section; for quick reference, table 18 lists all sites excavated in 1980.

Grass Mesa Village (Site 5MT23)[6]

Investigations conducted at Grass Mesa Village during 1980 are reported in Breternitz (1982); Emerson et al. (1982); and Ahlstrom and Dohm (1981).

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[6]Although the entire community cluster is called a village, for administrative purposes the central habitation (i.e., the center of the community) is also called the village. Therefore, individual sites have received village names.

Table 18. DAP Track 1, 2, and 3 investigations, 1980

Site No./ name	Location	Labor expended (crew-weeks)	Temporal summary (all dates A.D.)	Use summary
5MT23/Grass Mesa Village	Pool area, Grass Mesa Locality	21.0 (Tracks 1 and 2)	Continuous occupation from late 700's to 920-930 (Dos Casas, Periman, and Grass Mesa Subphases)	Site functioned as a large, permanent settlement (village); maximum expansion was in the middle to late A.D. 800's, when 10 to 15 roomblocks, with 75 to 100 dwelling units, and 25 to 40 pitstructures were in use
5MT2161/Prince Hamlet	Haul road and pool area, Grass Mesa Locality	6.8 (Track 1)	Continuous occupation from late 700's through late 800's (Dos Casas and Periman Subphases)	Site was a small, permanent settlement (hamlet); during the A.D. 800's, the site consisted of 2 pitstructures, and 1 roomblock with 4 to 5 dwelling units
5MT2165	Pool area, Grass Mesa Locality	0.1 (Track 3)	Occupation in early 800's	Site was probably a small hamlet with 1 pitstructure and single roomblock with 2 or 3 dwelling units
5MT2166	Pool area, Grass Mesa Locality	0.1 (Track 3)	Occupation probably in late 600's	Site was probably a small habitation with 1 pithouse dwelling unit and associated surface structures
5MT2170	Haul road and pool area, Grass Mesa Locality	0.1 (Track 3)	Occupation in the 700's (Sagehen Phase)	Site was probably a small hamlet with 1 pithouse dwelling unit
5MT2173	Borrow area B and pool area, Grass Mesa Locality	0.1 (Track 3)	Indeterminate; an Archaic component is suspected	Site was probably a limited activity locus; it may have functioned as a gathering and processing station

Note: The pool area is McPhee Reservoir.

Table 18. DAP Track 1, 2, and 3 investigations, 1980--Continued

Site No./ name	Location	Labor expended (crew-weeks)	Temporal summary (all dates A.D.)	Use summary
5MT2174/Dos Cuartos House	Borrow area B and pool area, Grass Mesa Locality	0.4 (Track 2)	Occupation in the 800's is probable (Dos Casas or Periman Subphase)	Site was probably a field house
5MT2175	Borrow area B and pool area, Grass Mesa Locality	0.1 (Track 3)	Indeterminate Anasazi	Site was probably an economic limited activity locus
5MT2181/Hamlet de la Olla	Borrow area B and pool area, Periman Locality	2.2 (Track 2)	Two occupations are present: one in the late 700's (Dos Casas Subphase) and the other in the 800's (McPhee Phase)	Site first functioned as a small habitation or hamlet with a pitstructure and one roomblock containing 3 dwelling units; during the later occupation, the site functioned as a field house
5MT2182/Rio Vista Village	Pool area, Periman Locality	25.6 (Tracks 1 and 2)	Continuous occupation from the late 700's to approximately 900 (Dos Casas, Periman, and perhaps Grass Mesa Subphases)	Site was a large, permanent habitation with 4 roomblock units; 25 to 35 surface room dwelling units and 7 to 10 pitstructures were probably used during the maximum expansion of the site
5MT2211	Pool area, Grass Mesa Locality	0.1 (Track 3)	Site was probably occupied in the early 800's	Site was a small habitation or hamlet, probably with a single pitstructure and a single roomblock containing 2 to 3 dwelling units
5MT2212	Pool area, Grass Mesa Locality	0.1 (Track 3)	Site has two occupations, the first in the 600's or early 700's, the second in the 900's or 1000's	Site apparently functioned as an economic limited activity locus

Table 18. DAP Track 1, 2, and 3 investigations, 1980--Continued

Site No./ name	Location	Labor expended (crew-weeks)	Temporal summary (all dates A.D.)	Use summary
5MT2213	Pool area, Grass Mesa Locality	0.1 (Track 3)	Site was occupied in the 700's (Sagehen Phase)	Indeterminate
5MT2215/ Sundance Hamlet	Pool area, Periman Locality	5.7 (Track 1)	Short-term use during the 1050-1200 period (Sundial Phase)	Site was probably intended to be a small habitation; however, use never extended beyond construction
5MT2216	Pool area, Grass Mesa Locality	0.1 (Track 3)	Two occupations are represented: the first in the 700's or 800's, the second in the 900's or 1000's	The early occupation was probably a small habitation, the later probably reflected seasonal use
5MT2241/ Southview House	Pool area, Sagehen Flats Locality	2.0 (Track 1)	First occupation during the 750-900 period; a later occupation during the 1050-1200 period	Site probably a seasonal locus
5MT2381	Takeline, Grass Mesa Locality	0.1 (Track 3)	Occupation in 700's	Site was probably a small settlement with a single pitstructure and 1 roomblock containing 2 to 3 dwelling units
5MT2854/Aldea Sierritas	Borrow area E, Sagehen Flats Locality	6.0 (Track 1)	Two occupations are represented: the first in the early-to-middle 700's (Sagehill Subphase) and the second in the middle 700's to late 700's/early 800's (Dos Casas Subphase)	Site functioned during both occupations as a hamlet; each occupation consisted of use of a single pithouse dwelling unit and associated surface structures.

Table 18. DAP Track 1, 2, and 3 investigations, 1980--Continued

Site No./ name	Location	Labor expended (crew-weeks)	Temporal summary (all dates A.D.)	Use summary
5MT4475/ McPhee Pueblo	Pool area, Periman Locality	10.2 (Track 1)	Continuous occupation from the late 700's to the middle to late 900's (Dos Casas, Periman, and Cline Subphases)	Site was a single roomblock unit in McPhee Village; during the middle to late A.D. 800's, approximately 14 dwelling units, 5 "regular" pitstructures, and one large, integrative pitstructure were in use
5MT4477/Masa Negra Pueblo	Pool area, Periman Locality	11.0 (Track 1)	Continuous occupation from the early 800's to early 900's (Dos Casas, Periman, and Cline Subphases)	Site was a roomblock unit in McPhee Village; during the middle to late 800's, 10 to 15 surface dwelling units and 5 pitstructures were in use
5MT4479/Aldea Alfareros	Pool area, Periman Locality	13.2 (Track 1)	Occupation in the late 800's (Periman Subphase)	Site was a roomblock unit in McPhee Village; 2 dwelling units and 2 pitstructures were present
5MT4480/ Rabbitbrush Pueblo	Pool area, Periman Locality	4.2 (Track 2)	Occupation in the middle and late 800's (Periman Subphase)	Site was a roomblock unit in McPhee Village; 15 to 25 surface dwelling units and 8 pitstructures were in use
5MT4541/ Jeddito Hamlet	Haul road, Sagehen Flats Locality	0.1 (Track 2)	Probable occupation in the 1000's or 1100's (Sundial Phase)	Site was probably a small habitation (only the southern extremity of the site was investigated)
5MT4571A/ McPhee Townsite	Pool area, Periman Locality	1.5 (Track 2)	The site was occupied from the 1920's through the 1940's	Site was a residential area in the historic lumber town of McPhee

Table 18. DAP Track 1, 2, and 3 investigations, 1980--Continued

Site No./ name	Location	Labor expended (crew-weeks)	Temporal summary (all dates A.D.)	Use summary
5MT4644/ Windy Wheat Hamlet	Borrow area E, Sagehen Flats Locality	3.6 (Track 1)	Two occupations are represented: the first in the middle 700's, the second in the late 700's and early 800's	Site functioned as a small habitation: during the first occupation, a small pithouse dwelling unit and associated surface structures were use; during maximum expansion durin the second occupation, 2 pitstructures and 1 roomblock with 4 to 6 dwelling units were used.
5MT4650/ Hanging Rock Hamlet	McPhee Dam and pool area, Grass Mesa Locality	4.7 (Track 2)	Occupation in the 800's is indicated	Site was a small habitation consisting of 2 pitstructures and a single roomblock containing 4 to 6 dwelling units.
5MT4671/ Periman Hamlet	Haul road and pool area, Periman Locality	24.9 (Tracks 1 and 2)	The site was occupied in the late 700's; early, middle, and late 800's; and early 900's	Site was an architecturally complex habitation: 3 pitstructures and 3 roomblocks containing a total of dwelling units were used; it is difficult to determine the contemporaneity of the various room and structures; site probably reuse in the late A.D. 800's as a field house
5MT4684/ Chindi Hamlet	Pool area, Periman Locality	3.6 (Tracks 1 and 2)	The site was occupied in the late 600's (Tres Bobos Subphase); it was also used in the late 800's (Periman Subphase)	Early use of the site was as a small habitation; two pithouse dwelling units and associated surface structures are present; the later use of the site was as a cemetery for the prehistoric McPhee settlement

Table 18. DAP Track 1, 2, and 3 investigations, 1980--Continued

Site No./ name	Location	Labor expended (crew-weeks)	Temporal summary (all dates A.D.)	Use summary
5MT4690/ Kangaroo Camp	Pool area, Periman Locality	0.3 (Track 2)	An aceramic occupation, either Archaic (before 500) or post-Anasazi (after 1300) is represented	Seasonal or limited activity use, probably economic in nature, is suggested
5MT4725/Tres Chapulines Pueblo	Haul road and pool area, Periman Locality	2.5 (Track 2)	The site was occupied in the middle and late 800's (Periman Subphase)	Site was a residential complex within McPhee Village: 12 to 18 surface dwelling units and 6 pitstructures are present
5MT4779/Dos Piedras Camp	Borrow Area B and pool area, Periman Locality	0.3 (Track 2)	An occupation in the 700's, 800's, or 900's is suggested	Site was a limited activity locus with emphasis on economic functions; a rock art panel is present
5MT4789/ Quasimodo Cave	Pool area, Grass Mesa Locality	0.6 (Track 2)	The site was occupied in the 900's or 1000's	Site was probably an economic limited activity locus; a storage cist was in the shelter
5MT4797/Cougar Springs Cave	Pool area, Grass Mesa Locality	1.2 (Track 2)	The site was probably occupied between A.D. 1 and 500	Seasonal use by Basketmaker II peoples is suggested
5MT5165/ Dickenson Homestead	Borrow Area B and pool area, Grass Mesa Locality	1.5 (Track 2)	The site was probably settled in the late 1800's and was used continuously into the early 20th century	The site is an early historic homestead
5MT5361/ DTA Site	Borrow Area B and pool area, Grass Mesa Locality	0.7 (Track 2)	Indeterminate Anasazi	The site may represent alluvial deposition of archaeological materials from a different location

Table 18. DAP Track 1, 2, and 3 investigations, 1980--Continued

Site No./ name	Location	Labor expended (crew-weeks)	Temporal summary (all dates A.D.)	Use summary
5MT5380/ Star Bead Shelter	Takeline, Dolores Locality	0.3 (Track 1)	The site was used by the Anasazi (1000's or 1100's) and by protohistoric peoples in the 19th century	The Anasazi use was probably as an economic limited activity locus; protohistoric use consisted of a human interment
5MT5399/ Los Atavios	Pool area, Sagehen Flats Locality	0.2 (Track 1)	The site probably dates to sometime during the 1850-1890 period	The site consists of the remains and personal effects of an individual; it may represent an accidental death rather than deliberate

Spatial and temporal background. Grass Mesa Village is situated on the third terrace above the Dolores River; it is located at the confluence of the Dolores River and Beaver Creek. The topography of this terrace, with formidable defensive advantages, is suitable for a major settlement. The site is located about 12 km northwest of the town of Dolores and 1.5 km east of the proposed McPhee Dam; the site will be inundated by the proposed reservoir.

The results of the 1979 and 1980 investigations suggested a long sequence of occupation at the site, perhaps beginning in the A.D. 700's and continuing into the early A.D. 900's; later rebuilding has destroyed or obscured most of the early components. Proveniences investigated by the DAP have been assigned to the Dos Casas, Periman, and Grass Mesa Subphases. As many as 25 to 40 pitstructures and 10 to 15 roomblocks consisting of 75 to 100 dwelling units were used during the most intensive occupation of the site (A.D. 860-880). These structures are overlain by surfaces and structures used during the last occupation of the site (Grass Mesa Subphase). A great kiva is present; apparently this structure was used sometime during the A.D. 800-880 time period.

1980 investigations. Full-scale excavations were undertaken in Areas 3 and 5 of Grass Mesa Village. In Area 3 of the site, 3.4 crew-weeks were devoted to completing the excavation of portions of Pitstructure 3 that underlay portions of Pitstructures 1 and 5; the latter two had been completely excavated during the 1979 field season. Pitstructure 3 proved to be a large (estimated floor area is 41 m^2), subrectangular structure with two superimposed surfaces containing numerous artifacts and floor

features.[7] This structure was built sometime during the A.D. 800-825 period and was remodeled during the A.D. 850's and 860's. In early August, work in Area 3 was completed, and testing operations were begun in Areas 1, 2, and 7 (refer to discussion of Areas 1, 2, and 7, this section).

In Area 5, the most northwestern area on the mesa, a probability sample was completed (a total of thirteen 2- by 2-m units--six in 1979, seven in 1980), and intensive investigations continued; altogether, 7.8 crew weeks were spent investigating portions of 10 pitstructures, 22 surface structures, and 13 nonstructural units. The continued excavation of Pitstructure 10, which had yielded an A.D. 867 cutting date during testing operations in 1979, confirmed the initial impression that this pithouse had been catastrophically abandoned, and it added a wealth of normally perishable material to DAP collections. Portions of Pitstructure 10 had been destroyed during the construction of Pitstructure 11, also investigated in 1980. Pitstructure 10, the earlier of the two structures, has an estimated floor area of approximately 20 m^2, while Pitstructure 11, with an estimated construction date of A.D. 880-900, measures only 8 to 10 m^2. Pitstructure 15, located near the southeastern boundary of Area 5, was partially excavated in 1980; although not enough of the structure was exposed to estimate floor area, the pithouse appears to be larger than any other investigated Area 5 pithouse. In Pitstructure 7, the great kiva in Area 5, the test trench begun in 1979 was extended across the complete diameter of the depression; two pithouses (Pitstructures 16 and 17) that postdate the larger structure were found during this operation.

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[7] Floor area estimate based on planimeter measurement; this estimate may differ from that reported elsewhere in the DAP report series.

Pitstructures 1, 4, 5, 6, 11, 16, and 17 in Area 5 are small, structurally simple, and often lack formal wingwalls and ventilator systems. Unlike the earlier pitstructures on the mesa, these pithouses are not obviously associated with any surface rooms and their locations appear to be more "haphazard" in relation to other architectural units at the site. The primary roofbeams of these pithouses are frequently Populus, which, also is a departure from the earlier pattern observed at the site. Tentatively it is hypothesized that increased population in the constricted space available on the mesa, under conditions of scarcity of more desirable construction materials, could account for these observed changes in the pattern.

Test excavations in Areas 1, 2, and 7 in the eastern portion of Grass Mesa Village resulted in the exposure of portions of 5 pitstructures, 14 surface structures, and 5 nonstructural units; these investigations entailed 8.8 crew-weeks of labor. The probability sample in Areas 1 and 7 was completed in 1980; in the course of these excavations, a series of superimposed surface structures and pitstructures was encountered in Area 7. Tentatively, the pitstructures encountered here are interpreted as being associated with the last occupation of the site.

Although the probability squares in Area 2 were not excavated to sterile deposits, numerous features and superimposed structures (the greatest number of intrusive structures at the site) were discovered during the excavation of these and adjacent units. Area 2 is believed to have been first occupied sometime during the Sagehen Phase, on the basis of the ceramic assemblage and the number and position of overlapping structures. Of the structures encountered, Pitstructure 13 was the best preserved--another probable case of catastrophic abandonment. Although slightly less than one-quarter of this structure was excavated, it is inferred to have a

floor area of at least 22 m^2. One interesting feature of the structure was a narrow, 50-cm-high bench or shelf of packed earth that was strengthened by regularly spaced juniper posts set into the floor. This can perhaps be interpreted as a wall-strengthening device, for the pitstructure wall in this area appears to have been dug into earlier cultural deposits. The post supported "bench," however, might continue beyond this, along a section of wall dug into the more stable sterile substrate. Of the three superimposed occupation surfaces identified in the pitstructure, two were excavated completely. Dating of the structure is uncertain, but it does not appear to be associated with the last occupation of the site.

Another probability square in Area 2 intercepted at least two and possibly three superimposed pitstructures that partially overlap at least two more pitstructures in the immediate vicinity. The latest and best understood of these is Pitstructure 14. Incorporation of some masonry in its construction suggests that it may date later than Pitstructure 13, located to the west. Because only a small area was excavated and because questions regarding the position of the southeast corner remain unresolved, it is difficult to estimate the floor area of this structure.

A third probability square in Area 2 intercepted a 2-m-long, 80-cm-wide, rock-lined feature that had been excavated into 2 m of stratified midden, and that had at least another 1.5 m of midden below it. The function of this feature, which had upright notched slabs that supported horizontal wood poles or beams, is unknown.

Prince Hamlet (Site 5MT2161)

Investigations conducted at Prince Hamlet in 1979 and 1980 are reported by Sebastian (1983).

Spatial and temporal background. Prince Hamlet is situated on an old river terrace on the north side of the Dolores River canyon, about 1 km

northwest of Grass Mesa Village and 12.6 km northwest of the town of Dolores. A roomblock, two pitstructures, and a midden were discovered during the 1979 and 1980 field seasons. The arrangement of architectural units corresponds to the "normal" pattern for the Periman Subphase (appendix B). Two elements and one episode were recognized at Prince Hamlet. On the basis of ceramic and architectural evidence, Element 1 is believed to date to A.D. 780-820; Element 2 (the major occupation of the site) is believed to date to A.D. 820-900; and Episode 1 probably occurred sometime during the A.D. 1000-1150 period. These elements span the Dos Casas and Periman Subphases. Two interhousehold clusters, including four to five dwelling units and two pitstructures, were recognized for the Element 2 occupation.

1980 investigations. At Prince Hamlet, 6.8 crew-weeks were devoted to completing the probability sample, to excavating portions of the two pitstructures, and to completely or partially excavating seven surface structures. In addition, the midden was tested and the walls of unexcavated rooms in the roomblock were outlined through trenching. Surprisingly, this site proved to have a number of unique characteristics, considering that it was selected as a "typical" small habitation. In Pitstructure 2, the full masonry lining of the structure walls, the post and masonry support at the base of the walls, and the massive, partly masonry wingwalls seem anomalously "late," given that the ceramics indicate a probable late A.D. 800's date. Pitstructure 1 had similar construction attributes. Characteristics of the colluvium into which the structures were dug might have demanded the wall strength provided by the masonry construction. Both pitstructures contained at least two superimposed surfaces and other evidence of remodeling, although only the upper surface

in each could be investigated in the time available. The southern half of Pitstructure 1 and the western half of Pitstructure 2 were cleared; floor area estimates are approximately 28 m^2 for the former and 33.3 m^2 for the latter. Some of the 19 rooms at the site form roomsuites containing, on the average, one large front room (ca. 3 by 5 m) backed by two smaller rooms (each ca. 2.5 by 1.5 m). The roomblock is arranged in an arc that is separated from the two pitstructures to the south by a retaining wall that extended across at least the eastern half of the site. The two pitstructures and the roomblock appear to have been occupied simultaneously. Late in the season, a surface room was discovered beneath the roomblock. This early room might be interpreted either as a detached surface room associated with an early surface in Pitstructure 1 to the south, or as a field house, marking the first Anasazi use of the site.

Rio Vista Village (Site 5MT2182)

Investigations conducted during 1980 at Rio Vista Village are reported in Fields (1981) and Wilshusen (1983a).

Spatial and temporal background. Rio Vista Village is situated on a relatively level colluvial slope on the east side of the Dolores River. The site is located about 6 km northwest of Dolores and will be inundated by the McPhee Reservoir. Rio Vista Village is the central habitation of a McPhee Phase settlement (Rio Vista Community Cluster), which consists of approximately eight habitation sites and a larger number of seasonal and limited activity sites, in addition to Rio Vista Village. Rio Vista Village proper consists of four roomblock units, several middens, and miscellaneous use areas. During the Periman Subphase, 25 to 35 dwelling units and 7 to 10 pitstructures grouped into 7 to 10 interhousehold clusters are believed to have been occupied. Tree-ring samples from

pitstructures associated with the two northernmost roomblock units have yielded dates that suggest that initial occupation of the site occurred in the A.D. 700's. However, later construction episodes have destroyed most of the pre-A.D. 800's contexts, and most of the data recovered postdate A.D. 850. Most of the site apparently was abandoned before A.D. 900, but some groups might have remained at the site into the first decade of the A.D. 900's. The Dos Casas and Periman Subphases, and possibly the Grass Mesa Subphase, are represented at this site.

1980 investigations. To facilitate recording of this large residential complex, Rio Vista Village was divided into seven areas; these designations included one each for the four roomblock units and others for refuse areas and peripheral areas. In 1980, fieldwork was concentrated on three of the four roomblock units.

Area 1: Investigations in Area 1 began on 18 June and lasted until 3 October. Operations undertaken during this period included a total surface artifact collection and the excavation of 15 probability squares and 7 architectural units (5 surface structures and 2 pitstructures). Total labor expenditure in Area 1 was 13.6 crew-weeks. Two major prehistoric occupations were tentatively identified in Area 1. The earliest (assumed to be late Sagehen Phase) is represented by a pithouse (fully excavated in 1980) and an unknown number of surface rooms that are assumed to underlie later structures. The second occupation (thought to represent the McPhee Phase) is represented by a pithouse, 8 to 10 surface rooms, and trash deposits; the latter are centered in the abandoned pithouse that was used during the first occupation.

Area 2: Area 2 work began on 11 August and was terminated on 3 October; most effort was expended on the excavation of 18 probability

squares. In addition, efforts were made to define the numbers, types, and positions of architectural and nonarchitectural units and to outline the occupational sequence of the area. Operations completed in 1980 included systematically collecting surface materials, outlining the walls in the roomblock area, and augering in the plaza area to locate pitstructures. At the end of the 1980 field season, only one element had been identified, although results of initial work suggest a complex history of remodeling and differential use. This element apparently dates to the McPhee Phase. The stripping and augering operations resulted in the identification of approximately 50 surface structures and 5 pitstructures; in addition, several outside features and a retaining wall south of the plaza area were identified and tested.

Area 3: In 1980, work in Area 3 began on 4 August and terminated on 3 October. During this time, a systematic surface collection was completed, and 13 of 17 probability squares were excavated. In conjunction with the probability sample, two living rooms and two storage rooms were also completely excavated. To date, one occupation representing a McPhee Phase component has been identified, although earlier architectural units may be present below the investigated units. The McPhee Phase pueblo consists of 20 to 25 surface structures, 2 pitstructures, and 1 plaza area.

Sundance Hamlet (Site 5MT2215)

1980 investigations at Sundance Hamlet are described in detail by Harriman (1983a).

Spatial and temporal background. Sundance Hamlet is situated at the edge of the Dolores River canyon, south of the junction between the House Creek and Dolores River drainages; it is located in the pool area of the

proposed McPhee Reservoir. Architectural units recorded for the site include two masonry surface rooms and an unfinished pitstructure that, based on its morphology, was probably intended to be a kiva. Architectural characteristics suggest that the site was used sometime during the Sundial Phase. The site might have been used by either the Escalante or Reservoir Communities (Escalante Subphase); the surface rooms are of rubble core construction, a building style not recognized at any other excavated project site.

1980 investigations. Investigations began on 14 July and ended on 5 September. Architectural remains investigated included the unfinished pitstructure and the two rooms; outside use surfaces peripheral to the architectural units were also investigated. Although the site is believed to be a small, Sundial Phase hamlet, the lack of any absolute dating materials makes any phase assignment tentative. The site is an unusual one in that it appears to have been abandoned during construction.

Southview House (Site 5MT2241)

Investigations conducted in 1980 at Southview House are reported in detail by Morris (1983).

Spatial and temporal background. Southview House is situated on a prominent knoll west of the Dolores River canyon and north of Sagehen Flats; it is located in the McPhee Reservoir pool area. Cultural remains investigated at the site included a rectangular surface structure and two outside use areas. Results of the analysis of the ceramic assemblage suggest that the main occupation at the site dates to the Sundial Phase; one of the outside use areas might have been used earlier (A.D. 750-900, or

during the Sagehen or McPhee Phases).[8]

1980 investigations. Fieldwork began on 27 August and ended 3 October. Artifacts on the surface of the site were collected; subsequent work was directed toward excavating the single surface structure. Investigations revealed a room of substantial masonry construction with a prepared floor. Based on the amount of displaced wall rubble at the site, the original height of the structure is inferred to have been in excess of 2 m. After completion of this phase of the investigation, the area around the structure was stripped, and in situ features and artifacts were mapped and recorded. Test squares were also excavated in locations southeast and southwest of the structure. Analysis of the distributions of surface artifacts in these areas revealed comparatively high material densities, which might reflect midden deposits. An area located approximately 20 m south of the structure, at the tip of the knoll, was also stripped. The collections from this area appeared to date to an earlier period than the other investigated portions of the site; it is inferred that this area was used seasonally during the McPhee or late Sagehen Phases.

Aldea Sierritas (Site 5MT2854)

Investigations conducted in 1979 and 1980 at Aldea Sierritas are reported in detail by Kuckelman (1983a).

Spatial and temporal background. Aldea Sierritas is situated in Sagehen Flats Locality, about 1 km west of the Dolores River canyon and about 6 km northwest of Dolores; the site is located in borrow area E. Investigations at the site revealed two pitstructures, several noncontiguous surface rooms, an area of sheet trash, and numerous

[8]Morris (1983) uses a more conservative approach when discussing the temporal placement of Southview House; in her report, the site was not assigned to a specific phase or subphase.

extramural features. Two occupations are represented; the first probably dates to sometime during the A.D. 700-760 period (Sagehill Subphase) and is represented by a single household cluster with one pithouse and associated surface structures. The second occupation is also represented by a single household cluster; it dates to sometime during the A.D. 760-825 period (Dos Casas Subphase).

1980 investigations. Fieldwork commenced at Aldea Sierritas on 19 May and terminated on 13 June. The goal of the investigation was to completely excavate areas begun in 1979 and to examine other areas to gather additional data. To this end, prehistoric surfaces north, east, and west of the pitstructures were cleared; structures and features discovered on the surfaces were excavated and recorded. Five 2- by 2-m test squares were also excavated in the sheet trash area south of the pitstructures.

McPhee Pueblo (Site 5MT4475)

Investigations conducted during 1978 and 1980 at McPhee Pueblo are presented in Brisbin (1980).

Spatial and temporal background. McPhee Pueblo is located on an alluvial fan, near the base of low sandstone cliffs that form the west limit of the Dolores River canyon. The site is part of the central habitation complex designated McPhee Village, which is located about 6 km northwest of the town of Dolores. This complex consists of numerous small and large roomblock units, including McPhee Pueblo, Masa Negra Pueblo, Rabbitbrush Pueblo, and Tres Chapulines Pueblo. McPhee Village and its constituent architectural units, including McPhee Pueblo, will be inundated by the filling of McPhee Reservoir, which is now under construction. McPhee Pueblo itself consists of a horseshoe-shaped roomblock bordered on the south end by a retaining wall. Within the plaza area, a number of

normal-sized pitstructures and one very large, centrally located pitstructure were found. A large midden was located to the south. An estimated 14 dwelling units and their associated pitstructures, grouped into 5 interhousehold clusters, have been defined for the Periman Subphase occupation (A.D. 870-900). Stratigraphic patterning at the site suggests that three or four major building episodes took place. The site might have been first occupied in the late A.D. 700's (Dos Casas Subphase), but most early contexts have been destroyed by later remodeling. Most of the investigated contexts have been assigned to the Periman Subphase occupation or to the later, smaller, Cline Subphase occupation. The total occupation span for the site is probably about 200 years (A.D. 770-970).

1980 investgations. Work at McPhee Pueblo began on 9 June and terminated on 3 October. The objectives of the 1980 field season were to completely investigate several roomsuites and associated outdoor work areas in the northern portion of the horseshoe-shaped roomblock and to excavate the large pitstructure below Pitstructures 1 and 2 (excavated in 1978). In addition, it was important to obtain an estimate of the total number of major architectural units (rooms and pitstructures) present at the site. During the early portion of the season, work focused on the large pitstructure. Architectural details and artifact content suggest that the structure served ceremonial and integrative functions. In the roomblock, two large living rooms and part of a third were excavated; work progressed slowly in this area because of complex stratigraphy incorporating multiple living surfaces. The plaza area south of the rooms was stripped of overlying fill, and features in this area were excavated and recorded. A large borrow pit and a small pithouse were also identified and investigated. To obtain room and pitstructure number estimates, the entire

roomblock area was shovel scraped and the walls were outlined. Systematic auger testing was carried out in the plaza area in an effort to locate possible pitstructures, and the southern portion of the site was shovel scraped to obtain preliminary estimates regarding the characteristics of the retaining wall joining the two arms of the roomblock.

Masa Negra Pueblo (Site 5MT4477)

Investigations conducted at Masa Negra Pueblo in 1980 are reported in Kuckelman (1983b).

Spatial and temporal background. Masa Negra Pueblo is located in the McPhee Reservoir pool area. The site is a large, residential complex, probably with close ties to McPhee Pueblo; Masa Negra Pueblo is part of McPhee Village. The site consists of one linearly arranged roomblock (40 to 50 rooms), a plaza area with approximately seven pitstructures, and a midden south of the plaza. Approximately 10 to 15 dwelling units and 5 pitstructures organized into 5 interhousehold clusters are recognized for the Periman Subphase occupation. Stratigraphic relationships suggest that three major building events took place; the site was probably first occupied in the early or mid-A.D. 800's (Dos Casas Subphase) and then expanded during the late A.D. 800's (Periman Subphase). The site was extensively remodeled at approximately A.D. 900 and was probably abandoned before A.D. 950 (Cline Subphase).

1980 investigations. Operations at Masa Negra Pueblo commenced on 4 June and terminated on 3 October. The general strategy adopted for the first year of investigations was to obtain an estimate of total architectural units present, to recover a set of data to be used in probability studies, and to intensively investigate a sample of cultural units. To meet these goals, the site was gridded, surface artifacts were

collected, the roomblock was defined by shovel scraping, and excavation of the probability sample squares was continued. In addition, a large integrative-domestic pitstructure and five surface rooms were excavated.

Aldea Alfareros (Site 5MT4479)

Investigations at Aldea Alfareros during 1980 are reported by Kleidon (1983).

Spatial and temporal background. Aldea Alfareros is located in the McPhee Reservoir pool area. The site is one of several roomblock units belonging to the McPhee Village settlement. Two dwelling units and two pitstructures organized into two interhousehold clusters have been defined for the site. Interpretations based on the 1980 work are that the site was occupied for only a short period in the late A.D. 800's. Analysis of the ceramics recovered from the site suggest that the site was used during the A.D. 860-890 period (Periman Subphase).

1980 investigations. Field operations at Aldea Alfareros commenced on 2 June and terminated on 19 September. The goal of the investigation was to recover information regarding a residential unit assigned to the McPhee Community Cluster and to the McPhee Phase. The data are to be used to help reconstruct the history and the internal structure of this nucleated habitation unit. The information will also serve as a basis for comparison with larger units, such as McPhee Pueblo. Surficial investigations completed during the season included a magnetometer survey, total surface artifact collection, auger testing, and blading of nonarchitectural areas. Subsurface work was focused on the complete excavation of two pitstructures, a roomblock, and features in the plaza and peripheral areas.

Windy Wheat Hamlet (Site 5MT4644)

Investigations conducted at Windy Wheat Hamlet during 1979 and 1980 are reported by Brisbin (1983).

Spatial and temporal background. Windy Wheat Hamlet is situated in a relatively level area in Sagehen Flats Locality, west of the Dolores River valley. The site is located in a borrow area about 1 km west of the river and about 6 km northwest of Dolores. Tree-ring sample dates and stratigraphic evidence suggest that there were two occupations at the site. The first (Element 1) probably dates to the middle A.D. 700's (A.D. 740-760) and consisted of one household cluster with a pithouse dwelling unit and associated surface structures. The second probably began about A.D. 776 and continued into the A.D. 800's. Two elements are recognized for the second occupation: the first (Element 2) consisted of one interhousehold cluster with one pitstructure and two to three roomsuite dwelling units; during the second (Element 3), an additional pitstructure was built and use of the other continued. Two interhousehold clusters, comprised of two pitstructures, four to six roomsuite dwelling units, and a refuse midden, have been identified for the Element 3 occupation.

1980 investigations. Field operations began at Windy Wheat Hamlet on 19 May and terminated on 10 June. The main goals of the 1980 program were to finish investigating the central portion of the site (the three pitstructures and the roomblock), to test a midden deposit located in the southwestern quarter of the site, and to investigate features in peripheral areas. Pitstructure 3 was excavated; the floor was exposed and floor artifacts were recovered. Work in the roomblock during 1980 consisted of identifying and recording rooms and surfaces not investigated in 1979. Seven 2- by 2-m test squares were excavated in the midden, and a

north-south backhoe trench was placed through the center of this area to record stratigraphy. A road grader was used to remove the plow zone from peripheral areas in an effort to identify features.

Periman Hamlet (Site 5MT4671)

Investigations conducted at Periman Hamlet during 1979 and 1980 are reported by Wilshusen (1983b) and Yarnell (1983).

Spatial and temporal background. Periman Hamlet is located on an alluvial fan that intersects the Dolores River flood plain on the east side of the valley. The site location permits easy access to riparian resources, yet is resistant to flooding because of the relatively high elevation of the fan. The site is located within the reservoir pool line. Three roomblock units and associated middens and peripheral activity areas were defined during the 1979 and 1980 field seasons. The roomblock units are arranged in a north-south row along the fan; the row is parallel to the main river course and perpendicular to the small side tributary that forms the fan. The northern roomblock unit (Area 1) consists of four roomsuite dwelling units and one pitstructure that form a single interhousehold cluster. Three roomsuite dwelling units and one pitstructure comprising one interhousehold cluster are recorded for the middle roomblock unit (Area 4); one to two roomsuite dwelling units and one pitstructure comprising one interhousehold cluster are recognized for the southern roomblock unit (Area 7). An isolated room, possibly a field house, was also found in Area 4. Occupational spans are estimated to be A.D. 800-860 for Area 1, A.D. 780-810 and A.D. 880-910 for Area 4, and A.D. 840-850 for Area 7.

1980 investigations. Work in 1980 was centered on the three roomblock units (Areas 1, 4, and 7).

Area 1: Work began in Area 1 on 12 May and ended on 1 August. The main objectives of the investigation were to define major structural units, to place the site in the local contemporaneous settlement system, to reconstruct the occupational and building sequence, and to recover data regarding prehistoric economic and social activities. The investigations revealed a residential complex consisting of 19 surface rooms (4 defined as living rooms), a single pitstructure, a plaza area, and peripheral use areas.

Area 4: Field operations in Area 4 began on 12 May and terminated on 9 August. The main objectives of the investigation were to identify and define major architectural units and to recover a representative sample of material from these units. A residential complex consisting of 11 surface structures, 1 pitstructure, 1 plaza area, 3 middens, and peripheral use areas was excavated. The roomblock had been extensively remodeled, which is consistent with hypothesized fluctuations in the population at the site. A room postdating this complex was also excavated.

Area 7: Fieldwork in Area 7 (formerly Site 5MT5100) began on 28 July and ended on 16 August. The main objectives of the investigation were to identify major architectural units, to recover a sample of artifacts, and to obtain an estimate of the time of occupation. A residential complex consisting of five or more surface rooms and a pitstructure was identified. The complex appears to have been occupied in the ninth century A.D.

Chindi Hamlet (Site 5MT4684)

Investigations conducted at Chindi Hamlet in 1980 are presented in detail by Tucker (1983).

Spatial and temporal background. Chindi Hamlet is situated on an alluvial terrace west of the Dolores River; the site is located about 6 km

northwest of Dolores. The site is within the planned pool area of the McPhee Reservoir. Investigations during 1980 revealed three pitstructures, an arc of noncontiquous surface structures, and a refuse deposit. Two household clusters, each consisting of a pithouse dwelling unit and associated surface rooms and outside work areas, were identified. The households at this small settlement probably were affiliated with other dispersed groups practicing similar adaptations in the vicinity (Kane 1981c:64, 66). Tree-ring samples and other sources of dating inference indicate that the site was occupied in the latter part of the seventh century A.D. (Tres Bobos Subphase).

Five human burials were recovered from Chindi Hamlet. Of these, two apparently were associated with the occupation of the site. The other three burials were recovered from the upper fills of the pitstructures or from surface structures and represent use of the site as a cemetery during the A.D. 800's (Periman Subphase), possibly by the occupants of McPhee Village: roomblock units belonging to the village are less than 100 m distant.

1980 investigations. Investigations at Chindi Hamlet began on 27 May and ended on 14 October. The initial goal of excavation was to identify architectural units present and to obtain an absolute age. Two well-preserved Basketmaker III pithouses were discovered during testing operations; because information from such structures is helpful in addressing some of the concerns of the research design, these two houses were completely excavated.

Star Bead Shelter (Site 5MT5380)

A description of 1980 investigations at Star Bead Shelter is available in Hovezak (1983).

Spatial and temporal background. Star Bead Shelter is located on the south rim of the Dolores River canyon, about 1 km west of the river. The site will not be directly impacted by project construction or development, but because of the precarious location and fragile condition of the site, it was decided to initiate a small-scale recovery program. The 1980 investigations revealed a human burial and associated grave goods in addition to an earlier limited activity occupation. Historical trade beads were associated with the burial, which suggests that it probably represents use of the area by protohistoric peoples. The artifact collection associated with the earlier occupation suggests an affiliation with the latter periods of the Anasazi Tradition.

1980 investigations. Investigations at Star Bead Shelter were carried out during the fall of 1980 (28 October to 5 November); the investigations included the retrieval of the skeletal remains and associated grave goods. Most of the cultural material was situated in several vertical crevices in the sandstone on the south rim of the canyon. Deposits at the bottom of the crevices were excavated by hand, and much of the sediment was transported to the project laboratory for fine screening. In addition, prehistoric features in a small rockshelter adjacent to the crevices were recorded and photographed. These features consisted of several bedrock mortars.

Los Atavios (Site 5MT5399)

Investigations conducted at Los Atavios during 1980 are reported by Chenault (1983a).

Spatial and temporal background. Los Atavios is situated in a small arroyo at the base of the escarpment that marks the House Creek fault. The site is located on the southeastern margin of the Sagehen Flats area, about

1 km west of the Dolores River and 5.5 km northwest of Dolores. The site is within the pool area of the proposed McPhee Reservoir. The investigations revealed the skeletal remains and personal effects of a single individual. Based on the characteristics of the personal effects, the site appears to date to the late A.D. 1850-1890 period.

1980 investigations. Investigations at the site began on 20 May and terminated on 22 May. The goal of the investigation was to completely excavate the burial; it was hoped the data would allow a better interpretation of the protohistoric or early historic occupation of the project area.

Testing Operations (Track 2)

Track 2 operations were conducted at 13 sites during 1980; the sites selected for this program are scheduled to be inundated by the filling of the McPhee Reservoir or to be partially or wholly destroyed by haul road construction. Eight sites were tested by University of Colorado crews. Most of these sites are located in the southern portion of the reservoir pool area. The other sites were tested by Washington State University crews.

Hamlet de la Olla (Site 5MT2181) was examined in October and November by a small field crew. The site is situated in borrow area B, on an alluvial fan at the mouth of a small, intermittent tributary that intersects the Dolores River canyon from the west side. The testing investigations revealed a small, Dos Casas Subphase hamlet with an interhousehold cluster that consisted of three roomsuite dwelling units and one small pitstructure. The southeast quarter of the pitstructure was excavated, and tree-ring samples were recovered from the roof fall stratum. In addition, the roomblock was outlined and two of the back rooms were

completely excavated. Several other rooms were trenched to determine their approximate architectural characteristics. Based on tree-ring samples and ceramic and architectural evidence, the occupation date of the hamlet is believed to be approximately A.D. 780-800/810.

Approximately 40 m south of the small hamlet is a single room, which is believed to have been a field house, and an isolated wall. The field house was completely excavated, a small area adjacent to the structure was excavated to prehistoric ground surface, and the isolated wall was partially exposed in a series of 2- by 2-m grid units. Dating the field house was difficult because the artifact assemblage was very small; however, based on architectural characteristics, the structure is believed to have been built and used sometime during the A.D. 850-975 period, or during the McPhee Phase. Field operations at Hamlet de la Olla are reported by Etzkorn (1983).

The same crew also conducted test excavations at Dos Piedras Camp (Site 5MT4779), located immediately south of Hamlet de la Olla. No architectural remains were observed at this site; however, a petroglyph panel was present on one of two large sandstone boulders. Investigation of this site consisted of a partial surface artifact collection and the excavation of a series of 2- by 2-m squares at the bases of the two boulders, which provided small but protective shelters. In addition, a backhoe trench was excavated in an area north of the boulders; no cultural materials were recovered from this trench. The site is believed to date to sometime during the A.D. 700's, 800's, or 900's (Sagehen and McPhee Phases). Field operations at this site are reported by Etzkorn (1982).

Two roomblock units were tested in the central habitation complex of McPhee Village; these are Rabbitbrush Pueblo (5MT4480) and Tres Chapulines

Pueblo (5MT4725). Rabbitbrush Pueblo, which dates to the middle and late A.D. 800's, consists of 15 to 25 dwelling units and 8 pitstructures, which are grouped into 8 interhousehold clusters; at Tres Chapulines Pueblo, 6 interhousehold clusters are recognized. Field procedures implemented by the testing crews were similar at both sites. At Rabbitbrush Pueblo, surface artifacts from the western half of the site were collected, four pitstructures were trenched, and specimens for tree-ring analysis were recovered. The western half of the roomblock was shovel scraped to reveal wall lines. At Tres Chapulines Pueblo, which dates to the middle and late A.D. 800's, the plaza area was bladed, and the six pitstructures south of the roomblock were tested by cross-trenching and by excavating their southeast quarters. Some test excavations were also carried out in the roomblock, but these were limited because some of the surface structures are believed to have been destroyed by construction of County Road X. Kuckelman and Harriman (1983) report on the operations at Rabbitbrush Pueblo; 1980 operations at Tres Chapulines Pueblo area are reported by Chenault (1983b).

Two smaller sites were also tested in the vicinity of the McPhee Village central habitation complex: Jeddito Hamlet (5MT4541) and Kangaroo Camp (5MT4690). The former is located west of the McPhee Village complex, in the Sagehen Flats area. Surface evidence indicated that the site probably was a small Sundial Phase habitation. Testing operations were confined to surface artifact collection, followed by blading of a suspected sheet trash area south of the roomblock and plaza; the sheet trash area was scheduled for destruction by construction of a haul road. The second site, Kangaroo Camp, is located about 1 km southwest of the McPhee Village complex on a low knoll overlooking the Sagehen Flats marsh. Surface

evidence suggested that the site might have contained a relatively undisturbed Archaic component. Surface artifacts were collected and the site was bladed with a grader, but no features were discovered. Test operations at Jeddito Hamlet and Kangaroo Camp are reported by Greenwald (1983) and Greenwald and Phagan (1983), respectively.

The University of Colorado tested two historic sites within the McPhee Reservoir pool area in 1980. A portion of the historic town site of McPhee (5MT4571A) was examined to determine the potential for data recovery. McPhee was a company lumber town that flourished in the 1920's and 1940's and was dismantled before 1950; there were no surviving structures when investigations began in 1980. Testing operations were conducted at the site of a workers' residential area located north of the company mill pond. Specific operations included surface artifact collection, magnetometer survey, and systematic augering of subsurface deposits. The materials recovered during 1980 should provide a useful base for reconstructing everyday life during the historical lumber town period. Refer to McCarthy (1980a) for a discussion of the 1980 investigation of McPhee town site.

Test excavations were also carried out at the Dickenson Homestead (5MT5165), in borrow area B. The goal of the investigation was to recover baseline data for the Euro-American homesteading periods (A.D. 1875-1891 and 1892-1927 [Kendrick 1983:23-39]) in the project area. Specific field operations included collecting surface artifacts, augering, and excavating thirty 1.5 by 1.5 m (5- by 5-ft) test squares. Interpretation of the data suggests that two structures (a house and an outbuilding) originally were present, but were destroyed by the time the site was investigated in 1980. University of Colorado fieldwork at Dickenson Homestead is reported by McCarthy (1980b).

Washington State University also conducted test operations during the summer of 1980; refer to Gross (1983) for a detailed discussion of these investigations. Work at Hanging Rock Hamlet (Site 5MT4650) included excavating a probability sample (13 units) and trenching to expose roomblock walls. Hanging Rock Hamlet is similar in plan to Prince Hamlet: two large pitstructures are located south of an arc of surface rooms. Unlike Prince Hamlet, however, Hanging Rock Hamlet appears to have a north-south-oriented western wing or roomblock, the walls of which were based with upright slabs; this roomblock was only one room wide. A retaining wall on the east separates the main roomblock from a gully but does not separate the roomblock from the pitstructures, as at Prince Hamlet. Portions of the midden appear to have been removed by the construction of County Road 28, as at Prince Hamlet. The ceramics from Hanging Rock Hamlet suggest a somewhat earlier occupation than at Prince Hamlet, possibly ending by the middle A.D. 800's. The less substantial and more highly variable construction of the surface rooms reinforces this conclusion.

Limited excavations were undertaken at four other sites. At Cougar Springs Cave (5MT4797), which faces northwest from the south side of Dry Creek Canyon, a late Archaic and/or Basketmaker II occupation was identified; this discovery provided an opportunity to study early lithic materials from apparently unmixed deposits (in other sites in the sector, these materials are often mixed with later assemblages). During the 1.2 crew-weeks spent at the site, a series of test trenches and 2- by 2-m grid squares was excavated and radiocarbon samples were collected.

Quasimodo Cave (5MT4789) is located on the opposite side of Dry Creek, slightly upstream from Cougar Springs Cave. A total of 0.6 crew-weeks was

spent at this site, which may have had two periods of occupation. The later, and more definite occupation, consists of an Anasazi component (probably Sundial Phase), during which the shallow shelter appears to have contained a storage structure. There is also some evidence of very brief Archaic and/or Basketmaker II use of the cave. A 21 m^2 area was excavated at the site.

During gravel-testing operations, the construction contractor exposed portions of a buried site, 5MT5361. Washington State University spent 0.5 crew-weeks investigating this site, using backhoe testing techniques with limited hand excavation expansion. Although this site was originally suspected to be Archaic on the basis of its location beneath 2 m of colluvial material, results of excavation, including recovery of a sherd, have suggested that the "site" is composed of colluvially redeposited materials from an Anasazi site located somewhere upslope, possibly 5MT5091. Radiocarbon samples have been collected to help confirm or refute this interpretation.

Finally, a site on the northwest side of the Dolores River, Dos Cuartos House (5MT2174), was investigated by Washington State University; 0.3 crew-weeks were spent excavating the two known surface rooms at the site. The placement of this site adjacent to an alluvial fan with an east-facing aspect and the absence of pitstructures suggest that this site was a field house. The three other sites in the locality that are located on alluvial fans (5MT2160, 5MT2165, and 5MT2175) are also interpreted as field houses, based on surface artifact collections and on the experience at 5MT2174. Dos Cuartos House was probably occupied during the A.D. 800's (Dos Casas or Periman Subphases).

Testing Operations (Track 3)

A very limited amount of time, approximately 0.5 crew-weeks, was spent conducting Track 3 investigations (intensive surface collections with or without gridding, occasionally accompanied by the excavation of one or two test pits) at the following 10 sites in the north portion of the pool area (Gross 1983):

5MT2165	5MT2211
5MT2166	5MT2212
5MT2170	5MT2213
5MT2173	5MT2216
5MT2175	5MT2381

These collections were intended to provide sufficient information concerning these sites to allow their placement in the temporal-functional matrix as required by the implementation design.

APPENDIX A

AN EVALUATION OF THE DAP RADIOCARBON DATING PROGRAM, 1978-1980

by

G. Timothy Gross

Introduction

The DAP collected 465 radiocarbon samples from 82 sites during the 1978 through 1980 field seasons. Table A.1 presents a breakdown of the samples by intensity of investigation (track). Radiocarbon samples were collected from approximately 84 percent of the sites investigated at the most intensive level (Track 1). Of the five Track 1 sites from which samples were not collected, two are protohistoric burials, and the other three yielded very little organic material. Those samples that have not been submitted to a laboratory for dating are being curated as part of the permanent DAP collections and will be available in the future should they be needed.

Table A.1 Summary of DAP radiocarbon samples, 1978-1980

Track	No. of sites	No. of samples collected	Mean No. samples collected per site	Range of no. of samples per site	No. of sites without samples	% of sites with samples
1	32	399	12.31	0-100	5	84.37
2	23	35	1.52	0-17	16	30.43
3	27	19	0.70	0-19	26	3.70
Total	82	453			47	

As of February 1982, 22 samples of material from archaeological sites had been dated using the radiocarbon technique. The results of the dating analyses have been puzzling. Fifteen of the dated samples could be checked against the ceramic date estimates for the sites from which they were taken. In only 3 (20 percent) of the 15 cases did the range of the radiocarbon dates overlap with that of the ceramic date estimates. Gaps of

200 to 300 years between the upper end of the radiocarbon range and the lower end of the ceramic date ranges were common. Figure A.1 is a comparison of radiocarbon date estimates with ceramic date estimates.

This appendix will examine the DAP radiocarbon dating program and will address two main questions: (1) why have radiocarbon samples collected from DAP sites not yielded reliable results, and (2) is radiocarbon dating a useful dating technique for the DAP?

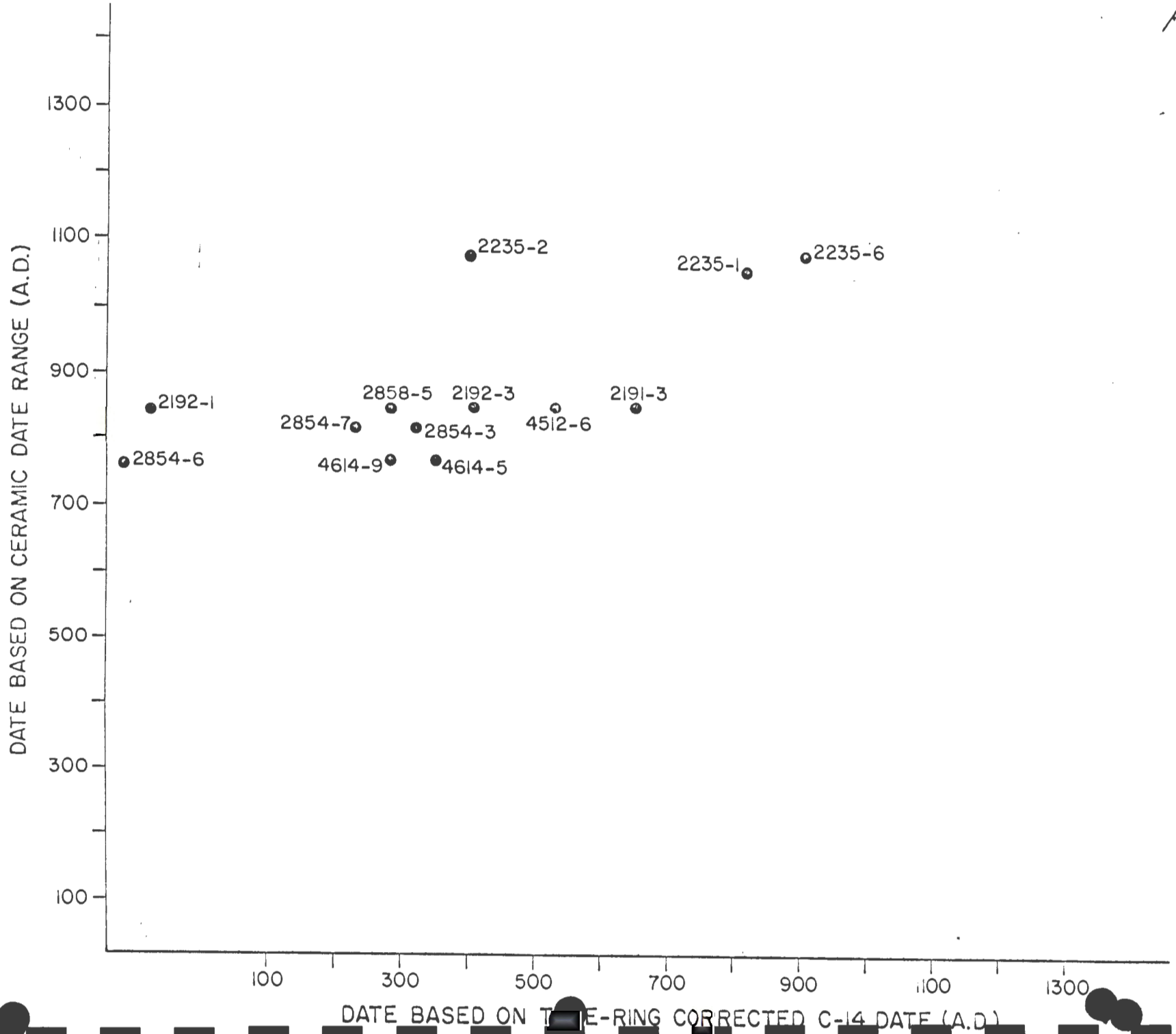
Understanding the DAP Radiocarbon Dates

This discussion, while not couched in the same terms, draws heavily on the model of dating processes in archaeology presented by Dean (1978).

One of the key assumptions in the archaeological use of radiocarbon dating (or any other dating technique) is that the date obtained from the analysis of a sample is in some way related to the date of some culturally meaningful event such as the construction of a structure or the initiation of occupation at a site. For that reason, for material being dated by the radiocarbon method, it must be possible to argue that the date of death of the organism(s) whose remains are being dated is near that of the event for which a date is required. The best materials for this purpose are bits of plant material that were collected in the same year that they were last growing (and, therefore, incorporating new carbon) by the inhabitants of the site in question. Furthermore, material that grew over a short period of time is better than material with a long (many years) growth period (cf. Dean 1978:226; Sheppard 1975:5). Examples of materials that have short growth periods, and that may have been collected by the Anasazi, include grasses, twigs, seeds, and cones. However, dates from such materials present a problem, since they must be corrected for the effects of isotopic

Figure A.1 Comparison of midpoints of ceramic date estimates and midpoints of radiocarbon dates. Numbers given are DAP radiocarbon sample numbers. The result for one radiocarbon sample, 5361-17, falls off the graph and is not depicted.

H.1


DATE BASED ON CERAMIC DATE RANGE (A.D.)
1300
1100
900
700
500
300
100
2235-2
2235-1
2235-6
2192-1
2858-5
2192-3
2191-3
2854-7
2854-3
4512-6
2854-6
4614-9
4614-5
100
300
500
700
900
1100
1300
DATE BASED ON TREE-RING CORRECTED C-14 DATE (A.D.)

fractionation, depending on the photosynthetic pathway employed by the plant (Sheppard 1975:53-54).

Wood is seldom a good material to date if one wishes to obtain a meaningful date for a relatively short-term cultural event, because trees have a long growth period and incorporate new carbon in rings on a yearly basis. The date for a piece of wood charcoal is an average determination for all of the rings, and the presence of the older rings will tend to make the date estimate older than the event that the investigator is trying to date (Dean 1978:239). This is a problem if the tree from which the sample was obtained was cut while still living, and can be greatly exacerbated if the common practice of collecting deadwood was employed. If it is assumed that wood found at a site was cut from a living tree (rather than having been collected as deadwood) and that the outer ring of the wood is the last ring on the tree, then the outer ring can be stripped off and dated (Schiffer 1976:147). In cases such as this, however, it is much better to try to obtain a tree-ring date that would have no standard deviation than to spend money on a radiocarbon sample.

Materials that are suitable for providing a date that is arguably close to the date of the cultural event of interest are seldom found in DAP Anasazi sites. When such materials are found, they are usually in quantities too small for conventional (beta count) radiocarbon dating, or they occur as parts of rare artifact types (basketry, matting, sandals, etc.) that are of more value for study in their own right than would be for providing a date with a standard error of 80 years. Most of these materials (with the exception of some of the worked vegetal materials) are stored and are not treated with preservatives. These collections would form an acceptable pool of material for radiocarbon dating by the accelerator method, should that method ever become readily available.

The Utility of Radiocarbon Dating to the DAP

Another problem with the accuracy of the radiocarbon dates obtained by the DAP centers around the precision of the dates. The error terms for dates as of February 1982 (exclusive of the one extreme case of ±2350 years) range from ±20 to ±170 years (fig. A.2). The mean value is 80 years and the mode is 60 years. The average radiocarbon date obtained by the DAP allows the assignment of a date range that is 160 years long with a 66 percent probability that the date falls within that range. This range is larger than two of the three archaeological phases recognized for the DAP Anasazi. At the 95 percent confidence level, the mean range is 320 years, longer than any defined DAP phase.

Such problems with the resolution of radiocarbon dates have been noted by at least one other investigator in the Southwest (Schiffer 1976:147). In addition, Dean (1978:247) has stated that radiocarbon dating cannot be used to solve problems of time placement that require resolution of 20 years or less. The experience of the DAP indicates that radiocarbon dating is not a reasonable choice as a dating technique when it is necessary to place sites into phases or subphases that are shorter than 160 years. This would mean that radiocarbon dating is not a good choice for dating DAP sites of the Anasazi Tradition.

Conclusion

None of the radiocarbon samples collected by the DAP have been particularly helpful in the temporal placement of ceramic-bearing sites, since the dates obtained disagree with ceramic date estimates, and the ceramic date estimates are assumed to be essentially correct. The

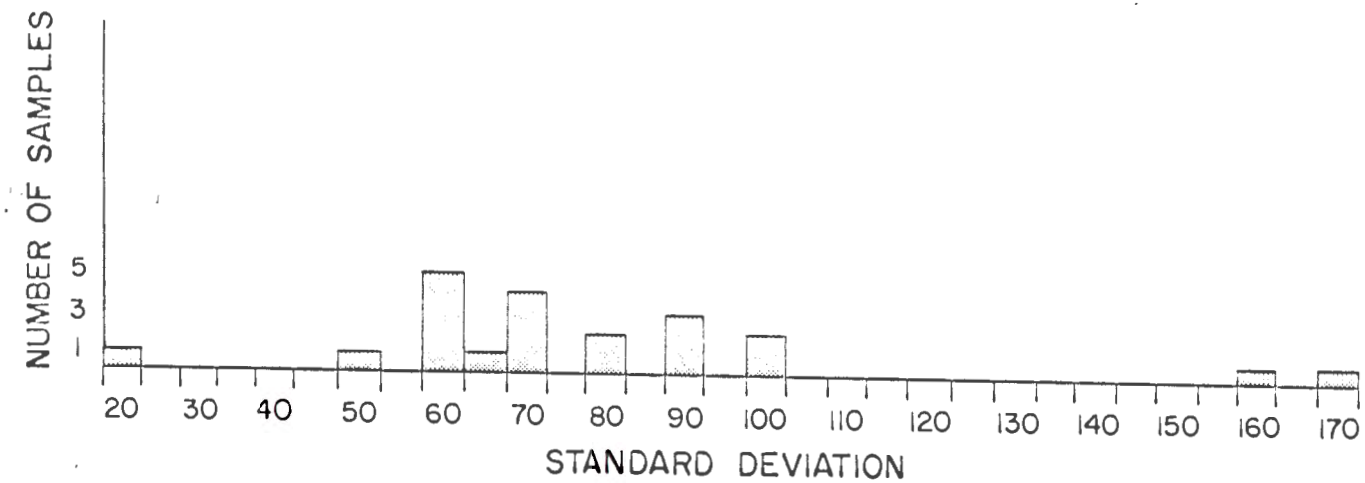


Figure A.2 Distribution of standard deviation values for DAP radiocarbon dates. One extreme value (2350 years) is not plotted.

unreliability of the radiocarbon dates is probably the result of the unsuitability of the materials submitted for analysis. In addition, the size of the standard deviations of the radiocarbon dates (even if they produced range estimates that seemed to be reasonable) does not allow fine enough temporal placement for use on DAP Anasazi sites. Given these results, does radiocarbon dating have a place on the DAP?

The judicious use of radiocarbon dating is appropriate for the DAP. The funds set aside for this purpose can be best used on aceramic sites and on sites for which no other dating method is feasible. Another reasonable use of the radiocarbon dating method is in the correlation of paleoclimatic material such as packrat middens (VanDevender 1981) or pollen samples (Clay 1981).

APPENDIX B

DATING BY ARCHITECTURAL SEQUENCING

by

Allen E. Kane

Introduction

Architectural sequencing is a promising approach for relatively dating Anasazi habitation sites. This method is based on the assumption that DAP architectural data usually conforms to normal distributions and that regularity is present in temporal variability. A study of pitstructure architecture conducted by DAP staff members in 1981 (Hewitt et al. 1983) demonstrated that architectural variability through time is patterned and that the patterns can be used to generate a typology with temporal definitions. In this appendix, the architectural data categories considered are (1) general site layout and architectural populations, (2) characteristics of surface structures, and (3) characteristics of pitstructures. Development of typological groupings is not attempted; rather, descriptions of the architectural characteristics are presented in outline form according to the DAP phase scheme. Characteristics described in the outline can then be compared with the data from particular sites to be evaluated for temporal placement. The reader is cautioned that the presentation is based on a general assumption of normal distribution for each temporal unit; however, some variability in architectural patterning is noted, even within some subphases. The Grass Mesa Subphase, in particular, is characterized by architectural variability rather than by normal trait or pattern distributions.

Architectural Data Categories

I. Tres Bobos Subphase (A.D. 600-700) of the Sagehen Phase. Comparative architectural data is presented in Brisbin et al.(1982), Montgomery (1982), and Tucker (1983).

A. General layout and structure populations. Habitation sites usually contain one pitstructure, an arc of surface structures and large, bell-shaped storage cists north and west of the pitstructure, and a scatter of surface refuse south of the pitstructure. Other smaller extramural features or structures may be present at the site; these include hearths, pits, ramadas, and borrow areas. Overall dimensions of habitations sites are about 40 to 60 m east-west by 40 to 60 m north-south; average site area is about 2000 to 2500 m^2. The surface structures, pitstructures, and refuse deposit usually are alined northwest-southwest or north-south. Sites with more than one pithouse have been recorded in the project area, but no aggregations of dwelling units such as those reported by Rohn (1975) or Wheat (1955) are known.

B. Surface structures. Tres Bobos Subphase surface structures are of two distinct structural and functional types. The more common and substantial structures are small, oval rooms with "beehive" roofs. These rooms average about 3 m^2 in area (Wolf 1983) and are semisubterranean, with a prepared floor surface excavated 20 to 30 cm below ground surface. The rooms generally lack floor features, although small hearths that have raised adobe rims and that are situated against the south wall have been recorded.[1]

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[1]Joel M. Brisbin, DAP, personal communication.

Roof construction for these structures does not conform to the usual four-post roof support pattern recorded for most Anasazi structures. Rather, the best reconstruction based on the available evidence is that the roof superstructure was beehive or tipilike in form and was constructed of a daub outer layer over a pole framework that formed an enclosure around the perimeter of the excavated floor. The poles acted as the supports for the roof. Functionally, these structures appear to have served primarily as storage facilities. This conclusion is based on the general lack of internal features and artifact concentrations, the small size of the structures (rendering it difficult to perform activities inside the structure), and the presence of charred corn and other vegetal materials in some structures. The presence of small hearths in a few rooms suggests that activities in addition to storage might have taken place. Populations of these small rooms range between 8 and 18 per site; they appear to cluster in groups of 3 to 4, perhaps indicating functional associations or differential use by the inhabitants of the site.

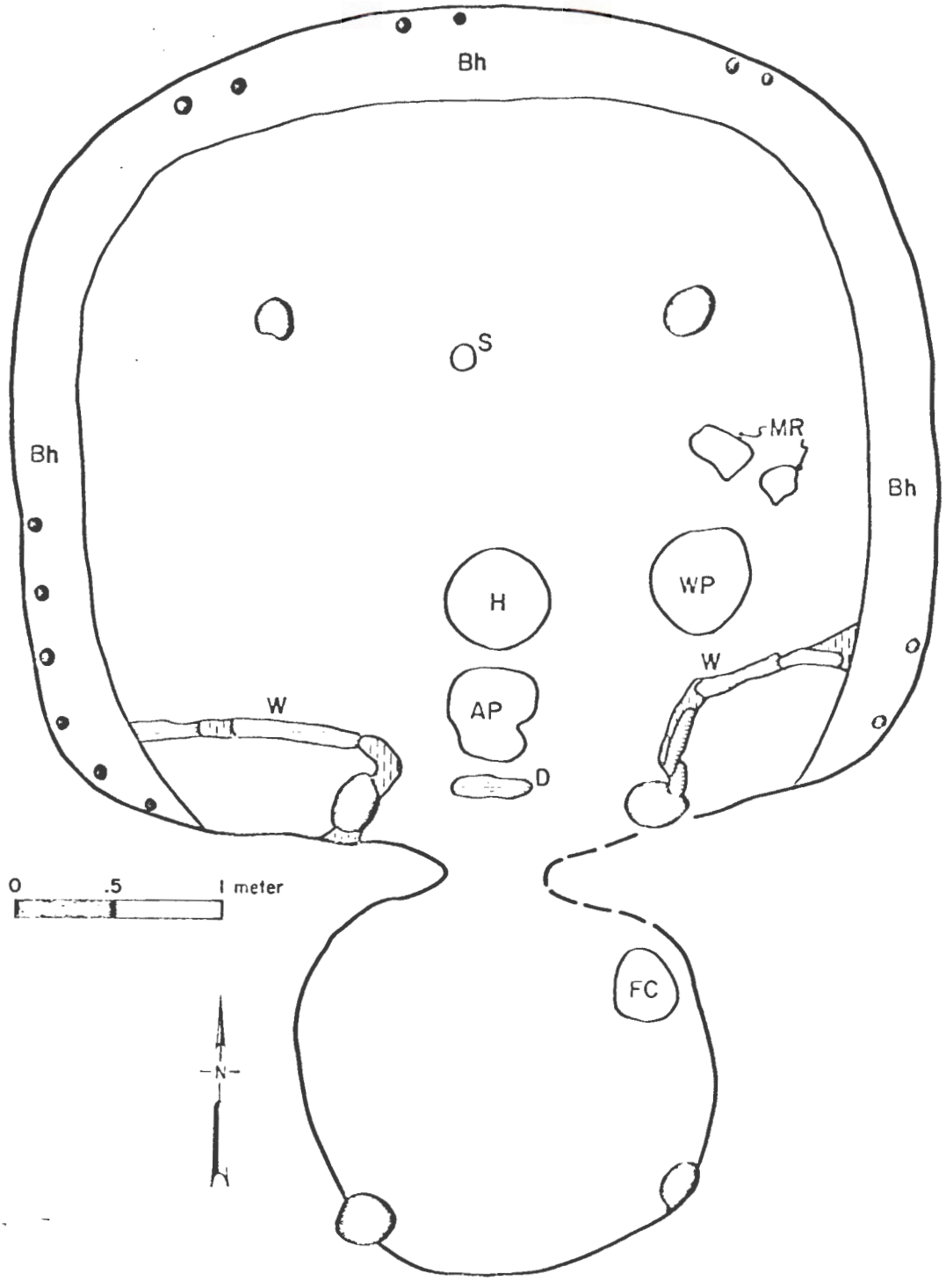
Also present at Tres Bobos habitations are more ephemeral surface structures that probably can be classed as ramadas. These appear to be rarer than the semisubterranean rooms (1 to 2 per site). They consist of four postholes at the edges of a use surface; these structures were apparently without substantial walls or roofs. It is possible, although no evidence is available from project excavations, that temporary pole and brush walls were present. Mean floor area for these structures apparently is about 4 m^2; interior features include hearths and

pits. Ramadas apparently served as outside work areas that provided some protection from the elements.

C. Pitstructures. Tres Bobos Subphase pitstructures conform to the "normal" Basketmaker III architectural pattern described by archaeologists working in the Mesa Verde Region (Birkedal 1976; Hayes and Lancaster 1975). Based on the artifacts left at abandonment, most internal activities probably were domestic or economic in function; therefore, they are called pithouses. Tres Bobos pithouses usually consist of two rooms or chambers, a larger chamber to the north and a smaller antechamber to the south; these are connected by a passage. The chambers are D-shaped with the flat sides facing each other. Figure B.1 illustrates a Tres Bobos Subphase pitstructure investigated by the DAP. The architectural specifications are provided in the following list; many of the measurements are taken from Hewitt et al. (1983).

1. Size. The mean size of Dolores area Tres Bobos pitstructures is about 25 m^2; however, considerable variability in size is noted (standard deviation is about 9 m^2).
2. Depth. Depths (prehistoric ground surface to floor) of Tres Bobos pitstructures average just under 1 m.
3. Shape. The squareness index (a value of 1.000 is square; 0.0785 is round; refer to Hewitt et al [1983:table 1]) for Tres Bobos pitstructures is 0.90; this is the lowest index for all temporal units used in Hewitt's study.
4. Roof construction. Tres Bobos pitstructures are characterized by the "normal" four-post roof support pattern. The

Fig. e B.1 A Tres Pinos Subphase pitstructure (adapted from Tucker 1983:fig. 20). Note antechamber, bench, slab wingwall, corner bins, and simple sipapu.



LEGEND			
		SIPAPU	S
ADOBE		HEARTH	H
SANDSTONE		METATE REST	MR
ASH PIT	AP	POSTHOLE	
BENCH	Bh	WARMING PIT	WP
DEFLECTOR	D	WINGWALL	W
FLOOR CIST	FC	INFERRED	

two southern posts are found in the wingwall or against the south wall of the main chamber. The northern posts are located in the northwest and northeast quarters; they are positioned nearer the center of the pitstructure than in later pitstructures. Leaner posts are usually anchored on the outer perimeter of the bench. Auxiliary posts may be positioned to shore up weak portions of the roof.

5. Bench. Benches usually are present in the main chamber and may be present in the antechamber as well. They are wider (0.5 to 1.0 m) than in later pitstructures.

6. Wingwall. A wingwall is usually present; it separates the southern quarter of the main chamber from the remainder of the chamber. The wall usually is constructed of vertical slabs and usually incorporates corner bins.

7. Bins. Two above-floor bins are usually present in the southwest and southeast corners; these are similar to "cupboards" in that they were roofed and had a side entry hole with a cover.

8. Ventilation system. Air apparently flowed into the main chamber from the antechamber passage; a deflector slab is positioned within 0.75 m of the south wall of the main chamber.

9. Domestic activity areas. One or two metate grinding stations are usually located in the northeast quadrant of the main chamber or adjacent to the east or west walls. The metates may be temporarily stored by leaning them against

the east or west walls in an upright position (Tucker 1983:fig. 22).

10. Ritual activity areas. A simple, cylindrical sipapu is usually located on the north-south axis of the main chamber, near the north wall.

II. Sagehill Subphase (A.D. 700-780) of the Sagehen Phase. Comparative architectural data is available in a series of project site reports (Hewitt 1981; Kuckelman 1983a; Yarnell 1982; Nelson 1983a).

A. General layout and structure populations. The layout of Sagehill Subphase habitation sites is similar to that of Tres Bobos Subphase sites: one pitstructure, an arc of surface structures north and west of the pitstructure, and an area of sheet refuse to the south or southeast are present. Outside features include hearths, pits, and borrow areas. Overall site dimensions range from 40 to 60 m east-west by 40 to 60 m north-south; site areas average about 2000 to 2500 m^2.

B. Surface structures. Sagehill Subphase surface structures appear to exhibit a greater amount of variability in form and function than do their Tres Bobos Subphase predecessors. Three gross structural-functional categories are suggested by the data, although the available sample is too small to test the validity of these categories. One category (thought to correspond to the definition for "living" room) includes relatively large structures with substantial roof and wall construction and with relatively numerous floor artifacts and features representing interior activities. Included in the second category are relatively large structures with insubstantial walls and roofs

and with relatively few floor artifacts and features. These structures are thought to be "ramadas"--outside work areas that were partially protected from the elements by pole and brush superstructures. The third category is thought to consist of "storage" facilities; these structures are relatively small with substantial wall and roof construction and with a near absence of floor artifacts and features.

Sagehill surface structures are noncontiguous and are arranged in an arc pattern west and north of the pitstructure area. The structures may be clustered in functionally associated groups, a phenomenon also noted for Tres Bobos Subphase sites. Populations of surface structures per site range between 6 and 12. Specific architectural details are as follows.

1. Shape. The structures usually are subrectangular or irregular in plan.
2. Size. The distribution of room sizes appears to be bimodal (Wolf 1983). Most of the rooms are small (3.3 to 6.0 m^2), but a significant minority are larger (10.0 to 14.0 m^2). This dichotomy apparently reflects functional differences: the smaller structures are storage rooms, while the larger are living rooms or ramadas.
3. Wall construction. The lack of sandstone slabs or rubble material in the fill of Sagehill Subphase surface structures suggests that walls were constructed of jacal, adobe, or mud. The structural integrity and substantiveness of these rooms is conjectural; some of the "rooms" might have had only partial walls or might have been ramadas.

4. Roof construction. Most structures have postholes in the vicinity of the corners, which suggests that a standard four-post support pattern was prevalent for roof construction.

5. Floors. The floors of Sagehill Subphase surface structures exhibit little preparation or finishing. Usually they consist of the leveled earthen surface that was cleared or excavated for the room and a veneer of dried mud or sand. The floors of some structures were excavated 15 to 30 cm into prehistoric ground surface (these were probably true "rooms" with daub or jacal walls), while others apparently were not excavated (these may have been ramadas).

6. Domestic and economic activity areas. Most rooms lack in situ artifacts and features and are thought to represent storage facilities, although there is little direct evidence for this. Some of the large rooms might have functioned as centers of domestic activity; Room 3 at Prairie Dog Hamlet (Site 5MT4614) (Yarnell 1982) contains a central fireplace, lithic debitage, and an in situ metate, which suggests that cooking, stone tool manufacture, and mealing were performed in the structure.

C. Pitstructures. Sagehill Subphase pitstructures exhibit marked differences when contrasted with Tres Bobos pitstructures. The antechamber has been replaced by a tunnel and shaft ventilator system. The structures are deeper and are usually subrectangular in plan rather than D-shaped and they usually lack benches. There is usually only one contemporaneous pitstructure per

habitation site, although the presence of several noncontemporaneous pitstructures suggests that multiple building episodes might have taken place. Feature populations and in situ artifacts reflect domestic or economic activities; hence, the term "pithouse" is probably an appropriate designation for Sagehill pitstructures. A Sagehill Subphase pitstructure is illustrated in figure B.2. Architectural specifics are as follows (some of the measurements are from Hewitt et al. 1983).

1. Size. Sagehill Subphase pitstructures average about 17.5 m^2 in area; this is substantially less than comparable Tres Bobos structures. There is also less size variability in pitstructures assigned to this subphase. It should be noted that the pitstructure population includes two very small examples (considered "outliers" in the graphed distribution of all Dolores pitstructures); the true average might be somewhat higher than the 17.5 m^2 figure.
2. Depth. Depths for Sagehill Subphase pitstructures average about 1.5 m; this is about 0.25 m greater than Tres Bobos structures and about 0.25 m less than Periman Subphase structures.
3. Shape. Sagehill Subphase pitstructures generally can be characterized as subrectangular (squareness index is 0.92, compared to 0.90 for Tres Bobos structures). "Subrectangular" is only a general description; plan outlines of Sagehill structures show that many can be described as irregular with reference to wall orientations and outlines.

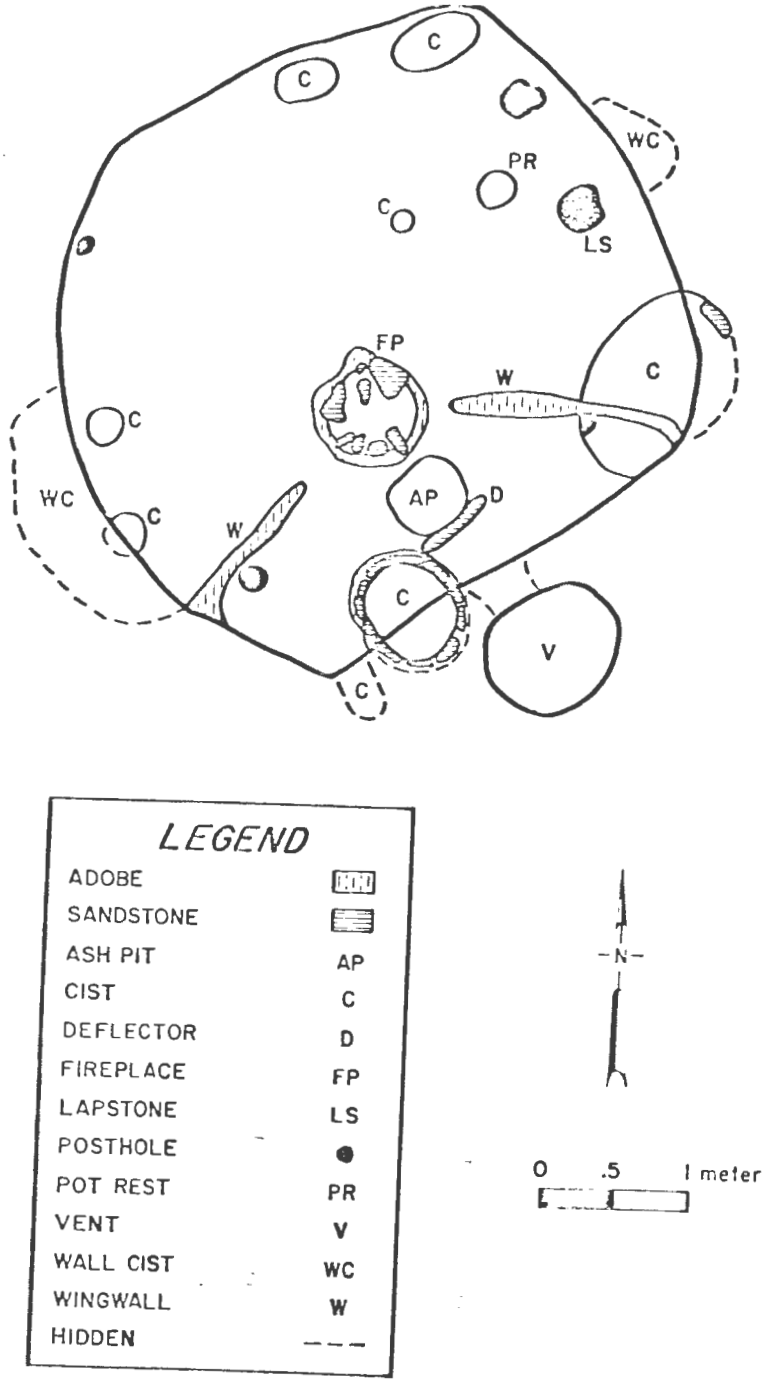


Figure B.2 A Sagehill Subphase pitstructure (adapted from Yarnell 1982:fig. 6.27). Note ventilation system, wingwall, subrectangular shape, and absence of bench and corner bins.

4. Roof construction. Sagehill Subphase pitstructures incorporate the standard four-post roof support system. Leaners apparently were grounded on the outside of the pit, perhaps on a prepared "leaner" shelf. Brisbin et al. (1982) report the presence of such a feature in Pitstructure 1 at Dos Casas Hamlet. Auxiliary posts may have been employed to shore up weak areas of the roof.

5. Bench. Most Sagehill Subphase pitstructures lack a bench. Pitstructure 1 at Pozo Hamlet (5MT4613) (Nelson 1983a) is an exception. This structure contains a fairly narrow bench (ca. 40 cm in width) that borders the west and east inner walls.

6. Wingwall. Sagehill Subphase pitstructures usually incorporate a wingwall that separates the southern quarter of the main chamber from the rest of the chamber. An approximate 1.5 m gap is present between the two halves of the wingwall. Wingwalls are usually built of adobe or mud and sometimes are reinforced with vertical poles or sandstone slabs.

7. Bins. No corner bins are present in Sagehill Subphase pitstructures.

8. Ventilation system. Tres Bobos antechambers are replaced by tunnel and shaft ventilator systems. Ventilator shafts are much larger in diameter than those in pitstructures assigned to later subphases, and may have served also as storage areas or as loci of other activities. The deflector is usually located between the wingwall and the south wall, approximately 50 cm north of the tunnel entrance.

9. Domestic and economic activity areas. A metate station is usually present in the southwest or southeast corner of the structure, behind the wingwall. The opposite southern corner is often used for storage of lithic tools (e.g., axes, cores, manos).

10. Ritual activity areas. A simple, cylindrical sipapu is usually present on the north-south axis of the structure near the north wall.

III. Dos Casas Subphase (A.D. 760-850) of the Sagehen Phase. Data for architectural comparisons can be found in Brisbin (1983), Wilshusen (1983b), Brisbin et al. (1982), and Etzkorn (1983).

A. General layout and structure populations. Dos Casas habitation sites usually contain a single major roomblock with a double row of rooms, a plaza-pitstructure area to the south, and a refuse midden. The roomblock usually has of 2 to 5 front rooms 4 to 15 back rooms. Single, noncontiguous rooms or ramadas also may be present, either east or west of the roomblock, or both. South of the roomblock is a plaza containing outside work areas and features and one or two pitstructures. South, southeast, or southwest of the plaza is a midden area that usually can be better characterized as a "mound" rather than as "sheet refuse." Dos Casas Subphase habitation sites exhibit greater size variability than earlier sites. Small habitation sites average about 1000 m^2 (30 m east-west by 35 m north-south) in area, while large ones may be over 5000 m^2 (75 m east-west by 75 m north-south) in area.

B. Surface structures--back rooms. Most back rooms in the main roomblocks are assumed to have functioned as storage facilities because of the relatively high investment in wall and roof construction and the lack of floor features. Other excavations of late A.D. 700's to early A.D. 800's sites in the northern San Juan area (Morris 1939; Brew 1946) have revealed rooms that are similar to Dolores area Dos Casas back rooms; some of the former had burned during occupation and were filled with the remains of cultigens. This is additional evidence to support the storage function inference. In addition to serving as loci for storage of cultivated harvests, the Dos Casas back rooms probably also functioned as storerooms for tools. Activities other than storage, such as animal and plant product processing or tool maintenance, also might have taken place in these locations (Wolf 1983); however, no Dos Casas back rooms with hearths have been recorded, which suggests that activities other than food and tool storage were rare in back rooms.

The "normal" Dos Casas pattern is two rear rooms per one front room; this three-room unit served as the abode (or dwelling unit) for a family. There do not seem to be any structural or functional differences when the two rear rooms common to a dwelling unit are compared. Specific architectural details of Dos Casas rear storage rooms are as follows.

1. Shape. The structures are rectangular or subrectangular in plan.
2. Size. The size distribution of back rooms appears to approximate a normal curve. The mean floor area is

approximately 3.5 m^2 (Wolf 1983:table 1), which is approximately 0.5 m^2 greater than comparable Sagehill Subphase structures; this increase may indicate the growing importance of storage as an economic practice by the Dolores Anasazi (Kane 1983).

3. Wall construction. A variety of materials was used in construction of Dos Casas back room walls. Rooms at Sagehen Flats and House Creek Locality sites, i.e., Dos Casas Hamlet (Brisbin et al. 1982), Windy Wheat Hamlet (Brisbin 1983), and Pozo Hamlet (Nelson 1983a) exhibit vertical sandstone slab construction for the base course and what is believed to be post and mud construction for upper portions. At Area 1 of Periman Hamlet (Wilshusen 1983b), lower walls consisted of masonry courses with horizontally laid sandstone blocks and river cobbles; upper courses were primarily daub with some sandstone rubble incorporated as filler material. At Prince Hamlet (Sebastian 1983), the lower courses of rear room walls consist of a combination of horizontal slab/block coursing and very large vertical slabs.

No certain conclusions regarding the distribution of construction modes can be drawn because of the inadequate size of the sample; two tentative trends are suggested for future evaluation. First, construction of rear room walls was expedient, and materials that were available within a short distance of the site were used. Hence, in the Sagehen Flats area, thin sandstone slabs were the only stone incorporated because few workable sandstone outcrops were

available in the vicinity of the sites. Sandstone and river cobbles were readily available within a short distance of the sites located within the canyon proper (Prince Hamlet and Periman Hamlet) and were used in greater amounts. Second, construction seems to become more substantial and incorporates more stone masonry late in the subphase (post-A.D. 800). This might reflect the increasing importance of such facilities to the prehistoric groups in the Dolores area. Dos Casas Subphase back rooms exhibit more investment in materials and construction labor than Tres Bobos and Sagehill analoges; this is also interpreted as reflecting the increased importance of storage in later periods.

4. Roof construction. Most rooms contain postholes in the corners, suggesting four-post roof support construction.

5. Floor. Floors of Dos Casas Subphase back rooms exhibit little preparation or finishing. Usually they are merely the leveled surface of the excavation that has been compacted through use; a thin layer of charcoal-mottled sand or mud may be present. Floor features are often limited to four corner postholes for the roof support posts; corner bins and small storage cists are sometimes present.

6. Domestic and economic activity areas. The distributions of floor artifacts in Dos Casas Subphase back rooms does not suggest spatially discrete activity areas; rather the distributions seem to be caused by abandonment activity and postabandonment processes. If the rooms have burned, quantities of burned corn kernels and beans are usually

discovered, suggesting that a primary function was food storage. In Room 4 at Windy Wheat Hamlet (Brisbin 1983:161) a storage vessel associated with a large quantity of beans was found. Ground stone tools (e.g., metates, manos, axes) are sometimes present, but their positions (e.g., leaning against walls, in corners) suggest temporary storage rather than use within the room. Two possible gaming pieces were recovered from Room 4 at Periman Hamlet (Wilshusen 1983b) perhaps indicating that items in addition to tools were stored in back rooms. Dos Casas back rooms also contained low densities of flaked lithic tools and debitage. These may represent tool maintenance activities, but the more likely explanation is abandonment behavior or postabandonment deposition.

C. Surface structures--front rooms. Front rooms in Dos Casas roomblocks are interpreted as living rooms or as processing rooms. Living rooms are arranged in dwelling unit roomsuites consisting of two back rooms and a front room. Living rooms contain full complements of features associated with domestic activities; these feataures include a central hearth, warming pits, corner bins, and mealing stations. Some structures may have served as specialized processing rooms; these are usually smaller in area and contain a more restricted feature complement.

A definitional problem, especially for the early part of the subphase, is whether these structures are completely enclosed rooms or are partially enclosed ramadas as suggested by McKenna

(1981:11-12); here they are considered to be rooms. Specific architectural details are as follows.

1. Shape. Dos Casas front rooms are rectangular or subrectangular. The north walls and two northern corners form square (90°) angles where the front rooms abut the rear rooms. The front (south) walls and south corners are often rounded, giving a "scalloped" appearance to plan views of Dos Casas roomblocks.

2. Size. Front rooms range from 5 to 20 m^2 in area. An inspection of the distribution of room sizes suggests that there is a double peak that probably represents two size and function populations. Front rooms with a mean area of about 14 to 15 m^2 probably can be functionally typed as living or domestic rooms; smaller front rooms have a mean area of about 8 m^2 and represent more functionally specialized processing rooms.

3. Wall construction. Walls of front rooms are less substantial than those of rear rooms and they incorporate less stone material. An exception is the northern wall, which is shared by both front and rear rooms; this wall is more substantial. Evidence for pre-A.D. 800 construction methods is scant because most early Dos Casas sites are in plowed areas. Front rooms might have been constructed of mud, perhaps in the form of turtleback courses; the walls might have formed complete enclosures, but they might have been only 1 to 1.5 m high. After A.D. 800, lower portions of the walls consisted of cobbles, or of sandstone blocks or slabs,

in courses of dried mud that incorporated stone rubble. In the latter case, a base course of vertical sandstone slabs or cobbles is usually present.

4. Roof construction. The locations of postholes in Dos Casas front rooms suggest that the four-post roof support system was the standard practice, although sometimes an extra pair of support posts are located near the north and south walls on the north-south axis of the structure. The latter posts probably were used as additional support for the primary beams in larger rooms that had relatively long east-west dimensions. The posts also may have supported an additional north-south primary beam across the center of the room.

5. Floor. The floor usually is excavated approximately 10 to 15 cm below prehistoric ground surface. The surface is formed by a veneer of dried mud that is covered by a layer of sand; the surface usually has a dark cast, probably due to the inclusion of charcoal and other organic material. Excavation usually reveals a much greater density of artifacts and features in front rooms than in back rooms. Some features that might be present include the following.

   a. Corner bins. One corner bin per room is usually present. The location is not consistent; it may be situated in a front or back corner.

   b. Hearth-ash pit complex. A large hearth is always present in a living room and may be supplemented with an ash pit; specialized processing rooms may lack hearths. The hearth is usually centrally located,

although sometimes it is situated in the west-center or east-center of the room.

c. Step-ups. Step-ups may be present along the back walls in front of the possible locations of doorways to the back rooms. These features apparently served as steps used to enter the back rooms. These may be in the form of an enclosure or "bin" formed by vertical slabs or they might consist of a single vertical slab.

d. Ventilation system. Ventilator systems were present in Rooms 2 and 16 at Periman Hamlet (Wilshusen 1983b: 52, 70-71). These consist of a subwall tunnel located near the center of the south wall and a deflector positioned between the interior tunnel opening and the hearth.

e. Metate stations. Dos Casas front rooms may incorporate mealing stations (a metate, often seated on a rest; one or more manos; and a collecting basin), usually in the southwest or southeast quarter of the room.

f. Features in small front rooms. The feature complement in the small rooms believed to be processing rooms differs from that in the larger living rooms. In addition to the four postholes needed for roof support, processing rooms may contain a hearth or series of hearths for heat or fire processing, and one or more floor cists or pits for temporary storage of materials and tools.

6. Functional and feature complement variability. The architectural descriptions for surface rooms are based on a perception of "normal" distributions in the available data. It must be said that there are exceptions to the normal pattern, for both the Dos Casas Subphase and the succeeding Periman Subphase. Examples of exceptions are large back rooms, which apparently served as living rooms, that were constructed by removing the shared center wall between two small back rooms and adding features; partitioned front rooms that apparently served as storage facilities; and small front rooms that appear to have functioned as living quarters rather than as processing facilities.

7. Domestic and economic activity areas. Large front rooms (living rooms) usually contain the space and features necessary for completion of day-to-day domestic tasks. The complement of features includes facilities for heating and cooking, food preparation, tool manufacture and maintenance, and temporary storage. Space for sleeping is usually available also. Small front rooms (processing rooms) contain features and space used for processing raw materials usually associated with subsistence. No ritual features (sipapus, basin-shaped pits with "paho" marks, or "paho" marks on floors) have been recorded in Dos Casas Subphase surface rooms.

D. Pitstructures. The architectural characteristics of Dos Casas Subphase pitstructures differ from those of Sagehill Subphase pitstructures, but the differences are not as extreme as those

between the Tres Bobos and Sagehill structures. Excavation data suggest that there are one to two pitstructures per habitation site; larger Dos Casas Subphase roomblock-pitstructure complexes at the central habitation locations may have been destroyed by later Periman Subphase construction or remodeling. Dos Casas pitstructures are about the same depth as Sagehill pitstructures, but have larger mean floor areas. Dos Casas pitstructures usually incorporate a bench, vertical-slab-based wingwalls, and a ventilator system. Central hearths are comparatively large and associated ash pits are common. Functionally, most Dos Casas pitstructures can probably be classed as "protokivas" (Morris 1939; Hayes and Lancaster 1975:183), as activities conducted within them seem to be either domestic/economic or integrative. Figure B.3 illustrates the general architectural characteristics and feature layout of Dos Casas Subphase pitstructures. Specific architectural characteristics are as follows (some of the measurements are taken from Hewitt et al. 1983).

1. Size. Dos Casas Subphase pitstructures average about 23 m^2 in area; this is about 5 m^2 more than Sagehill Subphase pitstructures. Size variability is somewhat greater than during the Sagehill Subphase; standard deviations in size are close to 9 m^2 (Dos Casas) compared to approximately 6.6 m^2 (Sagehill).
2. Shape. Dos Casas pitstructures are more regular in shape and more square than Sagehill structures. Dos Casas pitstructures apparently are subrectangular in form; the

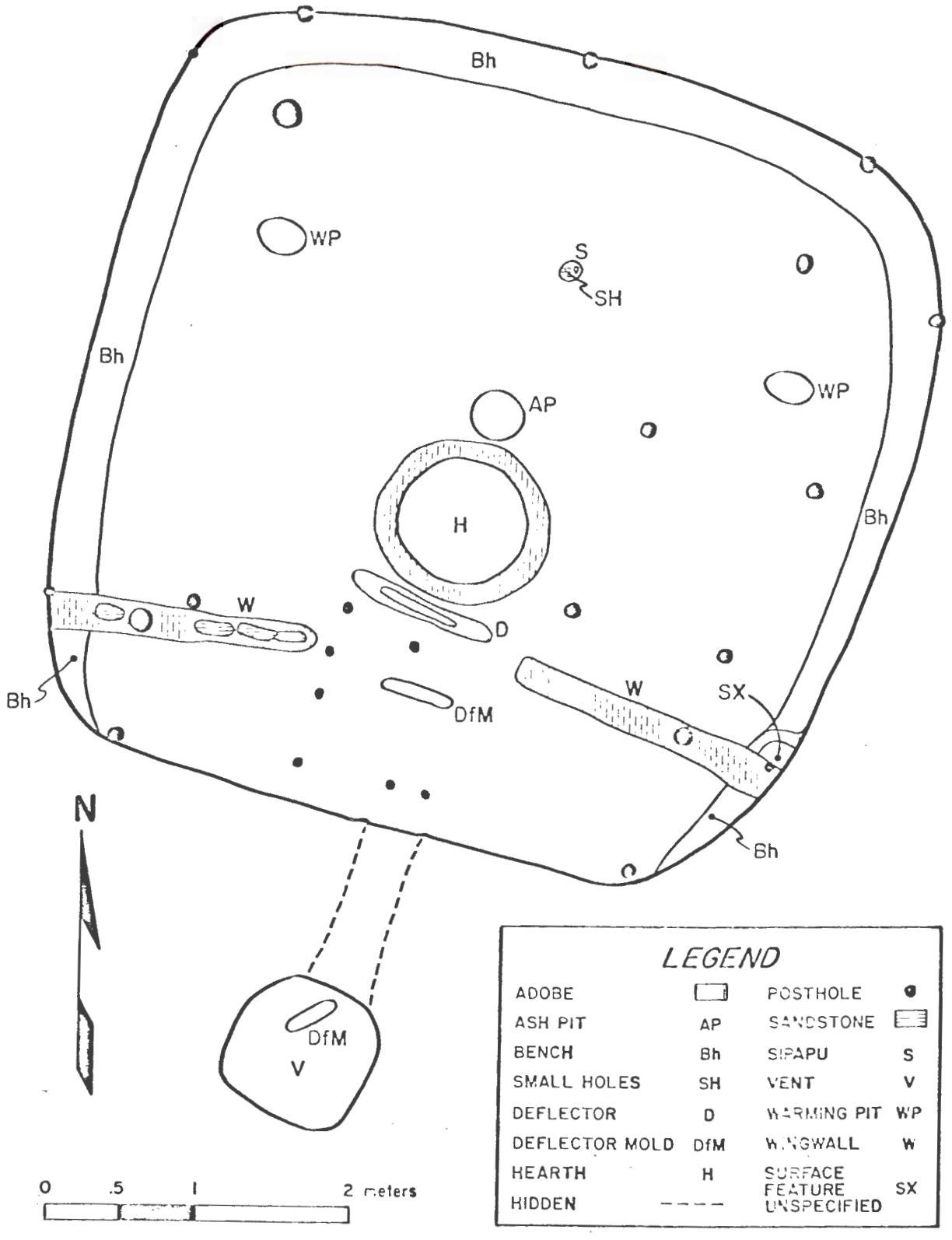


Figure B.3 A Dos Casas Subphase pitstructure (adapted from Brisbin 1983:fig. 15). Note subrectangular shape, bench, wingwall, and ventilation and heating features.

mean squareness index is 0.937, which is greater than the comparable figure for Sagehill pitstructures.

3. Depth. The mean depth of Dos Casas pitstructures is about 1.4 m, which is very close to the figure obtained for Sagehill Subphase pitstructures.

4. Roof construction. Four-post support roof patterns are present in most examples. The northern two postholes are near the corners while the southern postholes are incorporated into the wingwall. Auxiliary posts (e.g., smaller posts paired with the wingwall supports or two additional posts against the south wall) may be present. Leaner posts were footed on the bench.

5. Bench. Dos Casas Subphase pitstructures usually incorporate a three-quarter bench on the east, north, and west walls. The bench served as a foundation for the leaner poles that formed the vertical portion of the roof. The bench was also used as a temporary storage area for tools and containers.

6. Wingwall. Wingwalls usually are present in Dos Casas Subphase pitstructures. Wingwalls form a partition across the southern end of the structure, which creates a separate southern room or work area. The wingwalls are usually parallel to the north and south walls of the pitstructure. A gap may exist in the center portion of the wingwall on the north-south axis, perhaps to accomodate access between the north and south ends. Wingwall construction usually consists of a veneer of hardened mud and plaster over an internal support of vertical sandstone slabs or small posts

set into the floor. If vertical slabs were incorporated, they were arranged in either a single row or a double row with a core of mud or adobe (Brisbin 1983:fig. 29). The southern two main post supports usually were incorporated into the wingwall in Dos Casas Subphase pitstructures.

7. Bins. No corner or other floor bins have been recorded in Dos Casas Subphase pitstructures.

8. Ventilation system. Dos Casas Subphase pitstructures contain a standard Anasazi ventilator system in the form of a vertical shaft and a horizontal tunnel, the latter opening into the pitstructure at floor level and in the center of the south wall. The floor of the ventilator shaft is smaller in area than the floor in Sagehill shafts (1.1 m^2 versus 1.6 m^2) and apparently was not used for a storage or other activities. A deflector slab was positioned between the tunnel entrance and the central hearth. Usually this slab was located immediately south of the hearth, although one example (Dos Casas Hamlet, Pitstructure 2) is recorded where the deflector is in the south end of the structure very close to the tunnel entrance.

9. Hearth and heating complex. Dos Casas Subphase pitstructures contain a central hearth that is often complemented by an ash pit just south of the hearth. The hearth is usually slightly larger than Sagehill counterparts.

10. Domestic and economic activity areas. A metate station is usually present in the south end, either in the eastern or western corner. The other corner was often used as a

storage area for lithic tools (e.g., manos, axes, cores). Additional metate stations may be present north of the wingwall; these usually are located west of the central hearth. During investigations of Pitstructure 2 at Dos Casas Hamlet (Brisbin et al. 1982), a flat sandstone slab with a lump of raw clay was found in situ west of the hearth. This suggests that preliminary stages of ceramic vessel manufacture might have been based in pitstructures.

11. Ritual activity areas. Apparently a ritual activity area centered around a sipapu was usually situated north of the hearth on the north-south axis. Several sipapu forms have been recorded: simple cylindrical holes thought to be sipapus; "complex" sipapus incorporating small pits thought to represent marks left by prayer sticks or "pahos"; and clusters of small, cylindrical pits surrounded by prayer stick marks.

IV. Periman Subphase (A.D. 850-900) of the McPhee Phase. Architectural data for comparison and study is available in Brisbin (1980, 1982), Kuckelman (1982, 1983b), Morris (1982), Nelson (1983b), Chenault (1983b), Robinson (1984), and Fields (1981).

A. General layout and structure populations. Habitation sites seem to conform to one of two general patterns: large aggregated villages consisting of 4 or 5 to more than 15 roomblock units, and isolated single or double roomblock settlements (termed satellites by the DAP staff), which are assumed to be socially related to specific aggregated villages. The roomblock units within the large habitations also seem to have two size distri-

butions: small units consist of 1 to 2 interhousehold clusters with 2 to 6 surface dwellings units (8 to 20 individual rooms) and 1 to 2 pitstructures; large units contain 5 to 10 interhousehold clusters with 10 or more dwelling units (40 or more individual rooms) and 5 to 10 pitstructures. Large roomblock units usually include one or more oversized pitstructures that may have served as loci for integrative interhousehold activities. The small units appear to be spatially related to the more centralized large units and are believed to represent residential annexes. Roomblock configurations conform to the general pattern described for the preceeding Dos Casas Subphase: a roomblock, usually crescent shaped or possibly horseshoe shaped; a plaza area south of the roomblock containing pitstructures and extramural work areas; and a midden or possibly two to three separate refuse mounds south of the living complex. Small roomblock units range from 0.2 to 0.4 ha in area, while the large roomblock units usually cover between 2 and 4 ha.

B. Surface structures--back rooms. Periman Subphase back rooms are in many ways morphologically similar to their Dos Casas predecessors. The back rooms are arranged linearly within the contiguous roomblock and there is a consistent ratio of two back rooms per one front living room, or of one back room per front processing room. Specific architectural characteristics are as follows.

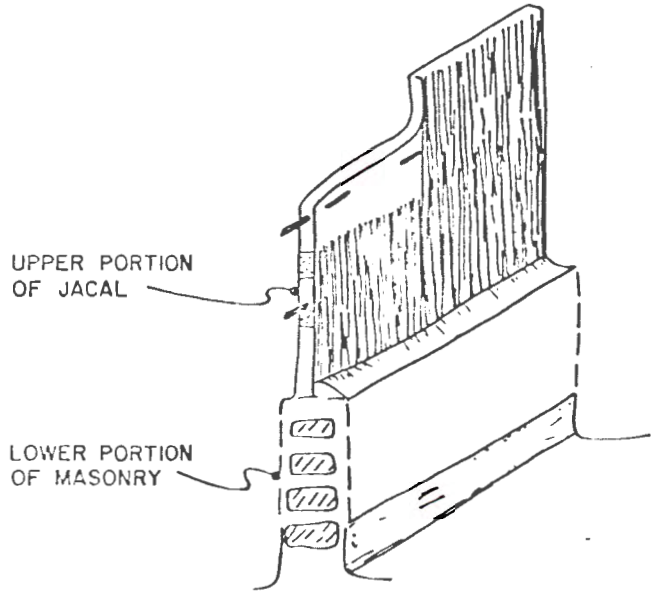
1. Shape. Without exception, the structures appear to be rectangular or square in plan.

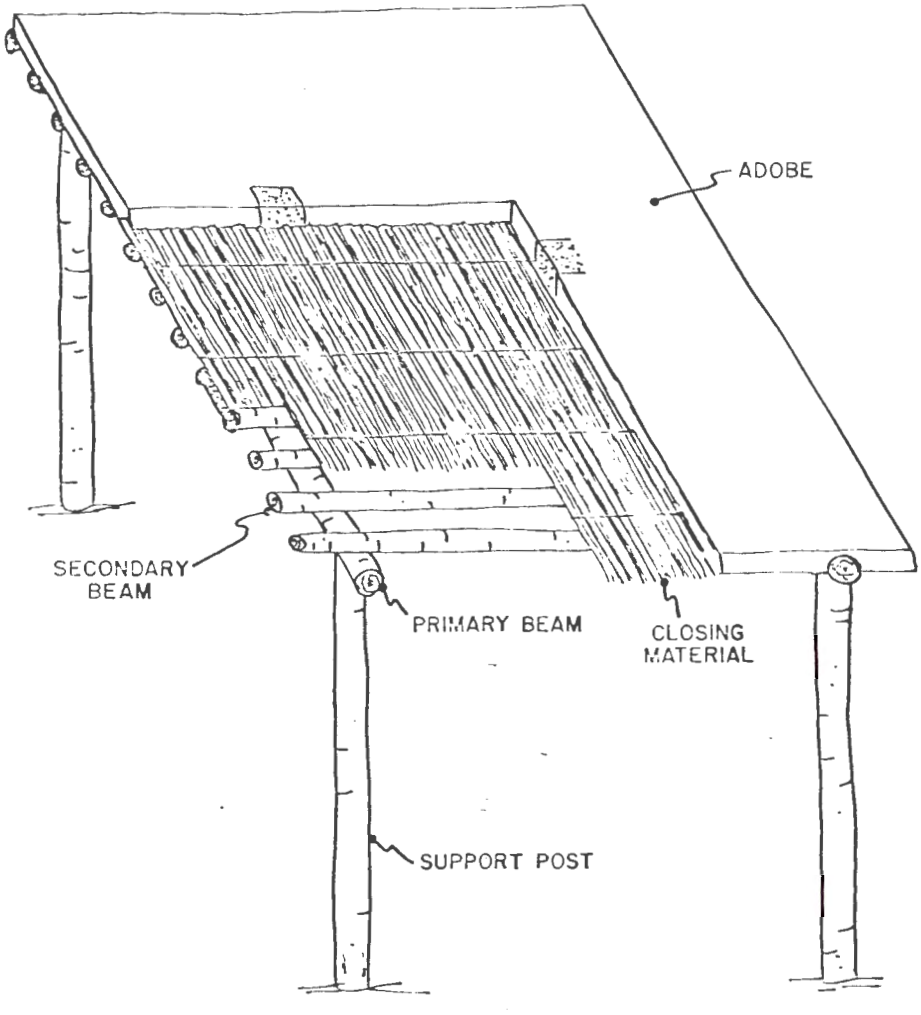
2. Size. The distribution of room sizes approximates a normal curve. The mean size is 5.4 m^2 (total floor area), which

is significantly larger than the mean size of Dos Casas back rooms (3.5 m^2); this may indicate increased investment in storage facilities (Wolf 1983). Some exceptions to the normal distribution have been observed; for example, Room 18 at 5MT5107 (Brisbin 1982) is more than 10 m^2 in area. This may represent a modification of the original architectural pattern to meet functional needs.

3. Walls construction. Periman Subphase back rooms exhibit a variety of wall construction types. Most back room walls were of composite construction; the lower portion (0.5 to 1.0 m) was masonry, and the upper portion was adobe or jacal (fig. B.4). Wall foundations were of adobe, horizontally laid sandstone slabs, or vertically placed sandstone slabs; subfloor trenches were often prepared to accomodate the foundation materials. Vertical-slab foundations in Periman Subphase back rooms may represent retention of original wall bases dating to the previous Dos Casas Subphase. Variability in wall construction for the late Pueblo I Period (A.D. 800-900) has also been described by Brew (1946:218-219) in a synthesis of early Anasazi architecture. The increased investment in materials and labor necessary to build partial masonry walls for back rooms may reflect increased dependence on storage and the need for a secure storage environment. Access to back rooms apparently was by means of a small door or hatch in the south wall. Field observations suggest that the hatch was above the floor

Figure B.4 Artist's reconstruction of [illegible] Subphase back room architecture. Top, walls. Note masonry base and jacal upper portion. Bottom, roof. Based on Morris' (1982:figs. 28 and 29) reconstruction of surface structures at Weasel Pueblo.





level and may have been reached by means of a step in the front room.

4. Roof construction. Most back rooms have four postholes near the four corners, which suggests that the four-post roof support pattern was employed. The roof itself apparently consisted of primary beams, secondary beams, and several layers of closing materials (fig. B.4). Postholes in back rooms are deeper, and they more consistently incorporate bracing and footing materials than do postholes in front rooms, perhaps indicating more substantial roof construction in back rooms.

5. Floor. Floors in back rooms usually consist of the use-compacted excavated ground surface, perhaps with a veneer of dried mud. They usually are located 10 to 20 cm below prehistoric ground surface and are level or basin shaped.

6. Activity areas. Back rooms dating to the A.D. 800's usually are assumed to have functioned primarily as storage facilities (Brew 1946:190-191; Hayes and Lancaster 1975:182-183). The data from Dolores mostly supports this assumption, albeit with some exceptions (Wolf 1983). Periman Subphase back rooms functioned as granaries (for storage of cultivated foodstuffs such as corn and beans), as storerooms (for storage of domestic tools and agricultural implements, wild or ruderal plant foods such as amaranth and chenopods, and perhaps of firewood or construction materials), and infrequently as locations for processing activities. Back room grinding stations (in situ metates, manos, and

collecting basins) have been recorded at DAP area sites. Rectangular bins and subfloor bell-shaped cists have also been recorded in Periman Subphase back rooms; this suggests that activities in these rooms included compartmentalized storage, perhaps for items in bulk.

In summary, it appears that architectural characteristics and functions of Periman Subphase back rooms are basically similar to those of the preceeding Dos Casas Subphase. Periman Subphase back rooms are larger, incorporate more substantial construction, and were used for a greater variety of activities, although storage remained the primary function.

C. Surface structures--front rooms. The sizes and feature populations of Periman Subphase front rooms have a bimodal distribution. Large (greater than 10 m^2 floor area) front rooms usually have feature populations consistent with definition of the structures as living or domestic rooms, while small (less than 10 m^2 floor area) front rooms have feature populations consistent with definition of the structures as processing facilities. These characteristics are similar to those described for Dos Casas Subphase front rooms, suggesting that the original form and function patterns established in the late A.D. 700's remained basically unchanged into the late A.D 800's. Remodeling and other modifications that resulted in departures from the normal pattern apparently were more frequent during the Periman Subphase. Examples of this phenomenon include use of small front rooms as living rooms and division of large front rooms into two

smaller units. Specific architectural characteristics of Periman Subphase front rooms are as follows:

1. Shape. Periman front rooms are rectangular or subrectangular in plan. The south corners may be rounded, which results in a "scalloped" appearance along the roomblock outline. Shape distributions are similar to those of the previous Dos Casas Subphase.
2. Size. Room sizes for Periman front rooms range from about 7 m^2 to 25 m^2. The distribution has two peaks and closely resembles the distribution for Dos Casas front rooms. The mean floor area for large rooms is about 17 m^2, which is slightly more than that for large Dos Casas rooms, while the mean for small rooms (approximately 8 m^2) is about the same as that for small Dos Casas Subphase rooms.
3. Wall construction. Periman front room walls are similar in form and construction to those of comparable Dos Casas structures. With the exception of the north wall, Periman front rooms incorporate less substantial materials than do back rooms; most construction was probably of daub turtlebacks or jacal. Foundations and some lower portions were of vertical sandstone slabs or of horizontally positioned stone blocks or cobbles.
4. Roof construction. Periman front room roofs probably were similar to Dos Casas front room roofs. The use of a standard Anasazi four-post support system was common practice, although sometimes two additional support

posts were used near the center of large rooms. A few rooms with eight support posts (four along both the north and south walls) have been found. In such cases, the additional posts probably were used to support additional construction members in rooms with relatively long east-west dimensions.

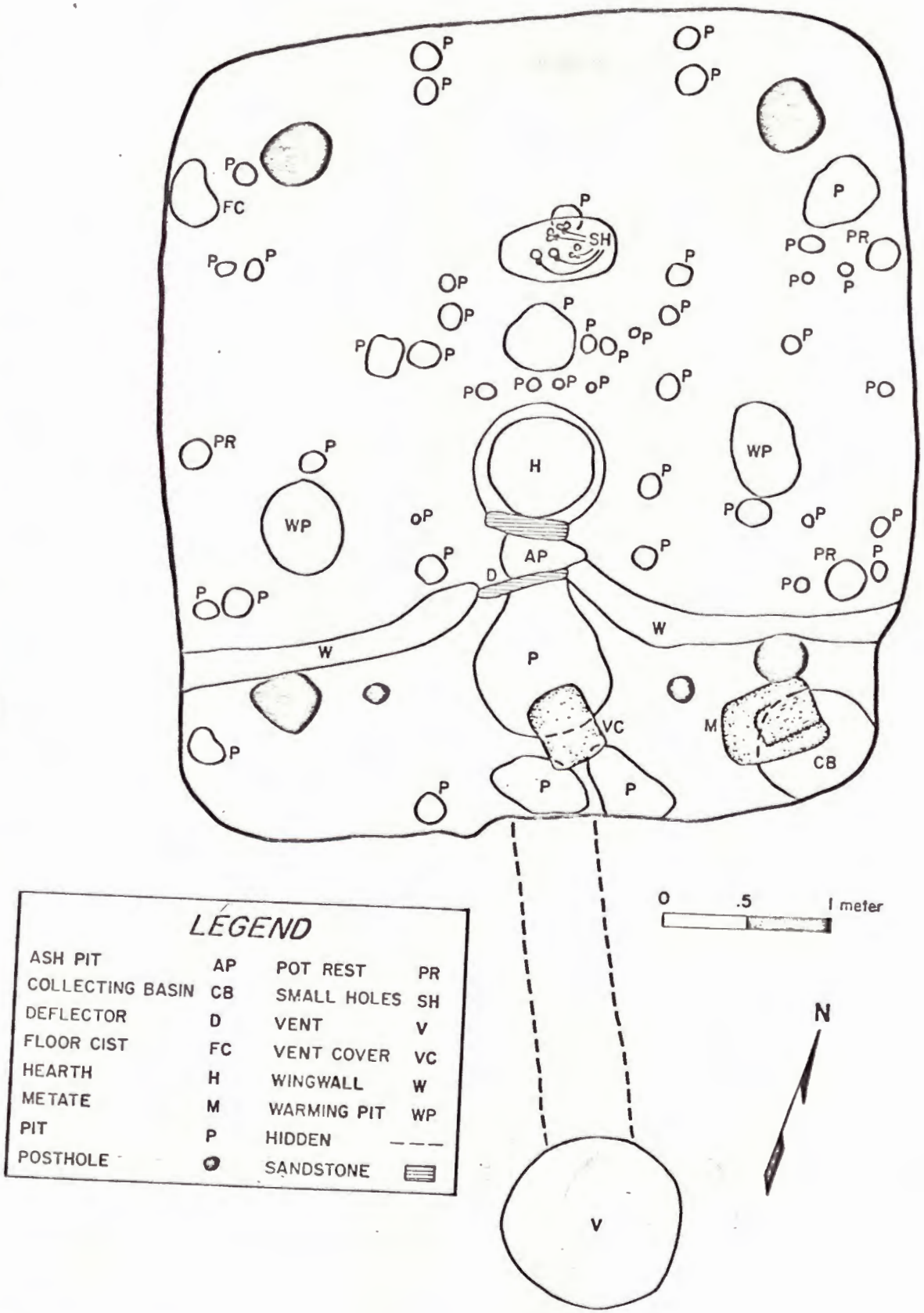
5. Floors and associated features. Floor construction and features in Periman front rooms are similar to those described for comparable Dos Casas structures. Refer to the Dos Casas descriptions for specific details.

D. Pitstructures. Periman Subphase pitstructures exhibit greater variability in form and function when compared to earlier pitstructures. Between 2 and 8 pitstructures per roomblock unit is characteristic of Periman Subphase habitation sites, and more than 40 pitstructures may have been in simultaneous use at some of the larger village settlements. Periman pitstructures appear to be consistently located in the plaza area south of the roomblock. Size, feature complement, and function appear to be interrelated; most small pitstructures contain a preponderence of domestic and processing features with some contents or architecture that are believed to have had ritual functions; these structures probably are "protokivas." Large (greater than 30 m^2) Periman pitstructures have a greater proportion of ritual features and contents, while very large (greater than 60 m^2) structures contain only ritual items and architecture; these latter two types of structures are termed "inte-

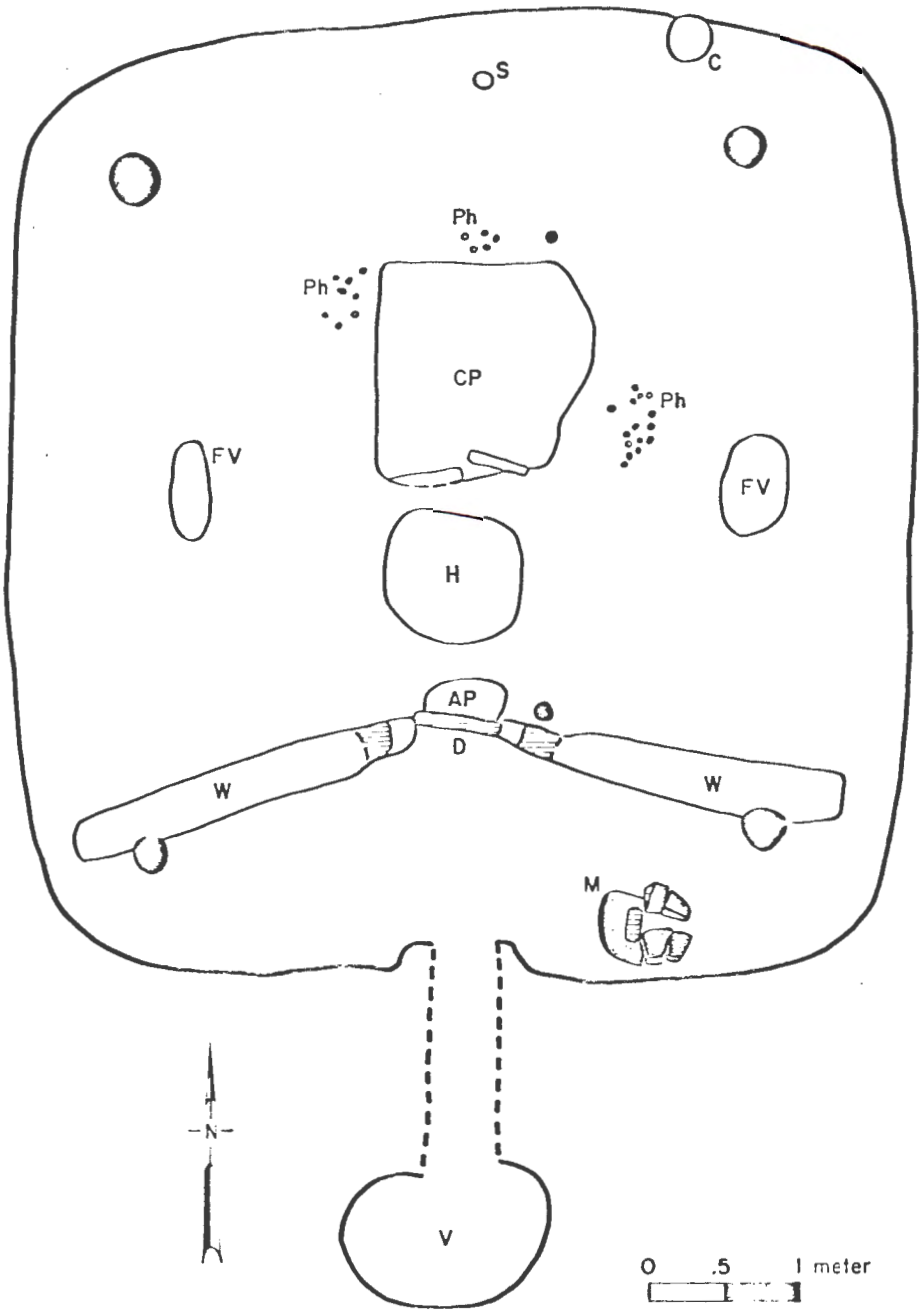
grative structures" because they are functionally distinct from "protokivas" and formally different from "kivas." Figures B.5 and B.6 illustrate form and architectural characteristics of two Periman Subphase pitstructures. Specific characteristics of Periman pitstructures are as follows (some of the measurements have been taken from Hewitt et al. 1983).

1. Size. The size distribution of Periman pitstructures suggests a bimodal distribution, probably reflecting two form and function populations. The small pitstructures (structures with mostly domestic features and activity areas) have a mean floor area of 17 to 18 m^2. The larger pitstructures (thought to be structures in which mostly integrative activities were performed) have a mean floor area of about 40 m^2. The distribution has a "tail" between the two mean peaks, perhaps indicating structures that were intermediate in function. Pitstructure 3 at McPhee Pueblo (Brisbin 1980) and Pitstructure 9 at Pueblo de las Golondrinas (Brisbin 1982) are two of these "outliers." The oversized structure at McPhee Pueblo has a floor area of 63 m^2, while the similar structure at Pueblo de las Golondrinas is over 50 m^2 in area.

2. Shape. Periman pitstructures are rectangular with rounded corners; the mean squareness index is 0.934, which is very close to the value for Dos Casas pitstructures (0.937).



re B.5 A Periman Subphase small pitstructure ("protokiva") (adapted from Kleidon 1983:fig. 33). Note subrectangular shape, form, and position of wingwall, ventilation system, features, and absence of bench.



LEGEND			
SANDSTONE	▤	PAHO MARKS	Ph
ASH PIT	AP	POSTHOLE	O
CIST	C	RECTANGULAR CENTRAL PIT	CP
DEFLECTOR	D	SIPAPU	S
FLOOR VAULT	FV	VENT	V
HEARTH	H	WINGWALL	W
METATE	M	HIDDEN	- - -

igure B.6 A Periman Subphase large pitstructure ("integrative structure") (adapted from Kuckelman 1983b). Note subrectangular shape, massive wingwall, ventilation system, rectangular pit north of hearth, vaults east and west of hearth, and absence of bench.

3. Depth. The mean depth for the smaller domestic pitstructures is about 1.6 m; for the larger integrative structures it is about 2.0 m. Periman pitstructures are somewhat deeper than Dos Casas pitstructures. Pitstructure 3 at McPhee is a "outlier" with a depth of over 3 m.

4. Roof construction. Roof patterns are similar to those noted for Dos Casas Subphase pitstructures. Four main support postholes are present; these are located in the northeast and northwest corners and in the wingwall. Auxiliary posts may be present. Leaner posts were apparently footed on a ground-level shelf around the margin of the structure as benches are absent in Periman pitstructures.

5. Bench. Benches are almost invariably absent in Periman pitstructures. The only recorded Periman benches are in Pitstructure 3 at McPhee Pueblo, and in Pitstructure 9 at Pueblo de las Golondrinas. The former consists of a low, raised platform fronted by slabs and situated against all four walls of the structure. In form and function, the bench in this structure is probably more akin to great kiva benches than to similar features in Tres Bobos or Dos Casas pitstructures. Pitstructure 9 at Pueblo de las Golondrinas included a possible bench against the north wall.

6. Wingwall. Wingwalls are found in most Periman Subphase pitstructures and are similar in general form and posi-

tion to those in Dos Casas pitstructures. Wingwalls in large, integrative Periman pitstructures are very regular and stylized in form and are more massive in construction than the wingwalls in the smaller pitstructures. Periman pitstructure wingwalls are often constructed of horizontal masonry and/or vertical posts rather than of the vertical slabs commonly used during preceding periods. Periman wingwalls often incorporate two notches and steps on either side of the deflector for access to the south end.

7. Bins. Bins are usually absent in Periman pitstructures; Pitstructure 2 at Prince Hamlet (Sebastian 1983) contains a corner bin built into the southwest corner of the main chamber north of the wingwall.

8. Ventilation system. Periman pitstructure ventilator systems are similar to those of the preceding Dos Casas Subphases. The deflector is usually an extention of the wingwall, but sometimes it is built into the south rim of the central hearth. The wingwall may jog north to incorporate the deflector. The deflector is usually a vertically positioned sandstone slab, but in some cases it may be constructed of horizontally laid masonry.

9. Hearth and heating complex. A central hearth and ash pit are present in Periman pitstructures. The ash pit is located south of the hearth; in large (720 m^2) pitstructures, this complex may be augmented with

shallow, basin-shaped heating pits east and west of the hearth. A small, cylindrical "sand receptacle" (Brisbin 1980) is sometimes present north of the hearth. This may have provided a convenient container for sand used to prop vessels in the hearth or may have been used for other hearth-related activities.

10. Domestic and economic activity areas. Locations of domestic and economic activities are similar to those in Dos Casas pitstructures. A mealing station is located in the southwest or southeast corner south of the wingwall, with a tool storage area located in the opposite corner. Additional mealing stations may be located immediately north of the wingwall in the two corners formed by the wingwall and the pitstructure walls. A lapstone is often found north of or to either side of the hearth, perhaps indicating that stone tool manufacture or maintenance took place in these areas. Pot rests are often located adjacent to the east and west walls and probably were used for temporary storage of water or raw materials in ceramic vessels.

The above description addresses the small, domestic Periman pitstructures; the larger, integrative pitstructures contain fewer features and artifacts that support domestic or economic inferences. A metate station was recorded in the southeast corner of Pitstructure 2 at Masa Negra Pueblo (Kuckelman 1983b), and two lapstones were located just southeast and southwest

of the central hearth in the same pitstructure. A lapstone was also recovered from the floor of Pitstructure 9 at Pueblo de las Golondrinas. With these exceptions, in situ ground stone artifacts used for food preparation or tool maintenance are rare in Periman integrative pitstructures.

11. Ritual activity areas. In small, domestic Periman pitstructures, a ritual or integrative activity area is usually located north of the central hearth on the north-south axis. This is usually in the form of a sand-filled oval basin with small circular pits (perhaps from prayer sticks or "pahos") arranged in an arc east and west of the basin and in the basin itself. Less frequently, the ritual feature may be a simple cylindrical hole or sipapu or a complex of superimposed cylindrical holes and paho marks (complex sipapu).

    Large, integrative Periman pitstructures contain a larger complement of ritual features and activity areas than their smaller counterparts. The most conspicuous is a large, rectangular, roofed pit north of the hearth. These pits have been called "ceremonial vaults." Associated with these vaults is an arc of paho marks in the floor of the structure. Other features with possible ritual significance include vaults east and west of the central hearth and "effigy" or "anthropomorphic" pits (Brisbin 1982). Ornament fragments (shell beads, turquoise plaques) are often

recovered from the floors of integrative Periman pitstructures.

V. Grass Mesa Subphase of the McPhee Phase (A.D. 880-925). Data for architectural comparison can be found in Breternitz (1983) and Wilshusen (1983a).

A. General layout and structure populations. The Grass Mesa Subphase is characterized by architectural variability. In many instances, the Grass Mesa inhabitants reoccupied Periman Subphase structures and often remodeled the surfaces to accomodate new constellations of features and activities. In other instances, entirely new structures were built. Grass Mesa Subphase habitation sites, therefore, are characterized by continuation of the old Periman roomblock-plaza pattern, which has been rendered more complex by abandonment of some units and addition of others. The traditional north-south orientation for most Anasazi structures remains an observable phenonmenon. Mean estimates of numbers of architectural units per habitation site are difficult to calculate because Grass Mesa occupations have only been recorded at two sites: Grass Mesa Village and Rio Vista Village; both sites contain multiple roomblock units assigned to the Grass Mesa Subphase.

B. Surface structures. Characteristics of Grass Mesa surface rooms conform to the general pattern of relatively great architectural variability. In cases where Periman rooms are reused, former back storage rooms may be modified into living or domestic rooms through addition of hearths and

other features. Former front living rooms might be reoccupied as open ramada-like areas on the northern margins of plazas. Areas where the Grass Mesa groups constructed new rooms have been recorded. These are usually small (ca. 4 to 6 m^2 in area) and noncontiguous, similar to Tres Bobos and Sagehill room layouts. No definitive characteristics are listed here for Grass Mesa rooms because of the variability in the data set.

C. Pitstructures. Grass Mesa pitstructures also manifest relatively great variability when compared to those from other periods. Some apparently can be functionally classed as protokivas, reflecting continuation of the old Dos Casas-Periman pattern of a duel function as domestic and integrative structures. Others (termed "pocket pitstructures" by the DAP staff) apparently served solely as living or economic activity locations and, therefore, can be classed as pithouses. The latter are characterized by their small size (sizes range from 6 to 15 m^2), expedient construction mode, and variability in feature complement and placement. For example, the structures are generally subrectangular with many irregularities in wall outlines, wingwalls may be present or absent, and mealing stations are variable in position, although they are usually west or south of the hearth. The standard four-post roof support pattern is maintained in Grass Mesa pitstructures. Because of the inherent variability in the data set, no definitive characteristics for Grass Mesa Subphase pitstructures are

described here. A plan view of a Grass Mesa "pocket pitstructure" is illustrated in figure B.7.

VI. Cline Subphase of the McPhee Phase (A.D. 900-975). Data for architectural comparisons are available in the DAP site report series (e.g., Brisbin 1980; Kuckelman 1983b; Morris 1982).

A. General layout and structure populations. The Cline Subphase is manifest only at the McPhee Community Cluster. Here, three roomblocks and five pitstructures are believed to have been associated with a post-A.D. 900 Cline Subphase occupation. Roomblocks consist of a double row of rooms; they are built over previously occupied Periman rooms and may incorporate portions of original Periman walls or surfaces in the new construction. The plaza/pitstructure area is located to the south.

B. Surface structures. Cline Subphase surface rooms are generally similar in form and function to their Periman predecessors, although several distinctive differences are noted. Cline surface rooms are not so easily grouped into domiciliary suites consisting of two back storage rooms and a front living room; wall alinements do not allow this simple definition. This may reflect organizational changes in the composition of Cline domestic and economic groups. However, both types of rooms are present. Cline surface rooms incorporate more horizontal masonry into their construction, and, therefore, reflect a greater initial investment in materials and labor and are less vulnerable to

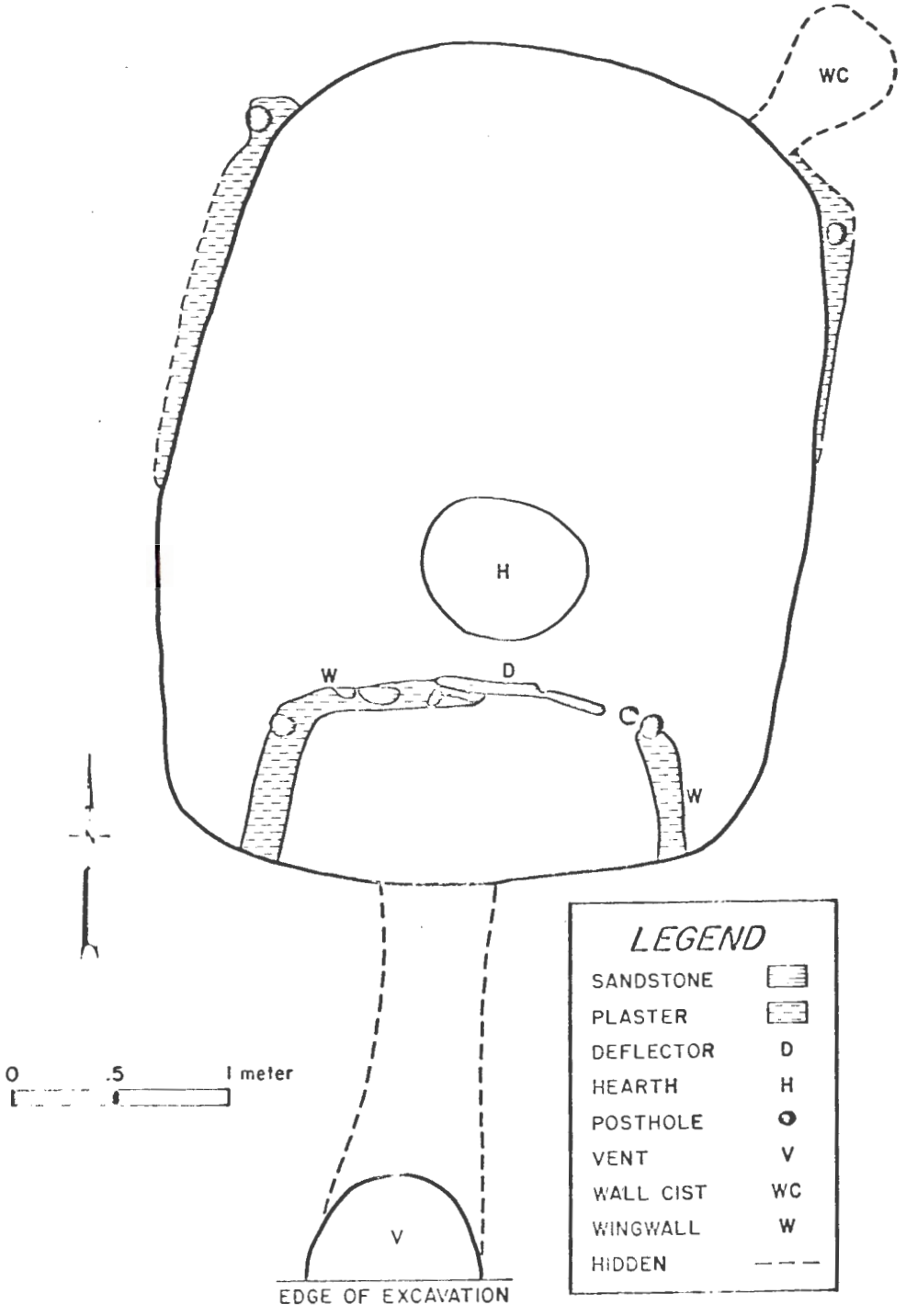


Figure B.7 A Grass Mesa Subphase "pocket pitstructure" (adapted from Ahlstrom and Dohm 1981). Note irregular outline, aberrant wingwall form, and ventilation system.

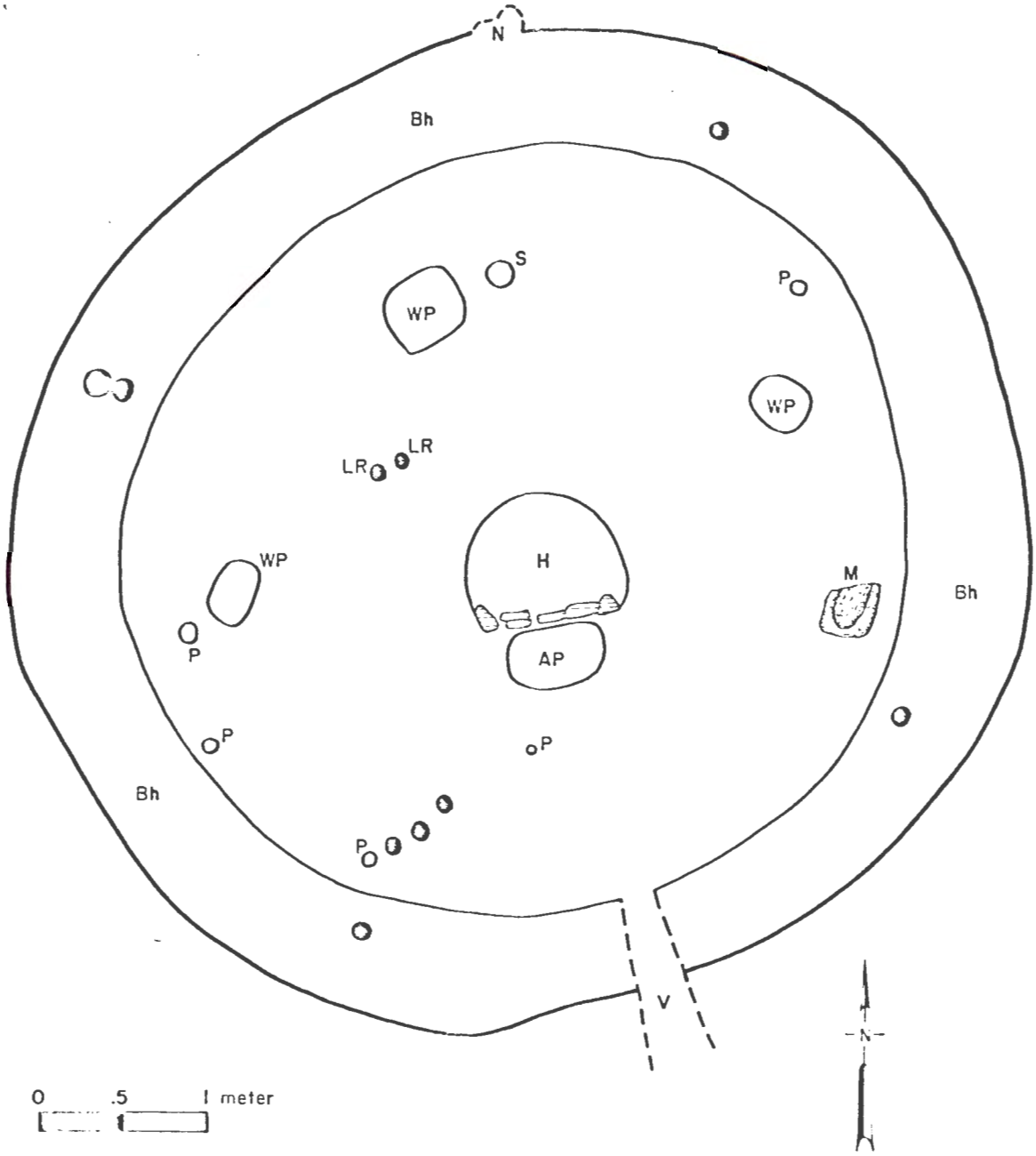
predators. Architectural characteristics of Cline Subphase surface rooms are as follows:

1. Shape. The structures are rectangular in plan.
2. Size. Two populations are present: small storage or processing rooms with a mean area of 7 to 8 m^2 and large living rooms with a mean area of about 14 to 15 m^2.
3. Wall construction. Walls are constructed partially of horizontally laid and mortared sandstone block masonry. The individual blocks are shaped by flaking and often exhibit a "scabbled" appearance (Brisbin 1980). Back room walls might have been constructed entirely of masonry while front room walls probably had upper portions of jacal or turtleback daub.
4. Roof construction. Most rooms contain postholes in the four corners suggesting that standard four-post construction was the dominant roofing pattern. Large front rooms may contain two additional post supports near the north-south axis of the structure.
5. Floor. Floors consist of the original surface of the excavation covered with a veneer of dried mud or sand.
6. Domestic and economic activity areas. Rooms can be functionally classified as storage, processing, and living rooms. Storage rooms contain few features and are usually small back rooms. Processing rooms contain grinding stations or sets of hearths and are small back or front rooms. Living rooms (large front rooms) con-

tain a complement of features (e.g., corner bins, central hearths, mealing stations) used in the performance of day-to-day domestic tasks.

C. Pitstructures. Cline pitstructures exhibit marked changes in form and function when compared to their Dos Casas and Periman Subphase predecessors. One or two pitstructures are present per roomblock unit. Pitstructures are circular rather than rectangular, and they usually have a bench. Wingwalls are absent and domestic/economic activity areas are rare, suggesting the increasing use of the pitstructure as a place for rituals and for group integration. Form and function of Cline pitstructures probably correspond to the definition of true "kivas" as presented in the archaeological literature (Lancaster and Pinkley 1954:55; Gillespie 1976:85-98). Figure B.8 illustrates the formal characteristics of a Cline Subphase pitstructure. Specific architectural characteristics are as follows.

1. Size. Cline Subphase pitstructures range from less than 10 m^2 to almost 30 m^2 of usable roofed area (floor plus bench surfaces). The sample population is too small to allow much description; however, it appears that the size distribution of structures may be bimodal: a small population with a mean area of between 10 and 15 m^2 and a larger population with a mean between 20 and 30 m^2.



LEGEND			
SANDSTONE		PIT	P
ASH PIT	AP	POSTHOLE	●
BENCH	Bh	SIPAPU	S
LADDER REST	LR	VENT	V
METATE	M	WARMING PIT	WP
NICHE	N	HIDDEN	- - -

Figure 8.8 A Cline Subphase pitstructure (adapted from Brisbin 1980). Note circular shape, bench, and absence of wingwall and domestic features.

2. Shape. Cline Subphase pitstructures are round, in sharp contrast with pitstructures from earlier periods.

3. Depth. Depths for Cline Subphase pitstructures range from 1.3 to 1.7 m.

4. Roof construction. Four-post roof support patterns are common, although some structures apparently had roofs with the main beams footed on the tops of the walls i.e., at ground level. When present, the four main supports are footed in the bench in the northwest, northeast, southwest, and southeast corners.

5. Bench. Presence or absence of a bench is variable in Cline pitstructures and may covary with size (large pitstructures incorporate a bench, small pitstructures usually do not). Pitstructure 5 at Masa Negra Pueblo (Kuckelman 1983b), near the small end of the size distribution, possessed a high bench. This feature may have served as reinforcement for the walls rather than as the more typical kiva bench. When present, the bench extends around the entire perimeter of the structure.

6. Wingwall. Wingwalls are absent in Cline Subphase pitstructures.

7. Bins. Bins are absent in Cline pitstructures.

8. Ventilation system. Cline Subphase pitstructures incorporate a standard ventilation system in the form of a horizontal tunnel and a vertical shaft, the former

opening into the pitstructure at floor level from the south. Pitstructure 1 (Kiva 1) at McPhee Pueblo (Brisbin 1980) possesses a subfloor ventilator tunnel with an opening just south of the central hearth.

9. Hearth and heating complex. Cline Subphase pitstructures incorporate a central hearth, usually accompanied by an ash pit to the south.

10. Domestic and economic activity areas. Evidence for domestic or economic processing activities is scant in Cline pitstructures; mealing stations, receptacles for tool storage, and in situ lapstones are notably absent. A trough metate fragment was found near the west wall of Pitstructure 1 at McPhee Pueblo. Artifact collections from Cline pitstructures usually contain ground stone tools (hammerstones, manos, pecking stones, and polishing stones), perhaps reflecting some maintenance or manufacturing activities; flakes; numerous white ware bowl fragments; some storage jar fragments; unworked bone scraps; and some bone tools (needles and awls).

11. Ritual activity areas. Because domestic activity areas are notably absent and because the density of pit features is low when compared with that of other periods, it is assumed that the primary functions of Cline pitstructures were ritual or ceremonial in nature. A simple cylindrical sipapu is usually present north of the hearth near the north wall. A niche, probably used for storage of ceremonial items, is often present in

the north wall, along the north-south axis. Artifact collections include items of possible ceremonial association such as rock crystals, stone or ceramic ornaments, and fragments of pigment stone.

VII. Marshview Subphase of the Sundial Phase (A.D. 1050-1200). Architectural data for comparison is available in individual documents from the DAP report series (Wilshusen 1982; Kleidon 1983; Kuckelman 1983c; Morris 1982; Harriman 1983b).

A. General layout and structure populations. Marshview Subphase habitation sites generally contain one pitstructure; sometimes this pitstructure is associated with a single surface structure. The latter may be of masonry construction or of less substantial jacal or brush construction. A typical Marshview habitation site incorporates the standard spatial arrangement of surface rooms, pitstructure, and refuse deposit alined on a north-south axis. These sites are very small (site areas usually are less than 600 m^2). The expedient construction styles and the relatively small sizes of these sites suggest that they probably are seasonal sites rather than permanent settlement sites.

B. Surface structures. Marshview surface structures are variable in form and construction. Of the Marshview sites with masonry surface rooms, Beaver Trap Shelter (Site 5MT4654) has a masonry roomblock with three contiguous rooms and a surface kiva incorporated into the block; Pinyon House (Site 5MT4751) has a single masonry room thought to be a storage facility; and the latest component at Weasel Pueblo (Site

5MT5106) includes a circular masonry structure that may have been a tower. Excavation of two Marshview sites without substantial surface architecture (Paintbrush House, Site 5MT2729; and Marshview Hamlet, Site 5MT2235) yielded indications of jacal or brush ramadalike structures north of the pitstructures. However, because of postabandonment erosion and disturbance, the form and function of these structures could not be estimated. Because of the variability within this data set, no summary of definitive characteristics is provided.

C. Pitstructures. Marshview Subphase pitstructures are very small, shallow, and exhibit less investment in materials and labor than their counterparts during previous periods. Functionally, they probably can be considered pithouses rather than kivas or protokivas as they lack evidence for ritual or ceremonial activity. Figure B.9 is a plan view of a Marshview Subphase pitstructure. Specific architectural characteristics are contained in the following list.

1. Size. Marshview Subphase pitstructures range from 5.3 m^2 to over 14 m^2 in floor area; the mean is about 8 m^2.
2. Shape. Marshview pitstructures are round or oval.
3. Depth. The mean depth of Marshview Subphase pitstructures is about 1.0 m; they are relatively shallow when compared with pitstructures of other periods.
4. Roof construction. Roof beams were usually footed at the top of the pit walls.

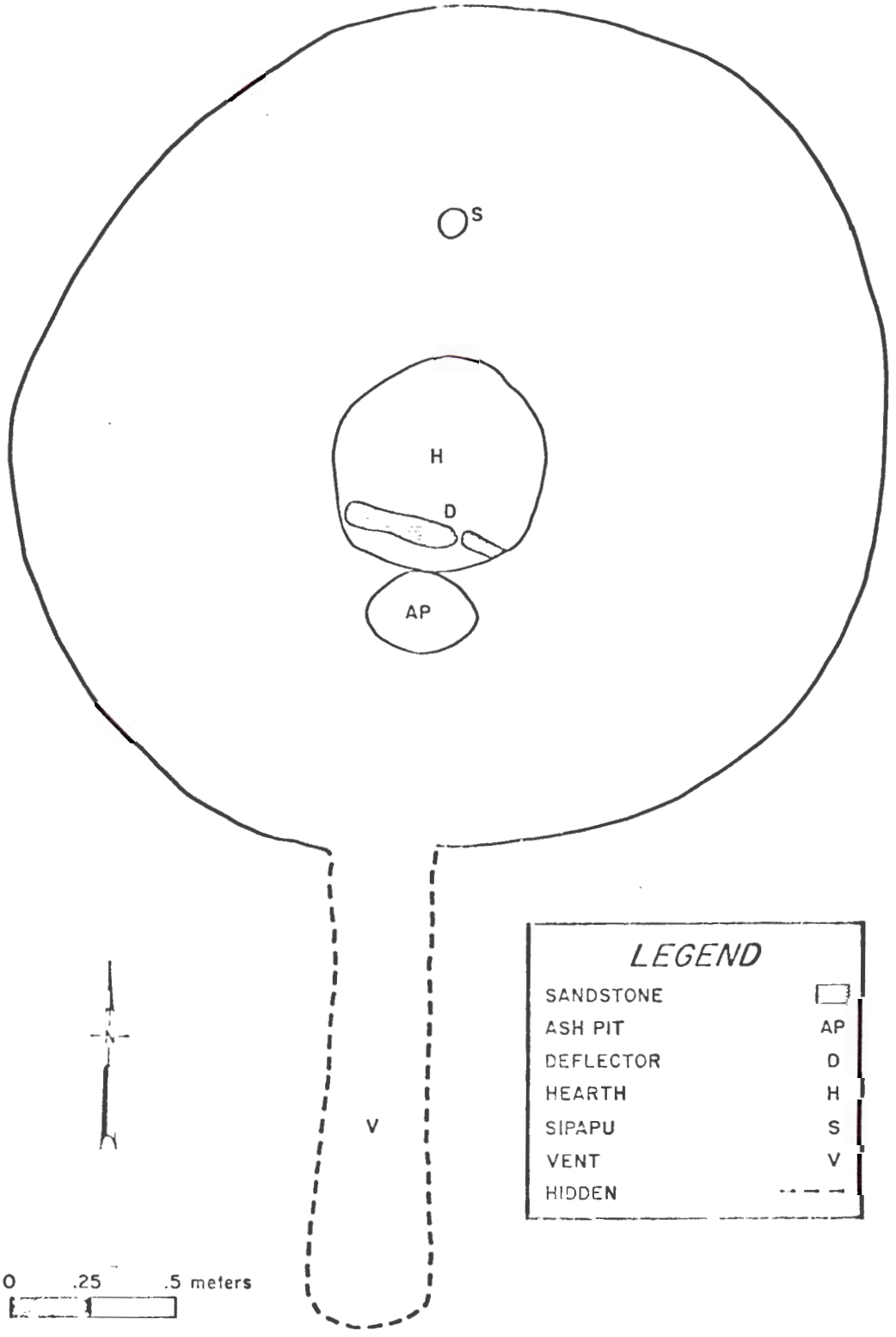


Figure 8.9 A Marshview Subphase pitstructure (adapted from Kuckelman 1983c). Note circular shape, ventilation system, low density of floor features, and absence of bench and wingwall.

5. Bench. Benches are absent in Marshview pitstructures.

6. Wingwall. Wingwalls are absent in Marshview pitstructures.

7. Bins. Bins are absent in Marshview pitstructures.

8. Ventilation system. Marshview pitstructures incorporate a standard horizontal tunnel-vertical shaft ventilator system. A deflector is usually located on the south margin of the central hearth.

9. Hearth and heating complex. Marshview pitstructures contain a central hearth and sometimes an associated ash pit south of the hearth.

10. Domestic and economic activity areas. Features indicative of domestic or economic activities, such as in situ metate stations or lapstones, are usually lacking in Marshview pitstructures. Features indicative of storage, such as wall or floor cists and pot rests, are often present.

11. Ritual activity areas. Evidence for ritual activities in Marshview pitstructures is usually absent.

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