

SMITHSONIAN MISCELLANEOUS COLLECTIONS

VOLUME 147, NO. 1

Published under a Grant from the
National Geographic Society

THE ARCHITECTURE OF PUEBLO BONITO

(WITH 81 PLATES)

By

NEIL M. JUDD

Associate in Anthropology, U. S. National Museum
Smithsonian Institution



(PUBLICATION 4524)

CITY OF WASHINGTON
PUBLISHED BY THE SMITHSONIAN INSTITUTION
JUNE 30, 1964

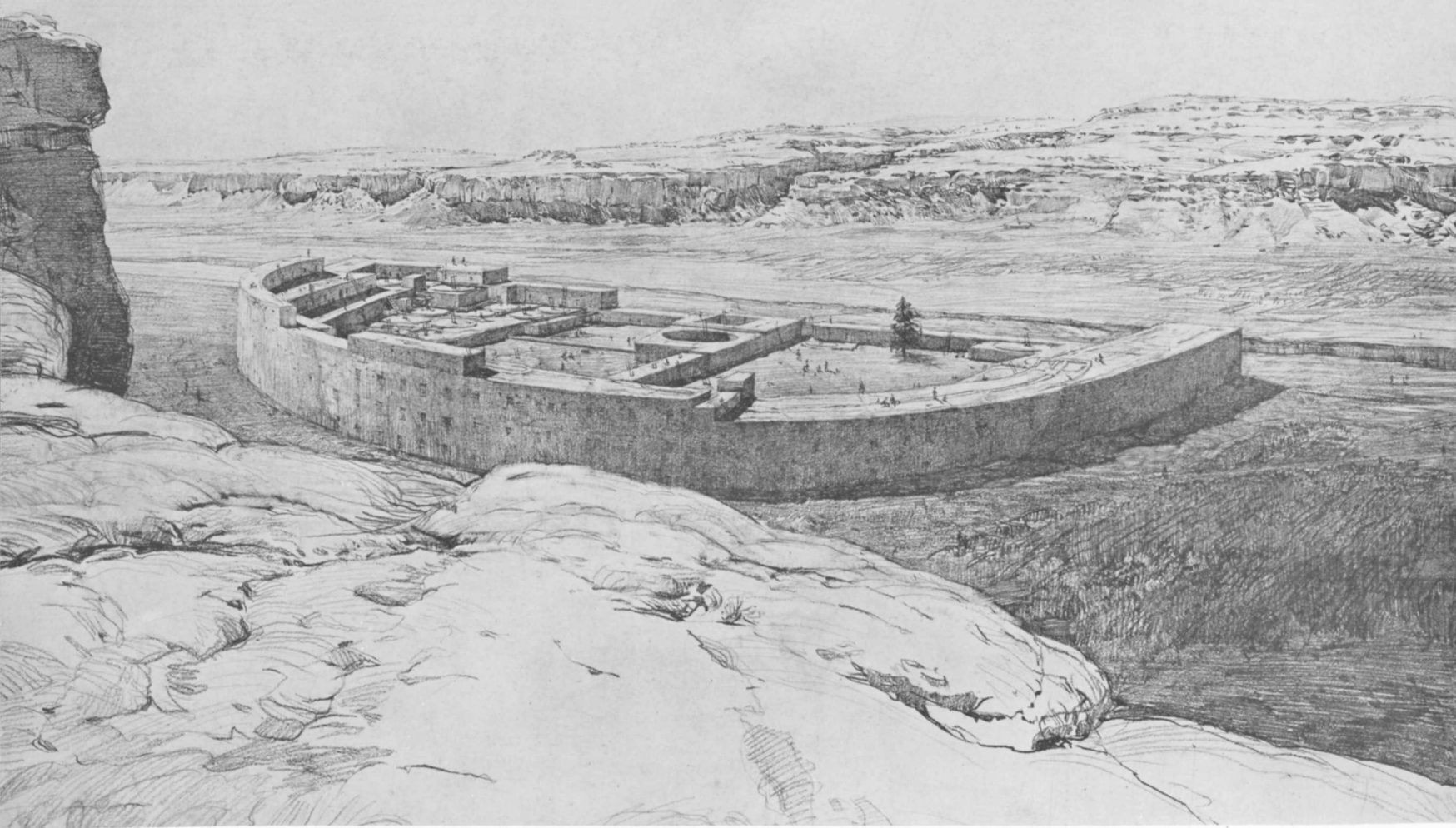


PLATE 1.—Pueblo Bonito from the north cliff.
(From an original drawing by Kenneth J. Conant, 1926.)

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FOREWORD

The present volume is the fifth of those recording the more technical results of the National Geographic Society's researches in Chaco Canyon, northwestern New Mexico. Earlier numbers are:

1. Dating Pueblo Bonito and other ruins of the Southwest, by A. E. Douglass. National Geographic Society Contr. Techn. Pap., Pueblo Bonito Ser., No. 1, 1935.
2. The geology of Chaco Canyon, New Mexico, in relation to the life and remains of the prehistoric peoples of Pueblo Bonito, by Kirk Bryan. Smithsonian Misc. Coll., vol. 122, No. 7, 1954.
3. The material culture of Pueblo Bonito, by Neil M. Judd, with Appendix: Canid remains from Pueblo Bonito and Pueblo del Arroyo, by Glover M. Allen. Smithsonian Misc. Coll., Vol. 124, 1954.
4. Pueblo del Arroyo, Chaco Canyon, New Mexico, by Neil M. Judd. Smithsonian Misc. Coll., vol. 138, No. 1, 1959.

A quarter century spans the publication period of these four titles, but they did not stand alone. Annual progress reports appeared in "Explorations and Field-work of the Smithsonian Institution," 1921-1928; fuller statements were offered from time to time in divers scientific journals by Bryan, Douglass, and the present writer; and five popular articles appeared in the National Geographic Magazine, as follows:

1. A new National Geographic Society expedition. Anonymous, June 1921, pp. 637-643.
2. The Pueblo Bonito Expedition of the National Geographic Society, by Neil M. Judd, March 1922, pp. 322-331.
3. Pueblo Bonito, the Ancient, by Neil M. Judd, July 1923, p. 99-108.
4. Everyday life in Pueblo Bonito, by Neil M. Judd, September 1925, pp. 227-262.
5. The secret of the Southwest solved by talkative tree-rings, by A. E. Douglass, December 1929, pp. 736-770.

Not all our data have been presented. At his request, I granted Dr. Frank H. H. Roberts, Jr., permission to include in his 1927 doctoral dissertation at Harvard University the pottery data he had assembled while in the employ of the Pueblo Bonito Expeditions but with the proviso, in keeping with my commitment to the National Geographic Society, that those data would not be made public until a

report on the Chaco Canyon phase of his subject was available for publication. As yet there has been no such report. Dr. T. Dale Stewart of the U. S. National Museum has examined for the Pueblo Bonito Expeditions all skeletal material collected at Pueblo Bonito by the National Geographic Society and by the Hyde Expeditions. Completion of our study of Chaco Canyon small-house sites, including those examined by the late Monroe Amsden under special permit from the Department of the Interior, now seems unlikely.

Admittedly, the present volume appears a long while after conclusion of field-work at Pueblo Bonito. Nevertheless, most of our findings have been readily accessible and have been utilized by other students. Dr. A. E. Douglass's now widely used tree-ring calendar received its first real impetus at Pueblo Bonito in 1922 and attained its goal, the dating of Pueblo Bonito, 7 years later at Show Low, Ariz. Since 1929 that calendar, greatly expanded by former Douglass students and others, has become a principal dependence of archeological research in the Southwest.

Dr. Kirk Bryan's 1924 and 1925 studies of sedimentation in Chaco Canyon have become the model for similar studies elsewhere. Dr. Frank H. H. Roberts, Jr., has drawn upon his 1925-1926 observations to illuminate each of his important publications on Southwestern archeology, 1930-1940, and these, in turn, have been the reliance of other archeologists. Our groundplan of Pueblo Bonito, lent for display at the Chaco Canyon National Monument, was reproduced by Gladwin (1945, fig. 17) and by McNitt (1957, p. 342). Only the details of our architectural investigations remained for presentation.

As previously explained (Judd, 1954, vii), the Chaco Canyon explorations of the National Geographic Society began with a 1920 reconnaissance which I was invited to lead. Upon conclusion of that survey a report was submitted to the Society's Committee on Research, Dr. Frederick V. Coville, chairman, and the Pueblo Bonito Expeditions were initiated the following year, 1921.

Pueblo Bonito was chosen for intensive investigation because it was judged both the oldest and largest of the 15 major Chaco Canyon ruins. Despite previous partial excavation by the Hyde Exploring Expeditions from the American Museum of Natural History, Pueblo Bonito was considered most likely to reveal those factors which had brought about the high Chaco Culture, a principal objective of the Society's Committee on Research. That this objective was not fully

realized is no reflection upon the Committee or upon my associates in the field, who were:

	1921	1922	1923	1924	1925	1926	1927
Karl Ruppert	x	x	x	x	x	x	
O. C. Havens	x		x	x	x		
A. H. Linsley (cook)	x						
H. B. Collins, Jr.		x	x	x			
George B. Martin		x	x				
Robert McFarlane (cook)		x					
Cecil Ban (cook)			x				
Frans Blom				x			
J. B. McNaughton (cook)				x			
L. C. Hammond				x	x	x	x
Monroe Amsden					x		
Frank H. H. Roberts, Jr.					x	x	
George M. McLellan (cook)					x	x	x
Henry B. Roberts						x	x
Dolores Calahan (secretary)							x

Each was a salaried employee; there were no volunteers. That only one cook returned for a second season is ample evidence, I prefer to believe, that Chaco Canyon has its limitations as a summer resort.

Our topographic map of Chaco Canyon, by Capt. R. P. Anderson, was published in Bryan (1954) with the latter's "post-Bonito channel" superposed. The final groundplan of Pueblo Bonito and pertinent diagrams appearing herein result from the 1925 and 1926 surveys of Oscar B. Walsh, C. E., and have been prepared for reproduction by Harold E. MacEwen. Based upon our excavation data, Dr. Kenneth J. Conant, formerly of the School of Architecture at Harvard, executed four drawings depicting Pueblo Bonito as it probably appeared in its heyday. Except as noted, other illustrations herein are from National Geographic Society photographs by O. C. Havens, of Gallup, N. Mex. Mrs. Jeraldine M. Whitmore, of the National Museum, has typed the final manuscript.

To the officers and staff of the National Geographic Society, Dr. Melville Bell Grosvenor, president, and to the successive Committees on Research, I am under great obligation for their unflinching confidence throughout the Pueblo Bonito Expeditions and subsequently. To the Penrose Fund of the American Philosophical Society I gratefully acknowledge a grant-in-aid that provided, in part, for necessary draftsmanship and clerical assistance. And, finally, to the

Smithsonian Institution, my mentor for more than 50 years, I am indebted for a corner in which to conclude the present study.

NEIL M. JUDD

*U. S. National Museum
Smithsonian Institution
Washington, D. C.
January 8, 1963*

CONTENTS

	<i>Page</i>
Foreword	iii
I. Introduction and conclusions.....	1
II. Old Bonito	57
III. The second-type addition	78
IV. The third-type addition of the Late Bonitians.....	125
V. The Northeast Foundation Complex.....	143
VI. The fourth-type addition.....	154
VII. The kivas of Pueblo Bonito.....	177
VIII. The south refuse mounds.....	212
IX. Alluviation and agriculture.....	223
Bibliography	235
Appendix A: Table of room dimensions, by Henry B. Roberts....	241
Appendix B: Excavation notes, Pueblo Bonito.....	264
Appendix C: Partial list of wall repairs made by the Pueblo Bonito	
Expeditions	338
Index	343

THE ARCHITECTURE OF PUEBLO BONITO

By NEIL M. JUDD

*Associate in Anthropology, U. S. National Museum
Smithsonian Institution*

(WITH 81 PLATES)

I. INTRODUCTION AND CONCLUSIONS

This is a story of the growth and decline of a single prehistoric village, Pueblo Bonito. It will have very little to say of other villages, historic or prehistoric. It is a story primarily of houses and house building. By adding to data previously published it seeks to portray the manner in which a twofold Indian community rose to preëminence and thereafter gradually fell apart and was lost.

Pueblo Bonito is the ruin of an Indian apartment house in Chaco Canyon, northwestern New Mexico (fig. 1). Built and occupied between A.D. 900 and 1100, it is one of 15 major ruins whose preservation was intended by President Theodore Roosevelt when he created the Chaco Canyon National Monument, March 11, 1907. Of these, Pueblo Bonito is at once the largest, the oldest, and the most famous (pl. 1).

Chaco Canyon, site of Pueblo Bonito, is a 15-mile-long section of the Chaco River. Cliff House sandstone walls the canyon on either side, but the river is a river in name only. Water flows through it only during the annual rainy season when floods may race its full length, a hundred miles from the Continental Divide to its confluence with the Rio San Juan. Half a mile or more in width, the canyon has never known a perennial stream, although it has sheltered diverse primitive folk from the ancient Basket Makers to the nomadic Navaho. Most advanced of these were the so-called Pueblo III peoples, builders of Pueblo Bonito, 14 other major communities, and numerous smaller settlements.

Over the centuries floodwaters have half filled Chaco Canyon with alluvium washed in from higher ground and at least twice have carved a watercourse, or arroyo, through that fill. Latest of these arroyos, 30 feet deep and 100 to 300 feet wide as we measured it, originated about 1850 and has since literally washed away at least

25 percent of the formerly arable land and thereby has largely destroyed the most conspicuous plant on the valley floor, greasewood. That 1850 arroyo is still in process of formation, but its predecessor, about half as large, came into being while Pueblo Bonito was inhabited and may have been a factor in compelling its abandonment.

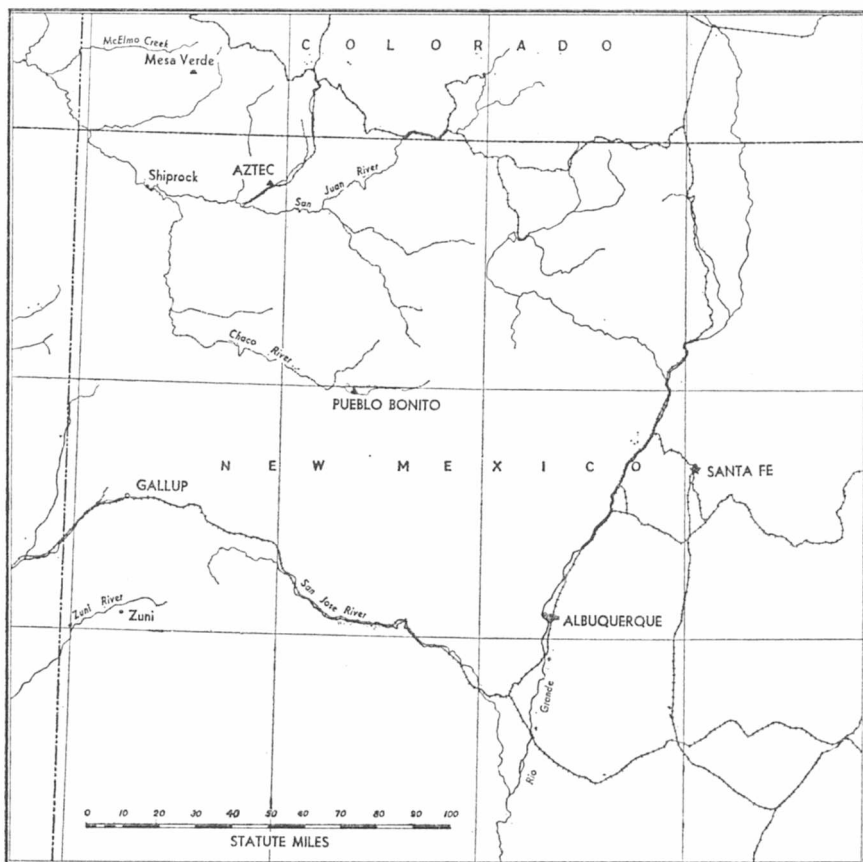


FIG. 1.—The northwest quarter of New Mexico, showing location of Pueblo Bonito.

Since an arroyo promptly collects to itself all surface runoff, vegetation is deprived of needed moisture and denudation follows. Without grasses, trees, and shrubs to prevent erosion; and without widespreading floodwaters to irrigate and replenish its fields, a population dependent upon agriculture for a livelihood, as were the Bonitians, could not long survive in a waterless valley.

We measured the elevation out in front of Pueblo Bonito at 6,250 feet, an elevation that indicates long winters and a relatively short growing season. Despite this handicap the ancient peoples who dwelt in Chaco Canyon obviously were content with their environment for they stayed on generation after generation, tilling their gardens of maize, beans, and pumpkins and building new homes as the need arose. Lacking local records—the nearest dependable rainfall gage was at the Crownpoint Indian Agency, 40 miles distant and 600 feet higher—we have assumed a current annual precipitation of 10 inches but this is clearly less than formerly. Chaco Canyon was greener when Pueblo Bonito was inhabited and pine trees, cottonwoods, willows, and rushes grew close at hand. Willows and a few cottonwoods still survived as late as 1922 when Anderson prepared the map published by Bryan (1954), but only rotted stumps, recumbent trunks and two dead pines remained of the nearby forests that had furnished timbers for the roofs of Pueblo Bonito (pl. 2, left, right).

Many of those timbers had grown under variable conditions, but others had stood where subsurface water was so constant as to produce annual growth rings of uniform thickness. Such uniformity plus the willows, the rushes, and the cottonwoods all attest to a wetter climate 800 or more years ago. We found no living spring but saw small, thin reeds struggling for survival in sheltered coves where rain-water seeps through the sandstone. In upper Rincon del Camino one of our Navaho workmen had developed such a seepage zone into a one-family water supply, the only one of its kind known to us. Huntington (1914, p. 80) mentions a former spring half a mile from "Hermoso," the south-cliff ruin known to National Park Service personnel as *Tsin Kletzin*. The precise location of that spring remains uncertain but it could be at the head of a shallow rincon just east of Casa Rinconada where Navaho indicated a wet-weather seep.

We have postulated a current annual precipitation of 10 inches, but just a little more would multiply native vegetation and thus provide a check to floodwater erosion. One additional inch, according to our geological advisers, would cause springs to flow again. One additional inch per year, it is believed, would restore Chaco Canyon to the haven it once was, bring back the grasslands where deer and antelope browsed, and increase the harvest of seeds and wild fruits available for human consumption.¹ The arroyo that has made Chaco Canyon a wasteland since 1850, like the one that caused

¹ Mammalian remains and plant products recovered from Bonitian rubbish during the Society's investigations are listed in Judd, 1954.

comparable desolation 8 centuries before, eventually will fill with alluvium and be forgotten but Pueblo Bonito remains a ruin, a magnificent ruin (pl. 3).

DISCOVERY AND EXPLORATION

Pueblo Bonito was first described by Lt. James H. Simpson (1850, p. 81) following a cursory inspection on the afternoon of August 28, 1849. Twenty-eight years later, in the spring of 1877, W. H. Jackson of the Hayden Surveys camped 4 or 5 days at a muddy water-hole west of Pueblo del Arroyo and during that brief period not only mapped the valley but prepared ground plans and descriptions of Pueblo Bonito and 10 other ruins—descriptions and plans used by all who followed (Jackson, 1878). A decade after Jackson, Victor Mindeleff of the Smithsonian Institution devoted 6 winter weeks to surveying, mapping, and photographing those same ruins for a report that never materialized (Mindeleff, 1891, p. 14; Powell, 1892, p. xxx).

The names by which the Chaco Canyon ruins are currently known have been variously written, but herein, as previously, we adhere to the spelling that was originally recorded by Simpson and Jackson and which is that since accepted by the United States Geographic Board, the Bureau of American Ethnology, and other recognized authorities.

Merchants from Rio Grande settlements, militiamen on their several missions, and U. S. Army engineers seeking a better route to the Pacific visited Chaco Canyon before and after Simpson. Few of these transients left any record of what they saw along the way, but some among them did regrettable damage to the old ruins while searching for souvenirs, and the finger of suspicion points to all.

Members of Colonel Washington's 1849 command have most frequently been accused of this vandalism but Simpson himself exonerates them. The troops camped for the night of August 26 about a mile from Pueblo Pintado, at the head of Chaco Canyon, and 2 days later left the valley at the Mesa Fachada (Fajada Butte), while Simpson (1850, p. 78) and nine companions rode on to examine Una Vida and other ruins, expecting to overtake the command by nightfall.

In 1877 old Hosta, one of Colonel Washington's 1849 guides, told Jackson (1878, p. 435) that timbers were lacking at Pueblo Pintado because soldiers "and other scouting parties" had used them for campfires. Apparently a well-known trail passed this way from Jemez and the Rio Grande settlements.

Military expeditions against the Navaho were recurrent in the middle 19th century and more than one camped in Chaco Canyon. On October 30, 1858, several members of Company E, Regiment of Mounted Rifles, carved their names on the cliff back of Chetro Kettle (Vivian, 1948, p. 16), and it is reasonable to believe that these or other troopers were responsible at least for some of the holes Jackson and Mindeleff saw in the north wall of Pueblo Bonito. Years later, during military service at Fort Wingate, May 10, 1909, to February 4, 1911, Privates Otto Wolford and John G. Bushman of the 1st Troop, 3d Cavalry, successor to the Mounted Rifles, carved their surnames at the top of the Pueblo Bonito stairway.

Mindeleff's 1887 photographs, earliest pictorial record of Pueblo Bonito, provide visible evidence that seekers after treasure had preceded him with pick and shovel. They had forced every sealed door in search of open rooms and had breached the high north wall at 3- to 5-foot intervals throughout its full length (Mindeleff Neg. 3022). "Relic hunting" was both a pastime and a vocation prior to passage of the Antiquities Act of 1906.

The Wetherill brothers from their ranch near Mancos, Colo., had discovered the famous cliff-dwellings of the Mesa Verde; had gathered and sold several collections from these and other prehistoric ruins. It was the hope of finding new ruins for exploitation that led Richard Wetherill to Chaco Canyon in October, 1895, accompanied by S. L. Palmer, his future father-in-law, and family. During the next few weeks the two men amused themselves by digging for curios, and both were successful. Palmer retained his share and later lent it for display in the public library, Hutchinson, Kans. (personal letter of June 8, 1921, to the National Geographic Society).

From Albuquerque after leaving Chaco Canyon, Wetherill wrote so enthusiastically of collecting possibilities at Pueblo Bonito that B. Talbot B. Hyde, of New York City, agreed to substitute a season there for one previously planned for the Marsh Pass region, north-eastern Arizona (McNitt, 1957, pp. 109-113). This proved to be the first of four expeditions, 1896-1899, financed by the Hyde brothers, B. Talbot B. and Frederick E., Jr., and directed from New York by Prof. F. W. Putnam, then curator of anthropology at the American Museum of Natural History. Although the Hyde brothers had previously purchased one or more archeological collections from Wetherill, they stipulated that, this time, excavations should be pursued under supervision of a recognized authority. The annual reports of the Museum do not state that Professor Putnam visited the scene

of operations before 1899, but he was personally represented each season by his assistant, George H. Pepper.

THE HYDE EXPEDITIONS

Outfitting at the Wetherill ranch the Hyde Expedition's freight wagon, chuckbox at the rear, made open camp close under the north wall of Pueblo Bonito early in the spring of 1896. There were no tents; it was a relic collector's camp (Pepper, 1920, fig. 3). Room 14*b*, where Lieutenant Simpson had carved his name August 28, 1849, was storeroom and kitchen; pipe for the camp stove was raised against the outside wall. As Professor Putnam's representative, Pepper supposedly was in charge of excavations but Wetherill obviously wielded a greater influence. He was a rugged individualist and not accustomed to taking orders, especially from a younger man; he had recommended the site and previous experience there told him where to dig; he spoke Navaho and Navaho Indians were employed as workmen; his teams did the freighting from Mancos to Chaco Canyon and back again.

In his biography of Richard Wetherill, Frank McNitt (1957) extols the undeniable capabilities of his subject while belittling Pepper for his lack of western training, for being less experienced than Wetherill in digging relics, and for the meticulousness of his excavation notes. Between the lines, however, one gains the impression that Putnam's instructions to Pepper did not always prevail; that the random selection of rooms for excavation was sometimes made with a view to their possible contents; that the sums annually available for expenses were never adequate; and that Wetherill never drew a living wage for his efforts. This last fact prompted various additional undertakings on his part, including another collecting campaign to Grand Gulch during the winter of 1896-97.

At the end of the second season at Pueblo Bonito, Wetherill had a one-room trading post built against the outer north wall, connecting with Room 14*b* (Pepper, 1920, fig. 4; McNitt, 1957, p. 173); the following year, 1898, a larger store with residence adjoining was erected near the southwest corner of the ruin, and the Hyde Exploring Expeditions, with Wetherill as manager, were in the Indian trading business on a large scale (Holsinger, MS., p. 70; McNitt, 1957, p. 191). Travelers on various missions came and went; a boarding house for employees at the southeast corner of Pueblo del Arroyo was retitled "the hotel"; excess guests were quartered in tents or in patched-up rooms in Pueblo Bonito. Among others, Rooms 122-124

were revamped and reroofed for occupancy. These same rooms were later utilized by the School of American Research (Hewett, 1921, p. 12), and they were still habitable when we repaired them for laboratory use in 1925 (pl. 4, upper).

During the summers of 1896-1899 the Hyde Expeditions cleared 190 rooms and kivas in Pueblo Bonito, numbered serially as excavated. In lieu of the final report that never was written, Pepper's rough field notes went to press hurriedly in the fall of 1920, some 10 years after he had left the American Museum of Natural History. As published, those notes do scant justice either to Pepper, the Hyde brothers, or to the American Museum, but they are indispensable to full understanding and appreciation of Pueblo Bonito. Since they pertain largely to portions of the ruin we did not explore, I have drawn upon them repeatedly in this study of local architecture.

As explained in the introduction to the 1920 publication, its accompanying ground plan was prepared by B.T.B. Hyde from Pepper's original memoranda and photographs, a preliminary survey made in 1900 or 1901 by Prof. R. E. Dodge, and a 1916 sketch by N. C. Nelson. That such a composite might include several inaccuracies was anticipated by Mr. Nelson (*ibid.*, p. 387) and those we discovered have been corrected on our own plan (herein, fig. 2) and so reported in text and tables.

Pepper states (1920, p. 339) that only "minor excavations" were made in Rooms 116-190 because "nothing of special interest" was developed in them. A different explanation was offered by Jack Martin, a one-time Hyde Expedition freighter and my teamster during the Society's 1920 reconnaissance of the Chaco country: Outside rooms were cleared by Wetherill to or near floor level in anticipation of resumption of Hyde Expedition excavations. But these latter had been brought to an end by Government pressure in 1901, the year a local post office was authorized under the name "Putnam" and the year Hyde Expedition headquarters were moved to Thoreau, on the Santa Fe Railroad.

It is unfortunate that no data relative to this particular sequence, 116-190, were recorded at the time of excavation, for all are of Late Bonitian construction and many overlie earlier walls. Of Rooms 1-115, on the other hand, 59 are Old Bonitian structures from which the 4 Hyde Expeditions recovered the wealth of household utensils, objects of personal adornment, and ceremonial paraphernalia that ever since have been held up as illustrative of the cultural heights attained by the inhabitants of Pueblo Bonito. Those treasures, however,

are mostly from Old Bonito. With few exceptions they represent the culture of the Old Bonitians, a P. II people, and not that of their P. III coresidents.

If an aura of commercialism still hangs over the work of the Hyde brothers at Pueblo Bonito it is more a reflection of the period than of association with Richard Wetherill, whose undeniable interest in archeology is not easily divorced from his activity as a collector. Relic hunting was legitimate and unrestricted at the time of the Hyde Expeditions, 1896-1899; anyone could dig for relics and keep what was found. This wide recognition of "finder's keeper" was evident even at Pueblo Bonito where the Hydes repeatedly had to purchase specimens their own employees had pilfered (Pepper, 1905, p. 190; 1920, p. 330; McNitt, 1957, p. 167). One eastern museum curator, irresistibly tempted by reports of fabulous discoveries, even ravaged a couple rooms after the Hydes had withdrawn at the end of their first season (Pepper, 1920, p. 210). Transient guests at expedition headquarters amused themselves by searching for souvenirs in the nearby ruin. Not until 1906 was a Federal law passed to prohibit unauthorized digging on the public domain and then largely to check the exploitation of Pueblo Bonito and other Chaco Canyon ruins.

THE PUEBLO BONITO EXPEDITIONS

Twenty years after the Hyde Expeditions came to an end and prior to the announced publication of Pepper's field notes, the National Geographic Society authorized the explorations reported herein and previously. Originally planned for 5 years but subsequently extended two more, the Pueblo Bonito Expeditions were expected to discover what factors had brought about the extraordinary Chaco Canyon civilization in what had come to be an unwatered, impoverished, and relatively uninhabited region. The Society's Committee on Research desired to identify the builders of Pueblo Bonito, if possible; to discover where they came from and where they went. The agricultural possibilities of the valley in prehistoric times, its then sources of water and fuel, and the location and extent of the ancient forests that had furnished timbers for the roofs of Pueblo Bonito and neighboring communities likewise were subjects for inquiry (Judd, 1922a, p. 117). Not until Pepper's volume appeared in the early summer of 1921 was it known that comparable studies had originally been planned for the Hyde Expeditions (Wissler, *in* Pepper, 1920, p. 1).

On the ground plan herein (fig. 2) rooms numbered 1-190 are those opened by the Hyde Expeditions. To correlate our studies with

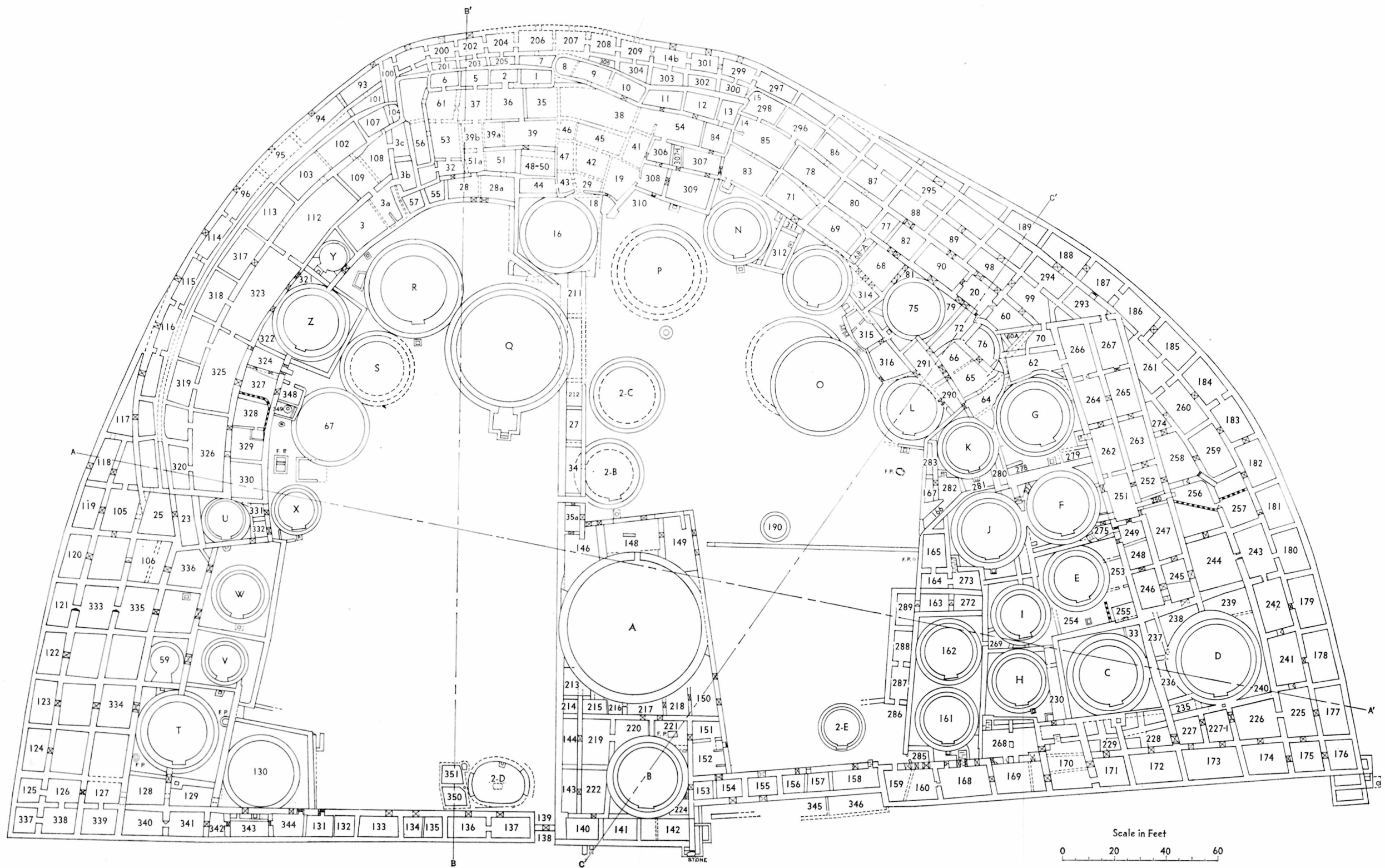


FIG. 2.—Ground plan of Pueblo Bonito with cross sections A-A', B-B', and C-C'. (From the original survey of Oscar B. Walsh, 1925.)

theirs, rooms excavated for the National Geographic Society likewise were numbered, beginning with 200, but our kivas were lettered. When we had exhausted the first kiva alphabet we began a second, each letter prefixed by the numeral 2. In both text and tables, room numbers followed by the letters B, C, or D indicate, respectively, the second, third, and fourth stories.

Of those bearing our numbers, Rooms 210, 227, 295, 299, 300 and Kivas Y and Z were cleared by unknown persons between 1900 and 1920. We numbered but did not excavate Rooms 205-208, 297, and 301-303; Kivas O, P, S, and 2-C were merely tested for pertinent information. It was my personal hope that these 12 and all those left unnumbered might be reserved for examination some years hence.

Except as noted hereinafter, we made no inquiry in rooms excavated by the Hyde Expeditions, 1-190. During our third season, however, the better to control surface drainage in the older section north of Kiva 16, we removed or leveled quantities of excavation debris left by our predecessors (pl. 5, lower). It was this effort, perhaps, that prompted Hewett (1921, p. 17; 1930, p. 302; 1936, p. 32), to state that I had unknowingly excavated rooms cleared and refilled by the Hyde Expeditions.

After Pepper's 1920 volume became available we utilized his recorded field notes as fully as possible. But there were additional data that seemed essential to the history of Pueblo Bonito.

Extramural stratigraphy.—Two conspicuous refuse mounds, the principal village dump, lie immediately south of the great ruin. Refuse heaps normally reflect the cultural changes of any community and potsherds provide a convenient means for measuring such changes in a prehistoric settlement. Since discards at the bottom are naturally older than those above, one of our first undertakings in the spring of 1921 was a 5-foot-wide trench through a previously undisturbed section of the West Mound, larger of the two. A stratigraphic column, 3 feet square, at the end of that trench reached clean sand at a depth of 19 feet 5 inches (pl. 6, left). From 23 unequal layers floored by ash, variously colored sand, or otherwise, we collected 2,119 potsherds (U.S.N.M. No. 334180).

That sherd collection disclosed a puzzling mixture of pre-Pueblo and later pottery types, top to bottom. There were 93 fragments of Plain-banded Culinary ware and 778 fragments or 36.7 percent, of Corrugated-coil. Early and late varieties of Black-on-white were present in all 23 layers; Black-on-red, in more than half. Straight-line Hachure occurred in every stratum except the two lowest, V and W.

Brown-with-polished-black-interior occurred in all but five strata: B, S, U, V, and W. A single Mesa Verde sherd was recovered in Layer E, the bottom of it 3 feet 7 inches below the surface. Proto-Mesa Verde fragments appeared above the 9½ foot level but not below. This 20-foot intermixture of early and late pottery came as such a complete surprise I questioned our findings and cut another column.

Next, I undertook to examine surrounding soils by means of 7 pits, 4 to 12 feet deep, dug at various distances and in various directions from Pueblo Bonito. None exhibited more than stratified sand, wind-blown and water-washed, with intervening silt layers, occasional lenses of gravel, bits of charcoal, and chance potsherds. A humus layer that might have identified a once-cultivated field was nowhere seen. And, despite a secret hope, none of my seven pits revealed any trace of the long-sought Bonitian burial ground.

We began our second season with a third column through West Mound rubbish and followed it with an East Mound test. Two years later we tried both mounds again. Then, in 1925, after my own efforts had failed, I invited Frank H. H. Roberts, Jr., to join my field staff and take charge of the local problem in stratigraphy. The invitation was extended upon recommendation of Dr. A. V. Kidder, a long-time friend and confidant, and chiefly in recognition of Roberts's convincing analysis of BM.III-P.I pottery from the Pagosa-Piedra region, southwestern Colorado. At Pueblo Bonito Roberts was assisted by the late Monroe Amsden after the latter, under special permit from the Department of the Interior, had concluded a study of 16 small-house ruins in and south of Chaco Canyon (U.S.N.M. Nos. 329803-45).

As graduate students in anthropology Amsden, at Washington, D. C., and Roberts, in Cambridge, Mass., had assisted during the winter of 1924-25 in analyzing the Pueblo Bonito potsherds I had previously collected. Failing health compelled Amsden to relinquish his part in this joint undertaking thus leaving to Roberts principal responsibility for our study of Pueblo Bonito ceramics, a study that had made scant progress prior to unexpected discoveries early in 1925.

Intramural stratigraphy.—During our fourth season, 1924, we had cleared the West Court to its last recognizable occupation level (pl. 7, upper) and, in so doing, had discovered that village waste and blown sand were piled up 6 feet 7 inches—almost ceiling high—against the outer east wall of Old Bonitian Rooms 329-330. Consequently one of our first tasks of the 1925 season was to seek explanation for

that accumulation. We made a number of tests close along the west side of the Court and then, boldly, extended our 1921 West Mound trench to the ruin and northward to Kiva Q.

That extended trench (pl. 6, right), 5 feet wide and 12 feet deep, solved our 4-year-old puzzle, the mixture of early and late village refuse. At a depth of 10 feet 2 inches we came upon the floor of a Great Kiva, over 50 feet in diameter, built inside a huge excavation expressly dug in a vast accumulation of household rubbish and later completely razed. Rubbish from that excavation, nearly 2000 tons of it, may well have started the West Mound—the mound we had profiled 4 times, 1921-1924. Sandstone spalls and chunks of dried mortar from the razed kiva added to the displaced rubbish. So, too, did quantities of current floor sweepings.

Just outside the south limit of that razed kiva was a previously undisturbed section of the original trash pile. Into that remnant Amsden and Roberts, to whom I had entrusted our entire stratigraphic study, sank two yard-square test pits the first 13 feet deep and the second, 12 (fig. 7). As in any other dump, discards at the bottom were older than those above and the sequence in which they occurred, bottom to top, provided the information on which Roberts and Amsden based our knowledge of local ceramics.

Much has been written about the prehistoric pottery of Chaco Canyon. Beginning with Kidder (1924), archeologists have extolled the exceptional whiteness of its surface slip, the variety and the perfection of its hachured designs, the blackness of its paint. More than one has puzzled over the association there of Early Pueblo and Late Pueblo vessel shapes and ornamentation, of mineral paint and vegetal paint—enigmas not solved until Amsden and Roberts cut their two 12-foot-deep tests into sub-court debris at Pueblo Bonito. From Test 1 they recovered 3,593 potsherds; from Test 2, 2,934.

The 2,934 sherds from Test 2 (U.S.N.M. No. 334175), to limit this presentation, occurred as follows:

[illegible]

Roberts and Amsden separated their 1,389 Black-on-white sherds into 19 lots including "miscellaneous" (37.5 percent) and those with no trace of paint (23.9 percent). Of the remainder, design elements familiar to all students of Pueblo history appeared at various levels and in the following proportions:

	A	B	C	D	E	F	G	H	I	J	K	Per- cent
Strata												
Straight hachure ...	4	31	8								43	3.1
Squiggled hachure ..	6	2	7	3	6	16	7	3	5		55	3.3
Ticked lines	4	10	16	5	15	18	7	6	4		85	6.2
Waved lines		4	5	4	3	7	8	4	1		36	2.6
Stepped triangles ...	5	16	17	25	9	20	12	4	9		117	8.5
Dotted triangles	6	3	13	15	9	9	9	4	4		72	5.2
Volutes	1	6	7	3	3	13	5	3	3		44	3.2
Checkerboard		1	1		1		3	1			7	0.5
Opposed dentates ...	1	2	2		1	4	2	1	2		15	1.1
Chaco-San Juan	11	15	5								31	2.3
Mesa Verde		1									1	0.1

To process the vast quantity of potsherds we had previously recovered from excavated rooms and trenches, Amsden and Roberts established a workshop in reconditioned Rooms 122-124 at the southwest corner of the ruin (pl. 4, upper). Here they sorted, counted at least twice, and classified an estimated 2,000,000 potsherds. After eliminating all recognizable duplicates there remained 203,188 fragments for tabulation, and these, coupled with data from West Court Tests 1 and 2, provide a framework for the history of pottery making at Pueblo Bonito. At the end of our studies all unwanted sherds were reburied, many of them in the West Mound cut made for our dump-cars and track (pl. 5, lower).

In reporting upon the material culture of Pueblo Bonito I paraphrased some of Roberts's field notes in listing the diagnostic features by which he and Amsden cataloged their Test 1 and Test 2 potsherds, and I summarized Miss Anna O. Shepard's identifications of local pigments and tempering agents (Judd, 1954, pp. 177-183; see, also, Shepard, 1939, p. 280). Nevertheless, for the present volume it seems desirable to augment my earlier review by more liberal citations from the memoranda Roberts recorded in 1925.

The preponderant pottery from Tests 1 and 2, a total of 25 vertical feet, was an assemblage that seemed to span the years from Pueblo I to Pueblo II in the Pecos classification (Kidder, 1927) or from earth-walled pit-houses to those of single-coursed masonry. Hence the term "Transitional" Roberts and Amsden coined to bridge the time between. Nearly half of this assemblage was a gray-paste

ware, primarily sherd-tempered and coated with an off-color white slip, polished before painting. The paint was of mineral origin and black or sometimes rusty-brown owing to inexpert firing or to insufficient iron.

Slips varied from thick to thin and were sometimes carelessly applied; both paint and slip sometimes showed a tendency to chip or peel—variations I attribute to the misfortunes of production rather than to intent. Rims were direct, tapered, and painted black; pitchers were full-bodied and round-bottomed; ladles were of the half-gourd form until later experimentation turned toward the bowl-and-handle type. Bowl sherds with polished black interior, although found deep in the two principal refuse mounds south of the village, occurred in the uppermost layers only of Test 2. Cook pots were of the smooth-bodied, banded-neck variety—broad to narrow bands, plain or indented—until followed by all-over Corrugated-coil.

Passing vogues in vessel form and painted decoration are evidenced from bottom to top in these and other stratified deposits. Squiggled hachure began early and so did stepped triangles, waved lines, and free-standing figures. There were transient preferences for designs composed of broad solid lines, for hachured figures with solid tips, and others balanced by opposing elements. After this old rubbish pile had accumulated to a depth of 8 feet, Straight-line Hachure was introduced, first with widely spaced composing lines within heavy frames and then with closer bars and lighter framing.

Contemporaneously with Straight-line Hachure and Corrugated-coil, or shortly thereafter, our so-called "Chaco-San Juan" type made its unexpected appearance—a black-on-white variety with a light-gray, stone-polished slip, tempered chiefly with pulverized potsherds and ornamented with Mesa Verde-like designs in organic paint. In thickness and rim treatment, Chaco-San Juan bowls exhibit a compromise between Mesa Verde and Chaco practices. Instead of being tapered and painted black in the Chaco tradition, rims are usually rounded and variously ticked; bowl exteriors are often carelessly bordered or slap-dashed across the bottom with a full slip-mop.

In Pueblo Bonito stratigraphy this Chaco-San Juan variety appears earlier and much more abundantly than Mesa Verde Black-on-white, but, although Roberts and Amsden separated the two while studying Chaco Canyon pottery in 1925, I admit an inability at this late date to distinguish one from the other except for individual pieces. Both are of wide distribution among the mesas and valleys of southeastern Utah and southwestern Colorado; both are perhaps best described by

Kidder's still useful, but rarely used, term "proto-Mesa Verde" (Kidder, 1924, p. 67). And I have since come to think of both as more or less synonymous with McElmo Black-on-white.

Classic Mesa Verde with its thick-walled bowls and flattened rims, its superb polish, and precisely executed designs, reached Chaco Canyon just as the high local culture was on the way out. Other late imports such as Houck, Kayenta, and Chaves Pass polychrome, Mimbres and Tularosa Coil (Judd, 1921, p. 110), and a few fragments of Navaho or Apache conical-base pots were also present. A black-on-red variety, or perhaps two varieties since Amsden and Roberts divided the lot by color, puzzled us at the time because sherds from early rubbish included fragments with hachured designs and ticked rims.

What we called "Mesa Verde," including a few fragments of undeniable Classic, comprised only 0.4 percent of the 208,188 sherds Roberts and Amsden tabulated at Pueblo Bonito, while our Chaco-San Juan group made up 6.6 percent of the total. Of 1,830 potsherds recovered during excavation of Kiva A, 22.6 percent were Chaco-San Juan and 10.4 percent Mesa Verde, but, among those from a limited subfloor test in the same chamber, percentages were 8.1 and 2.7, respectively. Four Chaco-San Juan sherds among 694 from a sub-floor test pit show that Old Bonitian Room 307 was built later than others of its kind.

While presenting these and other data gathered within the pueblo and without, I desire once again to stress the significant fact that no fragment of Straight-line Hachure, most widely cited element on Chaco Canyon pottery, was recovered below Layer C, 4 feet 2 inches from the surface in 12-foot-deep Test 2. This is equally true for Corrugated-coil Culinary and our Chaco-San Juan variety. Below Layer C every painted sherd was decorated with a black mineral paint and most of them were exclusively sherd-tempered. Sherd temper and mineral paint unite this pottery from the lower 8 feet of Test 2, the pottery of Old Bonito. Associated culinary vessels were rock- or sand-tempered, with smooth bodies and banded necks.

There are those who will disagree; but to me it seems obvious that a typological break occurs at this 8-foot level; that makers of a different pottery complex came to dwell at Pueblo Bonito after Old Bonitian household waste had accumulated to a depth of 8 feet or more. For myself only, the gray-paste, mineral-paint, black-on-white pottery from that lower 8 feet, the "Transitional," remains a single ware indistinguishable in composition and ornamentation from the

slaty-gray or grayish-white, sherd-tempered, mineral-paint pottery known throughout the San Juan country as "Mancos Black-on-white."

Although widely reported and often illustrated, Mancos Black-on-white was first described by Martin (1936, pp. 90-94) from Lowry Ruin, northwest of Mesa Verde National Park, southwestern Colorado. Subsequent investigations broadened his original description:

... a Chaco-like ware found in southeastern Utah and southwestern Colorado. It manifests the same general treatment, appearance, and elements of design as early Chaco pottery. These design elements are: squiggly, diagonal hatch; checker-boards with solid or hatched squares; pendent or opposed triangles, solid or hatched; terraces, or stepped elements; panels of oblique or vertical lines bordered by ticked lines, opposed triangles, or other solid elements; quartered patterns; cross or diamond hatch polka dots; solid elements bordered by parallel lines; plain stripes; ticked and double ticked lines; scrolls; all-over patterns . . . of oblique parallel lines . . . ; chevrons; and combinations of two or more of these elements (Martin, 1938, p. 268).

Writing from Santa Fe 10 years later, Reed (1958, p. 81) added to Martin's definition: "Mancos Black-on-white is characterized by tapered direct rims, unpainted or painted (sometimes smoothly rounded or nearly squared, sometimes ticked); moderately thin vessel walls . . . largely unslipped surfaces . . . typically dark bluish gray . . . but also very often light gray; iron paint; sherd temper"—an addition that appears to combine Roberts's definitions of the Transitional and Chaco-San Juan varieties noted at Pueblo Bonito. Of a collection then in hand Reed wrote (*ibid.*, p. 95): "Fully half the sample lot of Pueblo III sherds from stratigraphic work in Chaco Canyon deposited in the Laboratory of Anthropology by Roberts is solid-style Mancos."

Presumably that sample lot came from one of the two tests Roberts and Amsden cut through 12 feet of household sweepings under the West Court at Pueblo Bonito. Because Pueblo Bonito is customarily thought of as a Pueblo III ruin exclusively, Reed erred in assuming that every sherd in the sample was dated by the P. III fragments present. Actually, as I have attempted to emphasize repeatedly, Roberts and Amsden collected P. III sherds, including those of Pueblo Bonito's famed cylindrical vases, from the upper 4 feet only. Any accompanying Transitional, or P. II, fragments merely prove continuing production of the latter following arrival of P. III potters.

If the "solid-style Mancos" recognized by Reed in half the sample lot supplied by Roberts is identical with Mancos Black-on-white, a

diagnostic of Pueblo II civilization all the way across southwestern Colorado and southeastern Utah, then it was brought to Chaco Canyon by the immigrating Old Bonitians, a P. II people. There are those who will disagree, but to me the black-on-white pottery of Old Bonito has contributed to the Chaco-like resemblances reported from beyond the San Juan River fully as much as have the three varieties of Straight-line Hachure and other P. III pottery types of the Late Bonitians.

Since 1925 a numerous nomenclature has been advanced to identify every visible difference in Southwestern pottery, including that from Chaco Canyon. Personally, I find this multiplicity of terms more confusing than helpful. Those used at Pueblo Bonito by Roberts and Amsden still seem adequate but other students may prefer other designations. Each minor variation or error in manufacture does not, in my opinion, constitute a new variety. Differences in paste composition, surface finish, or density of pigment may be seen even on opposite sides of the same vessel, witness the 232 black-on-white specimens illustrated in "The Material Culture of Pueblo Bonito" (Judd, 1954).

In 1921, 1922, and again in 1925 our season's plans were discussed in the field with a chosen company of friends and colleagues skilled in Southwestern geology, physiology, Indian agriculture, and related subjects. Only the inadequacies of an archeological camp 95 miles from a corner grocery limited the number of our guests. Nevertheless, from impromptu discussions about the evening campfire came knowledge of Chaco Canyon's past history, its one-time forests, its prehistoric arroyo, and other factors reflected in the following pages. A welcome addition to our 1925 company was W. H. Jackson, then 82, whose 1877 survey first focused public attention upon Pueblo Bonito and its barren surroundings.

We examined Navaho fields to observe the methods practiced by local Indian farmers. We analyzed soils, flood waters, and well waters to ascertain their mineral content. Test Pit No. 3, 9 feet 2 inches deep, was situated midway between camp and the ruin (pl. 7, upper). Soil samples taken at 10-inch intervals in that pit showed an excess of sodium salts (black alkali), top to bottom, that would have rendered those soils impervious to water. Without water to wet the soil there would be no crop; without ample harvests a people dependent upon farming for a livelihood, as the Bonitians were, could not long survive as a compact, walled-in community.

The ancient forests of Chaco Canyon and the dating of Pueblo

Bonito.—Thousands of pine logs had gone into the roofing of Pueblo Bonito. We wanted to learn the source of those logs; we hoped to discover when they were felled. Toward this second objective, the tree-ring method developed by Dr. A. E. Douglass, then director of Steward Observatory, University of Arizona, as a means of measuring the effect of sunspots upon climate and tree growth, seemed most promising for our purpose. Using materials furnished by the American Museum of Natural History he had previously correlated Pueblo Bonito with Aztec Ruin and learned that sections of beams then in hand showed Pueblo Bonito to be older than Aztec.

In 1922 Dr. Douglass graciously agreed to aid the Society's search, and I promptly sent him all the wood samples we had recovered from Pueblo Bonito the year before. But I am reasonably sure that, as he studied these specimens, his thoughts were focused more upon sunspot influences than upon the age of Pueblo Bonito. It was 7 years until, and largely in consequence of the National Geographic Society's special Beam Expeditions of 1923, 1928, and 1929, he recognized the feasibility of a tree-ring calendar reaching backward into unrecorded history (Douglass, 1929, 1935).

At the beginning of our search for the age of Pueblo Bonito Dr. Douglass, who had been working with the giant redwoods of California, assured me that any timber less than 6 inches in diameter was scarcely worth saving. But it was not long thereafter before he was eagerly scanning every scrap we salvaged—splintered door lintels, beam borings, and charcoal paraffined and wrapped with twine. I mention these facts because his early results, published in the *National Geographic Magazine* for December 1929, and in the first number of this series (Douglass, 1935), made the dating of Pueblo Bonito seem such a simple achievement that few, even among his own students, realize the discouragements initially encountered and overcome. Now his method is commonly accepted as a trustworthy guide in Southwestern archeology, and many minds have lengthened his original list of dated tree rings (Douglass, 1935).

The 97 specimens from Pueblo Bonito sent to Douglass in 1922 and following, together with the place of origin and his determinations, are presented hereinafter, but individually they told us more than their age. They told us that many had been cut in winter or late autumn; that many had grown where moisture was surprisingly constant for a region now virtually waterless. Because the individual specimens were generally from straight-grained timbers, clean, smooth, and unscarred by transportation it was obvious the trees they

represented had grown at no great distance ; had been felled and peeled while green, and carried by manpower to the building site. But the forests from which they came are no longer in existence. A dozen pines, living and dead, stood at the head of Chaco Canyon at the time of the Society's 1920 reconnaissance ; four others, all dead and three of them fallen, were later seen in Wirito's Rincon, about 2 miles southeast of Pueblo Bonito (Douglass, 1935, p. 46).

Elderly Navaho told us of pine trees and stumps formerly present in Mockingbird Canyon and elsewhere. Unknown persons, according to one informant, had cut the pines on neighboring mesas and their stumps had been used for fuel by Mexican sheepherders. Always the sheepherders were to blame! Old Wello, with a steel ax issued at Fort Defiance before the turn of the century, felled two small pines on the rimrock at the head of Wirito's Rincon. He wanted them for repairs to his cabin, built by cattlemen at the north end of Peñasco Blanco mesa about 1880 and abandoned shortly thereafter. And, knowing I was from Washington, the old man took particular pains to assure me he had cut only two of the three pines then standing. A lone survivor, 5 or 6 inches in diameter, had won anchorage in shallow soil upon the south cliff overlooking our camp and stood there defiantly until some needy individual cut it for firewood during the winter of 1926-27 (Douglass, 1935, p. 40).

These scattered remnants, the dead logs in Wirito's rincon, the stumps in Mockingbird canyon and beyond, the decayed trunk from the West Court at Pueblo Bonito, the lone survivor on the south cliff, and the cluster of pines 15 miles to the east are all that remained in 1924 of forests which once crowned the mesas overlooking Chaco Canyon and extended down through the rincons and out upon the valley floor.

Whatever their extent or limitations, those ancient forests had produced thousands of choice timbers, large and small, for Pueblo Bonito and its neighbors. These timbers grew under diverse conditions as may be seen from the 97 specimens we recovered. In some of these, annual growth rings are so uniform as to indicate a nearly constant water supply year after year ; in others, rings are thin, starved, and stunted. These differences could reflect either a variable climate or merely unlike growing conditions.

That rainfall was once more plentiful in Chaco Canyon is suggested not only by growth rings in trees but also by the quantities of reeds and willows utilized in construction of Pueblo Bonito. Willows and reeds require moisture, and geologists tell us that ponds or swampy

places capable of nourishing reeds and willows could have been brought about, prior to erosion of the present arroyo, by only a slight increase in annual precipitation. Perhaps echoing recollections heard in boyhood, several of our elderly Navaho neighbors emphatically insisted that Chaco Canyon was greener "before white men came," that grass was then belly-high to a horse, and water could be had anywhere with a little digging.

These geological opinions and these Navaho recollections lend credence to the theory of climatic change in the Southwest, as advocated by Huntington (1914) and others. Paucity of rainfall has long been considered a principal cause of arroyo formation in the Southwest, and Douglass (1935, p. 49), with his tree rings before him, sees a succession of droughts down through the years. There was a short one about A.D. 920; another, around 980; still another, more severe and more widespread, between 1090 and 1101. Of our 59 datable timbers from Pueblo Bonito only two were cut during that decade; only six were felled during the 40-year period of subnormal rainfall, 1005-1044.

"In the 500-year history of Oraibi even the small droughts were accompanied by reduced building" (Douglass, 1932, p. 312). Throughout the long advance of Pueblo civilization, house construction always declined in times of reduced rainfall (Mindeleff, 1891). Timbers from old Hopi villages and trees from Arizona forests show that periods of below-average precipitation recurred irregularly during the 10th, 11th, and 12th centuries but Pueblo Bonito had been deserted 100 years or more when the Great Drought of 1276-1299 caused far-reaching devastation throughout the Plateau Province and, presumably, hastened abandonment of the famous cliff-dwellings of Mesa Verde National Park.

The prehistoric arroyo.—In 1924 and 1925 Dr. Kirk Bryan, a geologist with the U. S. Geological Survey and an acknowledged authority on groundwater resources of the Southwest, undertook in our behalf a study of sedimentation and erosion in Chaco Canyon. He examined minutely the banks of the present arroyo, of post-1850 origin, and learned much previously unsuspected of Chaco Canyon history. He discovered dead campfires and bits of broken pottery 20 feet and more below the surface; he noted that relics of Pueblo III peoples, the builders of Pueblo Bonito and its kind, occurred in the upper 4 feet only and those of earlier peoples below that level.

Bryan learned that the main Chaco Canyon fill had been built up over the centuries by intermittent floodwaters that shifted from place

to place, back and forth, stopped and flowed on, as they deposited their load of sandy silt and thus annually freshened areas for cultivation. This silting-up process was a slow one since floodwaters drop only part of their burden in passing and are lightly turned aside by a tuft of grass, a clump of greasewood, or a temporary barrier of wind-borne sand.

Some of that sandy silt was laid down so uniformly by gently flowing floods as to leave floor-smooth surfaces varying in width from a few feet to several hundred. Where W. H. Jackson in 1877 noted the foundations of small P. III ruin "5 or 6 feet below the general level of the valley" (Jackson, 1878, p. 443), bedded silt previously deposited extends out on either side, northward to surround Pueblo del Arroyo and southward across the width of the canyon (Bryan, 1954, pl. 6, upper). We came upon similar layers beneath the floors of Pueblo Bonito and farther east, under the abandoned foundations of a proposed Late Bonitian addition.

In their normal course, wandering floodwaters may erode channels of greater or less permanence. One such, close under the south walls of Pueblo Bonito, had persisted year after year despite determined efforts to dam it with village debris. It had attained a depth of 10 feet and its course had been turned repeatedly toward mid-valley before the Bonitians won the struggle. It was a forerunner of Chaco Canyon's destructive 12th-century arroyo which became Kirk Bryan's primary interest in 1924 and 1925.

Bryan first came upon this prehistoric arroyo near the southeast corner of Pueblo del Arroyo where Jackson in 1877 had discovered an earlier exposure 14 feet deep (Bryan, 1954, p. 32). From that point of discovery Bryan traced the ancient channel up and down canyon for several miles. Because sand and silt had gradually filled it to overflowing and continued thereafter to accumulate until its banks were buried under an additional 4 or 5 feet of alluvium, Bryan soon came to refer to that prehistoric arroyo as "the buried channel." And because potsherds found on the bottom of it could be correlated with the final decades of Pueblo Bonito, he often employed a second descriptive term, "the post-Bonito channel" (Bryan, 1925, 1926, 1941, 1954).

In his published papers, and especially that of 1954, Bryan reviews the history of this buried watercourse and discusses its probable influence upon the occupants of Pueblo Bonito. Where Douglass blames the builders for decimating the ancient Chaco forests and thus hastening arroyo formation, Bryan blames the arroyo. It was his

opinion that, by lowering the water table, the buried channel was chiefly responsible for the denudation of Chaco Canyon and destruction of Bonitian farmlands.

Chaco Canyon pioneers.—In his study of local geology, Bryan observed artifacts of the Bonitians and their contemporaries in the upper 4 feet of the valley fill. Below that level every potsherd was a product of Early Pueblo (P. I) or Basket Maker peoples. These were the pioneers of Chaco Canyon! They lived in slab-walled, earth-covered houses or in single-room pits dug deep into the valley floor, the roofs supported by four posts.

One such pit-dwelling, on the south side of the canyon opposite Pueblo Bonito, was partially excavated in 1920 (U.S.N.M. Nos. 315892-901); two years later caving of the arroyo bank a mile to the east exposed a second pithouse, its floor 12 feet 2 inches below the present surface (Judd, 1923, p. 136; 1924*b*, p. 404). After its abandonment 6 feet of floodwater silt and sand was deposited above roof level. Charred timbers from this buried home have been dated A.D. 720 and 777 (Douglass, 1935, p. 44, fn. 1; Smiley, 1951, p. 19); pottery and other artifacts (U.S.N.M. Nos. 324801-844) are typically P. I, as Roberts (1938) stated in correcting an earlier misinterpretation.

A third pit-dwelling, its floor at a depth of 13½ feet, had been half washed away before we discovered it. What remained hung in the west bank of a narrow gully 9 miles east of Pueblo Bonito (Judd, 1927, p. 168). On the opposite bank and 13 feet higher, a small P. III ruin was partially cleared by Frank Roberts that same summer, 1926, as he tested a nearby B.M. III village site for the Pueblo Bonito Expeditions (Judd, *ibid.*, p. 165). A year later Roberts completed excavation of this village for the Bureau of American Ethnology and has so ably reported its distinctive features (Roberts, 1928, 1929) there is no need herein to review the results of his 1926 testing. Shabik'eshchee is the only Late Basket Maker village known in Chaco Canyon, but there may be others.

The surviving portion of that gully bank pit-dwelling was described by Roberts as "Arroyo House." Under an equally appropriate name, "Half House," the same remnant was rediscovered and redescribed by Adams (1951) who postulates two "separate and distinct" occupation levels, lists 11 types among its potsherds, and cites Deric O'Bryan's tree-ring dates of A.D. 700-740 for charcoal fragments in the initial fill. Both Adams and Roberts classify this ancient dwelling as Basket Maker III but the same evidence could as easily read

Pueblo I. In any case this deep-lying pit-house and the one we cleared 8 miles down valley were both occupied in the 8th century, A.D.

The broken floors of two more BM. III or P. I pit-dwellings were revealed by our 1925 exploratory trench 11 feet 9 inches below the West Court surface or approximately 6 feet below the present valley surface south of Pueblo Bonito (fig. 7). In both instances sandstone slabs on end, packed between and held upright with mud, marked floor limit. Another early house remnant, including a 16-inch-high section of stone-topped adobe wall, was bared on a silt surface 6 feet 3 inches below floor level in Room 241. The builders of Pueblo Bonito probably were unaware of these and like remains deep beneath their foundations.

THE RUINS OF PUEBLO BONITO

Based on our tabulation (Appendix A), Pueblo Bonito included an estimated 651 rooms of which 152 were Old Bonitian and the remainder, Late Bonitian. If all were inhabited simultaneously, which is unlikely, and if an average family of five occupied three rooms, a local population of 1,090 is indicated. But these are only approximations; the real totals lie beyond our reach. Thus, for our present purpose, Pueblo Bonito at the height of its fame, A.D. 1000-1100 or thereabout, was a compact pile of 600 or more rooms from one to four stories high, the home of possibly 1,000 individuals (pl. 8).

Pueblo Bonito was the creation of two distinct peoples, each self-sufficient and each with its own cultural heritage. The original settlers had been in residence a long, long while before the second group arrived to take up joint occupancy of the village and proceed, forthwith, to dominate its varied activities. Lacking the names by which they knew each other, I have called the first group "the Old Bonitians"; the second group "the Late Bonitians" because they were, in fact, late comers to Pueblo Bonito. Their common home, more than 3 acres in ground area, was strictly utilitarian; shelter and subsistence were of primary concern to both peoples. Neither built monumental religious structures; neither sought to commemorate the accomplishments of previous leaders.

In 1920 during the Society's reconnaissance of the Chaco area the four Zuñi accompanying me returned from their first tour of Pueblo Bonito and voiced their joint conclusion: "White men built those walls; Indians could not." From Simpson's time forward the masonry of Pueblo Bonito and its neighbors has astonished all visitors to Chaco Canyon, irrespective of nationality.

Pueblo Bonito was in ruin when the National Geographic Society began its explorations in the spring of 1921. The pine and fir timbers "in excellent condition" seen by Simpson, Jackson, and Mindeleff had been pulled out or sawed off; many individual door and ventilator lintels had been dislodged or severed with steel axes. Local Navaho charge this vandalism to "sheep herders" and "soldiers" and perhaps with some justification but part of the blame lies elsewhere. In his letter of June 8, 1921, to the National Geographic Society, S. L. Palmer observed that wood from the old ruin was used for fuel when he and his family accompanied Richard Wetherill to Pueblo Bonito in October, 1895. Later, and before passage of the Antiquities Act of June 8, 1906, Wetherill erected his several homestead buildings and, in part at least, roofed them with ancient timbers from Pueblo Bonito.

In 1877, with particular reference to Pueblo Bonito, Jackson (1878, p. 441) wrote "many of the *vigas*, which are in excellent preservation, still retain their places and protect a number of rooms on the first floor." If not before, then shortly after Jackson's visit every room with ceiling intact had been discovered and appropriated by transient whites. The Hyde Expeditions utilized Room 14*b* and those nearby; Wetherill later repaired for his own use Rooms 25, 105, 119, and others adjacent to his residence. Room 295, which we cleared, is not readily accessible but it had been entered, perhaps from Room 88. Tin cans and broken glass strewn the floor; a large hole had been broken through the southwest wall and nails driven into its door lintel. Sometime later all beams and ceiling poles had been severed with steel ax or saw.

Pueblo Bonito was an empty shell when the National Geographic Society began its explorations and it was the desire of the Society's Committee on Research to preserve it as such, a monument to its prehistoric builders. Toward this end we employed each season one or more crews to repair previous damage as our investigations advanced (pl. 9, left). In this repair work, partly listed in Appendix C, we used only sandstone and mud—materials the Bonitians had used—and, where needed, ax-hewn timbers trucked in from Smith's Lake, 50 miles to the south. The old beam and ceiling-pole fragments we introduced during these wall repairs do not, of course, date the original masonry.

The cement capping about Kivas C and D (pl. 45, lower), erroneously attributed to the National Geographic Society in Park Service literature of the period, was actually an experiment in drainage

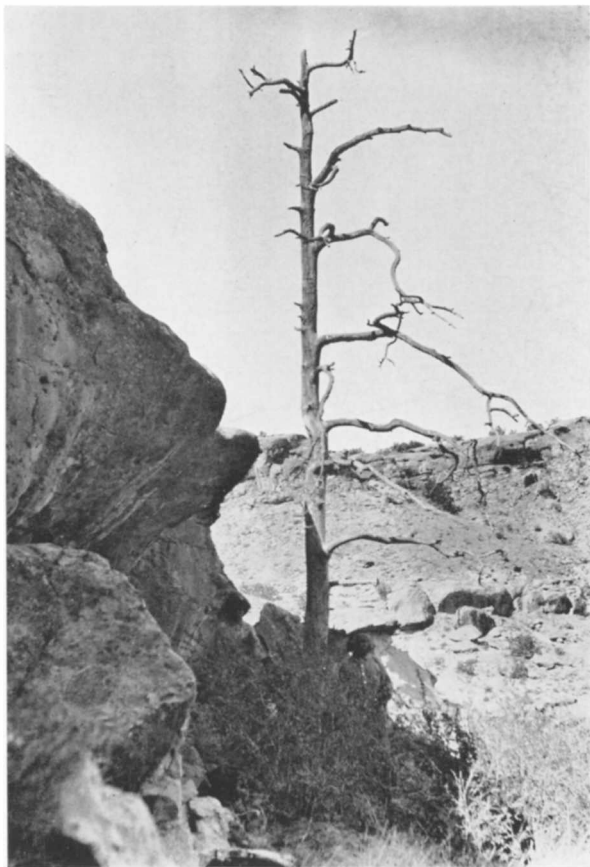
control undertaken by the National Park Service itself in April and May 1925 (letter to the director from Superintendent Pinkley, Dec. 24, 1925). Further experimentation was pursued during the summers of 1927 and 1928 under personal supervision of Martin L. Jackson, at that time custodian of Montezuma Castle National Monument, Camp Verde, Ariz. The Pueblo Bonito Expeditions used no cement in their repair work.

As stated heretofore, I regard Pueblo Bonito as the creation of two distinct peoples, the Old Bonitians and the Late Bonitians. They vanished 800 years ago, but we may know them from their distinctive architecture and the products of lesser industries (Judd, 1954). Presumably both peoples were born under the well-known Pueblo matrilineal system wherein the mother ruled the family and owned the house. Men might help with the heavier work of construction—quarrying stone, fetching and placing beams—but the women presumably laid the walls and plastered them, as women still did when Bourke (1884) and Mindeleff (1891) visited the Hopi and Zuñi villages. At that time family quarters might consist of one room or half a dozen. Building and plastering normally were late winter or springtime tasks when melting snow filled nearby pools. Living rooms were to the fore, storerooms at the rear or underneath.

Old Bonito was a Pueblo II community in every respect, built of wall-width slabs of sandstone, each slab spalled around the edge “much as a flint blade would be chipped”—to quote Morris’s (1939, p. 34) singularly apt description—and held one upon another by mud mortar pressed into place with bare fingers (pl. 10, 1). Wherever seen about the pueblo, house walls of this character identify the builders as Old Bonitians.

The exterior rear wall of Old Bonito, double-thick at floor level, had no door. Outside and upon 4 to 6 feet of sand wind-piled against that rear wall, Late Bonitian architects erected a single row of rooms embodying the first of their three principal varieties of stonework. To compensate for the slanting exterior of Old Bonito the abutting new masonry was backed with building waste or, where space invited, it rose to form a succession of wedge-shaped storerooms, as from 101 east to Room 298 (fig. 4). One gains the impression this addition was erected primarily to conceal the haphazard irregularity of the old wall.

In sharp contrast to that of Old Bonito, Late Bonitian masonry consists of a rubblework core faced on both sides by a veneer of neatly fitted sandstone blocks. Foundations are of roughly broken,



Dead pine, Wirito's Rincon, southeast of Pueblo Bonito.
(Photograph by Karl Ruppert, 1922.)



Recumbent pine logs, head of Wirito's Rincon, 2 miles
southeast of Pueblo Bonito.
(Photograph by Neil M. Judd, 1926.)



PLATE 3.—Pueblo Bonito from the north cliff in 1920.

The east and west refuse mounds, with Nelson's 1916 stratigraphic tests showing, lie beyond the ruin. At left, Wetherill's 1897 store.

(Photograph by Charles Martin, 1920.)



PLATE 4

Upper: Rooms 122-124, rebuilt by Richard Wetherill, were repaired by the Pueblo Bonito Expedition for laboratory use.
(Photograph by O. C. Havens, 1925.)

Lower: An apparently unfinished wall in the southwest corner, East Court, overlay older structures. Above, the exterior of Rooms 150-152 with ancient repairs.
(Photograph by Neil M. Judd, 1923.)





PLATE 5

Upper: East Court excavations near close of 1922 season. Room 190 and fragment of cross-court wall lie below paired dump cars; Pit No. 3 lies between ruin and camp, right margin.
(Photograph by Neil M. Judd, 1922.)

Lower: The West Court at beginning of the 1924 season; Kiva 16, left foreground; 1898 Wetherill house and store, upper right.
(Photograph by O. C. Havens, 1924.)



unshaped stones as a rule and may be offset several inches or recessed by a like amount—evidence that the foundation was prepared in advance and not always to the satisfaction of the masons who followed. Upper-story walls, invariably thinner than those next below, suggest upward construction after each successive floor was completed, hence the presence or absence of so-called floor offsets and their variability.

Although it is possible to see others, I recognize three principal varieties of Late Bonitian masonry. The first of these, that of the outside row mentioned above, combines blocks of soft, friable sandstone dressed on the exposed surface with hammerstones or abraders and interlaced with quarter-inch-thick tablets of harder, thin-bedded, laminate sandstone (pl. 10, 2).

In the second variety of Late Bonitian masonry (my third type at Pueblo Bonito), tablets of laminate sandstone $\frac{1}{2}$ to 1 inch thick were neatly arranged between blocks of friable sandstone 3 to 4 inches thick (pl. 10, 3). At its best this second variety, its individual blocks hand-smoothed and of uniform size, had an artistic quality none will deny (pl. 27, right). Later the denser laminate stone was often substituted.

As their experience with Chaco Canyon sandstone advanced, Late Bonitian architects increasingly favored the harder, laminate variety until, in their third and final variation (the last of my four Pueblo Bonito types), friable sandstone was practically eliminated (pl. 10, 4). This final variation—the climax of all Bonitian masonry—is largely restricted to the southeastern portion of the pueblo where, with no loss of time, it was substituted for an intended addition whose abandoned foundations extend 500 feet eastward (fig. 11).

Soft, friable Cliff House sandstone is available all along the base of the north canyon wall wherever portions have broken away and the harder, thin-bedded variety was formerly to be had on top, back some distance from the brink. Because it breaks readily into blocks that fit snugly with a minimum of mortar, this thin-bedded variety became an early favorite of Late Bonitian builders and they eventually exhausted the supply. I recall a pile of it, a one-man load, left on the cliff edge midway between Pueblo Bonito and Chetro Kettle and individual pieces scattered through the sand below.

Together, these four distinct kinds of masonry—one, Old Bonitian; three, Late Bonitian—frame Pueblo Bonito as we know it today. Late Bonitian masonry has won for Pueblo Bonito a reputation that will endure for all time, but, in our general admiration, the cruder

stonework of the Old Bonitians is commonly overlooked. This latter never changed; it remained the same from beginning to end—wall-thick slabs of spalled sandstone bedded in mud mortar and sometimes studded with thin stone chips (pl. 11, right). Late Bonitian builders erected second-story, and possibly third-story, partitions upon pine beams bridging lower rooms at ceiling level but the Old Bonitians never attempted this architectural feat so far as we know. Nor did they introduce longitudinal stringers within a wall to equalize vertical pressure.

In an effort to illustrate the relationship of these four kinds of masonry, one to another, I marked out three separate cross sections with the expectation of showing thereon all pertinent data from our excavations. That the results (figs. 13-15) are less than anticipated may be attributed to my unwillingness to risk visible structures in order to bare others deeply buried. Figure 2 is of the ground floor only; our data pertaining to individual rooms, upper and lower, are condensed in Appendices A and B.

Old Bonitian and Late Bonitian homes had their similarities and their dissimilarities. They differed in size, construction, and built-in fittings. Of 43 Old Bonitian ground floor rooms for which data are available, ceiling height averages 7 feet and floor area $120\frac{3}{4}$ square feet. Of 86 first-story Late Bonitian rooms (12 of second-type construction; 40, third-type; 34, fourth-type) ceiling height averages 8 feet $5\frac{1}{2}$ inches; floor area averages a fraction over 142 square feet and increases with each advance in masonry.

Ceilings.—Late Bonitian ceilings consisted of carefully selected pine and fir beams and poles supporting successive layers of dressed willows or pine boards, cedar bark, and adobe mud (pl. 12, upper). Old Bonitian ceilings, on the other hand, were casual assemblages of whatever materials lay near at hand: cottonwood, pine, pinyon, or juniper logs covered with brush, reeds or grass, cornstalks, and other chance gleanings (pl. 12, lower). Old Bonitian beam ends are characteristically conical, the beaverlike gnawing of a stone ax unmistakable.

Late Bonitian beams, ceiling poles, and door lintels were of selected straight-grained timbers, felled and peeled while green, and the knots rubbed off. Ceiling poles normally were seated in the wall masonry a couple inches but beams continued all the way through, their ends cut to a previously incised line, smoothed by a sandstone abrader and mudded over when the wall was plastered (pls. 13, right; 52, right). A flint chip marked the limiting line and Late

Bonitian ax-work, to the amazement of many observers, equaled that of a course, cross-cut steel saw (pl. 61, left). Stone axes from Pueblo Bonito are notoriously crude and few in number, but the Late Bonitians in some unaccountable manner were capable of trimming and placing their larger beams with an exactness that suggests prior measurement. Old Bonitian timbers frequently extended several feet through a wall, as in Rooms 302 and 304, but Late Bonitian timbers that did so, as in 227, are few in number and may indicate no more than an unwillingness to shorten a salvaged log.

In Old Bonitian homes pine ceiling poles of uniform diameter and spit juniper shakes probably evidence Late Bonitian reconstruction. Hatchways were present in both Old Bonitian and Late Bonitian ceilings, usually in the southeast corner.

Doors.—There is no door in the rear wall of Old Bonito and only 7, so far as we know, that once opened courtward from its ground-floor living-rooms. Those in Rooms 28 and 83 were provided with masonry steps to court level; the other five may be improvisations, cut through the old walls after later rooms were built in front of 306, 307, 323, 325, and 326.

Wherever we found them, Old Bonitian doors were more or less oval, approximately 22 inches in maximum width by 30 inches high, with mud-padded jambs rounding off top and bottom, and a sill height varying from 12 inches in Room 32 to 4 feet 9 inches at the north end of Room 325 (pl. 14, left). Late Bonitian doors, in contrast, are neatly regular with low sills and lintel poles of uniform diameter lashed together above the jambs and often extending to, or part way to, the walls on either side (pl. 14, right).

Many Late Bonitian doors shown partly blocked on our ground plan (fig. 2) probably were not blocked at all but had been left open for convenient passage during construction and were filled in later to the desired sill height. Hence the appearance of partial blocking seen in some of our illustrations. Among others, doorways in Rooms 246B, 247, and 291 are silled with dressed pine boards; those in 227 and 228B, with inverted Old Bonitian tabular metates instead of the customary sandstone slab.

Storeroom doors were fitted from the outside with slabs leaning against secondary lintels and jambs (pl. 13, left). All secondary lintels we noted at Pueblo Bonito were filled in above with masonry; none stood free for support of a cold-weather blanket, as described by Bourke (1884, p. 134) and Mindeleff (1891, p. 182) in Hopi and Zuñi homes of the past century.

Both the diagonal door, leading cornerwise from one room to another, and the Tau-shaped door appear to be Late Bonitian introductions. Of the former (pl. 15, left) we know of only seven or eight, all in houses of fourth-type masonry; of Tau-shaped doors, 32 in number, all but two are found in Late Bonitian walls.

Architecturally, the diagonal doorway seems such an admirable idea one would expect to find it in general use and from an early date. But quite the contrary. Relying upon memory rather than a fresh search of the literature, I recall only one example from another Chaco ruin and none at all among ancient cliff-dwellings. W. H. Jackson (1878, p. 436) described a diagonal door in a second-story wall at the northwest corner of Pueblo Pintado, but, surprisingly, he reported none at Pueblo Bonito although those connecting Rooms 173B and 228B, 180B and 242B, must have been visible to him in 1877 as they were to Mindeleff 10 years later. The feature appears occasionally in P. III ruins north of Chaco Canyon but only occasionally.

The T- or Tau-shaped door is an enigma. It is widely distributed throughout the Southwest both in historic and prehistoric villages, but no one to my knowledge has yet advanced a convincing explanation of its form or purpose. I have seen T-doors in prehistoric ruins as far west as Navaho Mountain but in none earlier than P. III. At Pueblo Bonito T-shaped doors were peculiar to the Late Bonitians since only two examples are known in Old Bonitian houses, and one of these, that connecting Rooms 321 and 323, is so conspicuously framed in third-type stonework as to evidence Late Bonitian alterations. Without regard to masonry, 23 of our 32 T-shaped doors occur in ground floor rooms, eight in those of the second story, and one in the third story, between Rooms 174C and 175C. This latter and those in the west walls of 226 and 227 were interior doorways; all others faced upon one of the courts. Largest of all, 7 feet 4 inches high and a foot above the floor, opened through the east wall of Room 334 upon the roof of Kiva T (pl. 16, left).

Two miniature T-shaped recesses, both empty, occur in the south wall of Old Bonitian Room 326B (pl. 11, left) which stands 8 feet 4 inches above its floor level with no trace of ceiling poles. Rarely does an Old Bonitian house boast a third story.

Ventilators are seen in rooms of all four masonry types. Altogether we have record of 183 of which 28 appear in 10 Old Bonitian rooms; 11 in six houses of second-type construction; 33 in 19 third-type structures, and the remainder in 53 fourth-type rooms six of which are in the third story. Ventilators vary in their dimensions and in height

above the floor; those of the second-story are usually larger than first-story ventilators. Of our total, 122, or 67 percent, had been wholly or partially closed with masonry, usually to leave a shallow inside recess.

Since ventilators presumably were intended to provide cross ventilation, the blocking of them, whether partial or complete, would seem to indicate a desire for simple physical comfort. Winters are cold in Chaco Canyon and reduced or closed ventilators would lessen winter drafts. I place no faith in theories that the blocking was a defensive measure. Nine ventilators in the west walls of two Old Bonitian storerooms, 320 and 217B, were sealed with stonework when the Late Bonitians erected their 2-story row of second-type rooms adjoining.

Storage shelves and clothes racks.—Single poles, 2 to 3 inches in diameter, across the width of a room and 5 to 5½ feet above its floor presumably served for hanging blankets and similar materials as such poles still do in Pueblo homes. At least five second-type Late Bonitian rooms (200, 203, 204, 209, 299) had been equipped with one or two single poles of this sort. Of 16 two-pole racks noted, 4 occur in Old Bonitian rooms (298B, 307-I, 315, 320) and obviously were introduced after construction.

Pepper (1920, p. 223) describes a 3-foot-high shelf at the west end of Room 62—three 4-inch-diameter logs, 2-inch poles above them, and a reed mat lashed on top by means of cedar splints and yucca thongs—and implies a second shelf at the east end. With little more than standing room between, two such shelves would measurably increase the storage capacity of a given room. Apparently such storage shelves were more frequent in the upper rooms of Pueblo Bonito.

Unpublished Mindeleff photographs show seven, possibly eight, close-lying pole seatings in the remaining north third of the west wall of Room 179C a couple inches below a half-blocked ventilator, but no provision had been made for a similar shelf in Room 180C, adjoining, where two west ventilators remain open. Seven pole seatings at lintel level of the southwest door in Room 185B and immediately below a ventilator were not matched by like seatings in the north half.

Seven-pole shelves may have been standard in upper storage rooms. Mindeleff photographed such a series in the west half of the north wall, Room 187C, at sill level of the third-story west door—a series that we carefully preserved during 1923 repairs (pl. 9, left) but which subsequently was lost when the Braced-up Cliff collapsed.

Granaries.—In the traditional P. II arrangement of Old Bonito,

storerooms stood at the rear, behind the dwellings but connected with them. On the earthen floor of remodeled Room 92, which is the second story of 3a (elsewhere described as Room 97), Pepper (*ibid.*, p. 298) found "a great deal of corn . . . bean bushes . . . still green . . . and beans in the pod." These freshly harvested crops may have been piled there temporarily, pending transfer to more secure storage. Burned corn-on-the-cob and pinyon nuts were noted in Room 5, a ground-floor storeroom. Stone-walled bins are described in Room 85, some fitted with slab doors and built one upon another.

Late Bonitian housewives preferred jar-shaped storage facilities in out-of-way places. Four outworn Corrugated-coil pots, one of them containing a quantity of unidentifiable grass seed, had been concealed under the floor of Late Bonitian Room 128. The five Banded-neck cook pots buried to the rim beneath the floor of Old Bonitian Room 323 were Old Bonitian and may have been placed there in imitation of a contemporary Late Bonitian practice (Judd, 1954, pls. 50-51).

Subfloor jar-shaped pits also served for Late Bonitian storage. We found five of them, averaging 42 inches in maximum diameter by 54 inches deep under the floor of Room 266, each rimmed to receive a discoidal sandstone slab at floor level. The five had been dug into clayey sand so compact there was no need for a plaster lining. Similar but smaller pits were exposed under Rooms 282 and 294 and still another, 46 inches in diameter by 50 inches deep, was noted outside Room 177.

Milling rooms.—So far as we know, only two among the 300-odd ground floor rooms in Pueblo Bonito, 90 and 291, were equipped with binned metates for grinding the daily ration of maize. Both were Late Bonitian rooms and both had been stripped of their mills and bin slabs at the time of abandonment or before. We observed no trace of a milling bin in first-story Old Bonitian rooms and Pepper mentions none. Obviously the housewives of Pueblo Bonito kept and used their metates in second- and third-story living rooms.

All Pueblo Bonito metates are of sandstone, troughed, and open at one end. None has an over-all grinding surface such as that from Room 5, Pueblo del Arroyo (Judd, 1959, p. 106). Mills of the Old Bonitians, to judge from Pepper's observations and our own, are broad, thin, and shallow-grooved—more deliberately trimmed, perhaps, but otherwise comparable to the tabular metates of Chaco Canyon BM. III and P. I. peoples (Roberts, 1929, p. 132; Judd,

1924, p. 402)—while those of the Late Bonitians were 4 or 5 inches thick, large and heavy, sometimes too bulky for a strong man to turn.

Fireplaces.—Of all the hearths on which Bonitian meals were prepared, we have record of only 69, all but two in ground-floor rooms. Twenty-five occur in 16 Old Bonitian dwellings; 44 in 36 Late Bonitian houses. Some were situated in the middle of the floor, more or less; others ranged along the wall or in a corner. Irrespective of placement, most of our 69 fireplaces were slab-lined and circular, or nearly so; 14 were lined with masonry and plastered; 5 were equipped with sandstone fire dogs; 7, including that in Old Bonitian Room 330, were rimmed with adobe.

Late Bonitian architects built Rooms 91 and 92 upon the walls of Old Bonitian Rooms 3 and 3*a*. A fireplace in second-story Room 91 is described by Pepper (1920, p. 40) as slab-lined; the one in 92 as shallow and probably rimmed with adobe (*ibid.*, p. 299). Since the bottom of this latter was no more than a thin layer of mud spread directly upon the pine poles and brush ceiling of 3*a*, it is surprising there had not been another destructive conflagration here. Inadequate protection from second- and third-story hearths probably accounted for most of the fires cited by Pepper.

What my notes describe as "fire pits," thus to distinguish them from domestic hearths, are of Late Bonitian construction but unknown function. We came upon seven of which these four are thoroughly typical: (1) In Room 221, an open-air work space, pit 3 feet 7 inches east-west by 28 inches wide and 31 inches deep, masonry-lined, filled with scorched sand and a scattering of charcoal; (2) 27 inches outside the southwest corner of Room 314, slab-lined pit 31 inches north-south by 21 inches wide and 27 inches deep, surrounded by flagstones; (3) north of Kiva X on the last recognizable West Court surface, masonry-lined and plastered pit 3 feet 8 inches wide and originally 5 feet 7 inches north-south but subsequently divided by a 2-foot-thick partition and both sides continued in use (pl. 17, upper); (4) Kiva R roof level north of the Kiva Z enclosure, 5 feet north-south by 35 inches wide by 49 inches deep, masonry-lined and plastered (pl. 18, left). The plaster of this latter was reddened by fire but not fused; sand and sandstone spalls filled the lower 2 feet, sand with bits of charcoal the remainder. Three others were noted subfloor: two in Room 215 and one in Room 220. In each of the seven instances there were no potsherds among the fill; no bone fragments, burned or unburned. Three pits were oriented north-south but their dimensions varied.

Conflagrations.—Pepper repeatedly cites evidence of fire in rooms excavated by the Hyde Expeditions, and we noted other instances of charred timbers, smoke-blackened walls, and burned sand upon the floor. Fire was an understandable hazard of occupancy, but the possibility of fires set by raiding parties long after desertion of the village is not to be dismissed lightly. Throughout the Plateau Province one may hear tales of ancestral Navaho, Ute, and Apache warriors who drove the Cliff Dwellers and contemporary peoples from their homes and then fired the buildings. Holsinger (MS., p. 17) may have been echoing such a story when he reported that about 40 rooms in the two easternmost rows at Pueblo Bonito had been burned, presumably by enemies.

Whatever the cause, fire had gutted many of these east-side rooms some time after they were vacated. In Room 257, for example, sand varying in depth from 19 inches at the north end to 27 inches at the south had collected upon the floor before the ceiling burned and collapsed.

Wall plaster in Room 260 was fire-reddened above a sand deposit several inches deep. Blown sand $4\frac{1}{2}$ feet in depth filled the southwest corner of Room 266 sloping thence to 18 inches in the opposite corner. Charred timbers lay upon that sand with more blown sand above the timbers and then masonry fallen from the second and third stories. The third-story south wall of Room 171 had collapsed and fallen outward and its outermost building stones inexplicably were overlain by a layer of burned sand, sticks, and cedarbark—a post-abandonment accumulation.

Pepper (1920, fig. 131) pictures 11 Late Bonitian pitchers on the floor of Room 99 half buried by stratified sand and only the exposed portions burned. When we cleared Old Bonitian Room 298 we learned that fire had destroyed both the first- and second-story ceilings but had barely scorched a blanket of wood chips spread over the lower floor. Whether these evidences of fire at Pueblo Bonito point to domestic carelessness or to post-occupancy raids is open to question but there can be no doubt that such flimsy hearths as those in Rooms 91 and 92 were ever-present dangers.

Wind-borne sand.—Sand is everywhere present in Chaco Canyon today, and wind-blown sand obviously was a daily annoyance to the housewives of Pueblo Bonito. It blew through open doors and sifted through ceilings. When Pepper entered Room 3 he found 2 or 3 feet of sand upon the floor; sand was 3 to 4 feet deep in Room 3a; 4 to 12 inches deep on the floor of Room 92 (second story of 3a).

Six feet of wind-borne sand had piled up against the rear wall of Old Bonitian Room 5 before the Late Bonitians built Room 203 upon that sand (fig. 14). Sand continued to accumulate while second-type masonry was in vogue. Around on the west side of the village it had accumulated to a depth of 3 feet 9 inches above approximate floor level of 3 unexcavated and unnumbered second-type rooms before Late Bonitian architects began their third-type Room 117 (pl. 37, upper).

Chaco Canyon's inexhaustible sand is carried on the prevailing upcanyon winds by day and back again at night, but our efforts to measure its rate of deposition proved unsuccessful. By early June one season a foot of sand had settled in the lee of a packing box I had anchored 50 feet west of Room 115 the previous fall and an unknown quantity had blown unchecked across the top. Bryan (1954, p. 21) estimated that 4-6 feet of blown sand had collected on the north side of Pueblo Bonito during the period 1900-1921 or at the rate of 3 inches a year. My own guess would double that rate. Wind-borne sand bulked large in every stratigraphic section we laid bare, including those in the two south refuse mounds.

Until 1903 when wind-blown sand barred the way, Hyde Expedition freight wagons traveled the old Farmington road across the mouth of Escavada Wash and northward (Bryan, 1954, fig. 1). Later, a substitute road left the Chaco by way of Mockingbird Canyon; still later, and currently, by way of the rocky Rincon del Camino. In 1920 drifted sand forced our reconnaissance wagon, old-time freighter Jack Martin at the whip, far out into the arroyo channel as we left Chaco Canyon, crossed the Escavada, and turned toward Farmington.

Defensive measures.—Bonitian families had scant protection against wind-driven sand, but they did their best to guard against marauding enemy bands. There was no door in the outside, rear wall of Old Bonito, but outside doors were provided for each room, upper and lower, in the 2-story row of second-type-masonry houses the Late Bonitians built to enclose the old settlement. And each of these Late Bonitian doors, to judge by the duplicating stonework, was sealed almost immediately and left sealed. Not until the 19th century was that blocking masonry pried loose (pls. 19, right; 26, upper).

In their next two constructional programs Late Bonitian architects presumably allowed only three external first-story doorways, those in Rooms 118, 154, and 155, and each of these likewise had been blocked. Only one outside second-story door was permitted so

far as we know, that in Room 182B, (pl. 13, right) and none at all, apparently, in third- and fourth-story rooms. Neither Jackson's description nor Mindeleff's 1887 photographs offer any evidence of an outside balcony, as at Chetro Kettle and Pueblo del Arroyo. Lacking external doorways to family apartments and with only one common gateway to the village, Pueblo Bonito was virtually a walled town.

The sole entrance to Pueblo Bonito, that in the southeast corner of the West Court between Rooms 137 and 140 (fig. 2), was originally 7 feet 10 inches wide. After an unknown interval this passageway was barred by a single crosswall with a 32-inch-wide door in the middle. Later, this reduced opening was blocked to leave, front and back, shallow alcoves presumably sheltering ladders to be pulled to the rooftops in time of need. There must have been pressing reason for this deliberate and progressive closing-in!

What is now represented to visitors as a second village gateway, in the southwest corner of the East Court is an error for which I am partially responsible. Room 155, previously cleared, had been refilled with excavation waste thrown out of 152. When we carted away this waste to make grade for our dump cars and track we removed some of the broken masonry, disintegrated and much reduced in the interval since excavation (pl. 5, upper). The south door of Room 155, shown open with sill at floor level on unpublished Hyde negative 570, presumably had been blocked during occupancy as was that in Room 154, adjoining. My failure partly to restore these broken walls left a low place between Rooms 154 and 156 that furnished some one with the idea of a second village entrance, balancing that to the West Court. On the other hand, Jackson's 1877 restoration of Pueblo Bonito shows a broad East Court gateway hereabout (pl. 49, upper).

The blank outside wall of Old Bonito, the promptly sealed doors in the initial Late Bonitian addition to the pueblo and omission of external doors thereafter, the barring of the lone town gateway, and evidence of prehistoric vandalism in Old Bonitian burial rooms (Judd, 1954, pp. 325-341), all combine to suggest early and recurrent hostile pressure against the inhabitants of Pueblo Bonito. The source of that pressure is conjectural, but it may well have been the Largo-Gallina area 100 miles to the northeast, whence came, presumably, the conical-bottomed pots we recovered from Kiva W and Room 314 (Judd, 1954, p. 195).

All Late Bonitian dwellings, including 314, had been stripped of

their contents and vacated. This fact might be interpreted as evidence of internecine strife but post-abandonment fires and the plundering of eight Old Bonitian burial rooms were not the work of neighbors. There are those who argue that harassment from nomadic groups rather than drought or impoverished soil initiated the Pueblo III exodus from the San Juan drainage, including Chaco Canyon. Others argue as convincingly that intramural quarreling, as happened at Oraibe in 1906, could have spurred abandonment of the northern mesas and valleys. Together internecine strife, or external harassment, plus droughts and impoverished soil would have proved a combination no superstitious Pueblo farmer could withstand.

During our study of Bonitian architecture we collected portions of 97 constructional timbers—not all we might have collected, as we know in retrospect, but what seemed at the time as an adequate selection of those we happened upon. The science of dendrochronology has advanced since its crude beginnings at Pueblo Bonito in 1922, and the samples we took for Dr. Douglass will reveal more than their dates as research upon them continues at the University of Arizona. Two former Douglass students, Terah R. Smiley and Bryant Bannister, have recently reviewed our 97 specimens, here listed by their original field number (the JPB numbers of Douglass publications), source, and masonry type and have revised several terminal dates previously announced.

TREE-RING DATES FROM PUEBLO BONITO

Field No.	Room	Location	Masonry type			
			1	2	3	4
1.....	245	Subfloor chamber, south end			1050	
2.....	227	Beam end from R. 173 [same as K-9; H-16 collected by E.H.M.]				1078
3.....	227	E-W beam [K-8]				1075
03....	"	Beam end from R. 173				1076
003....	"	" " " R. 227-I				1053
4.....	244	" fragment				decayed
5.....	"	" "				1060
6.....	"	" "				1097
7.....	"	" "				1078
8.....	"	" "				1078
10.....	256	Charred fragment				1050
14.....	257	Above blown sand, south of wattled wall				1081

(Continued)

TREE-RING DATES FROM PUEBLO BONITO—*Continued*

Field No.	Room	Location	Masonry type			
			1	2	3	4
15.....	257	Above blown sand, south of wattled wall				1124
16.....	"	Above blown sand, south of wattled wall				1047
17.....	"	Above blown sand, south of wattled wall				1126
18.....	"	Above blown sand, south of wattled wall				1080
19.....	"	Above blown sand, south of wattled wall				1083
20.....	"	Above blown sand, north of wattled wall				juniper
21.....	"	Above blown sand, north of wattled wall				"
22.....	227-I	Charred beam fragment				1064
23.....	"	" " "				1081
24.....	242					1080
25.....	"					1081
26.....	—	—				—
27.....	268	Rectangular post, west wall slot			1080	
28.....	162	Pilaster log, south side			juniper	
29.....	"	" " " "			"	
30.....	"	" " " "			"	
31.....	"	" "			"	
32.....	"	" "			"	
33.....	"	" "			"	
34.....	"	" "			"	
35.....	259					juniper
36.....	Kiva J	Pilaster No. 4			juniper	
37.....	"	" No. 5			1080	
38.....	Kiva C	" No. 8			1120	
39.....	Kiva H	" No. 2			juniper	
40.....	"	" No. 8			1054	
41.....	161	" No. 7			juniper	
42.....	Kiva B	" No. 4			1063	
43.....	"	" No. 5			1055	
44.....	"	" No. 2			juniper	
45.....	"	" No. 3			"	
46.....	264	Beam			1040	
47.....	62(?)	Hyde dump, north side Kiva G				
48.....	57	Beam end, north wall				1071
49.....	55-57	Stringer in wall between				1083

(Continued)

TREE-RING DATES FROM PUEBLO BONITO—*Continued*

Field No.	Room	Location	Masonry type			
			1	2	3	4
50.....	251	S. jamb post, east door to R. 250			juniper	
54.....	—	Beam, Wetherill store, outside R. 14b				1035
55.....	228	E beam, N-S pair, south end				1073
56.....	"	" " " " north "				1073
57.....	"	W " " " " "				com-placent
58.....	"	Beam end from R. 172 [behind N-S, partition]				1061
67.....	292	Beam from R. 293			920	
68.....	296		932			
69.....	"		1047			
70.....	Kiva L	Roofing pole			1061	
71.....	"	" "			com-placent	
72.....	"	" "			"	
73.....	"	" "			"	
74.....	"	" "			"	
75.....	298		cotton-wood			
76.....	—	North of R. 295				1041
77.....	—	" " "				com-placent
78.....	—	" " "				"
79.....	290-291	Beam under South wall (across N arc Kiva L)			1061	
80.....	3c(?)	[R. 111A] beam	cotton-wood			
81.....	Kiva L	Roofing pole, 12th layer from top			1047	
82.....	6	Post step at south door	decayed			
83.....	305	Beam fragment		1033		
90.....	308	" "		com-placent		
91.....	"	" "		"		
92.....	Kiva P	Pilaster log			juniper	
93.....	Kiva L	" No. 1			1011	
94.....	"	" No. 6			juniper	
95.....	—	Wetherill "gas house"				1057
96.....	—	" "				1062
97.....	286	Subfloor kiva, post, east side			1088(?)	
98.....	"	" " " " "			1091	

(Continued)

TREE-RING DATES FROM PUEBLO BONITO—*Concluded*

Field No.	Room	Location	Masonry type			
			1	2	3	4
99.....	—	Fallen tree, southeast corner, West Court (A.D. 983)				
104.....	317	Ceiling pole	828			
105.....	"	" "	859			
106.....	325	Post, southeast corner	919			
107.....	320	Beam [3-4" E-W beam]	919			
108.....	"	" " "	919			
109.....	"	" " "	919			
110.....	—	Ceiling pole, narrow space west of R. 320B				
				com- placent		
113.....	325	Post, northeast corner	919			
114.....	323	Beam	935			
115.....	"	"	935			
116.....	"	Post under beam No. 114	919			
117.....	"	" " " " 115	919			
118.....	327	Beam				
120.....	327	Beam from R. 325				
122.....	Kiva X	" " west, 5" dia.			1034	
123.....	"	"			—	
130.....	261	" [prob. from R. 267]			1070(?)	
145.....	314	" above fill in OB room			com- placent	

As will be noted from the foregoing, the National Geographic Society collected at Pueblo Bonito samples of 97 constructional timbers in 33 rooms and 9 kivas. Of this total, however, 38 (40 per cent) were not datable, either because the growth rings were too uniform ("complacent" in the Douglass terminology) or because the wood—juniper, pinyon, or cottonwood—is not yet readable. Of the remaining 59 specimens, 13 came from Old Bonitian houses and, except one reused 1047 beam, their cutting dates range from A.D. 828 to 935. Seven of these dates are identical, A.D. 919.

Seventeen specimens felled between 1011 and 1120, including a second obviously reused example dated 920, were collected in third-type rooms, and 28 other specimens, all cut between 1035 and 1126, came from fourth-type structures. Room 305 is our only dwelling of second-type masonry yielding a datable timber, a single specimen felled in A.D. 1033.

Thus, excepting the two clearly salvaged, the Pueblo Bonito Expedition's 59 datable timbers fall into two groups, one bracketing the

years A.D. 828 to 935 and the other 1011 to 1126. The first group is from Old Bonitian structures and the second, from Late Bonitian houses. Together, the 59 are too few in number to have more than a suggestive value but they do suggest periods of constructional activity.

If 107 years seems too short a period for the building of Old Bonito, with its 8 feet of rubbish piled out in front, it is to be remembered that our bracket is based upon 13 specimens only, all from larger rooms where pine and fir logs were utilized. Among Hyde Expedition beams submitted to him for cross dating with Aztec Ruin, Douglass (1921, p. 30) noted two from Rooms 32 and 36 in the north-central part of the old pueblo. Both, unfortunately, remain undated.

It will be observed also that two or more timbers with the same cutting date were recovered in only four rooms and that three of these (320, 323, 325) are in Old Bonito. (A previously sawed log in Room 228 was sampled twice.) Two pine beams from Old Bonitian Room 323, both felled in A.D. 935, had been propped with posts cut 16 years earlier. Reuse seems undeniable. Reuse, even repeated reuse, of constructional wood is a long-established Pueblo practice, as is the stacking of logs against future need.

In his review of material collected in Hopi villages by the second Beam Expedition, that of 1928, Douglass (1939) remarked that some of the logs represented had been in use for hundreds of years and were noticeably worn in consequence. While this may have been equally true of some of the pinyon and cottonwood logs from smaller rooms of Old Bonito, none of the pine and fir timbers we recovered, large or small, exhibited wear in any appreciable degree. They had been cut, peeled, and used without delay.

Our 46 dated timbers from Late Bonitian structures represent a very small portion of the total required to roof Pueblo Bonito. That total numbered in the thousands. Over 300 logs, long and short, were utilized in the cribbed ceiling of Kiva L and Kiva L was only one of perhaps 30 Late Bonitian kivas in use contemporaneously. In addition there were the dwellings and storerooms of a thousand people, more or less.

The JPB 99 of our list is from a much decayed pine that had stood at the south end of the West Court while Pueblo Bonito was inhabited (pl. 1). Initially Douglass (1935, p. 47) gave this fragment a tentative date of A.D. 1017 ± 35 , but in a later review Smiley fixed the outermost surviving ring at 983. One may only guess at the num-

ber of annual rings lost through disintegration but that lone, mid-valley straggler from the Chaco forest obviously witnessed the unfolding of much Pueblo Bonito history.

Added to those we recovered within the walls of Pueblo Bonito, our list includes three samples, JPB 54, 95, and 96, from fine old timbers in buildings Richard Wetherill erected between 1897 and 1910. The first of these, JPB 54, identifies a beam from the trading post Wetherill built in the autumn of 1897 outside Room 14b (Pepper, 1920, fig. 4) and which we razed in 1923; JPB 95 and 96 are beam samples from a square, isolated stone building that is identified on Holsinger's 1901 plan of Pueblo del Arroyo as "employees quarters" (Judd, 1959, fig. 45) but which Jack Martin, a Hyde Expedition teamster, called "Wetherill's gasoline house." This same small building is listed as "Tanner's garage" for specimens 2345 and 2346, both with a cutting date of 1065, collected for Gila Pueblo in 1940 by Dr. Deric O'Bryan.

O'Bryan (personal communication) also sectioned six ceiling poles in Room 97, a 2-story Old Bonitian room revamped by the Late Bonitians, and reported cutting dates at 1026, 1057, 1067, 1071, 1073, and 1092. Four timbers from another second-type room, 300, were dated 1029, 1040, 1044, and 1047. Gila Pueblo employed a mechanical method for counting rings but the results obtained rarely varied more than a year or two from those recorded by Douglass.

O'Bryan for Gila Pueblo is among those who have collected tree-ring material in Chaco Canyon since conclusion of the Pueblo Bonito Expeditions in 1927. He lists two constructional dates from Rooms 239 and 240, respectively, on the periphery of Kiva D, one (No. 2291) collected by G. Vivian in 1940 while repairing the southwest bench in Kiva F, and several from timbers, provenience unknown, utilized by Richard Wetherill in reroofing Bonitian rooms for his own use. Timbers that were sound, unscarred, and unclaimed were there for the taking when Wetherill came to establish his home in treeless Chaco Canyon and, however much we may regret the fact today, I am not among those who condemn him for having taken advantage of his opportunity.

Bryant Bannister (1960) dates at A.D. 1030, 1031, and 1077 three beams recovered by National Park Service personnel during demolition of "Ackerly House," the former Wetherill dwelling and store at the southwest corner of Pueblo Bonito (pl. 5, lower). Despite field numbers since added, the original National Geographic Society list ended with JPB 145, as indicated above.

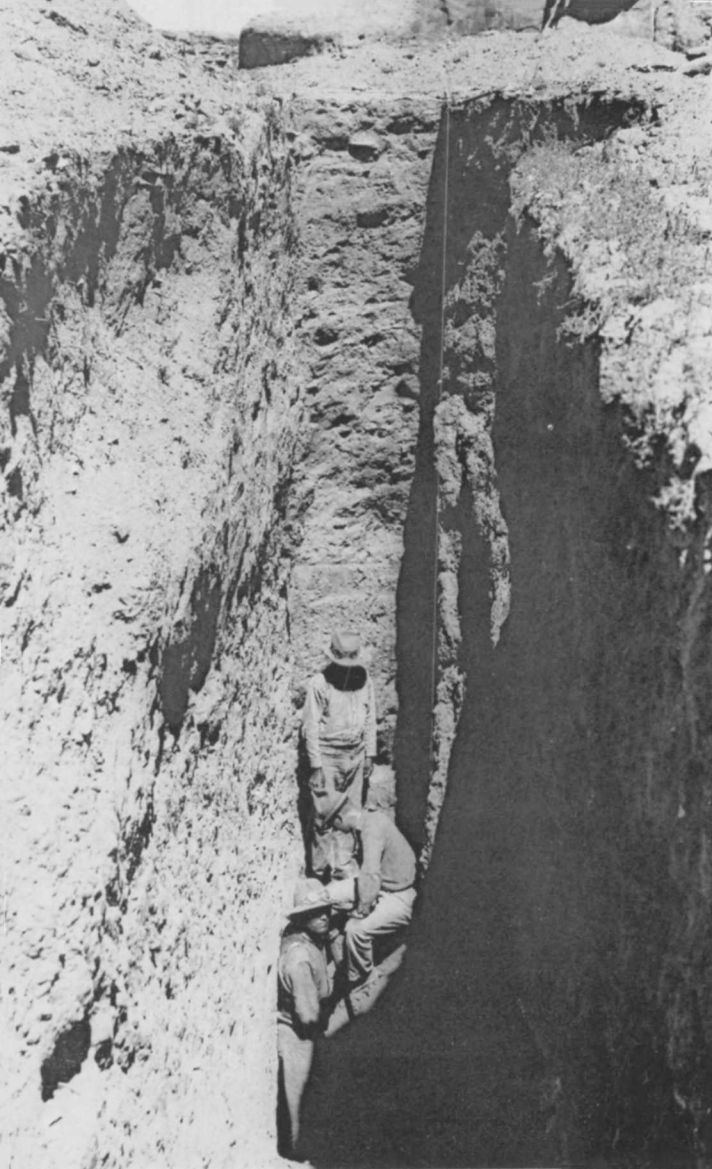


PLATE 6

Left: A stratigraphic test 20 feet deep, West Refuse Mound.

(Photograph by
O. C. Havens,
1921.)

Right: An exploratory West Court trench revealed razed buildings and an Old Bonitian trash heap.

(Photograph by
O. C. Havens,
1925.)





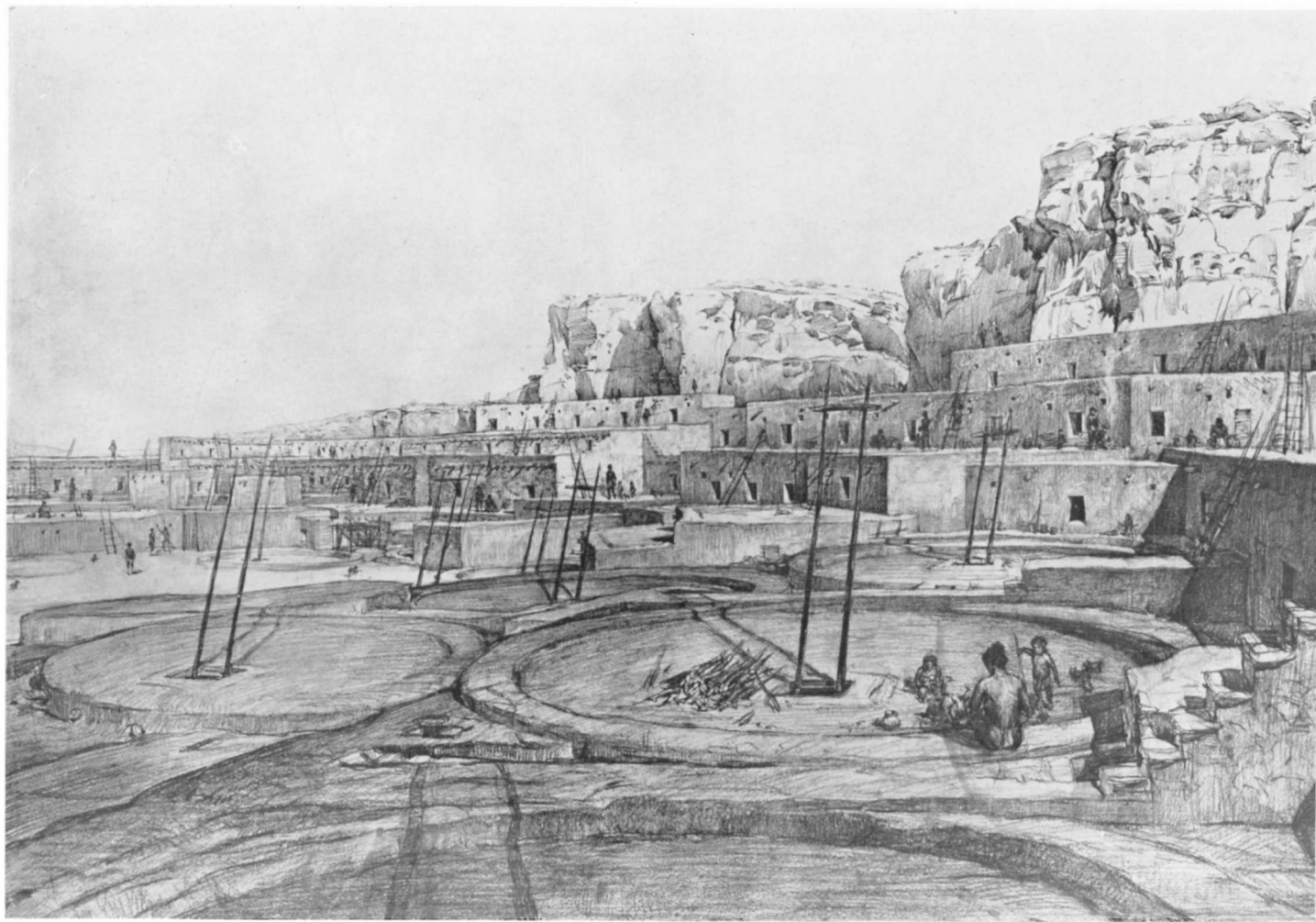
PLATE 7

Upper: Pueblo Bonito from the north cliff. Pit No. 3 lies at left of the path, mid-way between ruin and camp.

Lower: Beginning West Court excavations. North wall of Room 133 in foreground.

(Photographs by O. C. Havens, 1924.)





The East Court at Pueblo Bonito as it may have appeared about A.D. 1050.
(From the original drawing of Kenneth J. Conant, 1926.)



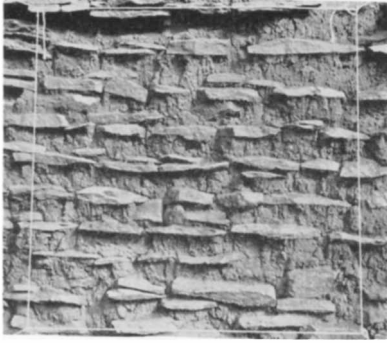
Repairing north wall of fourth-story Room 189D. At right, holes for 7-pole storage shelf, Room 186C, and repaired areas (lighter stonework).

(Photograph by Neil M. Judd, 1923.)

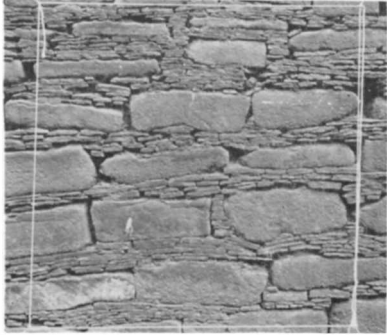


National Geographic Society repairs in third-story Room 180C; ceiling-pole level of Room 179 in foreground.

(Photograph by Neil M. Judd, 1921.)



1. Spalled-sandstone slabs of wall width laid in abundant quantities of mud and often protected from the elements by closely placed stone chips.



2. Rubble veneered with casual blocks of friable sandstone dressed on the face only and chinked all around with chips of laminate sandstone.



3. Rubble veneered with matched blocks, either of laminate or dressed friable sandstone or both, alternating with bands of inch-thick tablets of laminated sandstone.



4. Rubble veneered with laminate sandstone of fairly uniform thickness laid with a minimum of mud plaster between.

PLATE 10.—The four principal types of masonry at Pueblo Bonito, each represented by a 2-foot square section.

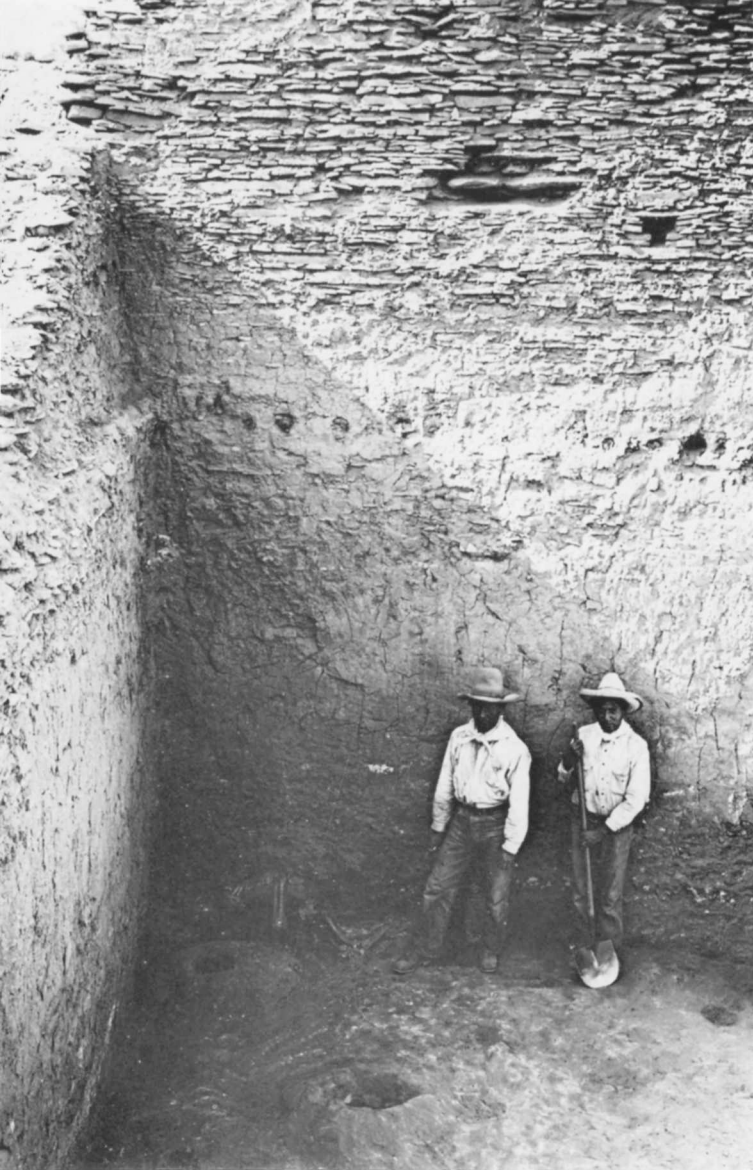
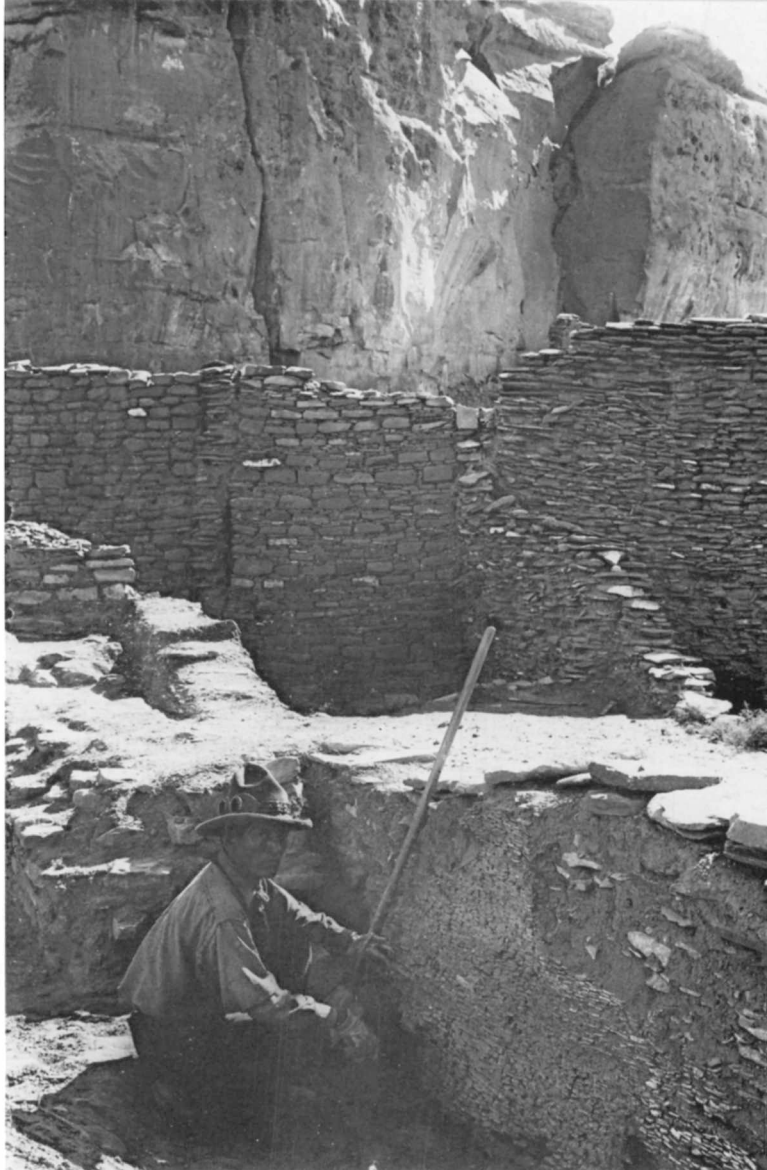


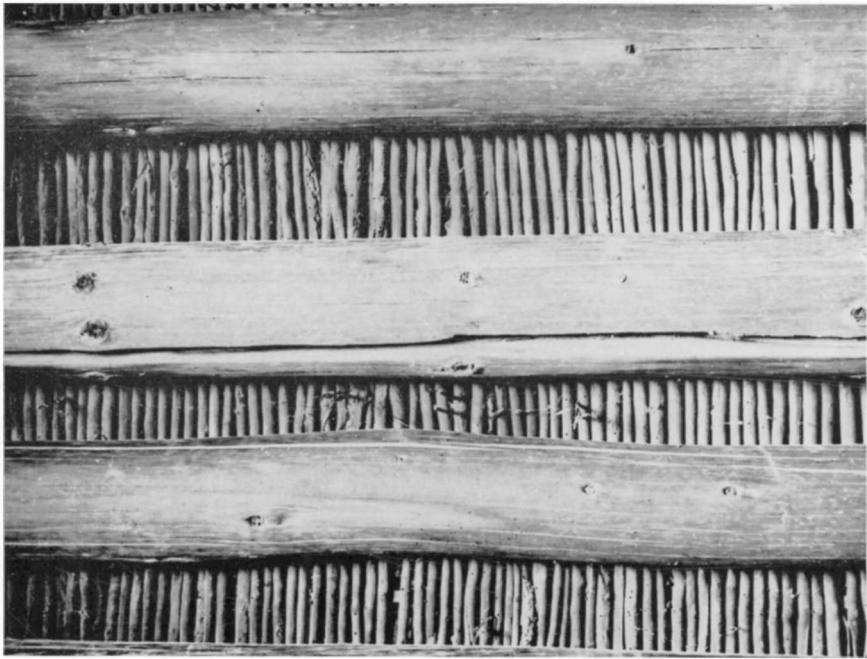
PLATE 11

Left: South end of Old Bonitian Room 326 with small T-shaped recess in second-story wall.

Right: Small-stone protection against rain and wind-blown sand, exterior of Old Bonitian Room 102.

(Photographs by O. C. Havens, 1924.)





The ceiling of Late Bonitian Room 14*b* included a layer of hand-smoothed willows.



A typical Old Bonitian ceiling usually contained a layer of chico brush.

(Photographs by O. C. Havens, 1924.)



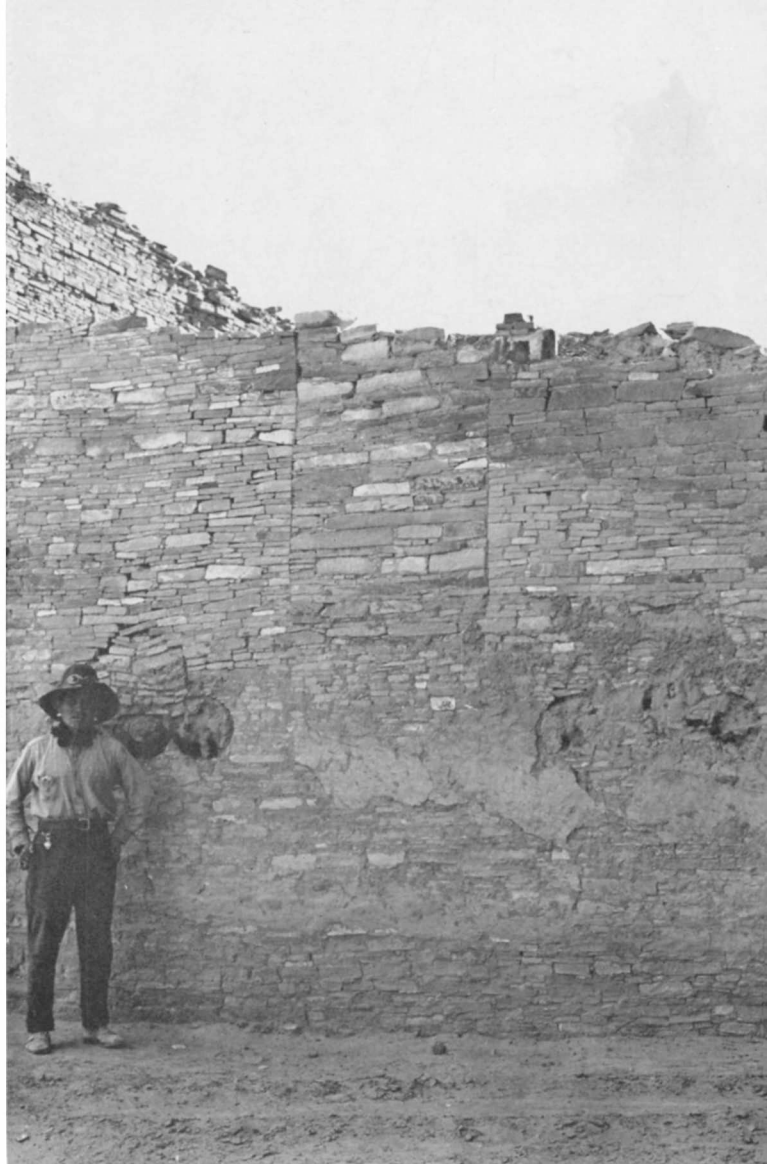
PLATE 13

Left: Late Bonitian door fitted with secondary jambs for retention of doorslab from Room 243.

(Photograph by Neil M. Judd, 1926.)

Right: Blocked outside door, Room 182B. First-story beam ends were severed flush and plastered over.

(Photograph by O. C. Havens, 1925.)



THE RISE AND FALL OF PUEBLO BONITO

Pueblo Bonito began as a wide-spreading crescent of Pueblo II houses with storerooms at the rear, several subterranean kivas out in front, and the village trash pile beyond. After that trash had accumulated to a depth of 8 feet or more, after 5 feet of sand had settled against the old P. II houses, another people came to join the original settlers—a Pueblo III people with a more advanced architecture and a different pottery complex. Together, the houses these P. III people built and the pottery they made are now widely accepted as earmarks of a distinct social development, "The Chaco Culture." One objective of the Pueblo Bonito Expeditions was to ascertain, if possible, the origin of this development and its termination.

We reached part of our goal but not all. After seven summers at Pueblo Bonito, 1921-1927, I am of the opinion that the P. II and the P. III peoples who formerly dwelt there had come independently from beyond the San Juan River, but I can only guess at their destination after leaving Chaco Canyon. This recognition of the broad area north of the San Juan as the place of origin—an area in which I have done no field work for many years—has been substantiated by the published observations of Kidder, Morris, Martin, Roberts, Brew, and others, and I have placed great confidence in those observations in what follows. I am aware of no later, equally pertinent researches.

The so-called Chaco Culture was just short of full bloom when it first came to Chaco Canyon. At Pueblo Bonito it introduced veneer-and-core masonry and architectural precision; it also introduced Corrugated-coil Culinary ware, Straight-line Hachure and, among others, a hybrid variety of domestic pottery we designated "the Chaco-San Juan." Seen by various observers and variously described, the Chaco Culture and influence attributed to it have been reported far beyond the borders of Chaco Canyon.

Chaco-like pottery and Chaco-like masonry have been cited repeatedly as proof that Lowry Ruin, northwest of Mesa Verde National Park and Aztec Ruin to the southeast, among others, represent colonies from Chaco Canyon. Mancos Black-on-white and McElmo Black-on-white were dominant pottery types at Lowry although Mesa Verde Black-on-white appeared conspicuously in the upper fill of several rooms (Martin, 1936, p. 94, 205). All Lowry masonry is of veneer-and-core, or double-coursed, composition but Martin separated it into 3 classes: Chaco-like, non-Chaco, and intermediate. Tabular sandstone identifies the first; squarish blocks of

friable sandstone, the second; blocks so irregular as to prevent uniform coursing, the third.

Aztec Ruin, with its predetermined ground plan, its large high-ceilinged rooms, and kivas sunk within the house mass is even closer to Chaco architecture than Lowry. Like the latter, however, Aztec masonry falls short of the Chaco ideal because building stone comparable to that of Chaco Canyon is not found in the vicinity. Aztec sandstones, and those generally throughout the northern country, are tough and cross-bedded; they lack the natural cleavage of Chaco sandstones.

Eventually both Lowry and Aztec were abandoned by their builders and thereafter were appropriated, partially repaired, and reoccupied by Mesa Verde peoples. This was also true of Solomon's Ruin, on the south bank of the San Juan River, and of various lesser structures to the northward. So-called Chaco peoples settled this northern country first and those with a Mesa Verde-like culture moved in later. Where remains of the two occur at the same site "the Mesa Verde is always on top" (Morris, 1939, p. 204)—not Classic Mesa Verde necessarily but its forerunner.

The range of Chaco-like influences and the occurrence of Chaco-like pottery and Mesa Verde-like pottery in the same river valleys and even in the same ruins were puzzles Earl Morris took for his own. No one did more than he to define and interpret the factors in these puzzles. He recognized the West Pueblo at Aztec Ruin as a Chaco-type building but regarded the pottery of its builders as no more than "Chaco-esque." He recognized the contemporaneity of "true Chaco," "Chaco-like," and "non-Chaco" earthenware throughout La Plata Valley (Morris, 1939, p. 205). Chaco-like pottery and masonry were especially noticeable at his Sites 36, 37, 39, and 41 and each of these had been reoccupied by peoples with a Mesa Verde-like culture.

On his plan of Aztec Ruin, Morris (1924) includes the local Great Kiva and 28 lesser kivas. Of these latter, 12 are represented with shallow basal recesses, 8 to 10 pilasters, and subfloor ventilators. Two (C, N) are shown with the deep south banquette that identifies them with the period of Mesa Verde, or a proto-Mesa Verde, occupancy. I use "proto-Mesa Verde" as a synonym because, unlike others, I see only one Mesa Verde-like culture for the Mesa Verde country—a culture born in small-house settlements westward toward the Rio Colorado or beyond, a culture that developed vigorously in McElmo Canyon and its numerous tributaries along the Colorado-Utah border

and culminated on the Mesa Verde itself in such composite cave communities as Spruce-tree House and Cliff Palace, with their distinctive pottery and numerous ceremonial chambers or kivas.

So-called Mesa Verde-type kivas may differ from place to place but they retain as fairly constant fixtures an encircling bench about 3 feet high, six masonry pilasters rising 2 to 3 feet higher, a deep above-bench recess or "banquette" at the south with a floor-level ventilator underneath and, between fireplace and north bench, a cylindrical hole in the floor, the *sipapu*, symbolic passageway from the underworld (Kidder, 1924, p. 60).

Chaco Canyon kivas, on the other hand, have low, log-enclosed supports for their cribbed ceilings rather than 3-foot-high masonry pilasters. They have a shallow in-bench recess at the south, a sub-floor ventilator connecting with an external shaft, and a sunken "vault" of unknown function west of the fireplace. They lack the deep, above-bench south banquette of Mesa Verde kivas and they lack the sipapu. In all the Society's Chaco Canyon investigations no kiva-floor hole was found that could positively be identified as a sipapu except, possibly, that in Kiva Q. But, as we shall see, both Mesa Verde-type and Chaco-type kivas occur at Pueblo Bonito.

Throughout the Mesa Verde country and southward many archaeological sites, early and late, display a mixture of elements considered distinctive either of the Mesa Verde culture or the Chaco. Morris's Site 39, at the junction of La Plata River and Barker Arroyo, includes a number of buildings evidencing occupancy from BM. III to late P. III, or Mesa Verde, times (Morris, 1939, pp. 50-55). Building I, a late structure, is noticeably Chaco-like in its planned arrangement; refuse piled on the north side contained many sherds that "in quality of paste, surface treatment, and ornamentation, might have come from the dump of Pueblo Bonito." But, the smaller of its two intramural kivas, No. 6, had eight masonry pilasters 3 feet high, a sub-floor ventilator, a shallow basal recess at the south, and a 39-inch-deep banquette above—a combination of Chaco-like and Mesa Verde-like fixtures.

Beneath Building I were remains of a Pueblo II cobblestone structure that included four small kivas of which Morris cleared two. One of these was typical of the Mesa Verde but its companion, Number 1, had a 9-inch-wide bench without pilasters, a south recess 6 inches deep, a sipapu, and an under-floor ventilating system—the only instance, if I read correctly, in which a subfloor ventilator is reported in a Pueblo II kiva. Here, then, as in the overlying Pueblo III build-

ing, architectural features that later came to distinguish Mesa Verde and Chaco-type kivas appear together in the same chamber.

Presumably all circular kivas, irrespective of period and locality, evolved from BM. III—P. I pit-houses wherein family living quarters were combined with an area set apart for rituals. Brew (1946) describes 14 such combinations at Site 13 on Alkali Ridge, southeastern Utah. No two are exactly alike. With one exception (N) all had four roof-supporting posts, a restricted area at the south, and a low passageway to an antechamber. Some had a sipapu or possible sipapu; 3 (B, E, M) were lined at floor edge with 2-inch-diameter posts, upright or leaning inward; one (H) had a three-quarter bench and upright posts at the rear of it.

Small posts slanting roofward from the rim of a pit-house, or from its "bench" when the pit was deeper, are characteristic of the Pueblo I period. They have been noted, north and south, wherever pit-dwellings are known and will be cited again in our description of P. III kivas at Pueblo Bonito. By their own charred timbers, a majority of dated pit-houses apparently were constructed in the 8th century. As previously noted, at least two of them occur in Chaco Canyon.

One-story surface structures walled by posts packed between with mud—a specialty of Pueblo I architects—often accompanied BM. III and P. I pit-dwellings. Roberts (1930) describes three different kinds of post-and-mud structures in the Piedra district, east of the Mesa Verde, each kind grouped crescentically about the north and west edges of the pit that supplied mud for house walls. Pueblo I post-stone-and-mud construction persisted on Alkali Ridge even after local pottery had developed into types generally recognized as Pueblo II (Brew, 1946, p. 222). Rocks crowded into the mud between posts led to coursed stonework and single-coursed masonry has long been regarded, sometimes incorrectly, as a badge of Pueblo II civilization.

Lancaster and Pinkley (1954) describe a remarkable sequence of three superposed P. II kivas at Site 16, Mesa Verde National Park, each provided with sipapu and lateral ventilator. The first was a simple 4-post jacal structure while the second was walled with "single-coursed" masonry and the third, with "double-coursed" stonework including blocks dressed by pecking. Alone among the three, this uppermost Site 16 kiva possessed masonry pilasters (eight in number, 2 feet high) and a deep south recess—features that thenceforth were to distinguish Mesa Verde kivas.

On the basis of our explorations at Pueblo Bonito the two bark dates, A.D. 1074, cited by Lancaster and Pinkley (*ibid.*, p. 78) seem to me a bit late for a Pueblo II building although quite in keeping with "double coursed" masonry. Both single- and double-coursed stonework appear at Pueblo Bonito, but the latter was not introduced until after 8 feet or more of household rubbish had accumulated in front of the original settlement. That original settlement was a crescent-shaped Pueblo II village of single-coursed masonry; 12 of the 13 datable timbers we recovered from its ruins were felled between A.D. 828 and 935. In contrast, beams, ceiling poles, and lintels salvaged from later portions of the same pueblo, those with double-coursed masonry, bear tree-ring dates from A.D. 1011 to 1126.

These latest rooms, despite their superior construction, were first to be abandoned as I read the record, and they were stripped of their furnishings in the process. The Old Bonitians, on the other hand, remained in residence and amassed the cultural treasures and the foodstuffs cataloged by the Hyde Expeditions. If eight Old Bonitian rooms eventually were converted into burial vaults for a hundred dead that could not be interred in the accustomed place the fact merely evidences continuing occupancy under adverse conditions (Judd, 1954, pp. 325-341). We found no adult burial in Late Bonitian dwellings.

Pueblo II masonry at its very best is found in Old Bonito—its equal has not been reported elsewhere—wall-wide slabs of sandstone spalled around the edges and bedded one upon another in a surplus of mud mortar (pl. 10, 1). Interior walls may include upright slabs at the base or posts with mud and rocks between in the old P. I. tradition; exteriors may slant inward after the manner of pit-house walls and may be studded with stone chips, presumably to lessen erosion by wind and water.

In his tabulation of architectural features observed on Alkali Ridge, Brew (1946, pp. 204-205) notes that 8 of the 14 BM. III—P. I pit-dwellings at Site 13 were equipped with 4 roof-supporting posts while five had six posts each and one (N) had none. Nine Pueblo II kivas on Alkali Ridge, like nearby pit-houses, had been dug down into native earth and plastered. Each of the nine was provided with a lateral, above-floor ventilator; the sipapu was present in five and absent in four; the deep south banquette appeared in two only, those at Site 11 and in Unit 2, Site 13.

Five of Brew's nine P. II kivas had six masonry pilasters each, two had eight, one had four, and the ninth retained the four free-standing

posts that preceded pilasters. Roberts (1939, p. 35) advances the very plausible thought that stones piled behind a weakened roof support led to masonry pilasters and that these latter eventually supplanted posts altogether. Kivas at Brew's Sites 3 and 9, one with four masonry pilasters and the other with four roof-supporting posts, were both bowl-shaped and seem likely forerunners of the bowl-shaped P. II kivas at Old Bonito.

From his investigations at Whitewater, Roberts (1939) points to two bench-wide adobe ridges in Structure 12 as possible antecedents of the low Chaco-type pilaster and to the subfloor ventilator in Kiva B, Unit 2—the only one observed at Whitewater—as one of the earliest of its kind. Both Kiva B and Structure 12 are described as Developmental Pueblo, or P. II; both were provided with the symbolic sipapu. But the subfloor ventilator was installed when Kiva B was reconditioned and a new floor laid. The possibility remains, therefore, although Roberts does not hazard the guess, that this renovation of a P. II kiva occurred coincident with construction of two nearby P. III house units and a Great Kiva, each of which possesses undeniable Chaco affinities and may be more or less contemporaneous with the Village of the Great Kivas on the Zuni Reservation, which is definitely P. III in time and possibly even post-Bonito (Roberts, 1932, p. 169).

The subfloor ventilator in the P. II kiva beneath Morris's Building I, Site 39, appears to be fully developed (Morris, 1939, p. 53). Since there is no hint here of reconstruction, this second example may be older than that in Roberts's rebuilt Kiva B. In either case the two apparently identify the subfloor ventilator—one of the most pronounced differences between Mesa Verde and Chaco kivas—as a P. II innovation. I know of none earlier. Two earthenware vessels crushed upon the floor of his buried kiva are also identified by Morris as Pueblo II.

There is still disagreement as to the actuality of P. II pottery just as there is dispute as to what constitutes Mancos Black-on-white and McElmo Black-on-white. Martin (1936, pp. 80-94) first described Mancos Black-on-white from Lowry Ruin where it was present "from earliest times, rising and then gradually decreasing in percentage" and, as it decreased, McElmo Black-on-white, "formerly known as proto-Mesa Verde," rose in favor (*ibid.*, p. 113). In part because these two varieties were associated at Lowry, Martin classified the ruin as "late P. II—early P. III" in time and culture but with strong Chaco affiliations. Indeed, his Mancos Black-on-white re-

sembled Chaco pottery so closely he was sometimes undecided whether a sherd in hand was one or the other (*ibid.*, p. 112). The nine known tree-ring dates from Lowry, A.D. 987-1086 (Smiley, 1951, p. 23), lie within the Pueblo Bonito bracket.

Presence of Mancos and McElmo pottery in association at northern ruins has long puzzled archeologists of the Pueblo area. Both are primarily sherd-tempered, but the one is ornamented with mineral paint and the other with organic. Mineral paint persisted from P. I through the Chaco-like phase of P. III, but meanwhile the use of organic paint increased progressively and became dominant by the end of the period, when Classic Mesa Verde was in its prime (Shepard, 1939, p. 254).

From Mesa Verde National Park Deric O'Bryan (1950) contributes to the definitions of both Mancos Black-on-white and McElmo Black-on-white. He identifies the first with small, one-kiva house units dated approximately A.D. 900-1050; the McElmo Phase, about 1050-1150, is identified with larger masonry settlements whose kivas in addition to the six pilaster-sipapu-fireplace-deflector and above-floor ventilator combination of Mancos Phase kivas, have the deep south banquette as an established feature. Here, then, in O'Bryan's post-1050 McElmo Phase is the fully developed Mesa Verde kiva of Kidder's definition, the one with the deep south banquette. O'Bryan found no pure McElmo site but noted that McElmo Black-on-white pottery sometimes occurs on Mancos ruins and even on those of post-McElmo times.

At their Site 16, also on Mesa Verde, Lancaster and Pinkley (1954, p. 70) noted that "90 percent of the pottery . . . is assignable to the P. II period, or the Mancos Mesa phase." Reed (1958) recognized both Mancos and McElmo among Chaco-like sherds at 4 late P. III, or Mesa Verde, sites he excavated in Mancos Canyon but regarded the McElmo as merely an improved Mancos. "Generally," he wrote (*ibid.*, p. 83) "Mancos Black-on-white has been called 'Chaco' pottery or thought of as closely related to Chaco pottery" and, again, as though clarifying Morris, "The so-called non-Chaco pottery of the Chaco period on the La Plata is clearly Mancos Black-on-white decorated with solid elements, lines and dots, and parallel stripes; the so-called Chaco-like is hachure-style Mancos" (*ibid.*, p. 97).

When Brew (1946, p. 285) found Mancos Black-on-white and McElmo Black-on-white intermixed in household waste on Alkali Ridge he listed the former as P. II and the latter as P. III but added "the Mancos . . . had begun to show Mesa Verde features. The

Mesa Verde was for the most part of the kind that could be called McElmo." Under the circumstances Brew took a second look at the McElmo and decided on the spot "to call it early Mesa Verde."

Early Mesa Verde, or McElmo, Black-on-white is a conspicuous variety at Chaco Canyon ruins, large and small. It was abundant in late deposits at Pueblo Bonito and upcanyon; it was preponderant at Pueblo del Arroyo (Judd, 1959, p. 175; Vivian, 1959, p. 26). Its off-color white slip, its rounded or flattened and tick-marked rim, its black organic paint, and its near-Mesa Verde designs separate it from other local types. It was a late arrival at Pueblo Bonito since, in 12 feet of West Court rubbish, Roberts and Amsden recovered no sherd of it below the upper 4 feet. Hence McElmo Black-on-white serves as an index to the comparative age of household sweepings wherever found in the valley.

At Leyit Kin and Bc 50-51, small-house sites opposite Pueblo Bonito, the presence of Mancos Black-on-white and McElmo Black-on-white proved puzzling to Brand, Kluckhohn, Dutton, and their colleagues from the University of New Mexico because, as I read their evidence (Brand, et al., 1937; Dutton, 1938; Kluckhohn and Reiter, 1939), all were too intent upon a greater antiquity. Casual sherd samples I collected in 1920 at half a dozen small sites on the south side of the canyon between The Gap and Winito's Rincon (U.S.N.M. Nos. 315841-867), and perhaps including Bc 50-51 and Leyit Kin, contained such a large proportion with Mesa Verde-like designs I classified them at the time as P. III and thus contemporaneous more or less with the major Chaco ruins (Judd, 1921, p. 102).

Based on this 1920 judgment, our Pueblo Bonito stratigraphy, and excavation data since published, Leyit Kin and Bc 50-51 appear to me no more than P. III offshoots from Pueblo Bonito or Chetro Kettle. Use of cottonwood and pinyon *vigas* (Kluckhohn and Reiter, 1939, p. 33) was a P. II trait at Old Bonito; "keyhole" kivas with high masonry pilasters and above-floor ventilators echo the Mesa Verde country. Only one kiva, No. 4 at Bc 51, had a subfloor ventilating system; all pottery types reported, irrespective of name, are varieties represented in the 12-foot-deep rubbish in the West Court at Pueblo Bonito. The preponderance of McElmo Black-on-white at Bc 50-51 together with rude masonry when tabular sandstone was readily accessible, adult burials in rooms, and use of potsherds as wall chinking combine to suggest a late P. III, Mesa Verde-like occupancy. Seven timbers from Leyit Kin were all felled in A.D. 1039 (Dutton, 1938, p. 23). That an underlying pit-house was en-

countered during excavation of Bc 50 is quite within reason for a typical P. I shelter lies at the base of a near-by slope and P. I or older peoples were long resident in Chaco Canyon (Judd, 1924*b*; Roberts, 1929; Bryan, 1954).

The association of P. II and P. III cultural traits, including kiva fixtures, is apparent at other sites, large and small, throughout the Chaco area. Still others, as Kidder (1924, p. 57) anticipated, may represent an earlier or a later horizon. There are the ruins Amsden examined south of Pueblo Bonito, and there is the one Roberts partially excavated in 1926 about 10 miles to the east (Judd, 1927*a*, p. 166). This latter contained so many adult burials and so many pieces of late Mesa Verde pottery (U.S.N.M. Nos. 334123-154) it was dubbed at the time "the Mesa Verde house."

Under special permits from the Department of the Interior, the Pueblo Bonito Expedition in 1925 extended its inquiries beyond Chaco Canyon. Monroe Amsden that year examined 16 small-house ruins in Kinbiniyol Valley, south of the Chaco (U.S.N.M. Nos. 329803-845) and the following summer, 1926, Frank H. H. Roberts, Jr., cut two stratigraphic sections, one 10 feet deep and the other 12, through village waste at Pueblo Alto, on the cliff north of Pueblo Bonito, and three similar tests, varying in depth from 3 feet 3 inches to 8 feet 8 inches, at Peñasco Blanco (Judd, 1927*a*, p. 168).

Amsden's data remain unpublished, but together his 16 small ruins impress me as being hastily built, briefly occupied refuges of post-P. II family groups, harried and on the run. Masonry, for example, is primarily of wall-wide sandstone blocks, relatively thick, not face-dressed but amply chinked, and with upright slabs at the base. Ruin 13, a compact unit in one corner of a slab-enclosed court, includes a kiva without pilasters but with a shallow basal recess at the south and a deeper banquette above, a square ventilator opening 2 inches above floor, a wattled deflector banked with adobe, a masonry-lined fireplace, and a probable sipapu. Ruin 13 potsherds (U.S.N.M. No. 329823) include Straight-line Hachure but those with solid lines, stepped triangles, ticked lines, and checkerboard figures are more numerous.

The stratigraphic data collected by Roberts at Peñasco Blanco and Pueblo Alto were, with my permission, included in his 1927 doctoral dissertation at Harvard and have since been cited repeatedly by other investigators. For our present review of Chaco Canyon history, however, it is important to note that the Pueblo Alto sherds (U.S.N.M. Nos. 334161-162) evidence construction and abandonment while Pueblo Bonito was in its prime since Old Bonitian types and

the famed hachured varieties of the Late Bonitians are both generally missing. At Peñasco Blanco, on the other hand, Roberts's stratigraphy reveals Transitional and Degenerate-Transitional from bottom to top, Chaco-San Juan and other late varieties in the upper strata only (U.S.N.M. Nos. 334166-168). This sherd record, coupled with a section of first-type, or Old Bonitian, masonry visible on the north-west side (the only ruin other than Pueblo Bonito where such masonry is known to occur in Chaco Canyon) suggested to Roberts that Peñasco Blanco was founded about the same time as Pueblo Bonito but may have been abandoned a bit earlier.

Potsherds we gathered in 1920 and 1925 from the surface at Chettro Kettle, Hungo Pavie, Una Vida, Weje-gi, and Pueblo Pintado likewise include relatively few Transitional and associated Old Bonitian fragments in proportion to later varieties such as the three hachured types, our organic-paint Chaco-San Juan or McElmo Black-on-white, and Corrugated-coil Culinary. This preponderance of late over early varieties of pottery suggests to me an outward movement from Pueblo Bonito—an outward movement which other students will dispute and which, admittedly, is not fully substantiated by our too-short list of constructional dates.

The number and range of tree-ring dates from major Chaco Canyon ruins, originally reported for the Pueblo Bonito Expeditions by Douglass (1929, 1935), have recently been reviewed by Smiley (1951) and Bannister (1959) and are listed herewith, from Peñasco Blanco eastward to Pueblo Pintado, the out-of-canyon sites being grouped at the end:

<i>Ruin</i>	<i>Number</i>	<i>Range of cutting dates</i>
Peñasco Blanco	(18)	898-1087
Ruin 9 (Casa Chiquita).....	(1)	-1060
“ 8 (Kin Kletso).....	(17)	1059-1178
Pueblo del Arroyo.....	(35)	1025-1117
Pueblo Bonito	(71)	828-1126
Chettro Kettle	(351)	911-1116
Hungo Pavie	(14)	942-1077
Una Vida	(8)	847-1048
Weje-gi	(1)	-1027
Pueblo Pintado	(2)	-1060
Pueblo Alto (N. cliff).....	(0)	
Sin-kle-sin (S. cliff).....	(2)	-1111
Kinklzhin (Black House).....	(1)	-1084
Kinbiniyol	(9)	941-1124
Kinya-a (Pueblo Viejo).....	(6)	1097-1106

Tree-ring dates merely suggest the period during which construction may have been under way. They cannot be taken at face value, especially when few in number. Timbers were used and reused, as Douglass (1935, 1939) observed after examining the material collected by the National Geographic Society Beam Expeditions of 1923, 1928, and 1929. Chaco Canyon forests indubitably were reduced, possibly destroyed, by builders of the major pueblos and while these latter were under construction it is reasonable to believe that, suitable trees being fewer and farther afield, easily accessible timbers were being salvaged from one abandoned village and carried to the next, as happened when Awatobi beams were transported to Hano and Walpi.

Decimation of the Chaco forests would have hastened formation of a contemporary arroyo, and this in turn would have brought about reduction in bordering farmlands. In arroyo formation, as Bryan (1954, p. 12) pointed out, erosion progresses headward or upstream and because there is progressive reduction in the number of rooms and in the quantity of visible rubbish especially at Hungo Pavie, Una Vida, Weje-gi, and Pueblo Pintado, it is my theory these east-lying ruins, reflect an up-canyon shift of a reduced population. As their fields failed, the village dwellers moved. And they moved just far enough, a mile or two at a time, to keep beyond the annually advancing arroyo. Food has always been a strong incentive to migration!

With fewer data available, Kidder (1924, p. 55) doubted that more than four or five major Chaco pueblos were inhabited simultaneously or that the population of the valley ever exceeded 6,000. On the basis of our later observations, I would reduce those estimates by half, to two great houses or three at most. I find no reason to believe the Old Bonitians were involved in this theoretical upcanyon population shift. They stayed behind, at least for a time, and stubbornly tilled their ancestral acreage, however curtailed. Malnutrition is evidenced in Old Bonitian skeletal remains recovered by the National Geographic Society (Judd, 1954). It was the Late Bonitians who moved and rebuilt and moved again.

Stonework associated with datable timbers is a further index to the age of a Chaco ruin. Florence Hawley (1938, p. 250) saw 10 distinct variations in Chaco Canyon masonry. At Pueblo Bonito I recognized four principal varieties: the oldest, P. II or Old Bonitian; the other three, Late Bonitian. Twelve tree-ring dates recovered from the older part of town extend from A.D. 828 to 935; 44 dates from Late Bonitian houses range from 1011 to 1126.

To judge solely from this Pueblo Bonito sequence, upcanyon masonry is all late. If my presumed eastward movement were spurred in any degree by enemy peoples, Weje-gi displays the only evidence—a row of cliffside portholes. Pueblo Pintado, easternmost of the major Chaco ruins and a prominent landmark from every direction, stands astride the Continental Divide.

Once the Divide had been attained which path was taken by bearers of the Chaco Culture? I do not know. Dispersal was by clan or family groups, the Late Bonitians first and the Old Bonitians sometime after. Nowhere is there evidence of mass migration. The two peoples did not necessarily follow the same trail but both left Chaco Canyon. Small pure Chaco sites are reported along the Continental Divide, southward from Pueblo Pintado and West of Mount Taylor. Reed (1950, p. 92) postulates a population shift eastward to the upper Rio Grande but elsewhere (1955, p. 179) recognizes among potsherds collected in the Zuñi country "true Chaco Black-on-white of the twelfth century."

A twelfth century migration southward from the Chaco country seems entirely reasonable. The latest known growth-ring from Pueblo Bonito is A.D. 1126; only one later Chaco date has been reported, A.D. 1178 from Ruin 8 (Kin Kletso) a half-mile west of Pueblo Bonito (Bannister, 1960, p. 20). All Late Bonitian rooms we explored had been vacated and stripped of their furnishings while the Old Bonitians continued in residence, storing their autumn harvests and, contrary to their cultural heritage, burying at least some of their dead in unused groundfloor rooms.

The small clustered rooms of Hopi towns have always seemed to me a reflection of those in Old Bonito just as the large, high-ceilinged rooms of Acoma and Zuñi have seemed to echo those of Late Bonito. This is only a personal impression, to be sure, but Chaco Canyon influences are stronger in south central New Mexico than in any other area personally known to me. And there remains the intriguing fact that the Zuñi, culturally Puebloan, are an isolated linguistic group.

The paired kivas Hodge (1923) excavated back of Hawikuh are pre-Zuñi and follow the Chaco tradition with their subfloor ventilators and sunken vaults west of the fireplace. Ruins underlying Ketchipauan, one of the Seven Cities of Cibola, are of excellent masonry and the equal of that at the paired kivas near Hawikuh.

In a letter of August 18, 1921, addressed to the first symposium held at the National Geographic Society's Pueblo Bonito camp, N. C.

Nelson recalled his observations at Acoma pueblo where house construction and orientation reminded him of ruins in Chaco Canyon although he saw no comparable affiliations in local pottery.

At Kiatuthlanna (1931), the Village of the Great Kivas (1932), and at Whitewater (1939, 1940), Roberts laid bare a cultural sequence extending from BM. III and P. I pit-houses to the terraced buildings of Pueblo III. Echoes from the Chaco were everywhere present and so were traits from the Mesa Verde country. With the sipapu an almost constant feature and base slabs overlain by coursed masonry occurring more frequently than is customary for their kind, the Whitewater pit-houses may represent a local architectural advance over those elsewhere or they may reflect usurpation of existing dwellings by later immigrants. Pit-house Number 2, for example, provided a tree-ring date of A.D. 814 while a room in Unit 3, a P. II building, gave one 200 years later, A.D. 1014, obviously late for a P. II structure. Summarizing his researches in this area, Roberts wrote (1939, p. 263) "the ruins . . . represent a peripheral lag in the Chaco pattern and, despite many recent expressions of opinion to the contrary, the flow of influence was from the Chaco . . . and not the reverse."

The Village of the Great Kivas on the Zuñi Reservation with its late Chaco masonry and pottery (Roberts, 1932); the two pre-Zuñi kivas near Hawikuh (Hodge, 1923); the typically Chaco black-on-white pottery from small-house sites south of Fort Defiance, Ariz. (Kidder, 1924, p. 56); the two earth-walled kivas at Site LA 2505 about 20 miles north of Gallup, N. Mex., one (B) with a deep south banquette, sipapu, above-floor ventilator, and tree-ring dates of A.D. 1020 and 1047 (Smiley, 1951, p. 26), and the other (A) with a lateral ventilator sealed and replaced by one of the subfloor variety (Bullard and Cassidy, 1956); the late Chaco masonry, Chaco-like pottery, and a Great Kiva in Manuelito Wash, south of Gallup (Reed, 1944, p. 167; Judd, 1954, p. 34), and Seltzer's comparative data (1944, p. 17) on Old Zuñi and Pueblo Bonito skulls, all offer strong support for the theory of a southward trek from Chaco Canyon in the twelfth century or thereabout.

Gladwin (1945), Martin (1936), and O'Bryan (1950) are among those who see the Chaco Culture rising from BM. III and P. I pit-houses of the Little Colorado-Puerco drainage and spreading thence northward through increasingly larger settlements to its demise in Chaco Canyon. Roberts and the present writer see distribution in the

opposite direction, from north to south, but neither is yet prepared to put a finger on the place of origin.

At Pueblo Bonito we have the distinct P. II culture of Old Bonito and the better known P. III culture of the Late Bonitians. Both were born somewhere among the sage-covered mesas and valleys of southeastern Utah and southwestern Colorado. There, among those valleys and mesas, the whole panorama of Pueblo architectural development lies exposed to view—a development that extends from single, earth-walled pit-houses to the wide-curving post-and-mud surface communities of P. I, to the wall-width masonry and crescentic grouping of P. II dwellings and storerooms and, finally, to the many-roomed, multiple-storied towns of Pueblo III. Somewhere in that far-reaching scene, and most likely where Pueblo II flourished, eventually will be found the cross-road from which the so-called Mesa Verde and the Chaco peoples took their separate ways.

The masonry-lined subfloor vault of Chaco kivas, although of unknown purpose, seems so unusual a feature its origin and development should be traceable. But nowhere among published descriptions do I find anything even remotely comparable except the oval depressions, filled and floored over, reported by Roberts (1939, p. 106) in P. I Structure 12 at Whitewater, Arizona, and by O'Bryan (1950, p. 34) in a P. II kiva at Site 102, Mesa Verde National Park, Colo., 150 miles distant.

At some as yet undetermined point in Pueblo prehistory, clan ritualists replaced the four traditional roof-supporting posts with masonry columns and later replaced these with low-log-enclosed pilasters. At some still unidentified stopping place they introduced a new, subfloor type of ventilator, eliminating the deflector. The one Morris (1939, p. 53) describes in a P. II kiva under Building I, Site 39, is the earliest of which I am aware but a companion kiva, Number 2, was typically Mesa Verde with its 6 masonry pilasters, a deep south banquette, and a lateral ventilating system. I know of no horizontal, log-enclosed pilaster earlier than those in the bowl-shaped P. II kivas at Pueblo Bonito.

Lowry Ruin, the West Pueblo at Aztec, Solomon's Ruin near Bloomfield, N. Mex., and the short-lived structure on Chimney Rock Mesa near Pagosa Springs, Colo. (Jeancon, 1922; Roberts, 1922), are among those repeatedly described as probable colonies from Chaco Canyon. Available tree-ring dates as listed by Smiley (1951) lend credence to this theory of colonization since a majority—49 from Aztec, A.D. 1110-1125; 9 from Lowry, 987-1086; 3 from Solomon's

Ruin, 1086-1089—lies in the last third of dated architecture at Pueblo Bonito. But the subject is not so easily dismissed.

The East Kiva on Chimney Rock, which seems so isolated and alone, is undeniably Chaco-like in its lack of a sipapu, its low log-enclosed pilasters, its west-side vault, and a subfloor ventilating system that was rebuilt to the original plan when the floor was raised. These Chaco resemblances invite further exploration, but at the time of his initial visit Roberts (1922, p. 12) recorded his then opinion that Chimney Rock pottery looked older than that of Chaco Canyon. If he is correct in this early impression then the associated Chaco-like masonry must be older and Chimney Rock stands not as a colony from Chaco Canyon but as a possible way station on a path southward.

"The Chaco-like remains north of the San Juan, both architectural and ceramic," wrote Earl Morris (1939, p. 204), "are so widespread and so numerous that I consider it untenable to view them wholly as an extension of or a backwash from, the Chaco Canyon center. . . . The most Chaco-like of the vessels from the north country, which seem so significant when viewed singly or selectively grouped, become far less so when viewed as the minor component that they are of the totality of wares among which they occur."

Kidder obviously had the same intangible evidence in mind when he observed that Chaco-like vessels from Montezuma Valley and McElmo Canyon, target of commercial and amateur collectors for half a century, "are seldom of the most pronounced Chaco types; they give one the impression of being either the product of a peripheral development affected by Chaco influence, or of an earlier and less specialized stage of the Chaco culture" (Kidder, 1924, p. 56). They may, he added, "indicate a northwestern spread or a northwestern origin" of that culture. Anna Shepard may have seen a like probability when she hinted (1939, p. 285) a common source in early P. III times or previously for the mineral-paint Chaco and the carbon-paint Mesa Verde wares.

Morris doubtless would have regarded Chimney Rock pottery as "more Chacoese than Chaco." To him the many small ruins throughout the San Juan and Animas valleys in which Chaco-like pottery predominates might be earlier, contemporary with, or even later than Chaco-like Aztec pueblo (Morris, 1928, p. 418). He does not so imply but some one of these small ruins may have spawned the unique ideas in architecture and in pottery ornamentation that brought about the Pueblo III conquest of Chaco Canyon.

In pursuing our investigations for the National Geographic Society

we failed to identify all the distinctive qualities that have set the Chaco Culture apart, but we did discover a great deal previously unknown about Pueblo Bonito. We learned that it is the architectural product of two unrelated peoples; that the first of these had been in residence long enough for 5 or 6 feet of blown sand to pile up against their homes before the second group arrived and built upon that sand. Source of the domestic water supply at Pueblo Bonito remains a mystery, but we turn with increasing favor toward the Navaho tradition that water could be had with shallow digging almost anywhere in the valley before erosion of the 1850 arroyo. The great natural cistern on the north cliff overlooking Pueblo Bonito was of limited capacity, even if it existed in A.D. 1000.

We learned that the forests which furnished roofing timbers for Pueblo Bonito flourished when rainfall was more abundant than it is today; that slow-flowing floodwaters following summer rains had spread widely across the valley floor annually depositing enough black alkali to lessen the productivity of village fields before a 12th-century arroyo lowered the water table beyond reach of surface vegetation.

We learned that each of three Late Bonitian additions to the original settlement had forced the abandonment and destruction of dwellings previously built; that plans for a fourth and more extensive addition were left incomplete and a substitute adopted. We learned that this substitute was itself abandoned when the Late Bonitians migrated, leaving their Pueblo II co-residents behind in sole possession of the compound pueblo. That these original settlers were last to depart is clear from the foodstuffs, the household utensils, and the ceremonial paraphernalia they left in their brush-roofed houses.

Reduction in arable lands, a consequence of reduced rainfall or erosion, seems a most likely cause for desertion of Chaco Canyon by the Bonitians. The Great Drought of 1276-1299 occurred 100 years too late to have been influential, but that of 1090-1101, perhaps an incentive for Bryan's buried arroyo, could have spurred the outgoing.

In the chapters which follow I shall seek to present Pueblo Bonito as we now know it, from the original P. II settlement to the last of the three additions planned and executed by the Late Bonitians.

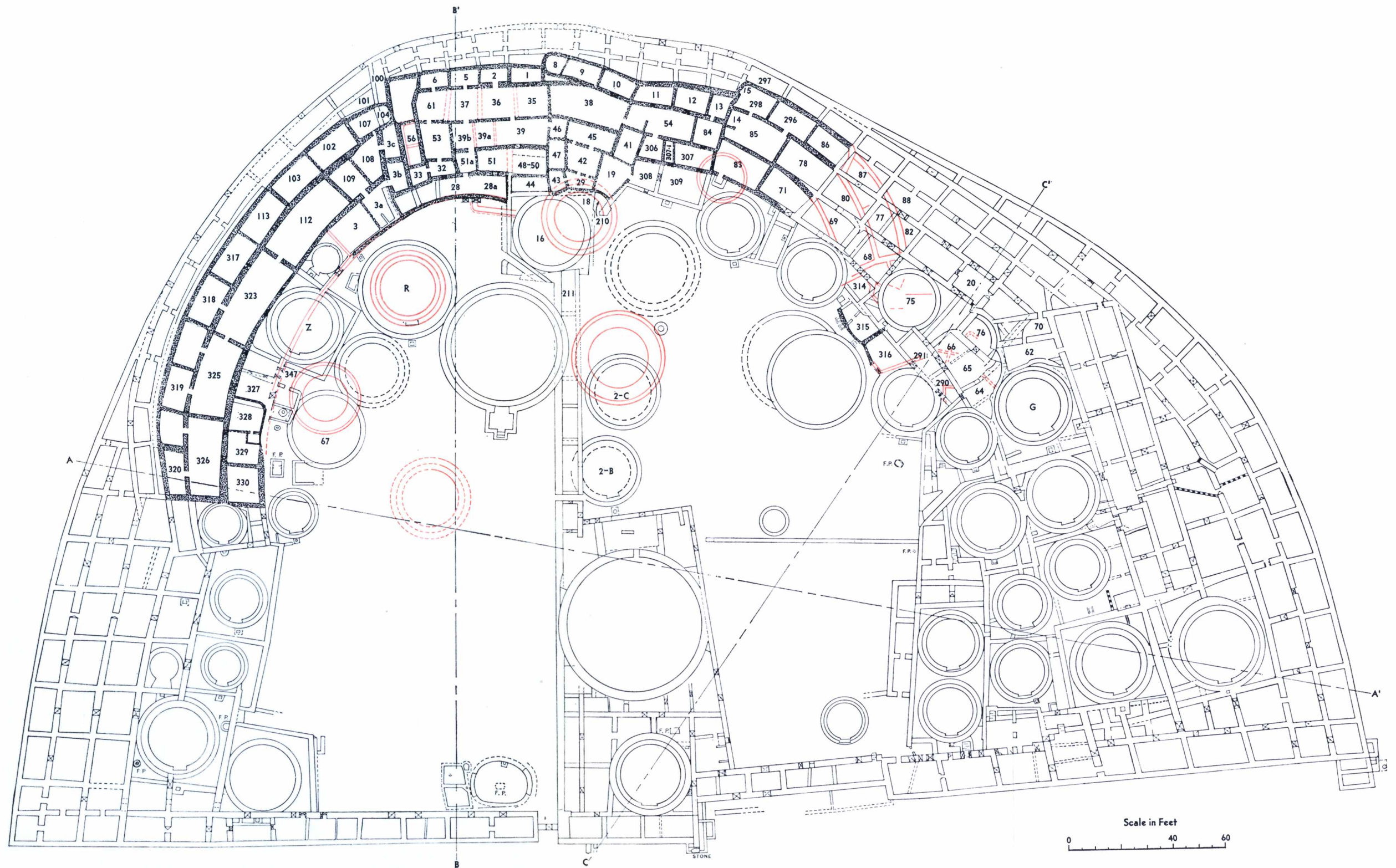


FIG. 3.—Ground plan showing extent of Old Bonito and known subfloor walls of first-type masonry.



PLATE 14

Left: Two-post
step to high north
door of Old Boni-
tian Room 325.

(Photograph by
O. C. Havens,
1924.)

Right: Looking
north through Late
Bonitian doors
from Room 175,
foreground.

(Photograph by
Neil M. Judd,
1926.)





PLATE 15

Left: Diagonal door, connecting Rooms 173B and 228B. At lower right, open door to Room 227.

(Photograph by Neil M. Judd, 1921.)

Right: The only first story diagonal door of record at Pueblo Bonito connected Rooms 257 and 258.

(Photograph by Neil M. Judd, 1926.)

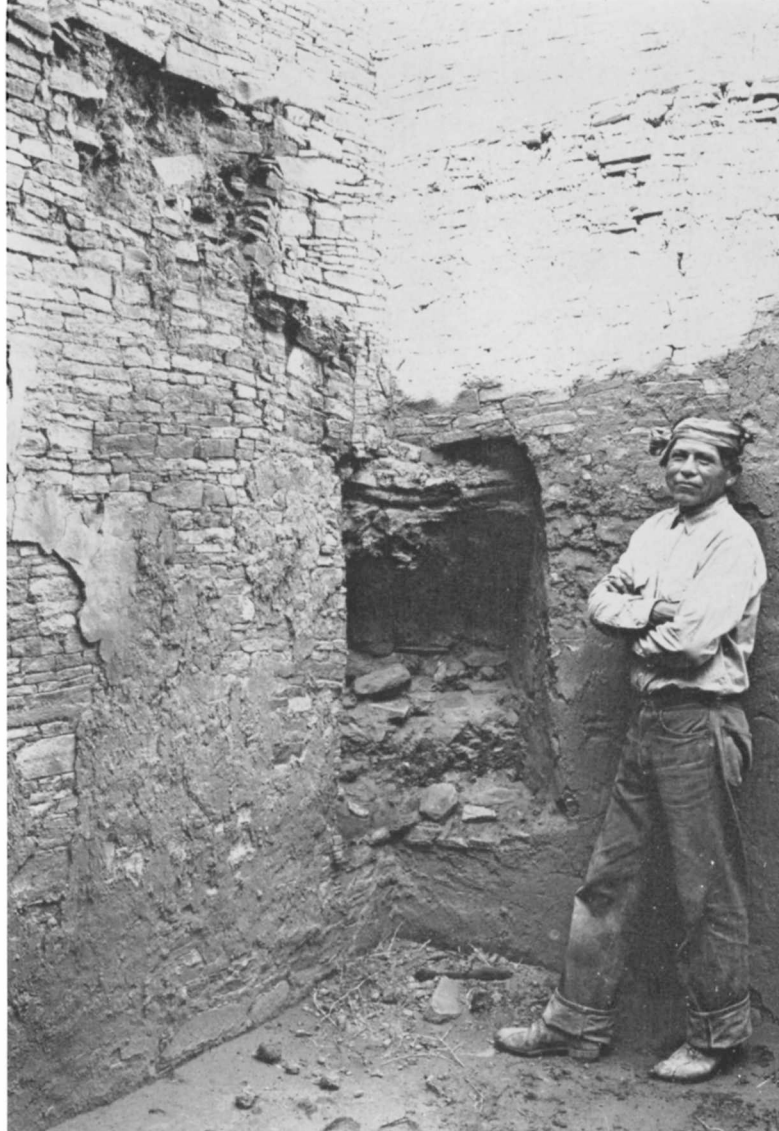




PLATE 16

Left: Blocked Tau-shaped doorway in third-type wall between Kivas V and 59.

Right: A huge Tau-shaped door, its sill 12 inches below floor level, formerly opened from Room 226 into 227-I.

(Photographs by Neil M. Judd, 1926.)

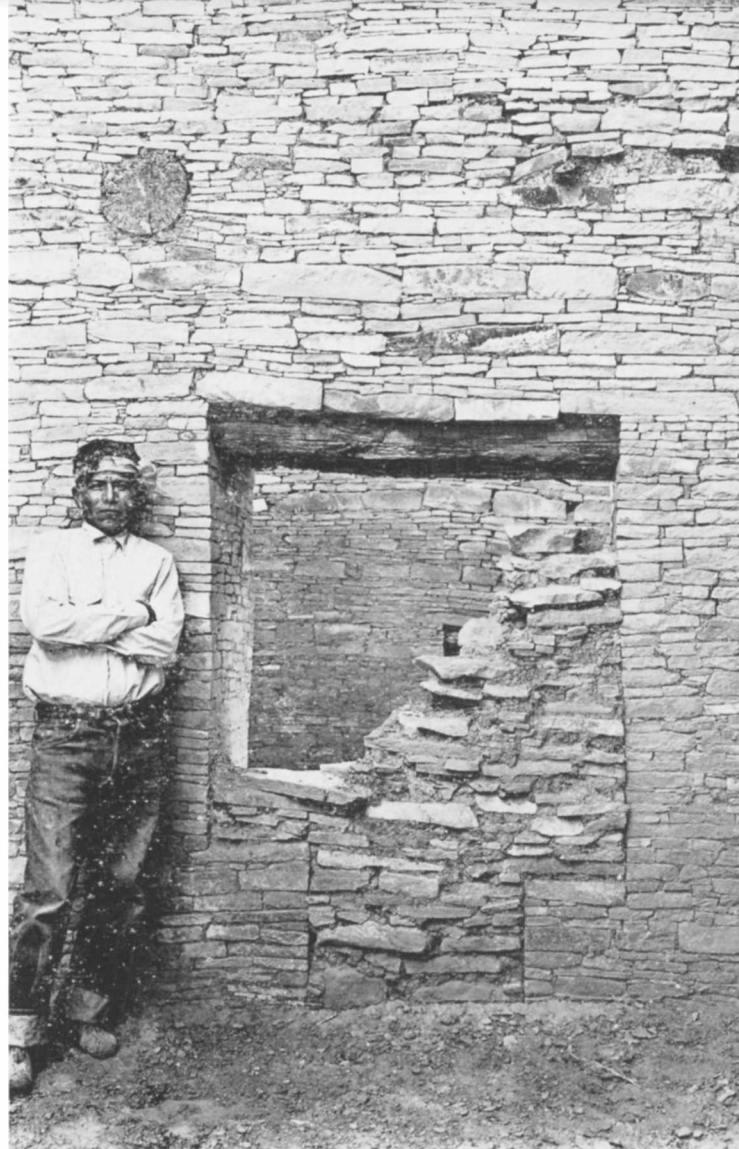


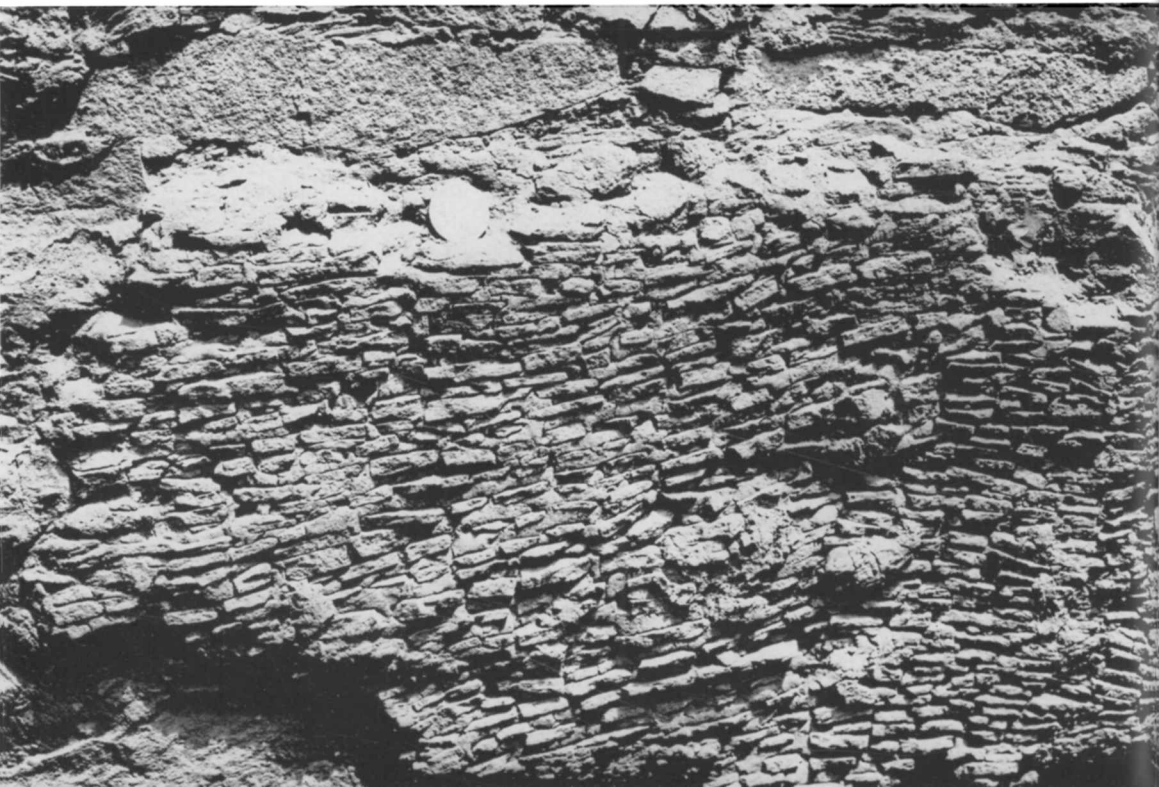


PLATE 17

Upper: Reduced fire-pit on West Court surface at Room 330 ceiling level.

Lower: Mosaic-work, lower outside wall of Old Bonitian Room 28. Stone-ax-cut beam, middle right; half-dollar, upper left.

(Photographs by O. C. Havens, 1924.)



II. OLD BONITO

Old Bonito is a Pueblo II settlement built of mud and wall-width slabs of sandstone. Its living rooms stand end to end in a wide crescent with one or two storerooms behind each dwelling, several subterranean kivas out in front of the house group, and a communal trash pile beyond the kivas. The Old Bonitians built their village close in the shadow of the north canyon wall, overlooking the broad Chaco Valley with its fringe of conifers, cottonwoods, and willows. When they began construction they built the foundations for their settlement over and between great blocks of sandstone previously fallen from the nearby cliff and apparently without thought as to the significance of those fallen blocks. And they probably were quite unaware that, long before, Pueblo I families had dug two or more pithouses on the same site (fig. 7).

On the Society's groundplan of Pueblo Bonito (fig. 3) the crescentic house cluster that identifies the original settlement stands out conspicuously. Jackson noticed its architectural peculiarities and so did Pepper, although neither recognized the unit as the home of an independent element in the local population. Old Bonito was planned and built by Pueblo II peoples and it remained a Pueblo II village even after Pueblo III clans had surrounded it with dwellings of their own.

The stonework of Old Bonito is typically Pueblo II—wall-wide sandstone slabs spalled around the edge with hammerstones and laid one upon another in generous quantities of mud (pl. 10, 1). Where surface mortar was noticeably thick, stone chips were pressed in to hold it in place or to protect it from wind and rain. Here, too, despite the intervening years, fingerprints of the builders remain for all to see.

This surface covering of close-lying chips occurred so frequently on exterior Old Bonitian stonework exposed by our explorations, we came to regard it as a standard Old Bonitian treatment. We found it on the outside of Room 102, concealed by the double-thick wall of Late Bonitian Room 94 (pl. 11, right). We found it on the exterior of Old Bonitian Room 13, on both the west and east ends of Room 28 (pl. 17, lower) and low on the outside of Room 330. Pepper (1920, pp. 317, 319) describes the same treatment on Old Bonitian masonry under Rooms 100 and 101.

The Old Bonitians were a stubborn people and especially so in their stonework. It never changed. Wherever found throughout the pueblo, irrespective of surroundings and irrespective of depth, Old Bonitian stonework remained the same—single-coursed, wall-wide slabs of sandstone bedded in a near-surplus of adobe mud.

In its crescentic arrangement Old Bonito is a haphazard agglomeration of large and small rooms added one by one as the need arose. But there is none that, from available data, can be recognized as the point of beginning. If a nucleus is to be found anywhere about the village it lies among the cluster of relatively small, crowded structures at the top of the crescent since larger rooms curve east and west. The quantity and diversity of ceremonial paraphernalia stored in some of those small rooms suggest an importance in the community quite out of proportion to their size. And four of them had come eventually to be used for burials—priesthood burials if one may judge from the wealth of accompanying ornaments.

Wherever we bared it the exterior rear wall of Old Bonito was double-thick at the bottom and sloped toward the ceiling. It had no door. Outside rooms, set aside for storage, were entered from the living rooms and these latter were entered through the concave front wall or through hatchways. Those we excavated, Rooms 296, 298, 317-330, were relatively straight-sided within, repeatedly plastered, and as often smoke stained. Large and small, there was a feeling of austerity about them, an emptiness that would have been less apparent, naturally, had we found more evidence of domestic life—kitchen utensils, mealing stones in place, poles or pegs for suspended blankets, agricultural tools, and implements of the craftsman.

THE HOUSES OF OLD BONITO

Irrespective of size, Old Bonitian rooms were floored with trampled mud and ceiled with whatever materials were near at hand. Cottonwood, pine, pinyon, or juniper logs—their ends gnawed beaver-like with stone axes—appear to have been utilized indiscriminately; brush of one sort or another was employed over the logs in Rooms 1, 3a, 3b, 28, 35a, 56, 320, 323, 327, and 330; reeds or grass are reported from at least 2 ceilings, in Rooms 3d and 85; cornstalks were included in the ceiling of Room 85. Weak beams and those shallowly seated in wall masonry necessitated supporting posts. Nearly every Old Bonitian room, no matter how small, had one or more ceiling props.

Room 323, averaging 13 by 35 feet, is one of four large living rooms, each with two storerooms at the rear, that comprised the original west arm of Old Bonito. Despite its size, 323 is perhaps typical of its time. Its floor was ill-defined, no more than a thin, dark ash layer upon the sand. In this, strangely enough, only one fireplace appeared—a nearly square, slab-lined fireplace 12 inches deep, its east side formed by a discarded metate. Buried rim-deep for storage at the south end of the room were five outworn cooking pots—plain bodied with banded neck.

Eight sturdy posts were required to support the ceiling of Room 323, and two of them were cut 16 years earlier than the beams they braced. Although mostly decayed when found, each post was of straight-grained pine 7-8 inches in diameter and stood on a sandstone slab in a dug hole, packed about with slab fragments on end and shale chips between fragments and post. In some instances posts were surrounded individually by a conical base of adobe mud, 6-8 inches thick at the crown (pl. 11, left). Ceiling poles rested upon the beams to support layered cedarbark and brush and mud for the second-story floor.

Being a living room, 323 had entrances in all four walls and all at an unusual height. That at the northeast, its sides broken out when Room 112 was excavated, was $4\frac{1}{2}$ feet above the floor. Three southeast doors, all blocked, were so high as to require post steps. One of these three, its sill at a height of 38 inches, had been closed upon construction of fourth-type Kiva Z; another, 6 feet 2 inches above floor level, likewise reflects Kiva Z influence since Late Bonitian masons had introduced new jambs and a hewn pine plank for a sill. Dislodged when the surrounding masonry collapsed during excavation, this sill plank measures $31\frac{1}{2}$ by 5 by $1\frac{3}{4}$ inches and has since been added to the national collections (U.S.N.M. No. 335275). Through its three southeast doorways Room 323 had ready access to the West Court before pre-Kiva Z rooms were built in front.

Low or high, Old Bonitian doorways are very much alike. Although basically rectangular, most appear more or less oval because their thickly mudded jambs curve up to the lintel poles and down to the sill slab. Storeroom doors were ordinarily equipped with a single secondary lintel pole about 5 inches below the main lintels and secondary jambs slanted to support a sandstone slab placed from the living room.

Sill height, which seems such an important consideration, varies in Old Bonito from a few inches to several feet. Of five doorways in

Room 325, three of them now sealed, sill height ranges from 16 inches to 4 feet 9 inches. The latter, a formidable step, was lessened by a 2½-foot section of log leaned against the stonework and by a toe-hold, 1½ inches deep, in the plaster above. The northeast door, its sill 4 feet 3 inches above the floor, was entered with help of two post steps, that nearest the wall being 9 inches in diameter and 33 inches high (pl. 14, left). On the opposite side, in Room 323, sill height from the latest floor is only 3½ feet. The west wing of Old Bonito ends two living rooms beyond, with the blank south walls of Rooms 320 and 326.

We can only guess at the number of individuals in an Old Bonitian family and at the bulk of those individuals. Today, the average family at Zuñi or one of the Hopi towns will number four or five persons, not counting the ever-present relatives of the housewife. And the dimensions of a prehistoric doorway, I am sure, provide no proper measure of physical attributes.

Courtward doorways such as those in Rooms 323, 325, and 326 may have been standard for ground-floor living rooms on the concave side of Old Bonito. However, in Rooms 28 and 85, and perhaps others for which data are lacking, steps were provided in order to reach court level, wind-blown sand and soil having accumulated ceiling-high outside. Rooms 3 and 3*b*, next west of 28, and all other fronting rooms south to 330 likewise were deeply buried by court-side accumulations. For these deep rooms hatchways offered a simple means of ingress and exit.

Hatchways in 3 and 3*a* (97) are described both from below and from their second stories, Rooms 91 and 92, respectively. The first of these openings, 2 by 3 feet, "was sealed with matting and bunches of cedarbark tied with yucca leaves"; the 3*a* hatchway likewise "had been covered with matting." Absence of lateral doors suggests that Rooms 315, 316, 328, 329, and 330, among others, also had been provided with ceiling hatches.

Old Bonitian architects were conservatives; they attempted few innovations. Their Pueblo II single-course masonry never changed but it was augmented here and there with earlier, inherited methods of house construction—posts with mud and rocks packed between and sandstone slabs at the base of a wall (pl. 20, upper and lower). Basal slabs, for example, are reported in Rooms 107, 306, and 317; flagstone floors, in 83, 142, and 320. Post-and-mud walls, harking straight back to Pueblo I times, were noted in Rooms 3, 3*a* (97), 8, 28, 61, 63, 327, 328, and 329 but in no case did these approach the

superior wattlework found in Late Bonitian Rooms 256 and 257 nor in a short section we exposed during subcourt explorations outside the northeast corner of Room 149.

Post-and-mud construction is generally accepted as a mark of Pueblo II civilization but Pueblo II stonework at its very best is also to be seen in Old Bonito. It surpasses that of every other Pueblo II settlement of which I have knowledge. And the town arrangement is pure Pueblo II—a crescentic assemblage of living rooms, each with paired storerooms at the rear, subterranean kivas out in front and a community trash pile beyond the kivas. Later stonework was double-coursed—a rubblework core veneered on both sides with faced building blocks.

That transverse block of small rooms that divides Old Bonito into two fairly equal parts includes both early and late masonry. Because published descriptions of these small rooms or at least some of them, have proved confusing to students of Pueblo Bonito it seems desirable to introduce at this point the results of my own independent inquiries, Pepper's field notes in hand.

Pepper (1920, p. 39) describes Room 3 as "one of a series of open rooms . . . extending in a northeasterly direction"; places Room 3*a* east of 3; 3*b*, north of 3*a*; 3*c*, west of 3*b*; 3*d* above 3*c* (pp. 43-45). These orientations afford ample evidence that Pepper was sometimes puzzled, as I often was, how best to record the bearing of a given wall. Comparing visible masonry with his text and reading the compass a bit closer, I would locate 3*a* northeast of Room 3; 3*b* northeast of 3*a*; 3*d* above 3*b*. The Society made no excavation in this series other than that necessary to construction of a stairway against the northeast wall of Room 3*a*, leading down to the door connecting with 3*b*. The open room above 3*b*, readily identified by its ceiling and west-end platform as Pepper's 3*d* (p. 45), is unquestionably the uppermost of the two open rooms below Room 110, entered in 1896 "through a hole broken in the wall" (p. 329). That hole, in the middle northeast wall, was breached from Room 58 (p. 220); a northwest corner hole, broken through the floor in front of the platform, gave access to the lower room, 3*b* (p. 329). Neither description nor recorded measurement positively identifies Room 3*c* but, situated "directly west [NW] of Room 3*b*" and entered "through a hole which someone had broken in the west [NW] wall" [of 3*b*] (p. 44), it must be the "lower part of [R. 111] . . . broken into through the south [SE] wall in 1896" (p. 330). These three holes: in the northwest wall of 3*b*, in the northeast wall and the northwest

floor of 3*d*, and the rounded front edge of the 3*d* platform, were all repaired by the National Park Service in 1926.

Room 91 is the second story of Room 3 (p. 297); Room 92 adjoins 91 on the north [NE] (p. 298) as the second story of 3*a*, which latter was subsequently cleared and renumbered 97 (p. 304). Together, these four rooms, 3, 3*a* (97), 91, and 92, are among the most instructive in Old Bonito. They reflect its beginning and echo its end. If Pepper's published descriptions are sometimes puzzling it is usually because his first- and second-story observations are intermixed.

Room 3, for example, with its thickly plastered heavily smoked walls, is described as probably a square kiva on account of its slab-sided fireplace, upright deflector, and presumed subfloor passageway to the outside (Pepper, 1920, p. 40, 298). However, duplicated descriptions provide evidence that figure 9 is not the "interior of Room 3" as stated but that of second-story Room 91. If the reported "passageway" had an external opening we saw no trace of it while clearing the narrow terrace overlooking Kiva R; neither did we observe trace of the four large 12-inch beams that "protruded fully 8 feet beyond the wall" of 91.

Room 92, adjoining 91, is the second story of Room 3*a* which was not excavated in 1896 when it was first entered but later when it was renumbered and described as Room 97. The original southeast side of 97 (or 3*a*) was of post-and-mud construction and continued as such into Room 3. Pepper's illustrations of 97 (1920, figs. 127, 128) together with his descriptions of upright sticks and posts at the southwest end of Room 28, as seen from 57 (*ibid.*, p. 219), indicate that the original post-and-mud southeast walls of 3 and 3*a* turned northwest between 3*a* and 28 before Late Bonitian architects introduced their concealing stonework on the northeast side of 3*a* (97) and built second-story Rooms 91 and 92.

Room 92, like 91, had a central fireplace which Pepper (*ibid.*, p. 299) describes as shallow and rimmed with adobe. Its thin clay bottom, seen in unpublished negative No. 304, was spread directly upon layers of cedarbark and close-lying pine poles—a fire hazard not recognized by the occupants—that formed both the floor of Room 92 and the ceiling of the room below, 3*a* (or 97). A closed hatchway pierced the floor at its south, or southeast, corner.

The same unpublished negative (No. 304) also shows a narrow-stemmed, T-shaped door in the Old Bonitian northwest wall and, to right and left, the second-type northeast and southwest walls that

identify Room 92 as a Late Bonitian installation. Both walls have since fallen but that at the southwest, "solid and exceedingly well made" (*ibid.*, p. 300), a foot thick and of superb second-type masonry, was built upon a log—the log seen at upper right in Pepper's figure 127—while that on the opposite side, the northeast, was double-thick. As Pepper (*ibid.*, p. 299) describes it, this Room 92 northeast wall consists of 26 inches of unplastered late masonry abutting the 16-inch-thick wall of Old Bonitian Room 3*d*, a total of $3\frac{1}{2}$ feet, and thus duplicates its ground-floor counterpart, between 97 and 3*b* (*ibid.*, p. 305).

This northeast wall offers another challenge to my classification of Pueblo Bonito masonry, for although I consider both upper and lower as of second-type construction the former is second-type on a larger scale and consists of large dressed blocks of friable sandstone chinked with larger-than-usual tablets of laminate sandstone (pl. 21, upper). In the lower room (97 or 3*a*), however, the stonework is less easily defined and appears from Pepper's figure 128 to include chance fragments of both laminate and friable sandstone, that is, a Late Bonitian job with salvaged materials.

Our interest in Rooms 91 and 92 is not limited to architecture. Both were provided with midfloor fireplaces and hatchways to the rooms below, fixtures normally found only in living rooms. But, in addition, quantities of foodstuffs had been stored in Room 92: "a great deal of corn . . . bean bushes . . . and masses of beans . . . still green; corn on the cob; and beans in the pod" (Pepper, 1920, p. 298)—a substantial representation of an average Pueblo harvest. Corn in the ear was also found stored in ground-floor Room 5 together with pinyon nuts, burned when fire destroyed the ceiling (*ibid.*, p. 46). Wild grass seed and other plant fruits were also gathered and stored for winter use.

We may be reasonably certain that our Old Bonitians ate rabbits and rodents, as Pueblo Indians always have done, but doubt remains in the case of turkeys and dogs. Pepper (*ibid.*, p. 56) reports the breastbones of nine turkeys recovered from debris in Room 100. He also reports dog skulls or skeletons in eight or more separate rooms and the Society's expeditions recovered still more (Judd, 1954, p. 65). Within the historic period, Pueblo tribes generally have respected a taboo against eating dog, bear, fish, and fowl, and I prefer to believe their ancestors did too.

It was the presence of foodstuffs stored in Rooms 2, 5, 6, and 92 as much as the eight Old Bonitian burial rooms and the relative shal-

lowness of many Hyde Expedition discoveries that convinced me Old Bonito was inhabited later than other sections of the pueblo. Here, in this oldest part of town, fragile but inflammable ceilings have survived in greatest number; here, scraps of textiles, feathers, and basketry have best withstood the elements; here one finds the greatest variety of cultural material and here one notes a preponderance of early pottery types along with increasing percentages of Late Hachure, McElmo Black-on-white, and Corrugated-coil Culinary. Kiva Q, at the northeast corner of the West Court, was a Late Bonitian creation and 2 or 3 Late Bonitian rooms overhung its eastern arc but, of 4,527 potsherds recovered during its excavation, 33.4 percent were Old Bonitian.

The original post-and-mud construction on the southeast side of Rooms 3 and 3a (97) continued south, I believe, to enclose the row of one-story rooms Old Bonitian architects built in front of 112, 323, 325, and 326 sometime prior to arrival of the Late Bonitians. A portion of this court-side row was removed, I feel certain, to make way for the second-type kiva that preceded Kiva Z (fig. 4). Post-and-mud walls still stand in Rooms 327, 328, and 329 where they served, as did those in 3 and 3a, as foundations for Late Bonitian walls erected at the second-story level.

Room 329 adjoins 328 on the south and together with three neighboring rooms, 320, 326, and 330, had come to be utilized late in the history of Pueblo Bonito for interment of 73 Old Bonitian dead, identified as such by their burial furnishings. The location of these four rooms at the extreme south end of the west wing may have influenced their selection as burial places but it is to be noted that four other rooms, 32, 33, 53, and 56, situated at the very heart of the old pueblo, likewise had become impromptu tombs when the local population was denied access to their extramural cemeteries (Judd, 1954, pp. 325-342).

Rooms 32, 33, 53, and 56 comprise a tight cluster of small ground-floor chambers at least two of which were storage places for ceremonial paraphernalia and all of which ultimately became tombs for more than 20 individuals (Pepper, 1909; 1920). A single door, subsequently sealed from Room 28, gave access to 32; open doors connected 32 with 33 and 53; 53 with 56. Thus the 20-odd bodies interred within these four rooms were all pulled through the 22- by 34-inch opening that formerly gave access from 28 to 32.

FOREIGN ROOMS IN PUEBLO BONITO

Elsewhere I have attempted to solve the puzzle of the extraordinary assemblage of Late Bonitian pottery that Pepper found on the floor of Old Bonitian Room 28, but I gave scant attention at the time to several vessels recovered just inside Room 32 (Judd, 1954, pp. 22-27). At least four of those vessels (Pepper, 1920, figs. 47-49) came from the Mesa Verde country, and their presence in an Old Bonitian burial room raises a question as to the authorship of certain nearby dwellings whose stonework does not conform to any local pattern.

North of Pepper's four burial rooms is a narrow row of east-west 2-story houses the masonry of which, as illustrated, is neither Old Bonitian nor Late Bonitian. I know less about this particular area than is desirable at the moment because our observations hereabout are all second-story observations and we had to reconcile them as best we could with Hyde's ground-floor measurements (*in* Pepper, 1920, pp. 353-358).

Pepper (*ibid.*, p. 180) describes the end walls of Room 36, for example, as "merely partitions" and his figure 80 provides confirmation. Although the lower part of the one illustrated appears to be at home in Pueblo Bonito, or nearly so, the part above ceiling level consists of unsystematic stonework that may be only a veneer but, nevertheless, is very non-Chaco in appearance. And the same may be said of the walls in Room 37, adjoining, as I judge from figure 81. It is my guess, and only a guess, that these second-story partitions are the work of masons foreign to Chaco Canyon but using salvaged local building materials.

The east wall of Room 61 is described (*ibid.*, p. 222) as "built of large dressed stones . . . no chinking" while the south side "was built around upright stakes." Opposite this south-side wall, at the left of the semioval door into Room 6, a wooden loop protruded from the plaster as a means of holding a door slab in place. Although the only one of its kind reported from Pueblo Bonito, this sort of door fastener is relatively common in cliff-dwellings of southwestern Colorado and southeastern Utah. Two such loops, each fitted with a spatulate wedge found in the sand below, barred access to a wicker-work granary in White Canyon that I photographed in 1907 and which was later illustrated by Dr. Byron Cummings (1910, p. 23) as more or less typical of those in the Kayenta country.

The Mesa Verde pottery from Room 32, the two small mugs from

Room 36, the loop door lock plus the post-and-mud wall in Room 61 (both P. II traits in southeastern Utah), and un-Chaco-like masonry all unite to strengthen my belief that families from beyond the Rio San Juan were welcomed at Old Bonito and occupied various rooms including 35, 36, 37, and 61. These four apparently were created by partitioning an Old Bonitian living-room fronting storerooms 1, 2, 5, and 6. Hyde Expedition timbers from Rooms 32 and 36 unfortunately remain undated (Douglass, 1921, p. 30) but it is to be recalled that Roberts and Amsden found no fragment of Mesa Verde-like pottery below the upper 50 inches of their 12-foot-deep West Court Test 2. Thus Mesa Verde pottery was introduced at Pueblo Bonito some time after arrival of the Late Bonitians.

The north face of Old Bonitian Room 28, as seen in Pepper's figure 44, is a Late Bonitian veneer of second-type masonry and is abutted by the partition between 28 and 28*a*. Room 28*a*, therefore, is an Old Bonitian idea that followed the veneering, a Late Bonitian veneering contemporaneous with construction of like walls in first- and second-story rooms both east and west from 91 and 92.

It is quite obvious from Pepper's recorded notes and from what we saw in the field that the Late Bonitians preempted and remodeled many Old Bonitian homes in this north-central section and east thereof. We observed the foundations for razed second-type walls under the floors of several rooms; we saw where second-type masonry had replaced first-type and where third-type had replaced the second. Beginning in Rooms 71, 78, and 86 there is an abrupt substitution of third-type masonry for that of Old Bonitian origin (pl. 22, upper).

Late Bonitian architects rebuilt the east third of Old Bonitian Room 71 and introduced a later floor about 6 inches above the original. On this latter was a slab-lined fireplace, 2 feet 7 inches in diameter and 14 inches from the end of a subfloor ventilator duct directed toward the southeast corner (Pepper, *ibid.*, p. 257).

Adjoining 71 on the west is Room 83, a much-altered Old Bonitian living room in which Pepper (*ibid.*, p. 269) noted three successive floors. The second of these consisted of sandstone slabs laid in adobe mud; the lower and earlier floor exhibited "a multiplicity of walls and fireplaces." Obviously the occupants lived here a long while. Unpublished Hyde negatives Nos. 275 and 276 show a west-end door, its jambs rounded and whitewashed, about 2 feet above the uppermost floor and 2 pairs of post steps below the sill.

KIVAS OF OLD BONITO

The south-wall foundation of Room 83 protruded 6-12 inches and rested directly upon the arc of a partially razed Old Bonitian kiva as it curved south, presumably to be demolished by the Late Bonitian builders of Kiva N, and west beneath the floors of Rooms 307 and 309. We do not know when that old kiva was razed but we do know that Old Bonitian Room 307 was built later than others of its kind because, of 694 potsherds from a limited test pit beneath the floor, 8 were Late Hachure, 4 were Chaco-San Juan or McElmo Black-on-white, and 366, or 52.8 percent, Corrugated-coil Culinary.

As Pepper (*ibid.*, p. 269) describes it that Old Bonitian kiva under Room 83 was bowl-shaped with an encircling bench 38 inches high, well plastered and its front edge rounded. Pepper's figure 114 shows less than one-quarter of the bench but no visible pilaster. With aboriginal perspicacity the builders incorporated in that bench a sizable boulder, part of an earlier cliff-fall, and spread adobe mud upon the soft sand that had drifted against it—sand and mud that eventually settled and left a shallow depression. Clean sand lay immediately under the kiva floor, 8 feet below that of Room 83.

We encountered a companion Old Bonitian kiva, rather the north half of one, during trenching operations in the northwest corner of the East Court (fig. 3). Its stonework, averaging 14 inches thick, was typical: roughly spalled sandstone blocks, unevenly but thickly plastered, fingerprinted all over, and sooted. Its west side, with an outward slope of $12\frac{1}{2}$ degrees, rises 12 feet above the floor and partly underlies the unnumbered room south of 211 (17); on the east side, the wall stands only 10 feet 3 inches, about $4\frac{1}{2}$ feet below the Court surface. Indicated diameters are: At floor level, $22\frac{1}{2}$ feet; above bench, 26 feet 7 inches; at wall top, 31 feet 10 inches.

An encircling bench, 25 inches high and averaging 34 inches wide, was surfaced with sandstone slabs and plastered. On it, in the portion we exposed, were the remains of two pilasters, each consisting of small sandstone chips set in adobe mud and enclosing a 6-inch log that lay flat upon the slab surface, its butt end inserted into the masonry and packed about with shale (pl. 23, right). The two averaged $10\frac{1}{2}$ inches wide by $6\frac{1}{2}$ inches high, their forward ends set back 7-8 inches. We saw no trace of offerings. Here, then, as with that under Room 83, a 4-pilaster kiva is indicated. Plaster adhered to the bench face, whitened to floor level but continuing an additional 13 inches to an earlier floor or work surface. Spread upon that lower floor was a 5-inch layer of shale and 8 inches of adobe mortar

from razed walls. Together, bench height and fill between floors thus equal the 38-inch-high bench Pepper reported in the old kiva under Room 83.

Our East Court Old Bonitian kiva, with its high bench and outward-slanting wall, was divided by an east-west partition built upon the floor and closely following the irregularities of the kiva masonry. The fact that this dividing wall had been constructed chiefly of unworked friable sandstone with individual blocks protruding at irregular intervals from both sides identified it as the north enclosing wall of Late Bonitian Kiva 2-C. At its west end, 2 feet thick, the partition was braced to the concave kiva wall by two series of small poles inserted 6 feet 4 inches and 7 feet 10 inches above the bench while on the opposite, or south, side two single poles at a height of 5 feet 9 inches joined the crosswall to the convex exterior of Kiva 2-C.

It should be noted at this point that, although the stonework of this bowl-shaped Old Bonitian kiva sloped outward at an average of $12\frac{1}{2}$ degrees, the walls of nearby Late Bonitian kivas 2-B and 2-C likewise had an outward but lesser slant.

Deep beneath the West Court terrace number 347, in front of Room 324, we came upon part of another Old Bonitian kiva and bared a 7-foot section of it (pl. 23, left). It partially underlay the remnant of a kiva built of second-type masonry while above this latter and at the surface is the previously excavated, third-type kiva readily identified from Pepper's description as his 67 but which was misplaced on Hyde's plan of the ruin (*in* Pepper, 1920, fig. 155).

The bench in that old, first-type kiva lies 9 feet 3 inches below the Room 347 pavement. Because our trench was narrow, with insecure stonework on either side, we did not determine bench height, but its width was 36 inches, its front edge rounded and 3 inches higher than the rear. Midway of our 7-foot arc was a masonry pilaster, adobe plastered, 8 inches wide by 6 inches high and full bench width without the usual setback. Lengthwise upon this pilaster was a 5-inch-diameter log, its butt end built into the kiva wall and its forward end seated upon a 4-inch post embedded in the bench masonry 2 feet 5 inches from its rear edge. This Old Bonitian pilaster stands alone and may be an exception, but alone it seems to be something of a compromise between those in the bowl-shaped kiva north of 2-C and the 4-post roof supports of P. II kivas in the San Juan country.

The stonework of this 7-foot-long section, razed to within 4 feet 10 inches of its bench, was 14 inches through, thickly plastered and smoke stained, with an outward slant of 13 degrees. It continued

northward beneath the fourth-type masonry of the Kiva Z enclosure and southward under both the second-type kiva remnant previously noted and the nondescript stonework of Room 348. Here, then, in beautiful succession we have a profile of kiva stonework from first-type to fourth: the oldest made way for the second; the second was replaced by third-type Kiva 67 and, after the latter served its purpose, fourth-type Kiva Z was built upon the remains.

Still another Old Bonitian kiva is represented, I believe, by two wall fragments unearthed during the digging of our West Court trench (fig. 7). One fragment, above Station 330 and razed to within 14 inches of its associated floor, 11 feet 10 inches below the last utilized surface, appears to be part of a bench face. Above and to the north is the second fragment, a 5-foot-high section of crude, thickly plastered external stonework with a pronounced upward and outward slant in the Old Bonitian tradition but with an indicated thickness of over 3 feet which would be unusual. These two sections of early stonework may, possibly, be parts of a first-type kiva otherwise completely razed in advance of later building activities. With admitted hesitancy I have represented its position on figure 3. Two feet in front of the supposed bench and 11 inches from each other are 2 postholes, each 5 inches in diameter and filled with sand from which we recovered three bone beads.

Although understandably dubious regarding origin and purpose of the two sections of stonework described above, I have less doubt in connection with the beginnings of Kiva R, a dominantly second-type Late Bonitian chamber repaired and renovated with third-type masonry (pl. 24, left). A test pit 6 feet 7 inches deep in front of and below the third pilaster revealed two earlier benches, the lower of first-type construction (pl. 24, right).

Obviously here was an Old Bonitian kiva whose outward wall slant was preserved in two subsequent Late Bonitian revisions. The original, therefore, was one of four known kivas fronting the crescentic house cluster of Old Bonito, and there is the possibility of at least two others: the dubious one exposed in our West Court trench and that to which Pepper points in his description of Room 19.

This latter, portions of which we located beneath the floors of Kiva 16 and Room 210, had an indicated diameter of about 19 feet. Room 210 preserves in its north wall part of the old kiva curve, here coated by six successive layers of plaster and each heavily smoked. Subfloor and adjoining on the south, the old wall averages 25 inches thick and had been razed to within 19 inches of its bench. This

latter, 37 inches wide and 28 inches high, had been repeatedly plastered and whitened; on it we noted the side of a demolished pilaster, set back 4 inches from the edge, but dimensions and makeup unknown. The outer or convex curve of this old kiva likewise had been plastered and whitewashed.

I hesitate to identify whitewashing of kiva stonework and especially of kiva benches as an Old Bonitian trait, but there may be significance in the fact that such treatment was commonplace among our Old Bonitians. Incised figures such as those in Room 97 (3a) are reported less frequently. Figures chalked on brown plaster and 3-foot whitewashed dados or a 2-foot white band above a brown dado are, apparently, among decorative concepts of the Late Bonitians.

The sandstone boulder utilized in the old kiva under Room 83 (Pepper, *ibid.*, p. 269) is only one of several that together provide evidence of a prodigious rock-fall from the north cliff sometime prior to the beginning of Old Bonito. Those boulders were already there and the old folk simply built over and around them. There is one under Room 83; another was incorporated in the wall of a storage bin in Room 85, adjoining (*ibid.*, p. 282). We noted like boulders $4\frac{1}{2}$ feet beneath the floor of Kiva N or 14 feet below approximate East Court level; we observed others underneath wall foundations in Old Bonitian Rooms 87, 296, and 298; still others were seen outside the pueblo where Late Bonitian architects, in their turn, had built foundations over and around massive blocks of cliff sandstone (see Judd, 1959b). Quite obviously a sizable section of north canyon wall had given way and cast its jagged fragments forward a hundred feet or more long before the Old Bonitians came to live here.

The bowl-shaped kiva these Old Bonitians built in front of their living room, 85, eventually was abandoned and Rooms 83 and 307 were erected above its remains. It seems probable these replacements were forced by Late Bonitian architects who were already active hereabout, as witness the Late Bonitian potsherds we recovered under the floor of Room 307 and witness, too, the Late Bonitian reconstruction program that began in Rooms 71, 78, and 86 and continued east therefrom.

LATE BONITIAN REPLACEMENTS

Old Bonitian 71, 78, and 86 were formerly adjoined on the east by their contemporaries, Rooms 69, 80, and 87, but these latter had been demolished during the Late Bonitian modernizing program and the wreckage of their partially razed walls was left where it fell and sub-

stitute rooms were built above. Third-type Late Bonitian masonry is presently most conspicuous throughout this whole rebuilt section, but second-type masonry preceded it.

Pepper's figure 123, for example, shows the east end of Old Bonitian Room 86 rebuilt with dressed sandstone blocks of rare uniformity and thinly chinked in the manner I would classify as second-type, while the opposite side of that same wall, as seen in figure 124, is a composite stonework, a blend of laminate and dressed friable sandstone, irregularly banded and separated by one to four layers of laminate chips. The upper-wall masonry in Room 87, as in 86, more nearly meets the specifications of my third type, and this is even more apparent in the second and third stories. Here as elsewhere replacements were made with salvaged building stone.

Pepper (1920, p. 288) includes his figure 124 to illustrate "walls of an angular room under Room 87." Limited testing convinced us that two of those subfloor walls are Old Bonitian. That at the far end, plastered and smoke-stained, is the exterior of original Old Bonitian Room 86, its outer corner rounded and abutted by the somewhat later Old Bonitian stonework that had enclosed Rooms 87, 77, and beyond (fig. 3). Wedged in to the right of that old stonework, under Pepper's pile of potsherds, is the north foundation of the Late Bonitian room that supplanted original 87. In the angle where the two old walls meet, their foundations vary from 7 to 18 inches thick and overlie several large, irregular sandstone blocks fallen from the north cliff. These blocks rested upon clean sand, 9 feet 10 inches below the floor of Late Bonitian Room 87.

At lower left in Pepper's figure 124 one notes the protruding south-wall foundation of the later room, built mostly of slabs from Old Bonitian walls and standing upon the original Old Bonitian floor, 6 feet 4 inches below that of Room 87 but 17 inches above floor level in original Old Bonitian Room 86, adjoining on the west. As this 17-inch difference may approximate the time interval between construction of original 86, with its convex outer northeast corner, and erection of original 87, so the 7-foot-9-inch difference in floor levels between original 86 and Late Bonitian Room 87 may provide a clue to the time that elapsed before Late Bonitian architects introduced their third-type masonry.

Pepper's descriptive data for Rooms 80, 69, 68, and 82 and our own sporadic testing in them evidence other Old Bonitian stonework paralleling that under Room 87. Clearly the east arm of crescentic Old Bonito formerly extended at least this far eastward before it

was razed and replaced by the Late Bonitians. How much farther it extended I do not know, but there is a hint of it in the subfloor walls and storage bins of Room 62 and Pepper's figure 107 (p. 260) shows an arc of plastered first-type masonry underlying the south side of Room 76 with an intrusive Late Bonitian slab-lined fireplace above.

Similarly, crossed walls under the floor of Room 66 were "evidently part of the old building" (*ibid.*, p. 248). I cannot follow Pepper's notes on adjoining Room 65, but his figure 103 shows what appears to be Old Bonitian stonework under the northeast corner—stonework I have hesitated to chart on our figure 3.

Again, in Room 64 "a series of walls was found under the floor" (*ibid.*, p. 237), and one of them, seen in unpublished negative No. 225 deep below the much-plastered and much-smoked Late Bonitian masonry on either side, is a cross wall that is more likely Old Bonitian than otherwise. Also, what I judge to be portions of other old house walls appear, in Pepper's unpublished negative No. 253, below the east half of Kiva 75 and under both ends of its west-side vault.

Three sections of indubitable Old Bonitian stonework, their associated floor at depth of 8 feet 2 inches, were exposed by our trenches at the west end of Room 314. Opposite, in the northeast corner, are more old walls sooted and plastered, some of which surely extend subfloor into Room 74, at the southwest corner of Late Bonitian Kiva 75. Finally, 7 feet 2 inches beneath the floor of Room 290 we came upon a well-marked pavement with associated Old Bonitian stonework that was 11 inches thick, unplastered on the exterior but both plastered and sooted inside.

These several observations, together with Rooms 315 and 316, lend substance to my belief that the right wing of Old Bonito extended at least this far to the east before it was razed to provide space for the Late Bonitian walls now standing.

Rooms 315 and 316 are portions of Old Bonitian structures that were reduced in floor area and otherwise altered when Late Bonitian architects built in a substitute northeast side, 8½ feet high, partially to serve as foundation for a third-type wall enclosing Rooms 290, 291, 74, and 314 and overhanging the north arc of Kiva L. In both 315 and 316 that built-in substitute consists largely of dressed blocks of friable sandstone and abuts plastered Old Bonitian stonework at either end. Both rooms had been roofed at a height of 7 feet, but the Room 315 ceiling rested upon two 8-inch longitudinal beams while that in 316 was supported by four similar beams placed transversely.



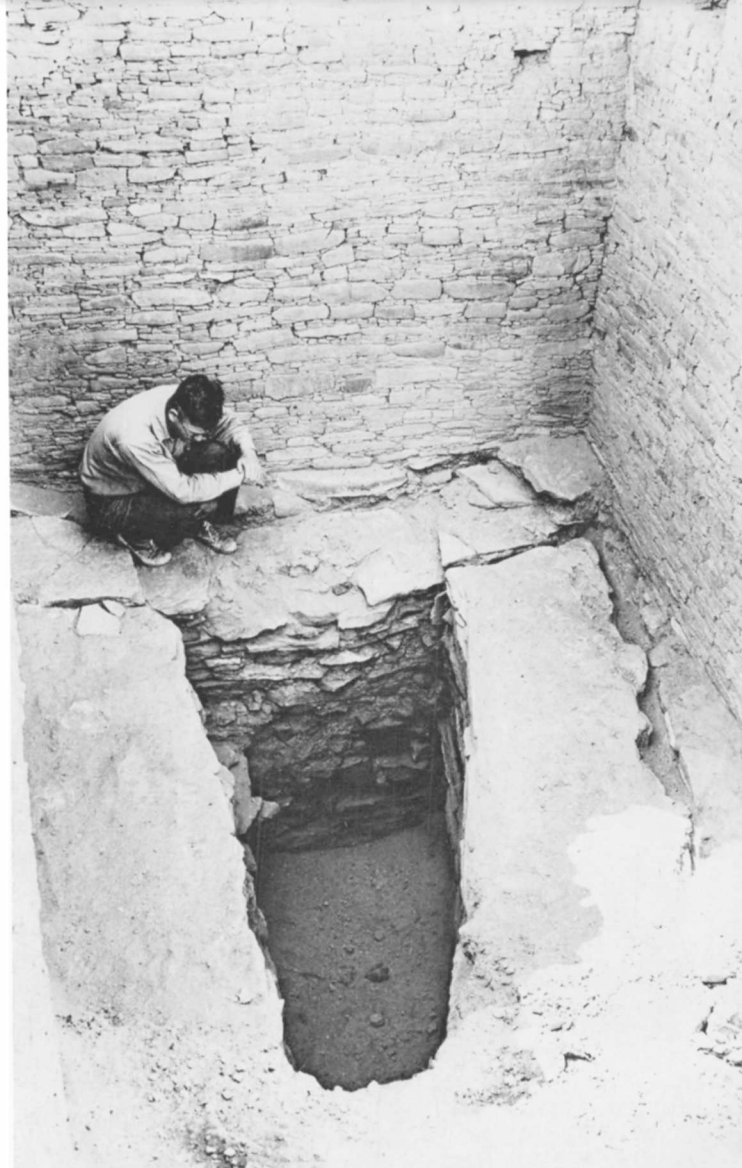
PLATE 18

Left: A deep, "fire pit" of unknown function on the terrace north of the Kiva Z enclosure, west of Kiva R.

(Photograph by O. C. Havens, 1924.)

Right: Before alteration and replacement, the east end of Old Bonitian Room 86 was abutted by another, its floor 6 feet 4 inches below that of Room 87.

(Photograph by Neil M. Judd, 1926.)





The northeast corner of Room 14a retains plaster and a 4-pole storage shelf.



The north doors of Rooms 14b (with blanket) and 301 had been forced open by unknown persons.

(Photographs by Victor Mindeleff, 1887. Courtesy of the Smithsonian Institution.)



PLATE 20

Upper: Post-and-mud south and west walls of second-story Old Bonitian Room 53.

Lower: The southwest corner of Room 327 with remnant of its post-and-mud south wall survives with blocked door to Room 325.

(Photographs by O. C. Havens, 1924.)





PLATE 21

Upper: Northeast wall of Room 92 (behind figure), with open door to Room 3d at lower left.

Lower: North door, Room 300B, with secondary jambs and lintel recessed for doorslab.

(Photographs by Neil M. Judd, 1923.)



Despite Late Bonitian alterations and repairs, both 315 and 316 possess architectural features that seem to identify them as originally Old Bonitian. In Room 315 a slab-lined fireplace occupies the southeast quarter while on a floor 6 inches lower another fireplace, masonry-lined and ash-filled, was half buried under the Late Bonitians' built-in northeast foundation. Cut into that same earlier floor and continuing under the south corner of the room to an external shaft is a masonry-lined ventilator duct. This latter, 26 inches wide by 29 inches deep, was originally 7 feet long but had been reduced to 22 inches when a masonry partition was introduced and the duct floor beyond was raised 15 inches.

At the northwest end of Room 315 an unplastered masonry partition now 25 inches high and half as thick, screens an alcove with floor 4 inches above that of the main room. Midway of that partition is a 15-inch opening, its sill at the alcove floor level and its south jamb a 5-inch-diameter post that may have propped the southernmost of the 2 main roofing beams. Three small poles against the northwest wall and 4 feet 9 inches above the alcove floor had formed a room-wide shelf 22 inches-deep—a fixture believed to be unusual in an Old Bonitian room. One inch above the alcove floor and 40 inches from its west corner a 13-by-16-inch-high ventilator pierces the southwest wall.

In the south corner of the alcove, cut into a floor 10 inches lower and connecting with an extramural shaft, is a masonry-lined ventilator duct measuring 19 inches NW-SE by 17 inches wide and 21 inches deep. It had been filled with ashy earth and floored over. On that same lower floor but in the opposite corner a slab-lined fireplace partially underlies a 6-foot section of first-type stonework that juts forward 18 inches and is there abutted by the Late Bonitian construction that provides a northeast side for Old Bonitian Rooms 315 and 316.

Room 316 likewise has at least one fixture usually associated with esoteric practices, a subfloor ventilator duct. Such a duct, 15 inches wide by 24 inches deep, underlies the south corner of the room and connects with an outside air intake that rises 6 feet 2 inches and thus equals the present height of the southwest wall. This latter is especially interesting since it consists of Old Bonitian stonework veneered by second-type Late Bonitian masonry. The adjoining southeast wall, indefinite as to type, is later and had replaced the convex curve of Kiva L. In the northwest corner a slab-lined fireplace 25 inches in diameter had been abandoned, floored over, and replaced by

one of rectangular form. This latter, also slab-lined but with mud-rounded corners, was ash-filled and contained three sandstone fire-dogs in a row.

The northeast quarter of 316 is occupied by a subfloor, masonry-lined passageway, 22 inches wide by 26 inches deep, that extends to and under the corner of the room and there, with an abrupt angle, turns to the right and continues an undetermined distance. At its abrupt angle the passageway was roofed by three 2-inch poles spread fanwise from its east side. A former southwest door had been blocked to leave a 10- by-13-inch ventilator at floor level, and this apparently was intended to be closed by a tabular metate left leaning against the nearby wall. With all doors closed, Room 316, like its neighbor, could have been entered only by means of a hatchway.

Recognition of Rooms 315 and 316 as possibly of ceremonial significance raises the question as to whether these and other quadrangular structures might have been adjuncts to circular subterranean kivas in Old Bonitian rituals. Rooms 327 and 328 possess features paralleling those in 315 and 316, and Pepper's description of Room 3a (97) certainly sets it apart from purely secular buildings. Our Room 309 likewise possesses fixtures foreign to local living quarters but 309 is a Late Bonitian chamber.

As previously stated, 327 is a one-story Old Bonitian room on the west side of the West Court. Its rear wall is the exterior of Old Bonitian 325, a living room; its south side is a combination of small posts spaced 4-5 inches apart, packed between with adobe mud, and surfaced with more mud (pl. 20, lower). The north and east sides of Room 327 include a facing of rather crude, typeless stonework that was added, apparently, just to support the second-type Late Bonitian walls built above. All four sides were repeatedly plastered and as often sooted. Both north and south walls abut the thickly plastered exterior of Room 325 and thus evidence their later construction.

The ceiling of Room 327 rested upon a single beam, its west end seated in a former Room 325 ventilator and the opposite end supported by a 6-inch post. Pine poles of uniform diameter lay upon the beam and a layer of chico brush upon the poles. In the northeast corner, however, the ceiling had been patched with cedar splints, probably at the time the walls were raised for a second story. Opposite, in the southeast corner, there was a 14- by-28-inch ceiling hatchway and below it, perhaps as a step, a slab-covered triangular bench, 28 inches high.

A former west door, its sill slab 15 inches below floor level and a like distance above a trampled surface that may be the original floor, represents a former court-side passage to and from Room 325. A companion east door, its sill 14 inches above the same trampled surface, served for a time and then was blocked. As if to favor an arthritic, a post step 11 inches in diameter and sill high had stood in front of that east door and, in front of the post, a 6-inch-high stone block as a second step. From this original floor a pine post reached up to prop the ceiling and a masonry-sided bin occupied each corner of the room except that at the northeast.

Subsequently that original east door was sealed, a second floor was installed 30 inches higher, and a new east door was cut through at floor level. The north jamb of this new passageway is a 2½-inch post that inclines outward at the top.

The post-and-mud wall in Room 327 curved south to form the original east side of 328, 329, and possibly 330. At the time of excavation in Room 328 the 2-inch posts in that old wall stood 39 inches high, 6-12 inches apart and were separated by adobe mud only. In Room 329 wall-wide stonework rather than mud filled in between posts. Post-and-mud walls at Old Bonito were never more than one story high, so far as I know, with the possible exception of Room 53B which may have been built upon a first-story fill but whose present south and west sides preserve a core of upright posts with mud between (pl. 20, upper).

Rooms 328 and 329 were both roofed, after the manner of 327, with a layer of brush supported by selected ceiling poles and posts. Four posts were required in 329, each standing in a slab-lined hole and packed about with shale chips. Second-type masonry built against the old post-and-mud wall of adjoining Room 327 rose from floor to ceiling on the north side of 328, partly surrounding a ceiling prop whose overlying beam had been retained as partial support for the second-story wall above. Spurred by a bit of whimsy, some unknown dawdler had crowned this post with a discoidal potrest made of squawbush bound with strips of yucca leaf. A companion post stood opposite the first, supporting a second beam.

Although the beams braced by these two posts belonged to the original ceiling they had been augmented by two others at the same height, 7 feet 3 inches, presumably when the Late Bonitians built their second-story room above. A southeast corner hatchway undoubtedly connected the upper and lower rooms, as in 327.

More than its neighbors Room 328 preserves the aura of a room

once dedicated to secret cult or religious practices. At midfloor is a 25-inch-diameter fireplace, rimmed with clay and accompanied by a shallow, scooped-out basin, probably intended for ashes. Sometime during occupancy of the room this fireplace was divided and its south half lined with slab fragments on edge but thereafter continued in use.

A floor-level ventilator 8 inches wide and 10 inches high pierced the east wall of 328 directly above a subfloor, slab-lined ventilator duct. This latter, 13 inches wide by 18 inches deep, was roofed at floor level by sandstone slabs supported on small transverse poles; at its proximal end, the customary air vent, 8 by 13 inches. The probable air intake, in a masonry column 3 feet outside the east wall, rises to West Court level, a vertical distance of over 7 feet. The essential draft deflector between ventilator and fireplace, although far out of line, must be the 6-stick section of wattlework joining the south wall to a nearby ceiling prop (pl. 25, left).

Questions of origin and association arise in connection with the under-floor ventilator in Room 328. Is it an Old Bonitian concept or the result of Late Bonitian influence? For unknown reasons this particular example had been blocked with masonry directly beneath the floor-level, east-wall ventilator. Otherwise it was entirely open when found and so was that above. Within the limits of my experience at Pueblo Bonito the subfloor type of ventilator was a prescribed feature of Late Bonitian circular kivas. For this reason I am of the opinion that those we discovered in Rooms 316 and 328 and the one Pepper (*ibid.*, p. 257) describes in Room 71 reflect influence exerted at the time Late Bonitian masonry was introduced at the second-story level or nearby. The walls of 328B are of second-type Late Bonitian composition while that at the northeast side of Room 316 was third-type and so too, presumably, the rebuilt east end of Room 71. Here, in 71, a 14-inch-wide ventilator duct extends from a central fireplace on an earlier floor at depth of 6 inches to and beneath the southeast corner of the room.

That the priesthood of Pueblo Bonito, early and late, maintained rectangular cult rooms as adjuncts to their circular kivas seems indisputable. Among others, there are 3a (97), 249, 309, 315, 316, 328, and 351 each with built-in fixtures that set it apart from ordinary dwellings. Then, most puzzling of all, there is the remnant of a quadrangular structure whose packed-clay floor we found outside and at the east end of Room 28, 10½ feet below its second-story floor level. The original foundation, here 21 inches high, had been built upon that clay floor after its associated bench had been partially razed.

That bench, of relatively crude stonework 24 inches wide by 34 inches high (the upper 4 inches raised and rounded at the front),

had been repeatedly plastered and smoke-stained and the final coat whitewashed. From a point directly beneath the horizontal abutment on the west side of the Kiva 16 enclosure (beyond which point we did not venture) we bared the lower bench westward for 9 feet 8 inches where it turned abruptly north for 20 inches and there had been demolished upon construction of the Room 28 foundation. The above-bench wall on either side of that angle, razed to within an average height of 7 inches, was merely the face of a cut clay bank. A disturbed area just to the west of our test pit presumably marks the limit of Hyde Expedition excavations in "Room 40."

Presumably that deep-seated, cutbank structure, with its adobe floor and plastered bench, is pre-Old Bonito, but we found nothing to identify its builders. It differs fundamentally from the two slab-lined pit-houses exposed by our West Court trench, and it differs from every P. I or P. II building of which I have knowledge except, possibly, another remnant we discovered on a pavement 6 feet 3 inches below the floor of Room 241 at the southeast corner of the pueblo. In this case, however, the former structure was represented by a section of adobe wall 8 inches thick and 16 inches high, topped with sandstone and buried under a layer of water-borne silt.

Describing Late Bonitian Room 100, Pepper (1920, p. 318) suggests that the north half of its east wall, protruding about 2 feet, "may have been a part of the old building," but I would guess that what he saw was actually the Late Bonitian foundation for that north half. On the other hand, the under-floor construction in Room 56 was undoubtedly Old Bonitian as were the walls built above. But nowhere short of Rooms 80 and 87 do I detect among Pepper's published field notes positive evidence of Late Bonitian replacement of Old Bonito's ground-floor dwellings. Late Bonitian architects surrounded the west wing of the old town with rooms of their own devising; in the east wing they razed and rebuilt.

It seems significant that the Late Bonitians confined their initial reconstruction activities to the east wing of the Old Bonito crescent. Their architects added second stories to the court-side row of ground-floor structures from Room 28 west and south to 329 or 330 but they ventured no replacement in that section. Pepper mentions none. We cleared 11 Old Bonitian west-wing rooms and observed no subfloor wall in either of them. Not until Late Bonitian architects had developed their second variety of masonry (my third type) did they undertake a major constructional program for the west side of the enlarged pueblo and by this time they were ready to replace all the walls they had previously built in the east wing above razed Old Bonitian rooms.

III. THE SECOND-TYPE ADDITION

Old Bonito had been inhabited a long, long while and its household rubbish had piled up 8 feet deep before a second people arrived to take up joint residence. This second people, whom I have called "The Late Bonitians" for want of a better name, proceeded immediately to usurp leadership of the community and shape it to their own desires.

Nowhere is this leadership more apparent than in architecture. Late Bonitian methods of house construction differed from Old Bonitian methods. Whereas the Old Bonitians adhered firmly to their traditional Pueblo II type of stonework—wall-wide slabs of spalled sandstone and adobe mortar (pl. 10, 1)—the Late Bonitians preferred walls composed of hand-dressed or selected blocks of sandstone veneering both sides of a rubblework core. This "double-course" masonry, as it has been called, was more stable than Old Bonitian stonework; with a setback at ceiling level, it invited superimposed rooms.

When the Late Bonitians came to dwell at Pueblo Bonito their first conspicuous undertaking was to surround the crescent-shaped old village with a single, close-fitting row of 2-story houses. The masonry they employed for this undertaking is what I have termed "second type" thus to distinguish it from that of the first settlers, the Old Bonitians. Second-type masonry consists of friable sandstone blocks, hammer-pecked or hand-abraded on the face only and chinked with quarter-inch tablets of laminate sandstone (pl. 10, 2).

Recording his observations in Room 1, Pepper (1920, p. 29) expressed the thought that the adjacent outer walls, which are of second-type construction, must "represent the latest additions to the no doubt constantly changing pueblo." Later, and in lighter mood, he described (*ibid.*, p. 332) this variety of local stonework as "the sandwich form"—large pieces with thin pieces between—which is just as good a name as any.

Why the Late Bonitians should have felt it necessary to envelop the old town with walls of their own is not now apparent; possibly it was to give expression to their sense of orderliness, for they found Old Bonito a crescentic assemblage of large and small rooms with others added haphazardly from time to time. Its convex outside wall, thickly coated with mud and slanted inward at the top, was solid and impenetrable. It had no door. It was its own defense.

If the Late Bonitians sought initially to eliminate the irregularities of that outside wall they succeeded admirably. They built Rooms 100 and 101 just to fill an external angle between 104 and the unnumbered room next on the east. They built Room 7 to fill a similar angle outside Rooms 1 and 8; and 300 to occupy a jog where Room 298 abutted 13. The inner wall of their encompassing row of 2-story houses all the way from Room 320 around to 298 has no visible purpose but to compensate for the inward slant of the older stonework.

From Room 320 to 102 that inner wall stood so close to the blank exterior of the old settlement that there was no space between for more than a wedge-shaped fill of constructional debris, but beyond 102 the external irregularity of the older building and its roofward slope invited a succession of 12 improvised storerooms. The abutting new masonry in each case conformed to the unevennesses of the older; in each case room depth, front to back, was only half that at ceiling level, or less. In at least one instance, Room 305, storage capacity was so limited its builders did not trouble to provide the customary doorway. Nevertheless, each of these intervening spaces, whether useful or not, was roofed ceiling-wise with selected pine poles, willows or split cedar, cedarbark, and mud.

The Late Bonitians were indefatigable builders. They built not only an enveloping row of 2-story houses against the door-less rear of Old Bonito but also a series of second-story rooms on its concave front, or at least part of it. Thereafter they razed and replaced with their own an unknown number of dwellings and storerooms in the eastern wing of Old Bonito. They propped the Braced-up Cliff with pine posts and built a broad terrace below (Judd, 1959*b*); they built retaining walls about the village dump just to confine its bulk.

The 2-story houses the Late Bonitians initially built on the convex north and west sides of Old Bonito apparently were closed and abandoned almost immediately. Each room, first and second stories, with the sole exception of 100, was provided with an external door, but these doors had been sealed with masonry so skillfully matching that on either side as to suggest little if any delay between room completion and door blocking. Each room was connected endwise with that adjoining, the connecting door invariably 2-3 inches wider at the sill than at the lintel. To judge from those we cleared, none of these Late Bonitian 2-story houses had been lived in. None had a fireplace. Their walls, plastered outside but not inside, had been constructed upon 3-5 feet of sand wind-piled against the slanting exterior of Old Bonito.

Room 100, a narrow Late Bonitian structure of second-type masonry, was built in an angle at the north end of an Old Bonitian 3-room sequence, 3*b*, 3*c*, and 104 that figuratively divides the old village into an east wing and a west (fig. 3). Room 104 originally was part of 107 the wall separating them having been erected in line with, if not actually continuing, that forming the west side of Room 100.

Adjoining 100 on the east is the Hyde Expedition's "old dark room," unnumbered but repeatedly cited in Pepper's published field notes. To the west and curving southward are Late Bonitian Rooms 93-96 and 114-116; east of "the old dark room" an even dozen contemporaneous but unexcavated dwellings remained in 1921 as sole survivors of that row of houses Late Bonitian architects initially raised to screen the old pueblo.

The National Geographic Society began its explorations in the first of these previously unexcavated dwellings, 200, a 6-by-10-foot room of unplastered second-type masonry, with a ceiling height of 9 feet 10 inches and a door in each wall. The north door, originally sealed, had been forced from the outside by some grasping individual and the near pair of its eight lintel poles severed by a steel ax (pl. 26, upper). Masonry fallen from upper stories, with a scattering of cedarbark and dressed willows, filled the groundfloor room.

Room 202, adjoining, was the counterpart of 200. Its four walls were unplastered; there was a door in each, and that to the outside had once been sealed. Dressed willows and cedarbark lay among fallen building stones. The south wall foundation, 20 inches high, had been erected upon stratified sand of undetermined depth but containing occasional spalls, potsherds, and bits of charcoal.

Rooms 201, 203, and 205 are Late Bonitian storerooms entered, respectively, from 200, 202, and 204. Like these latter, they are of second-type masonry and had been built against the first-type stonework of Old Bonito, conforming to all its irregularities. The south side of 203, for example, is the exterior of Rooms 4 and 5, a 2-story wall whose unplastered lower 3 feet slopes outward about 23° while that above is plastered and has a less pronounced inward slope (fig. 10). Thus the old wall is vertically convex. At its east end Room 203 is 22 inches wide at floor level and 33 inches at the top; its west-end measurements are 20 and 25 inches, respectively. The east half of the north wall having toppled outward along with its continuation eastward, we made no observation between Rooms 202 and 209.

Rainwater draining into 209 from the east and south had left 18

inches of stratified sand across its east end. The ceiling had collapsed upon this sand and had burned there before the upper walls gave way and fell. In front of the east door a scrap of sawed board bearing knife cuts and nail holes marked a 19th century attempt at holding back sand and rubble in preparation for use of Room 14*b*.

Room 14*b* is undoubtedly the most publicized room in all of Pueblo Bonito. It was entered August 28, 1849, by Lt. J. H. Simpson, R. H. Kern, and "one or two others" whose names and the date, scratched into the soft mud plaster on the south wall, were still there 28 years later "as plainly as if done but a few days previously" (Jackson, 1878, p. 442). Victor Mindeleff or members of his party slept in 14*b* for a night or two during the winter of 1887-88 (pl. 19, right), and the Hyde Expedition used it for a storeroom and kitchen (Pepper, 1920, p. 70) until Richard Wetherill completed his adjoining trading post in the fall of 1897. It was during this period, perhaps, that fresh mud was smeared over the four walls, concealing the record of those who had been there before.

The ceiling of Room 14*b* is a model of second-type Late Bonitian industry, perseverance, and esthetic appreciation. Pepper (*ibid.*, pp. 79-80) describes its composition as pine and spruce logs, 4-6 inches in diameter laid transversely and spaced 2-3 inches apart. These were covered at right angles by a layer of 163 close-lying willow sprouts, 3-4 feet long by $\frac{3}{8}$ inch in diameter, peeled, hand-smoothed and square-ended, and bound to the logs at 6-inch intervals with overlaying split willows and yucca thongs. Upon the willows was a blanket of cedarbark and, upon that, the mud floor of the room above. A southeast corner hatchway gave access to the second-story room.

Rainwater pouring through the south door of 14*b* and muddying their kitchen floor prompted members of the Hyde Expedition to block the opening with hasty stonework; later, to clear the room from which the water flowed (Pepper, *ibid.*, p. 70). That room was a Late Bonitian storeroom, 303, built of second-type masonry against the first-type exterior of Old Bonitian Room 11. Room 14*a* lies directly above 14*b* and, although much of its second-story masonry had previously fallen, the third- and fourth-story northeast corner still stood there at the time of the Society's investigations (pl. 80, left). Present also, surprisingly, was a spot of wall plaster Mindeleff had photographed in 1888, at the end of a third-story 4-pole storage shelf (pl. 19, left). For convenience in hanging blankets and lesser possessions, single poles had crossed each end of Rooms 200, 203, 204,

209, and perhaps others among this second-type Late Bonitian addition to the pueblo.

Surgeon J. F. Hammond's description of a Pueblo Bonito room not examined by Simpson (*in* Simpson, 1850, pp. 144-145) clearly combines his recollections of Room 14*b* with those of 303, as seen through the half-filled south door of 14*b*. Since all he observed through that opening had been removed prior to 1920 a winnowing of his description augments that of Pepper and provides understanding of a second variety of Late Bonitian ceiling—one no longer evident anywhere about the pueblo.

Hammond's "8 cylindrical beams about 7 inches in diameter" were in Room 14*b*; his "6 cylindrical beams . . . less than 2 feet apart" were in 303. Resting upon these six and at right angles to their length "were poles . . . about 2 inches in diameter . . . in contact with each other . . . bound together . . . by slips apparently of palm-leaf or marquez. . . . Above and resting upon the poles, closing all above, passing transversely of the room, were planks about 7 inches wide and $\frac{3}{4}$ of an inch in thickness. They were in contact, or nearly so . . . all their surfaces were . . . as smooth as if planed. . . . Beyond the plank[s] nothing was distinguishable from within. The room was redolent with the perfume of cedar."

Dr. Hammond did not enter Room 303; he merely stood in 14*b* and peered through its half-filled south door. The "planks" he saw were fitted so closely their overlying pad of cedarbark was not visible. But the six transverse beams were there and the 2-inch longitudinal poles. This whole assemblage, which appears so clearly in Pepper's informative figures 23 and 24, had slumped down together and had come to rest upon the south edge of the second-story floor whence they leaned, slantwise, to an open north door. That second-story door has since gone but the masonry on either side is readily identified. The planks and their blanket of cedarbark therefore represent not the floor of 14*a*, as the legends would have us believe, but that of third-story 303C, settled down upon the floor of the second-story room, 303B, which is at ceiling level of Old Bonitian Room 11B (pl. 27, left).

Hand-smoothed "planks" were a Late Bonitian specialty. So, too, the peeled and abraded willows in the ceiling of Room 14*b*. Pepper (*ibid.*, p. 318) said such willows were found "in all the rooms of this outer series" and my more limited observations partially confirm his. We saw none in rooms other than those of second-type construction, but not all such rooms were ceiled with dressed willows. Strips of red

cedar were substituted in some of them. Hand-smoothed planks may have appeared as floor boards more frequently than we know, but they were used also as lintels or sills for Late Bonitian doors, ventilators, and wall repositories. The Old Bonitians, so far as I may judge, were not workers in wood and the dressed pine and cedar boards we observed in their empty dwellings were probably acquired from the Late Bonitians through trade or otherwise.

Unknown individuals had forced entrance into Rooms 14*b*, 301, and 299 sometime prior to 1887 and all three had been appropriated for use by passers-by (pl. 19, right). We did not examine the first story of 301 but the original blocking of its north door had been replaced by rough stonework within a frame of 4-inch pine logs and sawed planking which we did not disturb. Our observations in the upper stories, 301 B-D, are recorded in Appendixes A and B.

In Room 299 the expert craftsmanship of 14*b* is repeated. Its ceiling consists of 23 transverse pine beams, 3 to 5 inches in diameter; above them and lying lengthwise of the room, we counted 134 peeled and abraded willows bound to the beams by split willow stalks (unbarked, flat side down) and yucca thongs. A layer of shredded cedar bark covered the willows. The four walls are of unplastered second-type masonry and there is a door in each. Seatings for a single cross-pole remain at each end of the room, 5 feet 2 inches above its floor, but that at the west end had supported three lesser poles, ends embedded in the masonry, to form a narrow midway shelf. Nails in ceiling beams and pendent baling wire identify 299 as a recently occupied storage place. Its formerly blocked north door is the easternmost of those to be seen in the existing outside north wall of Pueblo Bonito. Late Bonitian architects erected their double row of second-type rooms to encircle Old Bonito and twice thereafter changed the external contour of their addition and added another story.

Room 299 had its contemporary storeroom, 300, built to take advantage of an external angle where Old Bonitian Room 298 abuts Room 13. Like 303, Room 300 is of second-type masonry, but, unlike 303, its ceiling includes a layer of split cedar rather than dressed willows. The second of its 17 selected pine beams had been removed to provide for a southeast corner hatchway but this opening eventually had been closed by a purposely shaped sandstone slab. A more interesting fact, however, is that the ceiling beams of Late Bonitian Room 300 lie just above, if not upon, ceiling beams protruding through the south wall from second-story Old Bonitian Room 13B.

Jack Martin, a former Hyde Expedition freighter, identified

Room 300 as Richard Wetherill's one-time smokehouse, and this seems confirmed by heavily smoked walls and ceiling, an improvised east-end stone bench 20 inches high, pendent wires, and nails in beams and both north-door jambs.

Unlike those in second-type ground-floor houses, including storerooms, the walls of 300B were plastered. A tabular metate embedded face up in the floor was too near the north and east sides for use as a mill. A south door, 10 inches above floor level, had a hewn plank incorporated in its sill and secondary jambs slanted to retain a door-slab placed from the third story of Old Bonitian Room 13. That these two were connected, one a second-story Late Bonitian room of second-type masonry and the other a third-story Old Bonitian dwelling of first-type stonework, is a fact of more than passing interest in this study of local architecture. The north door of Room 300B, opening into 299B, is thoroughly typical except for its secondary jambs which slope outward and thus suggest that Room 299B, like 300B, was used for storage by occupants of Old Bonitian Room 13C (pl. 21, lower).

Here, as on the west side, Late Bonitian houses were built upon several feet of sand settled against the Old Bonitian dwellings. And the resulting difference in floor level prompted Late Bonitian architects to raise the ceiling level of their Room 297B about $2\frac{1}{2}$ feet above that of 299B in order to equal roof level of third-story Old Bonitian Room 298C (pls. 28; 26, lower).

Room 304, which adjoins 303, is another Late Bonitian storeroom built to occupy an irregularity in the outside wall of Old Bonito. Of its ceiling, only three transverse poles remain, all at the broad east end, and these, as in Room 300, were overlain by split red cedar rather than the dressed willows supposedly peculiar to rooms of second-type construction. There was no south door in Room 304 but one opposite gave access to and from Room 209. Although a storage place primarily, the skeleton of a golden eagle (*Aquila chrysaetos*) and the breast bones of three macaws were found upon the floor of Room 304.

The fact that ceiling timbers from Old Bonitian Room 10 protruded through its north wall to rest upon the floor of 304 urged us to another comparison of adjoining Old Bonitian and Late Bonitian dwellings. First of all, the north-wall foundation of 304 is 2 feet 7 inches high with a 7-inch-wide offset 10 inches below floor level. In contrast, the base of the first-type south wall lies 6 feet 3 inches below that same floor level, a figure that compares favorably with the

reported Room 10 ceiling height, 7 feet. Constructional debris—sandstone fragments and chunks of dried adobe mud—crowded the 40-inch space between that old south wall and the 31-inch-high north-wall foundation.

The formerly blocked outside door of Room 299 is the easternmost of its kind now evident. Presumably there had been another in the room next on the east, 297, but if so its outline was destroyed by some pre-1887 wielder of pick and crowbar (Mindeleff, Neg. 3209). Beginning with Room 297 the external second-type masonry of the Late Bonitians had been stripped away and replaced first with third-type stonework (fig. 5), then with fourth-type (fig. 6).

Much has been written herein of this outer north wall, Room 14*b* east to 297 and beyond, but its fascinating history merits further reference. It is all Late Bonitian handiwork. The Late Bonitian architects presumably began construction of their initial addition around at the southwest corner of Old Bonito whence a row of 2-story second-type houses is still to be seen extending from Room 25 to 100 (fig. 4). From 100 eastward, however, that outer row stepped up to three stories and all external openings—doors and ventilators—irrespective of the story in which they occurred, were carefully sealed with matching stonework. Room 14*b* and those on either side are among these 3-story, second-type-masonry houses although topped by part of a fourth story built at a later date (pl. 19, right).

That fourth-story remnant was standing there in 1877, and Jackson (1878, p. 441) remarked upon it. It was a remnant of the Late Bonitians' final building project. Previously they had raised a row of second-type houses outside the southward sloping exterior of Old Bonito and, presumably to adjust them to the height of Rooms 296 and 298, had raised the floor level of Room 297C about 2 feet higher than that of 299C (pl. 28). Thereafter a second addition and a third had been spliced into that same outside wall. The fourth-story remnant above 14*b* is part of that third addition.

Outside Room 297, however, the third room east of 14*b*, a complete change in masonry unexpectedly occurs—a change that has prompted speculation ever since Jackson's time. Here, starting at ground level and slanting upward and to the east, fourth-type masonry abruptly replaces the original second-type (pl. 53). But our data indicate this fourth-type replacement was preceded, and from approximately the same point of beginning, by a third-type substitution for the second-type masonry of the original exterior. No trace of that third-type substitute is externally visible today although remnants survive,

buried, within the pueblo. Externally one may still see where the original second-type wall was abutted by foundations prepared for an extensive fourth-type addition and where the present fourth-type replacement was introduced after plans for that addition had been abandoned (pls. 43, upper; 44, right).

Although the original second-type masonry outside Room 297B and its next-door neighbor was replaced by the present fourth-type veneer, their inside stonework remained second-type at its very best (pl. 29, left). However, in the unnumbered and unexcavated room next beyond, immediately north of Room 86, third-type masonry replaced the original second-type, in the second story if not in the first (pl. 22, upper). That third-type replacement was part of an extensive Late Bonitian reconstructional program that began in Rooms 86, 78, and 71 and, spreading east, eliminated perhaps 20 2-story houses of second-type masonry which, previously, had displaced an estimated 30 Old Bonitian dwellings and storerooms.

In his description of Room 86, Pepper (1920, p. 289) makes it clear this Old Bonitian dwelling had been appropriated by the Late Bonitians and remodeled to their own liking. The east end, as seen in his figure 123, consists of dressed blocks of sandstone with second-type chinking and the adjoining south side likewise was "new." Stonework at the west end was composed of large flat stones, typically Old Bonitian, and remains so today (pl. 22, upper).

Room 78 likewise was altered at the pleasure of Late Bonitian architects. The Old Bonitians had planned and built a crescent-shaped pueblo and the north and south sides of Rooms 71 and 78 curved south in continuation of their plan (fig. 3). Pepper's figure 108 shows a second-type east end in Room 78, as in 86, and the adjoining half of its south wall was obviously built in merely to straighten the convexity of the Old Bonitian original. Late Bonitian architects sought both to widen the Old Bonitian crescent and to surround it. Hence their alteration of first-type stonework in Rooms 86, 78, and 71 and the presence of second-type masonry on abandoned foundations subfloor in nearby houses.

In the unnumbered room north of 86, third-type masonry has replaced the original, of second-type. As I read the record, that second-type original was part of a Late Bonitian replacement program that continued from Room 297 southeast to Rooms 62 and 70 and adjacent structures, and thence across the pueblo to the remains of second-type masonry buildings beneath the floors of Rooms 25, 106, and 336 (fig. 4). That all this was subsequently supplanted by

a second and more deliberate Late Bonitian program is only part of the story of architecture at Pueblo Bonito.

As previously stated, Room 100 occupies a peripheral angle of Old Bonito. It is the only room in the enveloping Late Bonitian 2-story row that lacks an external door. Its west wall, despite larger-than-normal component parts, is of second-type masonry and a contemporary both of that in Room 104, adjoining, and of the northeast wall in Room 92 (pl. 21, upper). Longitudinal ceiling poles in Room 100 were covered with split cedar and cedarbark in addition to the willows of the text. "Individual willow strips . . . were used in all the rooms of this outer series" (Pepper, 1920, p. 318).

These three materials—peeled willows, split cedar, and cedarbark—are seen again in Pepper's figure 137, which illustrates not the ceiling in Room 112 as reported but that of the Hyde Expedition's "old dark room," unnumbered but next east of Room 100. The transverse pole seen in the foreground of figure 137 was a Late Bonitian stringer built into the wall between the "dark room" and that adjoining, a storeroom. Both were roofed by the same lot of ceiling poles, but these were covered in the dark room by layered willows; in the storeroom, by cedar splints and cedarbark. Mindeleff's 1887 photograph (pl. 26, upper) shows those ceiling poles extended through the north wall and about 2 feet of outside masonry above them but all had been stripped away prior to the Society's reconnaissance of 1920 (pl. 3).

Together with 101, Room 100 filled the broad external angle formed by Old Bonitian Room 107 as it abutted an unnumbered room next on the east (fig. 4). When they built 100, 101, and the partition at the east end of 107, the Late Bonitian architects undertook a little necessary repair work in addition. The floor of 107B, perhaps disrupted by the intruding partition, is described by Pepper (*ibid.*, p. 326) as comprising about twice the usual number of alternating layers of cedarbark and adobe above the original cottonwood beams "of various sizes, shapes, and conditions."

Since brush of some sort, almost standard in Old Bonitian ceilings, is not mentioned in the description, I assume it had been replaced with the layer of split cedar seen in unpublished Hyde negative No. 371. That same negative also shows, under the cedar splints, a series of small ceiling poles overlying four straight-grained pine logs that alternate with trios of pine poles. Straight-grained pine timbers, peeled willows or split cedar, and cedarbark were favored by Late Bonitian architects and the floor of Old Bonitian 107B was clearly a Late Bonitian repair job.

Room 107 was abutted by Late Bonitian storeroom 101 and the latter was connected with its contemporary, 93, by an open door and at least one ventilator. Southward from 93 the remaining houses in the encompassing Late Bonitian row had largely succumbed to the elements prior to 1877 (Jackson, 1878, p. 441). The outside wall of each room was 2 or 3 inches thicker than its opposite and these inner walls were built as close as possible to the sloping exterior of the older building leaving a V-shaped space to be filled with sand and constructional waste. Protected by such waste, the exterior of Old Bonitian Room 102 retained a superb example of the studwork, or "mosaic," that I believe once covered the outside of Old Bonito, or most of it (pl. 11, right).

The Hyde Expedition concluded its examination of this Late Bonitian west-side row of 2-story houses with excavation of Rooms 114, 115, and 116. Like those previously cleared, these three were built of relatively large friable sandstone blocks, rubbed smooth and chinked between with laminate chips—the very acme of second-type masonry (pl. 10, 2). This use of thin laminate sandstone as a chinking medium, so different from the mosaic-work of the Old Bonitians, really introduced tabular sandstone as a local building material. Thereafter, as the Late Bonitians pursued their successive expansion plans they utilized increasingly thicker blocks of the laminate variety and came ultimately to use it altogether.

Each room in the outer 2-story row was provided with 3 doors, each wider at the sill and each with 7-9 clean, pine lintel poles that might extend several feet beyond the jambs, perhaps to the side walls. In each instance the outside door was closed with masonry matching that of the wall itself; in each instance second-story doors occupied the same relative position as those of the first story. Apparently, there was no ground-floor fireplace in any of these 2-story houses; no interior plaster; no smoke-blackened walls; no evidence of occupancy. Together they formed a single row hiding the convex exterior of crescentic Old Bonito.

Late Bonitian Room 114 had a ceiling height of 10 feet 4 inches; at ceiling level its east wall stood 16 inches from the outside of Old Bonitian Room 317, next on the east. This old exterior, thickly plastered, doorless, and slanted inward like others of its kind, rose from a 17-inch-high foundation based on clean sand 5 feet 10 inches below floor level in Room 114. Thus the Late Bonitians began their enveloping row of 2-story houses almost at first-story ceiling level of the old village. If my calculations are correct, the floor of Old Bonitian Room 317 is about $4\frac{1}{2}$ feet lower than that of Room 114.

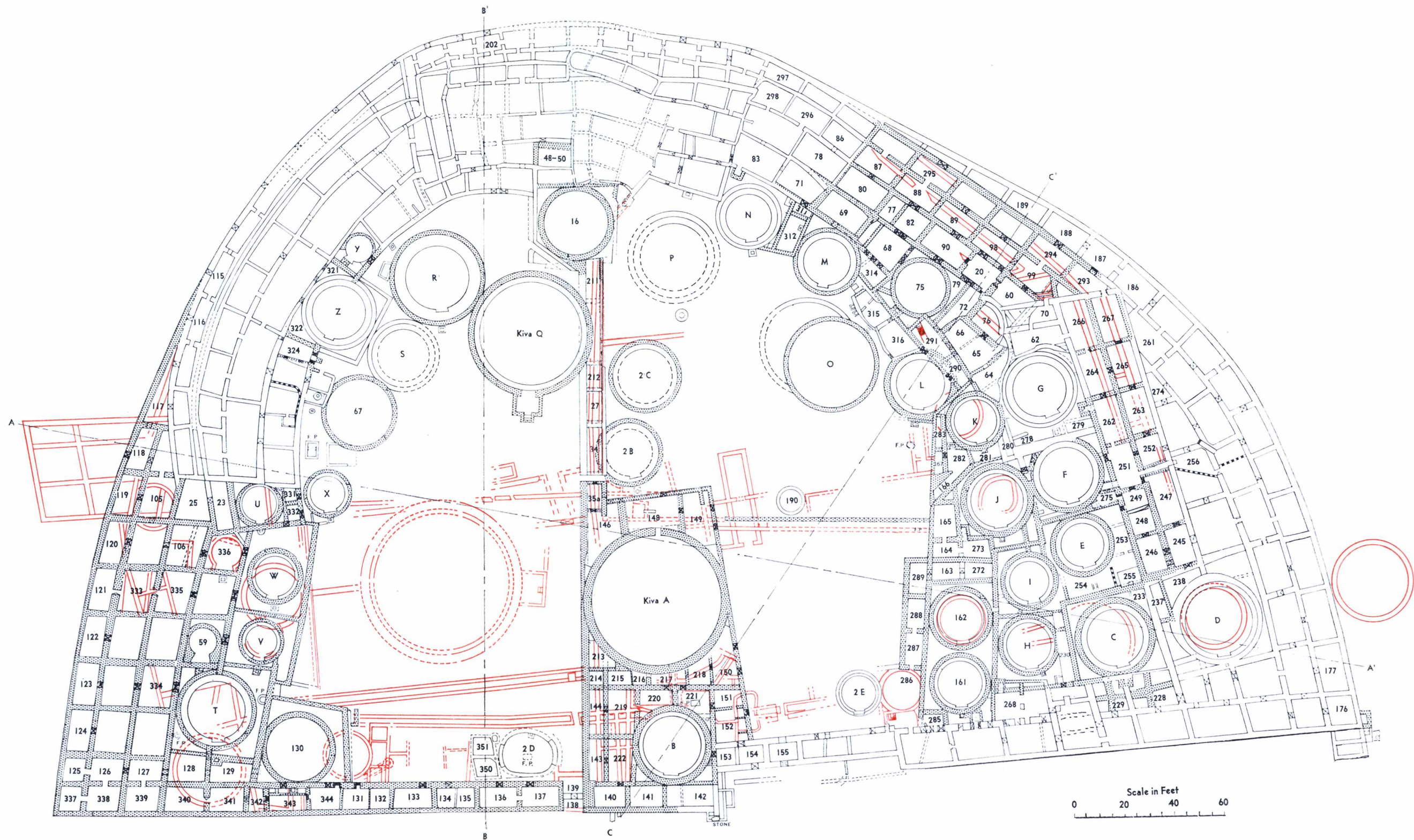


FIG. 5.—Ground plan showing extent of the second Late Bonitian addition with known subfloor walls and foundations for third-type masonry.



Third-type replacement of first-type masonry, north wall of Room 86B. Second-type interior, room north of 296B, at upper left.

(Photograph by Neil M. Judd, 1926.)



Old Bonitian Room 83, foreground, with third-type masonry above. Open door, upper left, is in north wall, room east of 297B.

(Photograph by O. C. Havens, 1921.)



PLATE 23

Left: Portion of partly razed Old Bonitian kiva underlying Terrace 347.

Right: North arc of Old Bonitian kiva; enclosing wall of Kiva 2-C at left.

(Photographs by Neil M. Judd, 1926.)

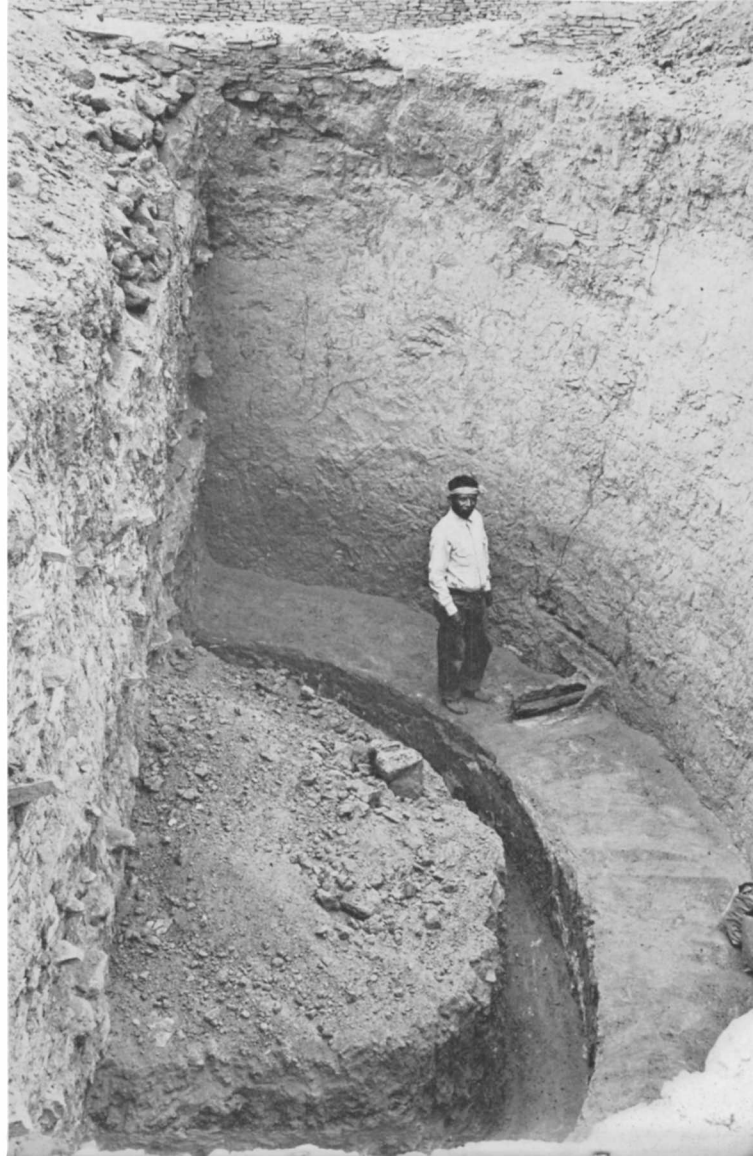




PLATE 24

Left: North arc of Kiva R with fourth-type masonry of Room 57, at upper left, abutting outer southeast corner of second-story Room 92.

Right: North bench niche and subfloor repository, Kiva R, with original first-type bench (under gloves) and three successive benches.

(Photographs by Neil M. Judd, 1927.)

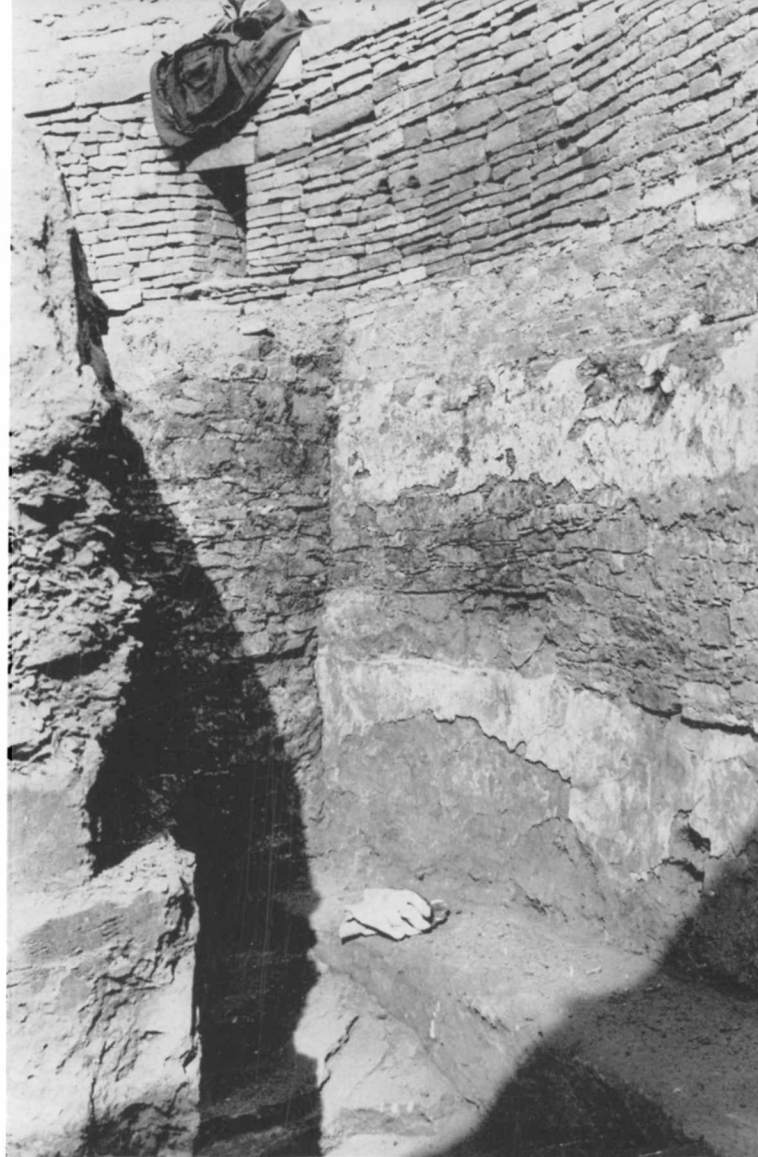




PLATE 25

Left: Northeast corner of Room 328 with part of post-and-mud east wall, sub-floor ventilator duct, and wattled screen (lower right).

(Photograph by O. C. Havens, 1924.)

Right: Willows bound horizontally to upright posts and coated with mud partitioned Room 256.

(Photograph by Neil M. Judd, 1922.)



The sealed door in the west wall of Room 115 invited close examination. Its north jamb, 3 feet high, was intact and so was half the original second-type blocking but the remainder had been removed and replaced above sill level with third-type masonry. Ten feet south of the surviving jamb this substituted stonework overhung the original by 5 inches (pl. 37, upper). Wind-blown sand had piled up against the outside wall until the blocked door was half covered but, 18 inches below sill level, we came upon a trampled silt surface and, 27 inches lower, the west-wall foundation, 29 inches high. That foundation was built upon blown sand of unknown depth but containing occasional bits of charcoal and early-type potsherds.

South of Room 115 are 116 and then three unnumbered rooms that preserve the convex outer curve and the original second-type masonry of the Late Bonitians' 2-story additions. We know these three only from the outside but assume they have practically the same floor level, wall height, and door arrangement as Rooms 114, 115, and others of their kind. In the first two, blocked west doors have lintels 21 inches above the floor of third-type Room 117 (pl. 37, lower). If we assume that those doors are 3 feet high, as was that in Room 115, and that each is 34 inches above its respective floor, the average measured sill height in Rooms 200 and 202, then floor level in those two unexcavated second-type Late Bonitian rooms is 3 feet 10 inches below that in third-type Room 117 and, based on our comparative data between 114 and 317, approximately $4\frac{1}{2}$ feet above floor level in Old Bonitian Room 320.

The narrow space between the southernmost of these three unexcavated Late Bonitian rooms and the exterior of Room 320 had been filled with waste and roofed over at time of construction. We noted remains of the one-time ceiling in the southwest ventilator of 320B—pine poles recently severed by a cross-cut saw and strips of split cedar above the poles. Presumably all comparable space between the older and later masonry northward to Room 101 was similarly roofed by the Late Bonitians.

Together, these five second-type rooms, 115, 116, and the unnumbered three, embody architectural data to which I shall return in the next chapter, but it may be recorded here that, although the west wing of Old Bonito ended with Rooms 320 and 326, the row of 2-story houses outside the old buildings continued at least two units beyond before all were razed and replaced during the Late Bonitian's second and greater expansion program—the program that began at the blocked west door of Room 115.

We found remains of those continuing second-type units underneath the floors of Rooms 25, 106, and 336. Pepper (1920, pp. 98-111) describes 25 as an "open room" containing a vast assortment of discarded materials and separates it into an "upper, or new part" and a "lower" part. Therein lies our principal interest in Room 25 for the "new part" features third-type masonry and thus identifies it with the Late Bonitians' second reconstruction program while the "lower" part is what remains of a room demolished in the path of that program.

The north wall of Room 25 and the lower half of its east side have survived from the original second-type room and have been incorporated in its third-type replacement. The south and west sides of the earlier structure, however, were largely razed and "new" walls were erected above their remains although not along the same lines. This misalignment accounts for the fact that the south end of the rebuilt room, 14 feet 4 inches wide, is twice that of the north end.

Subfloor in the northwest corner of this rebuilt room the partially razed west side of the earlier is crossed by the "new" west wall. The upper 3 feet of that older, second-type masonry had been replaced with foundationlike stonework to serve as support for the third-type wall above while the lower 2 feet remains typical of its period and is identical with that in the empty second-type rooms north to 116 and beyond. It was this surviving portion of the older structure, 5 feet 3 inches deep, filled with debris of demolition and floored over, that became the "lower" part of Pepper's description.

Following excavation, Room 25 was repaired and reroofed by Richard Wetherill for his own purposes. An east door was blocked; that on the west side was enlarged and barricaded; a hole broken through the north wall into the V-shaped space outside Room 320 (unpublished Hyde prints 305 and 440) was also closed, and five select pine ceiling poles were among those comprising the new roof. In 1959 Room 25 was utilized for storage by local Park Service personnel and, for reasons unknown to the present writer, was referred to as "the Judd room."

The two unpublished Hyde prints cited above also show an outward flare at the base of the north wall as though the Late Bonitian builders of Room 25 had closely followed the external slope of Old Bonitian 320. In his description of 25 Pepper (*ibid.*, p. 98) directed attention to a sandstone disk embedded in the second-story north masonry. Another such disk occurs low in the south wall of 106 (*ibid.*, p. 325) and yet another appears in the north side of Room 303.

Mindeleff in 1887 photographed a fourth example outside and just above lintel level of the formerly blocked north door to Room 200 (pl. 26, upper). Thus three of the four embedded sandstone disks of record occur in second-type Late Bonitian masonry. We did not dislodge one.

Room 106, correctly described by Pepper (*ibid.*, p. 324) but interchanged with Room 23 on Hyde's ground plan (*ibid.*, fig. 155), adjoins Room 25 on the south and the partly razed second-type wall noted subfloor in the northwest corner of the latter continues diagonally across Room 106 and on approximately the same level, here at a depth of 5 feet 8 inches. Other partially razed second-type masonry was disclosed by our trenches beneath the floors of Room 336 and Kiva U and it is reasonable to suppose that still other comparable remains lie deeply buried in areas we did not explore.

Room 336 was built of superior third-type masonry and shortly after completion a 1-inch layer of shale was spread upon the floor to underlie an intermural kiva, 11 feet 8 inches in diameter (pl. 74, lower). Subsequently that kiva was reduced to its lowermost two courses, but at time of construction it crossed a contemporary north-end wall of unknown purpose, and this latter, in turn, crossed an earlier second-type wall paralleling that diagonally subfloor in Room 106. At depth of 4 feet 7 inches the floor associated with this Room 336 subfloor wall is a foot higher than its counterpart in 106, but the masonry itself continues another foot and a half, to 6 feet. Both walls, the subfloor second-type and the north-end third-type, had been cut through upon construction of the under-floor ventilator duct connected with the short-lived kiva built within the walls and upon the original floor of Room 336.

Although I did not pursue the subject to a positive conclusion, I believe the partially razed second-type walls subfloor in Rooms 106 and 336 were in some way connected with the lower part of the one that separates Kivas U and W. Originally several feet higher, this latter wall still stood 16½ feet at the time of our investigation. Its lower 13 feet was a mixed masonry but predominantly of friable sandstone dressed and chinked after the manner of our second type while the remainder was typically third-type. With no identifiable foundation, the wall was based on an apparent work surface 6 feet 2 inches below floor level in nearby Kiva W and 9 feet 5 inches below that in Kiva U.

I may be quite wrong in assuming a relationship between the lower part of this wall and those subfloor in Rooms 106 and 336,

but in either case its construction followed demolition of a second-type kiva whose floor lies 8 feet 11 inches below that of third-type Kiva U. To judge from the arc we exposed, the wall of this earlier chamber, 21 inches thick, was razed 4 or 5 feet above its encircling bench. This latter, likewise partially razed, had been 30 inches high but my notes do not record its width. We guessed floor diameter at about 23 feet.

Thus the initial building activities of the Late Bonitians included not only Rooms 115, 116, and those adjoining on the south but also the original of Room 25 and north therefrom. Room 25 appears to have been the approximate turning point beyond which Late Bonitian architects did not venture in their first constructional program. The partially razed second-type kiva 9 feet under Kiva U was part of that initial program and salvable materials from it and from the under-floor walls in Rooms 25, 106, and 336 might account for the mixed masonry of the wall separating Kivas U and W.

Because the lower 9 feet 2 inches of that wall was not plastered externally it could, conceivably, have been built to conceal the partially razed remains of the older, underlying kiva, but its plastered upper half, above the 9-foot-2-inch level, seemingly was intended to screen two or more second-story rooms. In the portion we examined, two former doors, both subsequently blocked, appear 16 inches above the line of plastering or $10\frac{1}{2}$ feet above the basal work surface.

The first of these two doors, 24 inches wide by 46 inches high, had been carefully sealed and thereafter was abutted by the front wall of Room 336 when this latter and those next on the south formed the west boundary of the Court. The second-story rooms once entered through those doors had in their turn been demolished to provide space for Kiva U, 13 feet 10 inches in diameter, but the wall itself was left standing.

There is much hereabout not clarified by our researches. Good second-type masonry underlies the east side of Rooms 331 and 332, abutting the thickly plastered, chip-studded exterior of Old Bonitian Room 330, but cramped quarters discouraged deep digging. The wall separating these two small rooms was a partition only, built upon their floors, but that at the west, part of the Kiva U enclosure, retains a strong flavor of early Late Bonitian architecture. If not part of the original building program, these several walls were erected with stones salvaged from razed second-type rooms. A blocked and plastered door, 22 inches wide, at the south side of Room 332 and 5 feet above its floor does not, in my opinion, represent a second story

chamber but rather extension of the wall between Kivas U and W, with blocked doors at the second story level.

Our exploratory trenches in the West Court, while less convincing than I could wish, nevertheless disclosed remnants of cross-court building operations that, together with less dubious remnants under the East Court, indicate that Late Bonitian architects were, from the time they assumed control at Pueblo Bonito, intent upon joining its two extremes into a compact whole. This idea, which apparently never occurred to the builders of Old Bonito, was notably intensified during the Late Bonitians' second and greater expansion program (fig. 5).

When the Late Bonitians came to dwell at Pueblo Bonito their first major activity was a 2-part building program: a single row of 2-story houses raised against the blank exterior of Old Bonito and a series built upon a row of ground floor rooms lining its concave front. Both parts of that initial undertaking are still obvious today. Typical Old Bonitian stonework survives in Room 330B but north of it only 1-story buildings remain, mostly with second-type, Late Bonitian structures above.

Second-type Late Bonitian masonry is present for all to see in Rooms 328B, 327B, and 324, and, as previously explained, walls of the first two are supported by a cruder but contemporary variation built in to strengthen the Old Bonitian ground-floor stonework. The north and east sides of Room 324 are of third-type masonry at the second-story level, and followed demolition of a second-type kiva that partially underlies fourth-type Kiva Z. If this seems complicated let me add that during trenching operations outside the southeast corner of the Kiva Z enclosure, we came upon the arc of a first-type or Old Bonitian kiva that had been partially razed to make way for one of Late Bonitian second-type masonry and this latter, in due course, had been supplanted by third-type Kiva 67. Here, almost within arm's reach, was displayed the entire range of Pueblo Bonito stonework, first to last.

Room 324, a third type-masonry dwelling at the second-story level, was equipped with a masonry-lined fireplace boasting two sandstone firedogs. A half dozen stone implements and two shattered Corrugated-coil pots lay upon the floor. That floor was 10 feet above floor level in Old Bonitian Room 325, adjoining on the west, and $3\frac{1}{2}$ feet above that in Kiva Z.

Earlier floors were noted in Room 324 at depths of 7 inches and 42 inches. On the latest of these two a 7-inch-wide foundation of

unknown purpose crossed the room midway, from north to south. The earlier floor, that at depth of 42 inches, lay within the partially razed walls of a second-type kiva. The south side of the room, including stone apparently salvaged from that razed kiva, had been built upon a log whose west end was embedded in the first-type external stonework of Old Bonitian Room 325 and whose middle portion rested directly upon the second-type masonry of the under-floor kiva.

In our 4-foot-wide test pit, the floor of that earlier kiva lay 10 feet 4 inches below the uppermost in Room 324. Our pit revealed the usual kiva bench, 18 inches wide by 23 inches high, repeatedly plastered and as often smoke stained but neither pilaster nor south recess. The fact that only one coat of slightly sooted plaster appeared above bench level suggests that this razed second-type kiva was either short lived or that its upper walls were shielded by a wainscoting of upright sticks and grass.

The second-type kiva under Room 324 is only one of several contemporary structures erected in or on Old Bonitian court-side rooms before all were razed in advance of the third- and fourth-type walls now standing. Room 28, for example, was an Old Bonitian ground floor dwelling 40 feet long before Late Bonitian architects straightened its concave north side with a veneer of second-type masonry (Pepper, *ibid.*, fig. 144) and continued it at least to the second story ceiling level.

Part of that north-side veneer remains today between Room 28B and Room 52, the second story of 32. Except for a second-type partition built on a first-story beam, Room 28B was destroyed by fire (Judd, 1954, p. 24) and replaced with the fourth-type masonry that now encloses Rooms 55, 57 and 28B. A bit of contemporary patchwork is still to be seen at the north end of 55 where a ceiling timber was inserted into the Old Bonitian stonework (pl. 80, right).

Adjoining Room 28 on the west is ground floor Room 3*a* (or 97) with Room 92 as its second story and next beyond are Rooms 3 and 91, the latter above the former. As explained in Chapter II, the original northeast and southeast walls of Room 3*a* were of old-fashioned post-and-mud construction refaced with an inferior variety of second-type masonry. That at the northeast was the better of the two, and its continuation upward into Room 92 was better still.

Here, in second-story 92, Late Bonitian reconstruction is more in evidence. Veneering on the northeast side was 26 inches thick and, including the stonework of Old Bonitian Room 3*d* which it abutted,

made a total wall thickness of nearly $3\frac{1}{2}$ feet (Pepper, *ibid.*, p. 299). The southwest wall, a foot thick, was supported by an 8-inch straight-grained pine beam seen at upper right in Pepper's figure 127 (p. 307). Unpublished Hyde print 304 shows that supported wall to be of excellent second-type masonry and the equal of that adjoining on the southeast (pl. 24, left).

The floor of Room 91, next door to 92, rested upon four beams averaging a foot in diameter, and these were crossed at right angles by poles 2-4 inches thick (Pepper, *ibid.*, p. 40). There were no comparable beams under the floor of Room 92 but rather a dozen or more transverse poles some of which appear in Pepper's figures 127 and 128 (*ibid.*, pp. 307-8).

It is not improbable that ground-floor Rooms 3 and 3a (or 97) were originally one and that this was divided sometime after Late Bonitian architects built Rooms 91 and 92 at the second-story level. The straight-grained 8-inch pine beam on top of the dividing partition was part of that reconstruction; transverse poles extended from it across 3a to an "old" 6-inch beam half concealed at ceiling level in the Late Bonitian veneering of the northeast wall. Thus, although I detect no trace of it in Pepper's illustrations, the layer of close-lying northwest-southeast ceiling poles in unpublished Hyde print 304, with its covering of cedarbark and adobe and a mud-rimmed fireplace in the middle, necessarily overlay the transverse poles of figures 127 and 128. Clearly the Late Bonitians were rather prodigal in their use of straight-grained ceiling poles!

As to the time of these Late Bonitian alterations we have only the six ceiling-pole dates, A.D. 1036-1092, collected by Dr. Deric O'Bryan from Room 97 (or 3a), "upstairs" and "downstairs" (personal communication; Gila Pueblo Nos. 2297-9, 2303-5). National Geographic Society specimens 47 and 48 from Late Bonitian Rooms 55 and 57, just around the corner, bear cutting dates of 1071 and 1083. So the quantities of bean bushes, beans, and corn found on the floor of Room 92 (Pepper, *ibid.*, p. 298) could have been harvested either by the Late Bonitian builders of that room or by the Old Bonitian occupants of 3 and 3a.

Pepper identifies Room 3 as a "square kiva," whereas the slab-sided fireplace, the draft deflector, and the 12-inch-square "entrance to a passageway" that prompted the identification actually occur in the room above, 91. Outside, while clearing the terrace above Kiva R, we observed no evidence either of the reported ventilator intake or of the four 12-inch beams "protruding fully 8 feet."

Three of the Room 91 walls were of second-type Late Bonitian masonry, plastered and provided with doors. An oversized "niche" through the southwest side apparently extended to intramural Kiva Y, suggesting this latter was of contemporary or later construction. Like 92, Room 91 was equipped with a southeast corner hatchway connecting with the room below.

Rooms 91 and 92 were among those second-story rooms built by the Late Bonitians upon Old Bonitian ground floor structures lining the West Court from 328 or 329 to 28B and beyond. Portions of their characteristic second-type masonry survive at the north side of Room 28B (pl. 30, lower) and it is possible more of the same sort is preserved among the wreckage of nearby rooms, including 48-50.

Pepper (*ibid.*, p. 207) describes Rooms 48, 49, and 50 as "a rather peculiar series." As I interpret the description, ground floor Room 48 was of Old Bonitian stonework; upper 48 and 50 were separated by a wall built upon a large beam at ceiling level of the lower room; Room 49, "long and narrow," was the open space above the 2-foot-thick masonry built in at the north to support that large beam. Lower 48, therefore, was merely another Old Bonitian ground floor room that Late Bonitian architects modified in their early program of constructing dwellings at the second-story level.

A few doors east of 48-50 are Rooms 308 and 309, second-type Late Bonitian structures built in front of Old Bonitian Rooms 306, 307, and 307-I. Room 308 does not differ greatly from an ordinary dwelling but 309 is unique. There is nothing else like it in Pueblo Bonito. Both rooms are marked by low ceilings; as last occupied there was no means of direct communication between the two.

In Room 308 four 8-inch pine beams seated in the first-type north wall at a height of 4 feet 3 inches project southward an average of 7 feet 2 inches. Their size and square-cut ends identify them with the Late Bonitians, but all four were obviously salvaged elsewhere, since they are too short for room width here and one is visibly impressed by oversized cross timbers (pl. 31, lower). Two of the 4, paired, rest upon upon a masonry pillar that stands on the latest floor and half conceals a previously blocked east door. The other two beams were supported by individual posts and the space between them and the south wall was bridged by 3-inch ceiling poles.

Of four doors, one in each wall, only that leading into Room 19 remained open at the time of our observations. Old Bonitian repairs, including use of small chips pressed into the mud plaster, are evident about the blocked east door. An earlier floor at depth of 7 inches

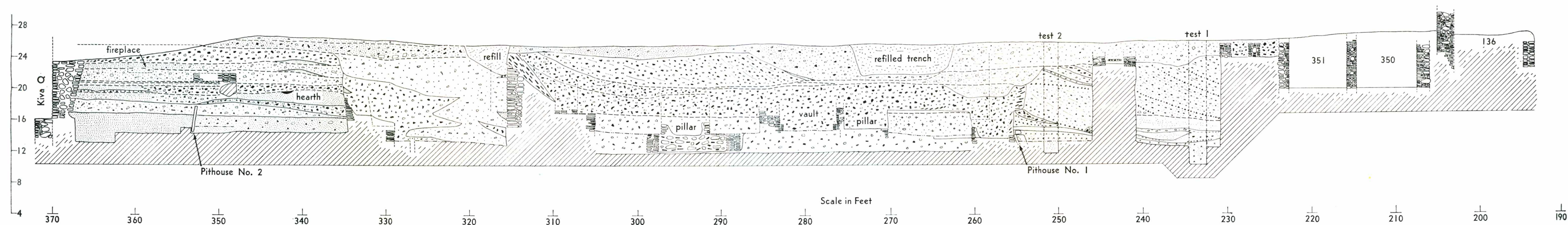
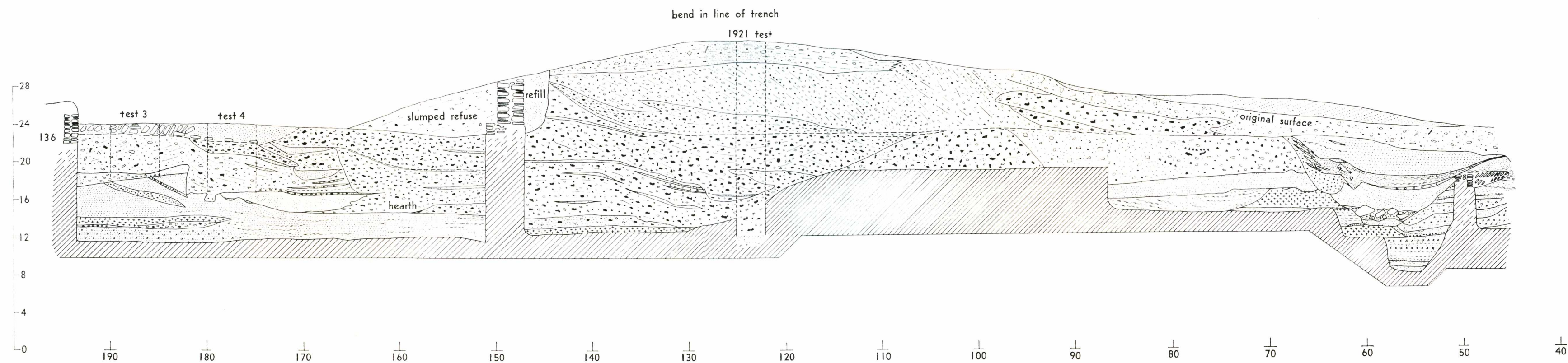
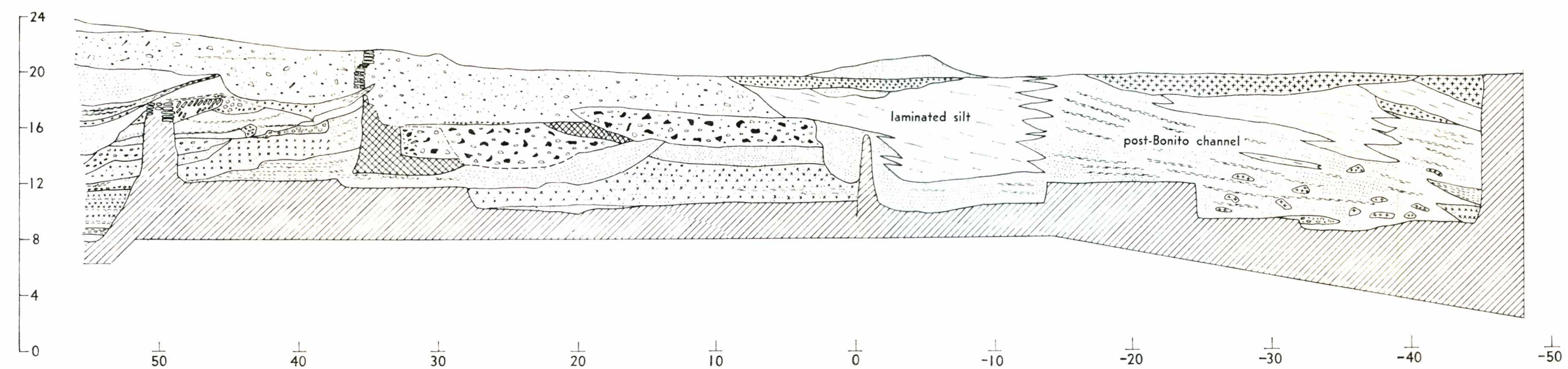


FIG. 7.—Profile of trench through West Refuse Mound and West Court to Great Kiva O.

contained a southeast corner hearth, 18 inches deep, unlined and unrimmed. On this same earlier floor, with no indication of intentional burial, we found the skeleton of a thick-billed parrot (*Rhynchopsitta pachyrhyncha*), imported from near the Arizona-Mexico border. While imprisoned, its sternum had become deformed by improper food or lack of sunlight, or both.

The 7-inch fill between floors contained a number of Corrugated-coil potsherds and fragments of bowls ornamented with designs in Chaco hachure—evidence these well-known Pueblo III types of domestic earthenware were present during or before construction of Room 308. Wall masonry continues an average of 6 inches below the earlier floor and we did not dig deeper.

Room 309 was certainly never designed for secular use. A plastered masonry block partially screens its northwest corner and the other three are occupied by quarter-circle enclosures whose floor areas vary from 6 inches above that of the room (NE) to 29 inches below (SW) and here an earlier floor lies 9 inches deeper (fig. 12). A bench of second-type masonry 9 inches wide by 7 inches high extends lengthwise of the east wall with a much plastered "shelf" or "seat" at its south end and, fronting this latter, an enclosure 9 inches deep but rimmed on the concave side by a 7-inch-wide offset 5 inches high (pl. 31, upper).

Opposite, in the northeast corner, a convex wall curves out and meets two plastered masonry buttresses, one against the north wall and one upon the east bench, thus enclosing an area frequently repaved and once ceiled by thin pine boards when the enclosed space was 33 inches deeper. Adjoining this area on the south and against the plastered face of the bench at its original height (38") was a masonry-lined feature, 29 inches deep, I inexplicably recorded as a "bin." Its purpose is unknown.

Close in the southwest corner of 309 is another quarter-circle feature also 29 inches deep, masonry-lined and plastered, its south and west sides continuing to an earlier floor at 38 inches. Midway of its concave side and 8 inches above its floor is a neat little niche, plastered but empty. Where the feature's east arm abuts the deeper south side of the room a floor-level ventilator opens through to connect with an external shaft built against the plastered exterior. Within the room, between ventilator and a masonry screen or deflector, the floor is 2 inches higher, and here we found the skeletons of an infant and a macaw (*Ara macao*). The fact may be purely fortuitous but three other macaw skeletons and that of an infant were recovered from shallow pits in Old Bonitian Room 306, north of 308.

Beyond the screen is a large conical fireplace, unrimmed, 22 inches deep but only the upper 10 inches of its masonry plastered. Between fireplace and screen is a sunken repository, likewise conical, 8 inches deep and 12 inches in diameter at the top. A second possible repository, slab-lined, abuts the convex front of the northeast enclosure.

In addition to these several features there is against the middle south wall of Room 309 a masonry-lined and plastered "vault" 44 inches deep. On its north side, 9 inches below the room floor, is a 4-inch-wide offset and, lengthwise of it, the imprint of a pole $1\frac{1}{2}$ inches in diameter, an imprint not unlike those sometimes seen at the sides of kiva vaults. There was no comparable offset, no pole imprint, on the south side; no suggestion of a covering.

Earlier floors at depths of 19 and 36 inches in the northwest corner, at 29 and 38 inches in the southwest corner, and plastered masonry to a depth of 44 inches in the south-side "vault" all suggest that the second-type walls of Room 309 had stood here a long while and that the several fixtures described above may not be of equal age.

We encountered on these earlier floors, particularly in the northwest corner, sections of broken masonry but not enough to justify the thought that they had duplicated at an earlier period features in the room as last occupied. Like evidence did not present itself in Room 308 where, by our tests, floor levels are shallower. A former connecting door, its sill 8 inches below floor in 309, had been sealed before a masonry pillar was built on the latest 308 floor after which a second opening was cut through above, presumably to provide access to 308B.

Room 310, fronting Rooms 308 and 309, has been considered as an open workspace. Apparently it had been utilized by both Old Bonitian and Late Bonitian housewives, for we counted eight earlier work surfaces. The uppermost of these, $3\frac{1}{2}$ feet above the west-wall foundation, supported masonry enclosing the ventilator shaft from Room 309, 13 x 20 inches; between it and the northwest corner of the area, six large recumbent slabs and nine metates, both tabular and Late Bonitian. One metate was bedded in adobe and rimmed with masonry; underneath it were two sandstone slabs, one upon the other, each seated in mud and the lower covering a masonry-lined receptacle $5\frac{1}{2}$ inches square and empty. Three similar repositories, each slab-covered, were noted on that same surface close against the north wall and west of the Room 309 ventilator. Between the first of these four and the corner were two shallow depressions, each containing a number of shells, beads, and flint chips (U.S.N.M. No. 336028). "In olden times," said one of our Zuñi workmen, "turquoise and

beads were planted under the floor to keep children from falling off ladders."

This so-called workspace, 310, extended to the rim of Kiva N, a 6-pilastered chamber of second-type masonry that was apparently built upon the remains of one or more earlier dwellings which, in their time, had supplanted the partially razed Old Bonitian kiva Pepper (*ibid.*, p. 269) found subfloor in Room 83. The north arc of Kiva N now stands 9 feet 3 inches above its floor, but 4 feet 7 inches below floor level we came upon a large block of native sandstone, part of the same cliff-fall Pepper reported on the first-type kiva bench under 83.

Plastered and whitened second-type masonry was disclosed repeatedly during our testing hereabout, in and under Rooms 311, 312, and the area numbered 313. What is left of Room 312, with its slab-lined fireplace and floor repositories, overlooks Kiva N from the east and likewise appears originally to have been of second-type masonry. Although third-type stonework is now most in evidence the upper 11 inches of it at the south end rests upon the partially razed and rebuilt second-type masonry of 313. Among the miscellany scattered over the floor of Room 312 were a few bones of *Ara macao*, the red, blue, and yellow macaw of tropical America, and several late Chaco potsherds including fragments of a white cylindrical vase.

That irregular open space numbered 313, south of 312, may conceal the remains of one or more former dwellings. The latest floorlike surface we came upon lies 4 feet 2 inches below that of Room 312. A white-plastered door jamb, the apparent remnant of a west wall, has been incorporated in the Kiva N ventilator shaft; from this point the north side, of good second-type masonry, extends 15 feet 10 inches to a rebuilt corner above Kiva M. Here, among a welter of mixed masonry, we came upon the remains of a 27-inch shaft whose stonework, razed 44 inches below floor level, connects at a depth of 7 feet 10 inches with a slab-floored tunnel, 26 inches wide by 25 inches high, roofed with transverse poles and sandstone slabs, that extends northward under 312 to an unknown destination.

Although second-type masonry appears predominant among these partially razed, subfloor walls our plotting of them (fig. 4) does not seem reasonable. Some obviously preceded construction of Kiva M; some followed. In a second test pit at the southeast corner of the area we bared seven distinct and fairly uniform levels the lowermost, at 7½ feet, of compacted sand but containing particles of charcoal. A third pit, at the west side of the open area, re-

vealed the convex curve of an adobe wall, 34 inches high, razed $2\frac{1}{2}$ feet below the surface and partially covered by the external stonework of Kiva N.

Apparently there was more Late Bonitian constructional activity around the courtward side of Old Bonito than our data disclose. Some of that activity, as we have seen, included walls of second-type masonry; some of it resulted in walls built, in part at least, with stone salvaged from razed second-type structures. Demolition, reconstruction, and replacement are everywhere evident.

Kiva R, at the north end of the West Court, apparently possessed some intangible quality that led to repeated revision rather than replacement. Its location may have been the determining factor. At any rate Kiva R apparently started as an Old Bonitian creation which the Late Bonitians adopted and rebuilt, first in second- and later in third-type masonry. And with each revision the Late Bonitian priesthood adhered religiously to the outward slope of the original (pl. 69, lower). In contrast, Kiva N was constructed of second-type masonry throughout but upon the site of an abandoned and partially razed Old Bonitian chamber.

Eastward from Kiva N and Room 312 whatever court-side structures of second-type masonry formerly existed have been replaced by those of third-type masonry. This is an area of intensive Late Bonitian constructional activity. Their architects ordered demolition of at least 15 Old Bonitian 2-story houses to make way for those of second-type masonry. Our test pits revealed portions of second-type kivas beneath third-type kivas L and O (figs. 4; 15), but north thereof I am less certain. Such foundations as we came upon usually were so completely stripped of their stonework there was nothing left by which to identify them. Bare foundations all look alike!

Some of the underfloor masonry in Rooms 88 and 90 is positively second-type; some of that under Kiva 75 might be or it might be older, as was previously suggested. Some of the lower walls in much-altered Room 64 retain a strong flavor of original second-type construction and this is also true of the subfloor ventilator ducts and other fixtures of Old Bonitian Rooms 315 and 316. Not until one comes to Rooms 62 and 70 and Kiva G may one enter surface structures in which second-type masonry visibly predominates. And, after G, there is that conspicuous rectangular block of 14 adjacent rooms in which Late Bonitian architects exercised the whole gamut of their distinctive stonework.

Pepper (1920, p. 223) wrote: "Room 62 was very interesting."

He might have added those on either side, Room 70 and Kiva G, for they are equally interesting. Each evidences long occupancy and extensive alterations. The west end of Room 62 is clearly of our second-type masonry, as seen in untrimmed Hyde negatives 217 and 221 from which Pepper's figures 99 and 100 were prepared. Built-in sections at either end of the irregular south side, the convex curve of Kiva G between, are composites of second-, third-, and fourth-type Late Bonitian masonry. Overhanging the northwest corner just above ceiling level (*ibid.*, p. 232; fig. 98) is a northeast-southwest wall of banded fourth-type stonework, presumably a second-story continuation of that diagonally through Room 70.

Where a later coat of plaster lines across the west end of Room 62 about $3\frac{1}{2}$ feet above its floor, three north-south logs supported a storage shelf composed of 2-inch poles with reed mats lashed to them by strips of wood and yucca cord. About a foot east of this shelf a rectangular door into Room 70, sill height unknown, had been reduced to oval form by secondary jambs and lintels.

The west end of 62, of typical second-type masonry but scant foundation, was built upon compacted sand into which five storage cists had been dug, their average depth being 3 feet 9 inches. Like those we discovered under the floor of Room 266, adjoining on the east (Judd, 1954, p. 48), Pepper's five cists were filled with broken pottery and sand; in addition, the contents of two were covered by fragments of large burden baskets, the only baskets of their type reported from Pueblo Bonito.

Of the sherds visible in Pepper's figure 100 (*ibid.*, p. 227) I recognize four pitchers of the old globular form, with sloping shoulders and handles attached below the rim. Visible bowl and pitcher ornamentation is likewise in the old tradition, which Roberts and Amsden described as Transitional or Degenerate-transitional (Judd, 1954, p. 178). This is the pottery of Old Bonito, as made known by test pits through household sweepings beneath the West Court. It is reasonable to believe, however, that fragments of Late Bonitian vessels were also represented in the cist fill, as they were in Room 266.

In the published description of Room 62 I find no positive evidence of Old Bonitian occupancy of this immediate area but such evidence may have been overlooked since there is at least a suggestion of it in the northwest bench of Kiva G. We are told the north wall of Room 62 continued 4 feet below its lower floor, the one with the sherd-filled storage cists, while the south side continued to a depth

of over 6 feet. We have no comparative data as to floor levels in 62 and 70 but that in 266, with its underfloor cists, was just 5 feet below a single southwest door whose sill height in Room 62 is given as 9 inches or, possibly, 21 inches (Pepper, *ibid.*, pp. 233, 236).

Room 266 lies immediately east, or northeast, of 62 and 70; the wall between, as seen from 266, is of good second-type masonry and so, too, is the near two-thirds of its northwest side as the latter continues west to the outside curve of Room 76. The remainder of that northwest wall is of third-type construction.

From the open north door of Room 62 the evidence of building and rebuilding in Room 70 seemed particularly puzzling and I am not sure my interpretation of the published record is entirely accurate. Apparently guided by depth alone, Pepper believed the lower part, the "first floor" as he called it (*ibid.*, p. 256), had been built by "the old people." His "old people," however, elsewhere in his field notes recognizable as my Old Bonitians, are here readily identified by their distinctive masonry as early Late Bonitians. As seen in unpublished Hyde negative 245 (herein, pl. 32, right), the lowest wall in Room 70 is of second-type masonry with a rectangular door in the middle. Eventually that wall was razed approximately at lintel level and a new floor laid; a cruder, foundation-like stonework of salvaged rock was substituted at left and right and plastered as though for occupancy. A square doorway at new-floor level, its inset jambs unrealistically slanted outward to support a doorslab placed from within, connected with Room 99, adjoining.

That floor-level door is our introduction to 99, but, with the previously unpublished Hyde print of Room 70 in hand, it seems desirable to note several architectural features that are no longer visible: (1) a beam hole in the rebuilt west half of the north wall and lesser timbers protruding from the left evidence a second-story floor a few inches below the log-supported, third-type northeast corner wall (which had collapsed prior to 1921); (2) that corner wall, the unbanded masonry opposite, and the built-in section between, apparently were all parts of a Late Bonitian room at the second-story level, one angle of which projected above the northwest corner of Room 62 (Pepper, *ibid.*, fig. 98); (3) the rectangular doorway in the partially razed second-type north wall of Room 70 was blocked from the other side by the abutting southwest wall and foundation of third-type Room 99. Construction of these latter, therefore, obviously prompted the successive revisions of Room 70.

Pepper's notes on Room 99 (*ibid.*, pp. 313-316) leave little to be

desired. The square door in its southeast wall 3 feet 5 inches above the floor is the same square door we saw at floor level in the rebuilt second-type north wall under Room 70B. The latest floor in third-type Room 99, therefore, is at foundation level of its second-type southeast wall or approximately $3\frac{1}{2}$ feet lower than that in remodeled Room 70, a relationship that is reversed elsewhere.

The National Geographic Society found Room 99 filled with fallen masonry and blown sand to sill level of its square southeast doorway, that is, to a depth of $3\frac{1}{2}$ feet (NGS. Neg. 18668A). We removed this fill in our search for earlier walls and were rewarded by five separate underfloor foundations averaging 19 inches wide by 17 inches high but with no trace of finished masonry upon either. I believe they were preliminary to construction of third-type Room 99 and have so represented them on figure 5. Four sides of this room are of unmistakable third-type masonry but that at the southeast is of second-type. It was the abutting southwest foundation of Room 99 that blocked the rectangular door in the partially razed second-type north wall of Room 70.

Room 266, adjoining Rooms 62 and 70, is one of 14 comprising a rectangular block of east-wing rooms that stands forth conspicuously on any ground plan of Pueblo Bonito (fig. 2). Like 62 and 70, Room 266 was initially built of early, or second-type, Late Bonitian masonry but this was subsequently altered with each of several structural revisions. The west side of the room and the adjoining half of its north end are second-type but the remainder of the north wall is third-type and its easternmost $3\frac{1}{2}$ feet is later still. With unbanded laminate stonework predominant, the east wall may even be fourth-type while that at the south is a mixture of second-, third-, and fourth.

An earlier Room 266 floor or work surface at a depth of 10-12 inches immediately overlies an unidentifiable foundation averaging 21 inches wide and varying from 30 to 40 inches in height as it extends lengthwise of the room and passes beyond both north and south ends. It carries no masonry but may have been laid when the east half of the north wall was rebuilt (fig. 5).

Dug into compacted sand on either side of this subfloor foundation were five jar-shaped storage cists. With constricted orifices, they averaged $4\frac{1}{2}$ feet deep by $3\frac{1}{2}$ feet in maximum diameter and were not plastered. At the bottom of each was a hollow of unknown significance, oblong to oval in shape and $2\frac{1}{2}$ to 4 inches deep. Three of the five cists were situated east of the longitudinal subfloor foundation; two on the west side. Two of the former and one of the latter

had actually been dug against the foundation, thus causing one side to be flattened. The cists, therefore, were later than the foundation whatever the age of this latter.

Although it carried no identifying stonework, that subfloor foundation is unquestionably Late Bonitian but it could be either early or late. My only reason for suggesting an early period is its possible relationship to those foundations and floor levels underlying the whole 14-room block (figs. 8, 9), which block is basically of second-type construction with later revisions. The five Room 266 cists followed the subfloor foundation and they were dug for storage purposes although only one, No. 4, yielded evidence of foodstuffs. All five, like those reported by Pepper in Room 62, were filled with blown sand and broken pottery. From the sherds in Cist No. 1 we restored 22 bowls of which 20 were less than 6 inches in diameter (Judd, 1954, pl. 56).

These subfloor storage cists were the outstanding feature of Room 266 but the level of their overlying work surface or floor could not, unfortunately, be accurately correlated with that Pepper reported in Room 62, adjoining. Sill height of a west door is 4 feet above the Room 266 floor but we lack a corresponding measurement from the opposite side. North of this opening the west wall of 266 is noticeably convex and at a height of 5 feet 8 inches, holds one or more longitudinal poles positioned, perhaps, coincident with Room 70 alterations. A south door, opening into Room 264, had a sill height of only 26 inches.

The subfloor foundation noted in Room 266 continues under 264 but here a second pavement reduced sill height of the connecting door to 15 inches and that of a former south door to a mere 3. In the next two rooms, 262 and 251, deeper digging revealed abandoned second-type walls and associated floors at much lower levels. Figures 8, 9 will illustrate our findings more clearly than words and the depths indicated will explain why our observations were usually limited to narrow test pits. Lower walls invariably were built of hand-smoothed friable sandstone and were chinked after the manner of our second type while upper masonry in most cases was a mixture of second-type and third.

In Room 262, where east and west foundations lie 6 feet 5 inches below the latest floor level, we exposed an earlier surface a foot deeper and on it a wall fragment 20 inches wide by 8 inches high, plastered on the east side only and painted pink, that continues under and beyond the north end of the room. On an apparent work surface at depth of 5 feet 9 inches, occupying the whole south end of 262,



Ceiling poles of the Hyde Expedition's "old dark room" extended through its north wall: open door of Room 200, at left.



Empty beam holes in Room 299B (right center) are about 2 feet lower than those of Room 297B, next on the left. At lower right, the broken north door of Room 301.

(Photographs by Victor Mindeleff, 1887. Courtesy of the Smithsonian Institution.)



PLATE 27

Left: Ceiling level of Room 11B, under outstretched hand, lies at floor level of second-type Room 303B. Above, blocked door and repaired walls of Room 301C.

Right: Third-type masonry at its best, north wall of Late Bonitian Room 335.

(Photographs by Neil M. Judd, 1927.)





PLATE 28.—Ceiling beams in Room 297B were seated higher than those in 299B (above blocked door, right margin) to approximate roof level of Old Bonitian Room 298C. Fourth-type masonry merges with second-type outside 297.

(Photograph by Charles Martin, 1920.)



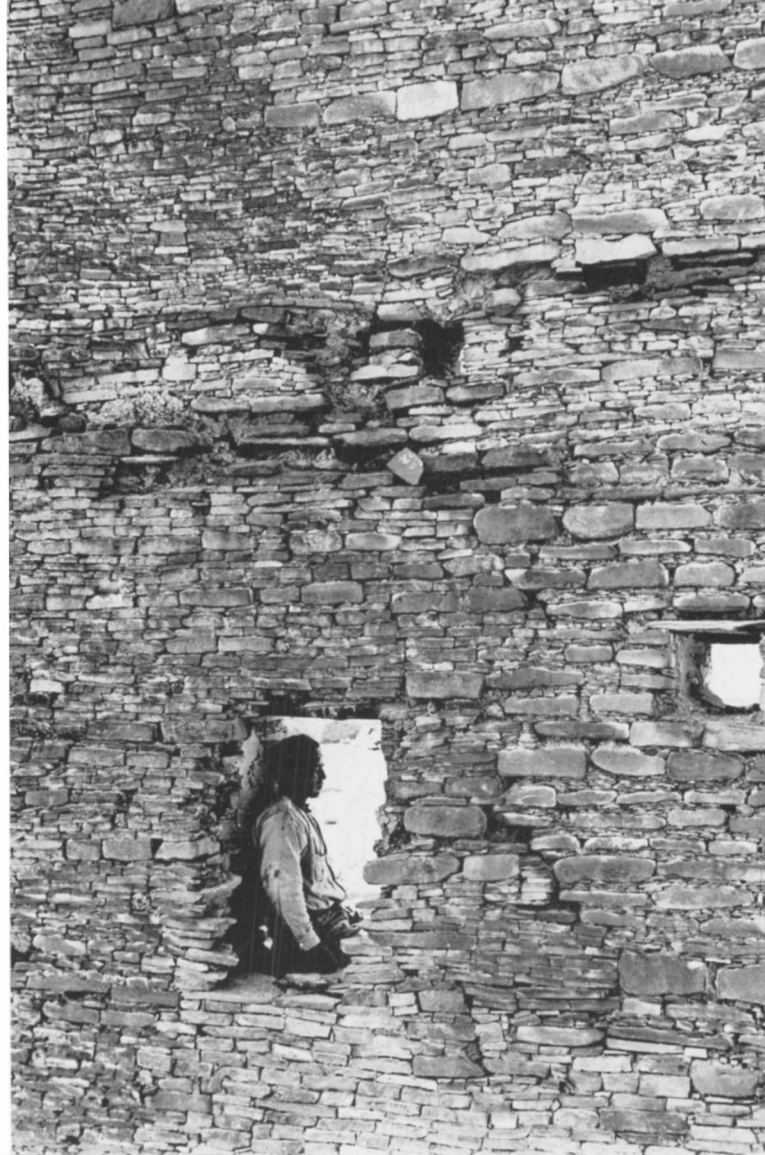
PLATE 29

Left: Second-type masonry survives on the inner north wall of the room next east of 297B, its formerly blocked door opened since 1900.

(Photograph by
Neil M. Judd,
1921.)

Right: Exterior view of door at left, the fourth-type veneer merging with the original second-type.

(Photograph by
Neil M. Judd,
1926.)



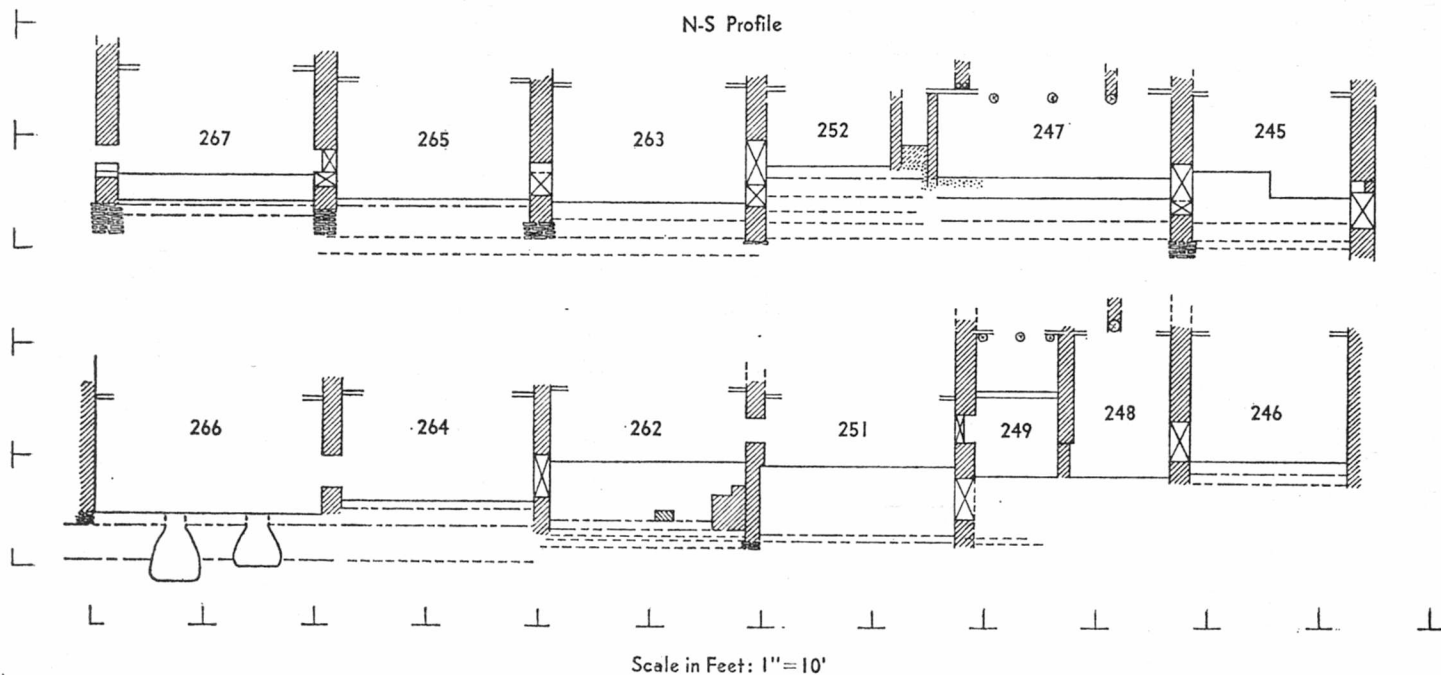
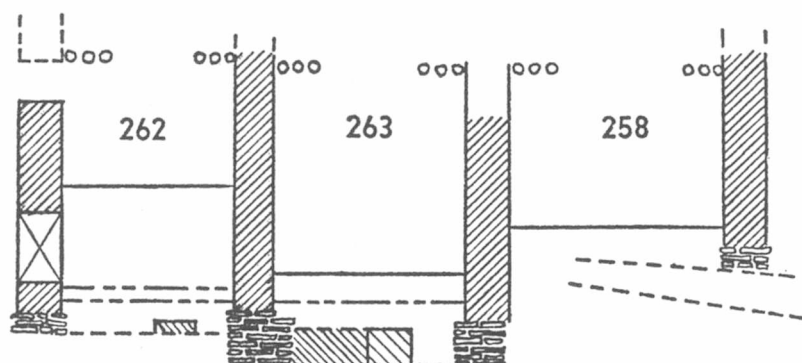


FIG. 8.—North-south profile, Rooms 266-267 through Rooms 245-246, showing earlier floor levels.

is a puzzling block of solid stonework faced with a mixture of second- and third-type masonry the upper 22 inches of which remains unplastered. In the face of that block, at a height of 3 feet, the first of two open step-like recesses appears.

A rude foundation at a depth of 5 feet 1 inch abuts the plastered west side of 262 and extends eastward as though to cross the room. At 2 feet 6 inches above the floor on which that foundation lies, a now blocked door formerly opened into Room 264 where sill height



Scale in Feet: 1" = 10'

FIG. 9.—East-west cross section of Rooms 262, 263, and 258.

remains only 3 inches. The current Room 262 floor lies 5 feet 4 inches higher, covering all but the lintels of its blocked north door but a south door, 20 inches above the later floor, gave access to Room 251.

This latter, Room 251, likewise marks a site long occupied; earlier masonry lies deep beneath its adobe floor. Its visible north end, for example, built of comparatively large blocks of laminate sandstone without banding, rests directly upon and overhangs by from 4 to 8 inches its partially razed underfloor counterpart, still 5 feet 11 inches high. Opposite, at the south side, underfloor masonry stands 6 feet 3 inches and there is an earlier floor 6 inches lower.

All four of these abandoned under-251 walls are of readily recognized second-type masonry and all remain unplastered. A former south door, 19 inches above the floor at 6 feet 3 inches and roughly blocked, had opened into the unexplored area under Rooms

248 and 249 but a later one, subsequently sealed from 249, had accompanied the final revision of 251. In this final remodeling, wall masonry is a mongrel composed primarily of laminate sandstone but including many dressed blocks of friable sandstone. As last occupied, Room 251 connected with 262, adjoining on the north, and with 256 by means of an alleyway, 250. The improvised opening into 250 was provided with a sturdy pine post at its south jamb and a hewn plank on top to support six 3-inch lintels (NGS. Neg. 15866A).

And thus it was all down the row, from Room 266 to 246. Each room had experienced repeated changes; in each, earlier walls and pavements had been replaced. With a ceiling height of 11 feet 4 inches, Room 246 had earlier floors at depths of 12 and 20 inches, each covered with debris of reconstruction. The latest of these two had been spread 7 inches above the sill of a neatly blocked door to Room 248, but there was no trace of a comparable opening in the south wall. The lower floor covered a layer of stones and we did not dig deeper.

Rooms 248 and 249 were not dwellings but the result of a dwelling divided. Indeed, 248 may have been an intentional sacrifice since the partition between had been built from the 249 side and the lower 3 feet of it was only one stone wide, corresponding to the depth of a deliberate sand fill in 248. Above the 3-foot mark the partition doubled in thickness and household sweepings overlay the barren sand.

Room 249, the north half of this former residence, had been separated from 248 and then divided vertically into upper and lower chambers. The upper, roofed by three east-west pine beams 10 inches in diameter at the original height of 13 feet, plus the usual ceiling poles and layered cedar splints, had been crushed down into the lower chamber by collapse of second-story masonry. This lower chamber, roofed by four 4-inch east-west logs at a height of 7 feet, the customary ceiling poles, and a layer of reeds, was designed to house macaws whose feathers were in endless ceremonial demand.

North and west doors in the lower chamber had been blocked and plastered to leave foot-deep recesses. A possible hatchway in the southwest corner was suggested by a hand-hewn board, 5 inches wide and 26 inches long, found on the floor together with rounded chunks of adobe. Lengthwise of the east wall an adobe-floored shelf about 40 inches wide and supported on four 4-inch logs set into the north and south masonry 3 feet 8 inches above the floor provided a shelf for live macaws (*Ara macao*). We found four

articulated skeletons and the skull of a fifth; quantities of droppings on floor and shelf provide evidence the birds had been long in this dark, doorless chamber. Pinyon nut shells, squash seeds, and corn cobs suggest the food offered.

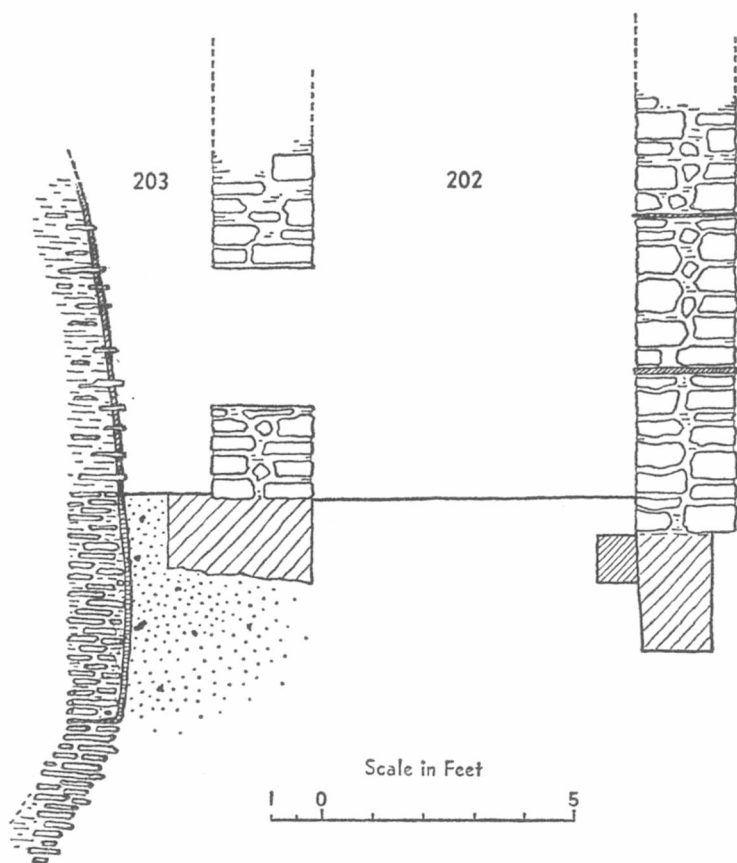


FIG. 10.—Diagrammatic sketch showing relationship of Late Bonitian Rooms 202-203 to Old Bonitian Rooms 4-5.

As in other instances, the wall between 248B and 249B had been built upon a beam at first story ceiling level; during 1921 repairs we marked its former position by stones protruding from the side walls. In both rooms ground floor masonry reflected our second-type while that of the upper stories was best described as third type.

The eastern row of our rectangular block parallels the western row figuratively as well as actually (fig. 8). Each room exhibits

one to four earlier floors with accompanying alterations to walls and ceilings. Each room had its beginning in what was indubitably second-type masonry despite a high proportion of laminate sandstone; thereafter, each architectural change witnessed the increasing use of salvaged building blocks but with decreasing reliance upon those of friable sandstone. On any ground plan of Pueblo Bonito this entire 14-room block looks as though it had been planned and built as a unit and perhaps it was. The entire group may at one time have formed the eastern boundary of the pueblo since its outer wall was formerly doorless and since surface features beyond are all later and at a higher level.

Room 245 lies between 246 and 244 and shows influence from both. The fourth-type Late Bonitian masonry of Room 244 abuts the plastered exterior of 245 exactly 5 feet 4 inches above its foundation. Both inside and out the east wall of 245 reflects the stonework of 244 and thus suggests the time of its last alteration. There are earlier floors at depths of 4 feet 9 inches, 6 feet 1, and 6 feet 8, each separated from its predecessor by constructional debris in which we noted bits of cedarbark, twigs and potsherds.

The south wall foundation of Room 245 at a depth of $7\frac{1}{2}$ feet lies 19 inches below the sill of a blocked door that evidences at least one former dwelling in the space now occupied by Room 238 and Kiva D. Across the south half of 245 is an architectural feature which, for want of an accurate term, I called the "subfloor chamber." It was 2 feet 4 inches deep and its adobe floor rounded off with the plaster of its four walls; ultimately it had been filled with constructional debris and floored over, the flooring in this instance merging with the plaster of the main room.

Embedded upright in the southwest corner of this "chamber" fill, a 3-foot length of pine log 8 inches in diameter provided a 24-inch-high step to an elevated doorway that slanted upward through the wall and into Room 246B. A foot below the top of that step a 2-inch hole gouged from one side identified the log as one salvaged from a kiva pilaster. I am aware of no other Pueblo Bonito example in which a room on one level was connected with another on a different level by means of an intermural stairway. Architecturally the idea seems worth copying.

Mindeleff (1891) states that the oblique wall opening as a means of conveying light to a lower room was a fairly frequent feature at Zuñi in the mid-19th century.

Room 247, originally one with 252, is separated from the latter

by a narrow passageway, 250, connecting Rooms 251 and 256. The south side of this passageway is a coarsely constructed partition built upon the floor of Room 247 and directly under one of its regular ceiling beams. Only 16 inches north of this beam a comparable timber seated above the second-story floor offsets, supported a masonry wall between Rooms 247BN and 252B. Among fallen roof timbers in the northwest corner of Room 247 we recovered 20 loosely tied bundles of cedar bark. Over a dozen more were found in 250 (pl. 61, right).

Room 252 as last occupied had a ceiling height of only $6\frac{1}{2}$ feet but a test against its north wall revealed earlier floors at depths of 13 inches, 2 feet 7 inches, 3 feet 11, and 5 feet 4. An original doorway to Room 263 had been remodeled and raised at least once in conformity with these changes in floor level (fig. 8).

Like its neighbors, Room 263 exhibits a mixture of second- and third-type stonework. Its upper floor, despite a ceiling height of 10 feet 5 inches, lies 3 feet 8 inches below that of Room 252 and $4\frac{1}{2}$ feet below that of 262 (fig. 9). There is an earlier Room 263 floor at depth of 17 inches and 34 inches deeper a north-south foundation extends lengthwise of the room and continues northward under Room 265.

A 2-inch course of small laminate pieces on this subfloor foundation offers inadequate identification but it has been plotted as a probable third-type product (fig. 5). Standing upon this abandoned foundation, an 8-inch-diameter post packed about with mud and sandstone spalls, represents a probable ceiling prop that was broken off at a height of 4 feet 3 inches, or 8 inches below the latest Room 263 floor. To our surprise, the 7 feet of waste profiled by our south-end test pit revealed a disproportionally small amount of rock-impressed adobe from razed walls although here, as in other units of the group, there was abundant evidence of construction, demolition, and reconstruction.

A cross section midway of the rectangle, through Rooms 262, 263, and 258, offers additional data (fig. 9). In Room 258 the fourth-type north and south walls, their foundations at floor level, abut the plastered west side whose foundation lies 5 feet 2 inches deeper. That west side is the refaced exterior of Rooms 252 and 263. The latest floor in 263, $4\frac{1}{2}$ feet below that of 262, is 3 feet 8 inches below the latest floor in Room 252 and 32 inches below that of 258.

That our 14-room rectangular block was once the eastern limit of the pueblo seems probable for several reasons. There are the differences in floor level between the 14 rooms and those adjoining.

The east foundation of Rooms 252 and 263 lies 5 feet 2 inches below floor level in fourth-type Room 258; the east foundation of Room 245 lies 6 feet 9 inches below the latest floor of 244; and the original north corner of Room 267, at the northeast angle of our rectangular block, lies 4 feet 4 inches below floor level of Room 186 (pl. 32, left). There was an apparent eastward slope all along that outer wall evidenced, among others, by two constructional surfaces subfloor in the southeast corner of Room 258.

Construction of these east-lying rooms, including 186, 244, and 258, followed abandonment of plans for a far-reaching extension of Pueblo Bonito (fig. 11) and these abandoned plans, in some instances at least, had followed earlier structures that were built, used for a time, and then deserted by the Late Bonitians. One such is the second-type kiva, 10 feet deep, that underlies Rooms 243, 244, and those adjoining (fig. 4). A 33-inch-wide north-south foundation, part of the abandoned eastward-reaching plans, bisects the kiva, rests upon its floor at depth of 10 feet, and fills its under-floor ventilator duct.

Another kiva whose excellent, unplastered stonework identifies it immediately as third-type and therefore presumably a bit later than that above, lies outside the northeast corner of Room 179 (fig. 5). It, too, was 10 feet deep but the uppermost foot consisted of a ceiling-pole offset of wall thickness, rimmed with relatively large blocks of friable sandstone. An above-bench diameter of 28 feet is indicated. Our test pit exposed a bench, 25 inches high by 32 inches wide, its front edge somewhat broken down and, at the rear, an empty 6-inch-wide trough presumably designed for a wainscoting of posts or dressed planks. The single pilaster we exposed here measured 18 inches wide and was set back 5 inches; wall masonry above it had been dislodged when the pilaster log and ceiling timbers were torn free.

These two kivas, one of second-type construction and the other of third-, lie outside the area known to have been occupied initially by the Late Bonitians. Such data as we gathered suggested that the 14-room rectangular block was itself part of that initial program but, of any second-type structures to the west of it, all have been razed and replaced by those of a later period. Only Kiva G, with Rooms 62, 70, and those nearby retain visible evidence that they were built when second-type masonry was in high favor.

Kiva G was revised and rebuilt at least twice. What I judge to be part of the original second-type structure is represented by the

convex middle south side of Room 62 and an eastward continuation that forced a corresponding convexity in the west wall of Room 264. This original was succeeded by a larger, elongated chamber built with salvaged materials the plastered inner face of which is preserved in the stonework above the south recess and in the western three-fourths of the kiva wall. An elongation eastward resulted when the builders sought to utilize part of the kiva they were replacing.

Finally, and apparently only to correct this asymmetry, a veneering that approaches third-type masonry was introduced from near Pilaster No. 1 to just short of No. 3 (pl. 68, left). As will be noted, only the lower half of the kiva wall, old and new, was plastered.

Unlike the wall above, the Kiva G bench, 35 inches wide and 24 inches high, had been replastered repeatedly and all but the first coat whitened. Its 6 pilasters, set back an average of 2 inches, enclose log sections walled at the sides with small-stone masonry and thickly plastered. Between pilasters and about 8 inches from the rear wall, pine posts 2-3 inches in diameter supported a packing of coarse bunch grass. Paired ceiling logs rested upon these pilasters 6 inches above the bench and thus effectively concealed both posts and grass packing. Lintel-like poles embedded in the rebuilt masonry are still visible above No. 2 pilaster.

Other customary kiva furnishings were also present: A slab-lined fireplace 2 feet in diameter; a subfloor "vault" west of the fireplace, filled with blown sand and debris of occupation; a 15-inch-square outlet for the under-floor ventilator duct; a south bench recess and a north bench niche between Pilasters 3 and 4. Thus Kiva G, a lone east wing survivor of its period, is thoroughly typical of later Pueblo Bonito kivas as we know them.

The bench recess between Pilasters 3 and 4 was 5 inches above the floor and measured 29 by 9 inches by 13 inches deep. It was plastered inside and whitened. On either side of it the bench masonry includes a section of coarse stonework closely resembling that of Old Bonito (pl. 70, lower), but, with lean data in my field notes, I hesitated to identify it as such on figure 3.

West of Kiva G are half a dozen rooms, 166, 167, 280-283, and Kiva K all of third-type masonry. We assumed these several structures overlie older rooms more or less contemporaneous with G, but rather than dig through them we limited our search to a test pit just outside Room 167.

That court-side test revealed not only three earlier court surfaces but also a partially razed second-type wall 19 inches thick, emerging

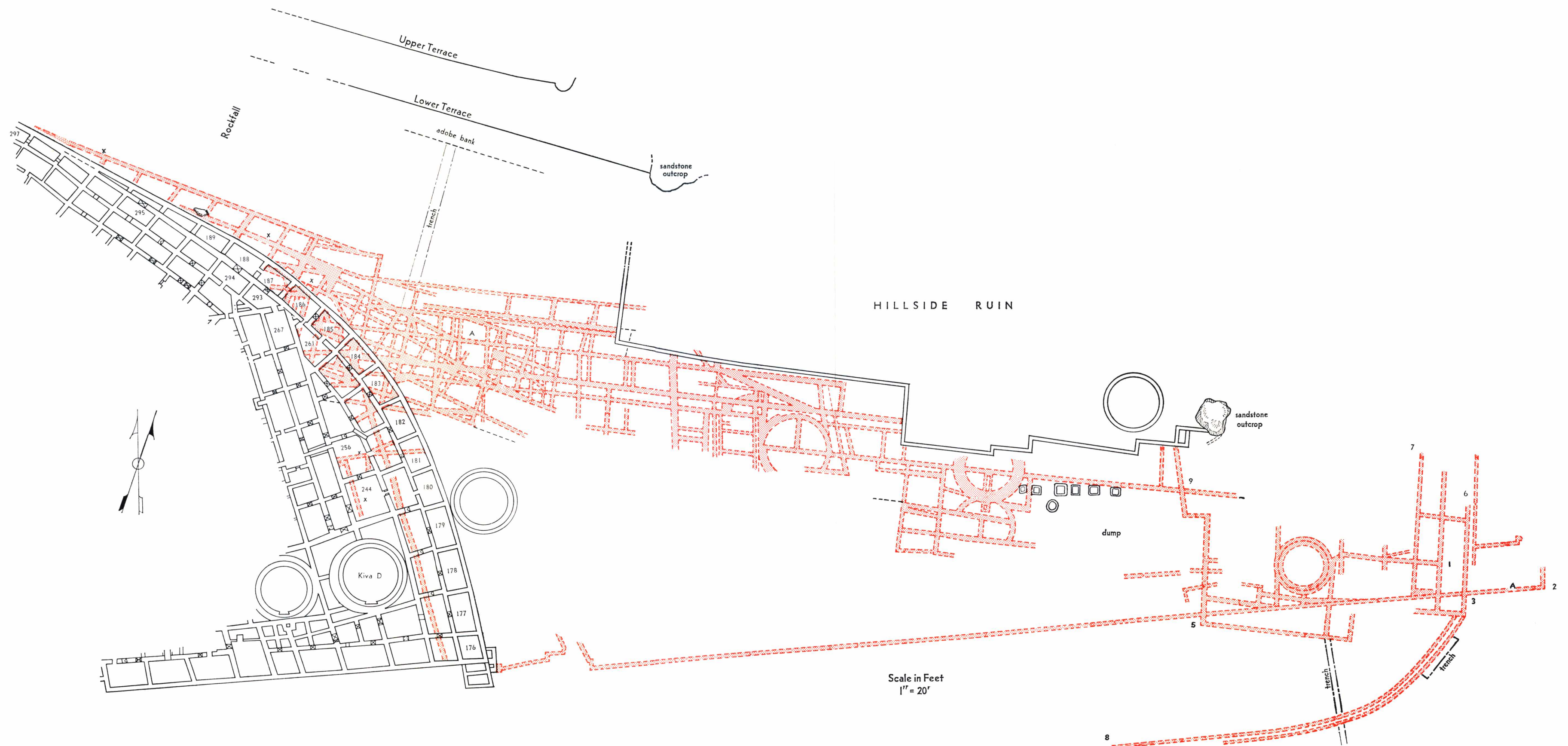


FIG. 11.—Exposed portion of the Northeast Foundation Complex in relation to Pueblo Bonito and Hillside Ruin. (From the original survey of Oscar B. Walsh.)

from under Room 167 and continuing westward (pl. 33, left). About 5 feet from its point of emergence that wall was joined by another that diverged somewhat from the line of 167 to form a small room 4 feet 3 inches wide. Despite its narrowness, this small room had been a dwelling. Its three visible walls were plastered and the plaster rounded to its floor, 6 feet below the surface. Part of a T-shaped door survived on the north side, its sill at a height of 17 inches; beneath it was an adobe step 6 inches high, its front sloping from a 9-inch base to a 7-inch tread.

In due course this doorway had been blocked from the outside to leave a 19-inch-deep recess within. But its lower east jamb, of second-type masonry, continued northwest about 4 feet and there was replaced by third-type masonry to form the east side of a narrow chamber 3 feet 10 inches wide by $13\frac{1}{2}$ feet long—a sort of forerunner for Room 283. The outer west side of that narrow chamber, of superb second-type stonework continuing from the small room under 167, was based 6 feet 8 inches below the surface (pl. 34, upper).

Later and a foot higher that second-type exterior was abutted by another wall of like construction, 18 inches thick. The two were thickly plastered above the line of abutment as though for living quarters but had been razed simultaneously a couple feet higher, 3 feet or thereabout below the surface. All the lower walls we bared in this section were originally of second-type masonry but all had been wholly or partially replaced by third-type stonework and all eventually were wholly or partially pulled down. Finally, sealing all that had gone before, a slab-lined fireplace 25 inches square and half as deep found place above the abandoned walls.

That slab-lined fireplace was built on the last recognizable East Court surface, the surface upon which the bordering court walls were built and upon which a lone wall crosses from east to west. The original height and purpose of this cross-wall remain unknown, but it was late in point of time and it had meaning for the Late Bonitians. It stood 18 inches high and 16 inches wide where we found it, abutting the exterior of Room 165, and apparently had replaced an earlier one on a surface 3 feet lower.

From this same point, on its 15-inch foundation, the wall extended 85 feet across court to Room 149, thence under its east wall and sub-floor at a depth of 37 inches, and under the west side. At 78 feet 5 inches from Room 165, or 6 feet 7 inches short of 149, a vertical break, straight as a door jamb, occurred in that cross-wall. The next $3\frac{1}{2}$ feet consisted of coarser stonework as though a deliberate fill-in

and the remaining 3 feet, on a foundation 11 inches below the surface, had been reduced to court level as though for an open passageway.

That above-court wall was paralleled at an average of 26 inches by a near-duplicate, 21 inches high and 4 inches below ground, that likewise passed under the east side of Room 149 and westward on an earlier floor at depth of 37 inches. Constructed chiefly of large blocks of dressed sandstone with relatively little chinking, this parallel wall also appeared to be one built of material salvaged from older structures. In composition it was neither second-type nor fourth- but a blend of the two. Thus Room 149, itself a third-type-masonry building on the periphery of Kiva A, is later than the lone, third-type wall crossing the East Court (fig. 5).

Various test pits and trenches we cut north and south of these cross-walls pierced earlier court surfaces exposing portions of razed buildings that sometimes seemed self-explanatory but more frequently defied explanation. A trench we opened outside the northeast corner of Room 149 revealed a succession of former surfaces the more obvious of which were at depths of 10, 20, 28 and 38 inches. The lower 2 feet of our test exposed mixed debris of occupation and demolition. Directly beneath the corner and at the 38-inch level we came upon the imprint of a wattled wall, oriented east-west. On approximately the same level but farther out we found an oval, masonry-lined repository 10 by 22 inches by 10 inches deep, finished on the inside only and filled with shale fragments. Nearby but 10 inches higher an unlined basin 9 inches deep likewise contained shale.

Of greater significance was a section of wall, 21 inches thick, rough on its west side but faced with excellent second-type masonry, plastered and whitened, that paralleled Room 149 at a distance of $4\frac{1}{2}$ feet. That section proved to be our introduction to a pair of rooms built of second-type masonry but later partly razed and replaced with third-type stonework. Those two rooms straddled the second-type cross-court wall we had previously discovered emerging from beneath Room 167 32 feet 9 inches north of Room 289. However fragmentary their masonry, the two rooms were almost equal in size, averaging $7\frac{1}{2}$ by 16 feet, and their adobe floors lay 7 feet below the surface.

Seven feet measures the rise in court level since those second-type walls were built. In the wall separating the two there is a former door, $3\frac{1}{2}$ feet wide and 22 inches across the sill. On the floor below, a masonry step of door width and an 11-inch tread stands 6 inches high. Three feet 4 inches above floor level the original second-

type masonry of its west jamb, plaster adhering, was abruptly replaced by foundation stonework for a third-type construction one course of which survives upon a 3-inch-wide offset at a height of 5 feet (pl. 35, left).

In the upper part of that rebuilt west jamb, just below the offset and 2 feet under the surface, a pair of 4-inch holes mark the positions of horizontal timbers placed there to carry the weight of superposed masonry. With more foundation stonework replacing the original west wall it is obvious that here a building of second-type masonry, its floor at a depth of 7 feet, had given way to one of third-type masonry on a level 5 feet higher.

That second-type wall separating these two rooms once continued westward under Room 149 and eastward across court to underlie Room 167. In both directions it had fallen victim to salvaging operations. Within 10 feet from the plastered door jamb its eastward extension had been reduced from 40 inches to a couple courses only and thereafter a mid-court section was razed completely to allow for construction of Shrine Room 190 (pl. 35, right).

A companion wall, 18 inches thick and likewise of second-type masonry, parallels that above at a distance of 7 feet 8 inches. From its east end where it abuts older duplicating masonry 5 feet 8 inches below the surface (pl. 34, upper), this second cross-court wall extends west 64 feet 8 inches and there abuts the middle east side of the north room of our 2-room unit (fig. 4). As with its opposite, this second wall was finished on the outer face only and had been razed irregularly, its height varying from 30 inches at its east end to 49 inches half way across the court. Here, at its highest the partially razed wall was buried under debris of demolition with occupational debris piled on top.

Casual tests along the length of these parallel, second-type under-court walls disclosed abundant evidence of demolition and reconstruction. Wall fragments of varying width and composition were encountered at various depths but their significance was rarely apparent within the limits of our exploratory trenches. Some fragments were of second-type masonry, some were of third-type and, less frequently, some looked precisely like the best of local fourth-type stonework. As with the two major cross-court walls, these lesser sections were usually finished on one side only. At 21 feet 2 inches west of Room 167 a 16-inch-wide bare foundation joined the two on their associated pavement at depth of 6 feet 9 inches and 12 feet farther

out on the same level a stub of typical second-type masonry buttressed the south member of the pair.

In the rebuilt room with the plastered door jamb previously described, the south wall foundation was laid in a dug trench. Masonry originally erected upon that foundation was second-type but third-type masonry had been substituted later. Here, as at the north end, there was a south door of unusual width, 3 feet 7 inches; in its rebuilt upper west jamb, as at the north end, two 4-inch timbers had been installed presumably to support the later third-type masonry. The east jamb of this former south door, plastered and whitened, had been razed 26 inches above its associated floor at which level a new pavement extended southward (pl. 34, lower).

A westward extension of that second-type south wall had been razed a foot and a half outside the corner and replaced with typeless foundation stonework that continued westward underneath the bordering East Court masonry. A corresponding eastward extension had been razed $2\frac{1}{2}$ feet beyond its original southeast corner, perhaps in anticipation of the second-type kiva that occupies a large proportion of the south sub-court area.

All we know of that second-type under-court kiva was revealed in two narrow trenches, one on the east side and the other, on the southwest. Floor depth in the first was 12 feet 10 inches; in the second, 11 feet 3 inches. An encircling bench averaging 30 inches high measured 24 inches wide and we counted 19 layers of whitened plaster on its front. The upper wall had been razed to within $3\frac{1}{2}$ feet of bench top. Neither test exposed a pilaster or other fixture.

Remnants of three more partially razed second-type kivas were noted, subsurface, in the northeast corner of the Court. One of these three, of pre-Kiva L vintage, was provided with a ventilator shaft that, piled about with loose rock, occupied half the floor of a still earlier second-type kiva. This latter had been razed almost to floor level at depth of 5 feet 8 inches, a depth equaling that of our second cross-court wall, adjoining.

West of this razed kiva we came upon the remains of another, likewise of second-type masonry and partly underlying Kiva O. The portion of its upper wall exposed in our narrow trench, measured 38 inches thick and most of its facing stones had been removed although the exterior stood 3 feet higher. Floor lay at a depth of $7\frac{1}{2}$ feet. An encircling bench, 28 inches high and 35 inches wide, was surfaced with sandstone slabs and plastered but bore no evidence of a pole or plank wainscoting.

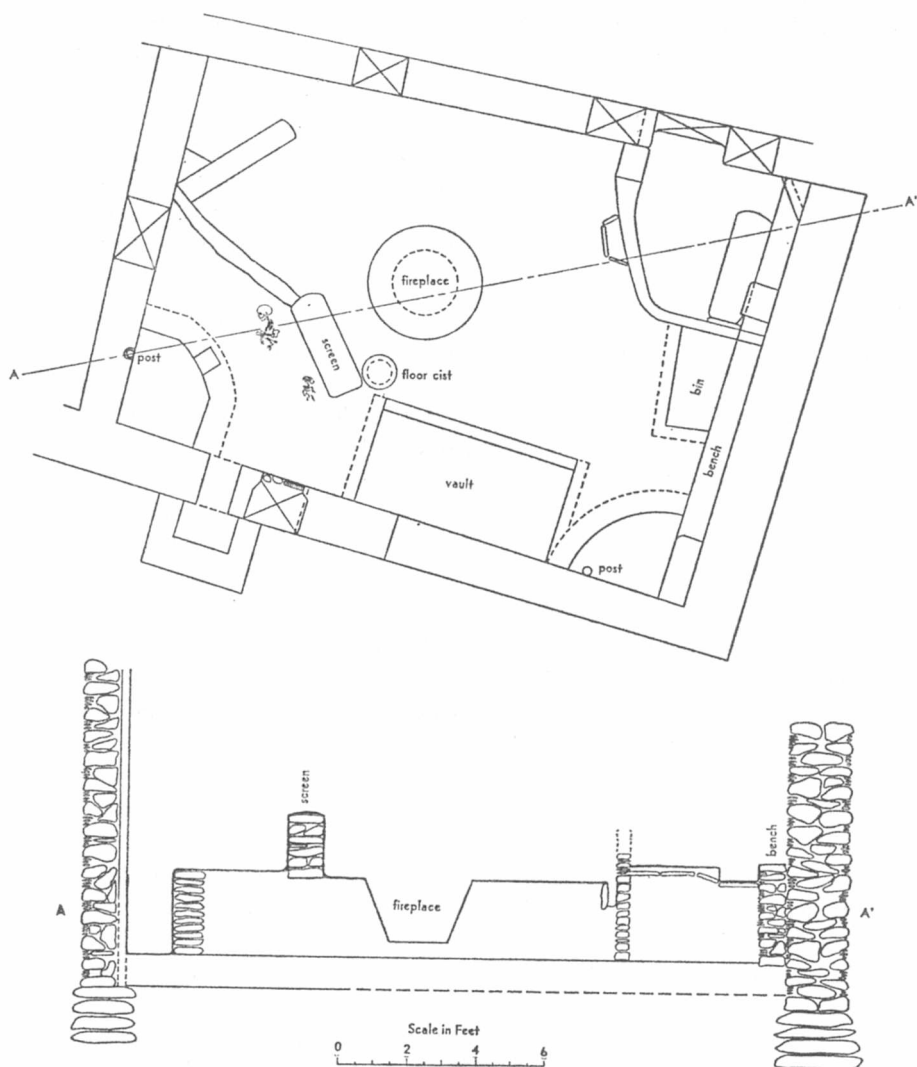


FIG. 12.—Late Bonitian Room 309 and cross section.

Still farther west, in the far corner of the East Court, we were all agreeably surprised to discover part of an Old Bonitian kiva—a kiva which the Late Bonitian priesthood had pre-empted as a site desired for their own third-type Kiva 2-C. Because that old structure was built in the characteristic P. II tradition of the Old Bonitians I have chosen to describe it in Chapter II (fig. 3).

A limited test in the East Court corner outside Rooms 164 and 289 showed the latter to have been built upon the last court level while the 164 wall was based 10 inches lower. Temporary fires had burned on that same surface, at 10 inches; below the 6-foot level, water-reworked constructional debris and blown sand comprised the visible fill.

South of the court-dividing wall, outside third-type Room 150 but continuing under it, were two pairs of partially razed walls of second-type construction. The external masonry of 150 extends only 17 inches below the latest recognizable East Court surface, and since it overlies the two pairs, obviously was erected some time after their abandonment. Together, their walls average 15 inches thick and 31 inches apart; a like distance separates the first pair from the second (fig. 4). Their associated floors at depths of 5 feet 6 inches and 6 feet 4 inches, respectively, were covered by a purposeful fill of sandstone spalls and shale fragments.

Although these two pairs continued westward beneath Room 150 their eastward ends were abruptly joined by blocks of abutting masonry 9 feet and 10 feet 10 inches outside the room. Beyond the end-blocks and separated from them by open passageways 17 inches wide in one instance and 21 inches in the other, were in-line extensions of the two pairs.

These four end-blocked pairs with passageways between are all very much alike. Their paired walls average 15 inches wide and 31 inches from each other. Each pair stands upon a trampled surface at depth of $5\frac{1}{2}$ feet (three cases) or 6 feet 4 inches below the latest Court surface. In each instance the paired walls had been razed at heights varying from 22 inches to 50 inches and were packed between with broken sandstone and shale chips. In at least one instance the paired walls had been built in dug ditches and the space between ditch bank and stonework filled with fragments of dried wall adobe and shale. In all four cases the paired walls were finished on the inside only, three of them in a coarse but undeniable version of second-type masonry while the fourth was indefinite.

About 5 feet to the south, where the 9-inch-wide foundation offset

of Room 151 marks the latest East Court level, the plastered and sooted face of a nondescript wall, 10-12 inches thick, emerges from under 151, extends east about 30 inches and then irregularly south to an inner corner where it turns abruptly west and beneath the east side of Room 152 (fig. 5). Here, in the 46-inch space between this retreating wall and the Court corner, we noted 2 earlier surfaces and an 8 by 10 inch ventilator into Room 154. Opposite, at its north end, that plastered and soot-covered masonry had been razed about $4\frac{1}{2}$ feet above its indistinct floor but there was an apparent work surface a foot and a half lower—approximately at the same level as one we had previously noted 6 feet 10 inches beneath the floor of Room 152.

That 10-inch soot-covered masonry is abutted from the east by a pair of fragmentary walls of excellent third-type masonry built on a former court surface about 18 inches below the latest—the one in line with the Room 151 foundation offset. The paired walls average 17 inches wide, stand 26 inches apart, and end with a rectangular block of matching stonework 9 feet 10 inches from Court side. They had been almost wholly razed, as I read the admittedly confusing record, sometime prior to erection of the nondescript wall under Room 152 and before this latter gave way to the third-type stonework that now walls this portion of the East Court (pl. 4, lower).

Following demolition of that third-type pair and on the same plane with its razed south member, a 23-inch-wide foundation was constructed here for some unfathomed purpose. Obviously it was not designed, as first seemed probable, in connection with an incomplete Court-corner dwelling, for an in-line extension of it, following a 47-inch interruption, continued eastward 20-odd feet and in the process overlay part of the razed third-type pair.

The over-all resemblance of this third-type pair to those of second-type construction on a surface 4 feet lower is at once apparent. Although their original function remains uncertain it seems significant that these paired walls should have been repeated in practically the same place after a time lapse represented by 4 feet of normal court accumulation and after a change from second- to third-type masonry. Because masonry was my principal guide in seeking to trace the evolution of Pueblo Bonito some of the razed walls in this particular corner are represented on one ground plan (fig. 4) and some on another (fig. 5) while still others, perhaps later than either but with no identifying stonework, are not represented at all.

The earlier court surface that supports all these ancient walls, razed and otherwise, slopes perceptibly southward and apparently passes beneath the bordering south rooms at a depth of 20-25 inches. A test trench next Room 155 failed to disclose a north foundation but bared successive accumulations of constructional and occupational waste. On these successive levels, sections of razed masonry occurred repeatedly, many of third-type composition but all seemed quite as meaningless as those we had previously encountered north of the late cross-court wall.

Some of these older East Court walls, paired and otherwise, continue beneath intervening rooms and out, subsurface, into the West Court. In some instances they may be identified by remnants of surviving masonry; in other cases identification is uncertain or impossible. In some instances I have illogically allowed depth to influence my judgment; hence, perhaps, the greater amount of subsurface West Court construction represented on figure 5. But it is instructive to note that here, as in the East Court, walls of second-type masonry generally rise from surfaces 3 or 4 feet lower than those of third-type.

Except for Old Bonitian Rooms 329 and 330, the West Court is rimmed with Late Bonitian masonry and mostly at or above ceiling level of the Old Bonitian dwellings. Beginning with Room 328 and continuing north to Room 28 the Late Bonitians built houses of second-type masonry at the second story level; some of these, as Rooms 28B, 55, 57, and Kiva Z, were later wholly or partially rebuilt with fourth-type stonework. Intermural steps were provided to enter ground floor Room 28 after 28B, 55 and 57 were erected above. A partially razed second-type kiva underlies Room 324 and another underlies Kiva 67.

In 1924 while clearing the West Court in anticipation of the next season, we came upon a very late double fireplace built on the last recognizable Court surface just outside the northeast corner of Old Bonitian Room 330 (pl. 17, upper). Masonry-lined and plastered, that fireplace originally measured 3 feet 8 inches by 5 feet 7 inches but subsequently had been divided by a 2-foot partition and continued in use.

With that last recognizable West Court surface only a foot or so below roof level of Rooms 329 and 330 we decided to make an exploratory test to see what lay beneath. On a former occupation level at depth of 14 inches we came upon another, nearby fireplace lined chiefly with metate fragments, measuring 26 by 42 inches and



PLATE 30

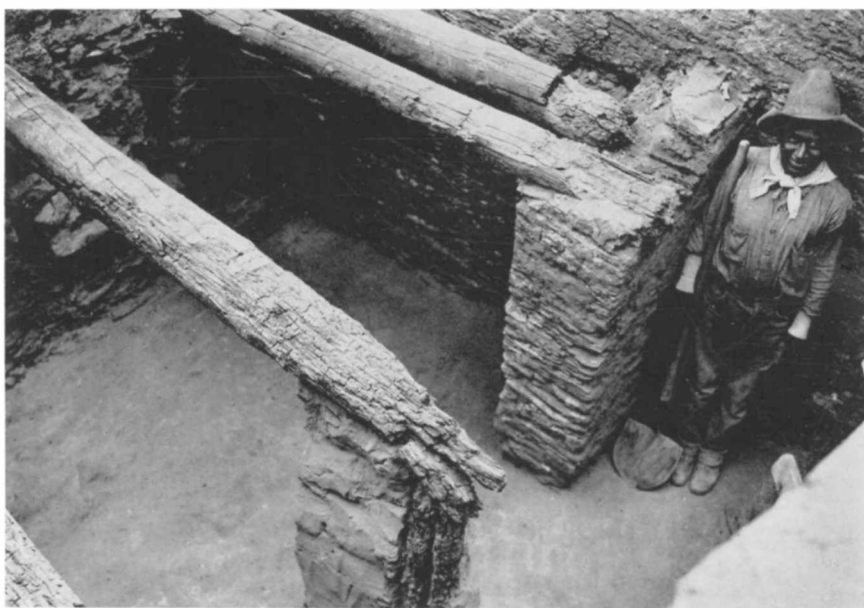
Upper: North central section of Pueblo Bonito; workman stands in Room 296B. Open door at left is in room east of 297B.
(Photograph by Neil M. Judd, 1922.)

Lower: Room 55 with second-type masonry of Room 28B (right) and fourth-type masonry between 55 and 57 at left.
(Photograph by O. C. Havens, 1924.)





East end of Room 309 with south-side vault at lower right.



Room 308 beams with supporting post and masonry pillar.

(Photographs by Neil M. Judd, 1923.)



PLATE 32

Left: Southwest wall and foundation of Room 186 (upper left) overlying external northeast corner of original Room 267.

(Photograph by Neil M. Judd, 1927.)

Right: North end of Room 70 with open door to Room 99 and second-type wall below; third-type wall on beam at upper right.

(Hyde Exped. photograph. Courtesy of American Museum of Natural History.)





PLATE 33

Left: The outer west side of Room 167, repaired, overlay partially razed second-type walls continuing across the East Court.

Right: The north wall of Room 140 preserves the original southeast corner of the West Court.

(Photographs by
Neil M. Judd,
1926.)



filled with wood ash. Earlier Court levels were noted at depths of 29 inches, 38 inches, 5 feet 2 inches, and 6 feet 7.

At the 38-inch level several decayed poles 2-3 inches in diameter protruded $2\frac{1}{2}$ or 3 feet from the Room 329 exterior. They were overlain by strips of split cedar and cedar bark but were supported, strangely enough, by timbers paralleling the 329 exterior. Beneath these latter were other poles, decayed and broken, and quantities of vegetal matter, sandstone spalls and fragments of dried wall adobe. Deeper, on a surface at depth of 6 feet 7 inches, were 9 posts or post-holes, 3-5 inches in diameter (one was 8 inches), irregularly spaced but averaging 14 inches from the Old Bonitian wall. This feature is probably to be identified as an extension of the post-and-mud wall represented in Rooms 327, 328, and the northeast side of 329.

In contrast with this Old Bonitian stonework, Late Bonitian masonry now bordering the West Court was begun on or near the last occupation level. The existing east side, for example, a mixture of third- and banded fourth-type masonry that had toppled outward, and which we repaired in 1924 (pl. 36, upper), replaced one whose partially razed remains underlie Rooms 143 and 144. Blocks of dressed friable sandstone are numerous in that earlier wall the character of which is seen more clearly at its former southeast corner, as preserved in Room 140 (pl. 33, right). Successive court surfaces and walls that replaced others were encountered repeatedly throughout the West Court. Some walls are positively of second-type construction, some are third-type and some are foundations without means of identification.

A sturdy wall of second-type masonry, 23 inches thick and razed at an average height of 33 inches, emerges from under Room 146 on an associated floor 6 feet below the last West Court level, extends northwest 31 feet 5 inches to an acute angle, thence east 3 feet 9 inches where it was demolished presumably upon construction of Room 34. Paralleling that sub-Court wall at a distance of 3 feet 10 inches and at the same depth is another of like construction both ends of which unite with contemporary walls that turn sharply west and were razed after a few feet.

From the middle west side of this same parallel member, two abutting sections likewise extend west a few feet and also were completely razed. The second of these two provided both the base for a solid triangle of second-type masonry and the south jamb, now 13 inches high, of a former door in the western member of the second-type pair (fig. 4). About $5\frac{1}{2}$ feet west of that solid triangle

and on an associated floor at depth of 6 feet 2 inches we exposed a fireplace, 15 by 17 inches and 7 inches deep, lined with 7 slab fragments on edge.

From the apex of that solid triangle less than 3 feet of the former second-type wall extended west at the time of our explorations and this remnant had been incorporated in a third-type replacement the base of which lay 3 feet 9 inches above the second-type floor and its fireplace or $2\frac{1}{2}$ feet below the Court surface. This third-type replacement proved to be only one of several comparable efforts in this particular area, some of which appeared independently while others had utilized as foundations portions of second-type masonry previously erected and abandoned. Hence the near duplication to be noted on our figures 4 and 5.

One of these third-type constructions, a 2-foot-wide wall razed at a height of 22 inches, emerges from under the north end of Room 146 to abut and overlie the partly razed second-type pair described above and continue west a little more than 12 feet until it was itself razed to make way for still later construction. That 22-inch-high wall remnant was built upon a 30-inch foundation rising from the floor associated with the second-type pair at depth of 6 feet and abutting them from either side. In that remnant, 37 inches from the exterior of 146 is the east jamb of a former opening, 4 feet 9 inches wide and subsequently blocked, whose adobe sill rested directly upon the partially razed second-type pair $3\frac{1}{2}$ feet below the court surface (pl. 36, lower).

At the south end of the West Court, as in the East Court, we uncovered a succession of former occupation levels, sections of foundations devoid of identifiable masonry, and Late Bonitian wall fragments that seemed as much one type as another. Many of these, but not all, have been represented on figure 5 because they were so shallowly based they could not possibly be older than third-type. So here, I again have substituted intuition for solid masonry as my guide to the architecture of Pueblo Bonito. But depth, alone, is sometimes a dependable yardstick. While walls of second-type masonry are often based 6 feet below the surface those identifiable as third-type rarely occur below 4 feet.

Paired walls reminiscent of those we had encountered at the south end of the East Court emerged from under the middle of Room 144 and continued west across the plaza to disappear under the northeast corner of the Kiva 130 enclosure (fig. 5). Where they first appeared the pair is positively of third-type composition and their ends are closed as were those in the East Court, by an external block

of matching masonry (pl. 36, upper). Also, as in the East Court, there was a so-called "passageway" at the end of this blocked pair and a westward extension that exhibits a mixture of all our masonry types except Old Bonitian and is, accordingly, best described as "indefinite." The two members are each 16 inches thick and finished on both faces; they stand 25 inches apart with an adobe pavement between and were razed at an average height of 18 inches or 5 inches below the latest surface. Shallowness if not mixed masonry would appear to identify this pair as a late creation in the history of Pueblo Bonito (fig. 5).

Another, quite comparable pair of cross-court walls lies 12 feet 4 inches north of those just described and a few inches deeper. They are cruder than the first pair, but also average 16 inches wide, stand 26-27 inches apart, and are finished on the inside only. Without foundation, this pair was joined 30 inches below the surface by a connecting floor that was covered by a 3-inch layer of sand and an equal amount of shale chips. At its west end, where the pair continues beneath the north side of the Kiva 130 enclosure, a section of stonework resembles our second-type; elsewhere it is "indefinite."

Outside this Kiva 130 enclosure we found an assortment of razed rooms and fragmentary walls resembling the hodgepodge in the southwest corner of the East Court except that none was built above the last recognized West Court surface. Earlier pavements at depths of 10 and 23 inches abutted the whitened plaster on outer north side of Room 131. A partly razed kiva partially underlies Kiva 130 and what may be its cylindrical air shaft underlies a 3-room unit adjoining (fig. 5).

Eastward from this assemblage, as in the East Court, we noted various sections of masonry of little immediate significance and numerous fireplaces. Among these, its orifice at the last Court level 11 feet 10 inches north of Room 134, was a masonry-lined repository or shrine 13 inches in diameter and of equal depth. Beyond this latter were subcourt Rooms 350 and 351 and Kiva 2-D, described elsewhere.

Here, too, occupying much of the West Court at a depth of 10 feet or more were the remains of a completely razed Great Kiva that I at first assumed must have been built of second-type masonry but which, for reasons to be presented in the next chapter, I have since come to regard as more likely one of third-type construction (fig. 5).

The Late Bonitians were endowed with an unconquerable urge to build. They built retaining terraces beneath the Braced-up Cliff and walls to curtail drift of waste in their two principal rubbish piles. They built dwellings of friable sandstone, pecked or hand-smoothed

on the surface, and destroyed those buildings to replace them with others. And each time they razed and rebuilt they salvaged suitable stones and timbers for reuse in their next architectural adventure.

Back of Pueblo Bonito, at the west end of the Braced-up Cliff and built against a flat area of the canyon wall, is a one-room dwelling and an associated kiva. The two were partly concealed by fragments of a former rock-fall and filled with blown sand and fallen masonry. To judge from their stonework—blocks of dressed friable sandstone with sparse chinking—both structures are of Late Bonitian origin and perhaps early. If others are present they were not immediately visible. By reverting to the past tense I emphasize the fact that our observations were made in 1927; that the little room and its kiva may not have survived collapse of the Braced-up Cliff in 1941.

In 1927 the kiva measured 13 feet 7 inches in diameter and its highest wall, at the north, stood 4 feet 5 inches above floor level. A surrounding bench, flag-paved on top and adobe surfaced, averaged 17 inches wide by 34 inches high. There were no pilasters; above and below bench level the walls were smoothly plastered. A south bench recess, 4 feet 9 inches wide and 13½ inches deep, rose above a subfloor ventilator duct that ended, 3½ feet from the rear wall, in a 10 by 13-inch vent. The duct, masonry-lined and flag-paved, was 13 inches wide by 19 inches deep and had been roofed ceiling-wise. Fifteen inches beyond the opening was a plastered but unrimmed fireplace 21 inches in diameter and 6 inches deep.

Three feet 9 inches northeast from the concave face of the kiva and also abutting the cliff was the one-room dwelling. It measured 11½ feet on the east, 14 on the west, 9 feet 10 inches on the south, and 10½ feet on the north. Here, at the north, eight seatings for roof poles had been pecked into the sandstone 7 feet above the floor. A large rock incorporated in the east side had been utilized for whetting bone awls and like tools. About 2 feet from the northeast corner 3 human foot prints, pecked into the sandstone and averaging 6 inches wide by 10 inches long, marched single file up the cliff face. The lowermost of the three was half concealed by the adobe floor and its underlying debris but of greater interest was the fact that each of the three was represented with six toes (pl. 81, lower). A smaller, 5-toed print, the only normal one in the lot, likewise had been partly buried. These 4 carvings and a zigzag figure incised on the middle north wall apparently illustrate the full range of our unknown artist's ability.

Pecked beam seatings grouped at intervals along the canyon wall east of Pueblo Bonito unquestionably mark the positions of other former 1- and 2-room houses.

IV. THE THIRD-TYPE ADDITION OF THE LATE BONITIANS

The Pueblo III coresidents of Pueblo Bonito began their second and more ambitious constructional program at the blocked west door of Room 115. Here, midway in the row of 2-story houses they had previously built to enclose crescentic Old Bonito, the Late Bonitians introduced a new variety of stonework, splicing it into the second-type masonry of Room 115 and extending it southward in a wide-sweeping curve to Room 337, at the extreme southwest corner of the pueblo (fig. 5).

That new variety consists of larger building stones separated by bands of inch-thick tablets of thin-bedded, laminate sandstone. Nowhere about the village are the differences between second- and third-type masonry more clearly portrayed than here at the blocked west door of Room 115 (pl. 37, upper). The builders tore out the south jamb of that blocked door and tied in their new stonework at sill level, 3 feet 9 inches above the second-type foundation. Ten feet to the south the newer stonework overhangs the older by 5 inches.

In its southward extension the substituted wall conceals a blocked west door in Room 116 and curves outside the next 3 rooms, likewise of second-type masonry but unnumbered and unexcavated. Blocked west doors in two of these are to be seen in Room 117, their decayed lintels 21 inches above its adobe floor. Triangular Room 117, unnumbered on Hyde's plan of Pueblo Bonito (*in* Pepper, 1920, fig. 155), is readily identified by unpublished Hyde prints No. 550 and 552.

Late Bonitian architects really got under way with Room 117 but first they changed their minds a couple times. Their initial plan was to add an external block of six contiguous rooms joined to the older second-type masonry (fig. 5). They laid the foundations, prepared for an east-wall tie-in, and actually started building. Then they abandoned this first plan in favor of one whose outer west wall abutted the southwest corner of Room 116, extending thence southward on a foundation 29 inches wide by 34 inches high and now underlying Rooms 117, 118, and 119.

Then this second plan was discarded. The builders abandoned their 29-inch foundation and built a new one 3 feet outside, this time dovetailing its masonry into the blocked door of second-type Room 115, and bringing it down past 116 to form the present west

side of Room 117. They spread an adobe floor over all the foundation stonework previously laid, replaced with good third-type masonry the second-type stonework stripped from the east side in anticipation of the 6-room tie-in, and built a new south wall upon that floor. Here, once again, the distinguishing characteristics of second- and third-type masonry stand in juxtaposition (pl. 37, lower). A board-framed south door of recent date probably marks the position of an original, connecting with Room 118.

A narrow test pit in the southeast corner of Room 117 showed its older east side masonry continuing 3 feet 10 inches below floor level to a 21-inch-high foundation—figures that agree closely with those outside Room 115 and southward where the same old second-type wall cuts through the northeast corner of Room 105 and subfloor across 25, 106, and 336.

As reported in the previous chapter these three rooms, 25, 106, and 336, are third-type dwellings erected upon the partially razed walls of two second-type structures that were among those built by the Late Bonitians to conceal the irregularities of Old Bonito. A difference of approximately 4 feet separates the floor of second-type Room 25 from its successor. In 106 and 336 some of the subfloor walls are early while others are late. Third-type only was represented under the floors of nearby dwellings.

Room 105, adjoining 25 on the west, is one of excellent third-type stonework and was included in the constructional program that began at the blocked west door of Room 115, replacing the 6-room unit outside 117. Part of that unit was overlain by the foundationless remains of a small kiva whose third-type masonry, reduced to 6 inches, looks no older than that of Room 105 itself. Other third-type kivas, large and small, underlie third-type Rooms 128 and 129, Kivas V and W (fig. 5).

That beneath the floors of Rooms 128, 129, 340, and 341 is a particularly fine example of its period. Its masonry, 2 feet thick and plastered, consists of dressed sandstone, both friable and laminate. Its bench, originally 24 inches wide by 29 inches high, had been stripped of all facing stones. Nine feet above bench level a 13-inch-wide encircling collar once held the distal ends of an upper layer of roofing poles. Despite its depth, the kiva was more than half filled with constructional debris.

At 7 feet 3 inches beneath Kiva V our test trench came upon the floor of a predecessor, its stonework likewise third-type but razed at a height of 30 inches. Remnants of a contemporary kiva, its

24-inch-wide bench razed to within 10 inches of its associated floor, were noted 5 feet 4 inches beneath Kiva W. The Late Bonitians had no hesitancy in tearing down and replacing buildings, whatever their purpose.

Overlying second-type walls subfloor in Room 336 is still another small third-type kiva. Like that in 105, its walls were razed to within a few inches of their floor (pl. 74, lower). The earlier second-type walls underneath may be connected with similar remains deep beneath Kiva U and with the lower portion of a 16-foot-high wall between Kivas U and W. But in every instance we came upon in this southwestern quarter of the pueblo and eastward across the West Court, third-type masonry was utilized to repair or replace second-type stonework.

Room 335, which adjoins 106, offers a superb example of third-type masonry, repeatedly photographed and undoubtedly the finest in all the village (pl. 27, right). Below its floor are other third-type walls but they are decidedly inferior. More than half the rooms in Pueblo Bonito have been classed, rightly or wrongly, as of third-type construction but relatively few of them exhibit the skill and the patience evidenced in the walls of 335, 334, and some of their neighbors.

Throughout this whole southwestern quarter perfectly good walls gave way to others that appear no better either from an esthetic or structural point of view. All are of third-type masonry. Four rooms, 128, 129, 340, and 341, were built above the remains of a perfectly serviceable kiva; Room 343, a third-type dwelling with central fireplace, was abandoned as such and refitted to provide a ventilator for Kiva 130. Huge T-shaped, courtward-facing doors in Rooms 334, 336 and the two next on the south were blocked with over-sized stones before Kivas T, V, and W were built out in front (pl. 16, left).

The period represented by the Late Bonitians' second addition was one of marked constructional activity. It was the period in which Pueblo Bonito assumed, or began to assume, its final unique ground plan; the period, perhaps, during which the Bonitians attained the very apex of their far-ranging prestige. Earlier buildings were razed and replaced in prodigal fashion and stones salvaged from razed walls were incorporated in their replacements. Much of this construction and reconstruction took place in the north and east sections of the pueblo.

Over 5 feet of blown sand had piled up against the slanting exterior of Old Bonitian Room 10 before Late Bonitian builders began

their second-type storeroom, 304, adjoining. Ceiling beams from Room 10 protrude through its north wall at floor level of 304. Old Bonitian rooms were remodeled and their first-type stonework replaced with second-type. Subsequently third-type masonry replaced the second throughout most of this area.

Perhaps 30 Old Bonitian dwellings and storerooms east of 71, 78, and 86 were razed and replaced by those of second-type masonry during the Late Bonitians' initial constructional program. Many of these latter, in turn, were replaced by a successor program that began in the unnumbered room immediately north of 86 (pl. 22, upper) and, continuing east, left some of its foundations subfloor in Rooms 87, 88, 295, and others. Ultimately the third-type walls now standing replaced all that had gone before (fig. 5).

From these standing walls and their predecessors it seems obvious that Late Bonitian architects were actuated by an urge to surround Old Bonito with stonework of their own. Each succeeding change appears, knowingly or otherwise, to have preserved the original crescent of Old Bonito. If the Late Bonitians sought to join the arms of that crescent and close in the space between it was their own idea, one that never occurred to the occupants of Old Bonito. East and west, Late Bonitian rooms overlie the remains of earlier Late Bonitian walls. Those crossing the two courts subfloor south of Kiva A are later and shallower than those on the north side and their stonework includes more salvaged material.

Our first undertaking in 1921 as we sought to discover the history of Pueblo Bonito was a stratigraphic section of the principal village refuse mound, the western (pl. 6, left). We profiled that 20-foot-deep accumulation four separate times, 1921-1924, and always with the same result: Fragments of early and late domestic pottery and incredible quantities of constructional waste were intermixed, top to bottom. There seemed no plausible explanation for this admixture. Finally, in desperation, I determined to seek solution within the ruin itself. Anticipating the next season we moved our major equipment to the West Court in the late summer of 1924 and laid bare its last occupation level, 6 feet 5 inches above the floor of Old Bonitian Room 330 (pl. 17, upper).

Beginning our 1925 program, we extended the West Mound trench to Room 136 and thence north to Kiva Q (pl. 6, right). That exploratory trench, 40 feet from the straight east side of the Court and 5 feet wide not only solved the mystery of the intermixed village debris but revealed far more of village history than we had anticipated.

The West Mound had a north retaining wall as well as one on the south side. Between that on the north and Room 136 was a 12-foot-deep floodwater channel, filled with sand, silt, and household sweepings, the bottom of it about 8 feet below the valley plain (fig. 7). Two feet 4 inches north of 136 we came unexpectedly upon the inner south face of Room 350, an unusual structure 5½ feet deep with an unrimmed fireplace and a northeast-corner ventilator shaft rising to court level. On the floor, a plain half-gourd ladle (U.S.N.M. No. 336372) and several late hachured potsherds.

Room 351, another sunken chamber, was separated from 350 by a 14-inch-thick masonry wall (pl. 64, lower). Like 350, Room 351 was provided with an unrimmed fireplace and a northeast-corner ventilator. Unlike that in 350, however, the Room 351 ventilator had an external air shaft. Although crude and unusual, both rooms were probably of late construction; both were decorated inside, Room 351 by a white rectangle painted with seven "saw teeth" on the upper edge and 350, with two human hands, a human foot, and miscellaneous lines carelessly incised on the south and west wall plaster.

North of 351 our trench exposed the first of two pairs of cross-court walls described in the previous chapter, the pavement between being only 2 feet beneath the surface. Above Station 255 on figure 7 sandstone slabs a foot high marked the edge of a P. I pit-house floor 11 feet 9 inches below the Court surface or 6 feet below the level of the plain in midvalley. Abutting the north side of those slabs were the remains of a masonry wall subsequently recognized as the south arc of a Great Kiva, its floor at a depth of 10 feet 2 inches.

Our 5-foot-wide trench sliced through that Great Kiva just east of its middle line, exposing two masonry pillars and the so-called "vaults" between. The north bench, stripped of its facing stones, measured 25 inches wide by 24 inches high. A wet-weather surface rather than a second floor extended south at bench level. Here, at the north, the main wall had been razed 3 inches above its bench; what was left had been buried under a dump of constructional debris and a thick layer of shale fragments, the two sloping down sharply from the top of an east-west wall. That wall, 7 feet 2 inches high including foundation, had been razed 2½ feet below the present Court surface and was only one among several architectural features revealed by our West Court trench.

Time meant but little to a prehistoric Indian, but our unanticipated Great Kiva represented a vast expenditure of labor. In addition to the north and south arcs bared by our trench we de-

liberately cut another on the west side, out in front of the Kiva W enclosure. From these three points we estimated floor diameter at about 53 feet. With a 2-foot-wide bench and a 3-foot main wall, external diameter would have been approximately 63 feet. Average depth was 10 feet 7 inches. The entire structure had been built in a cylindrical pit purposely dug in an enormous pile of village rubbish. Tool marks remain in the cut bank at south and west.

A west-side margin of 38 inches remains between stonework and bank and if this holds all the way around the pit dug for that Great Kiva would approximate 69 feet in diameter. The contents of that pit had to be disposed of. Earth and rock from a hole 69 feet in diameter by $10\frac{1}{2}$ feet deep would equal 39,262.55 cubic feet or 291 modern truck loads at 5 cubic yards per load—a prodigious undertaking for a people with no metal and no means of transportation other than blankets and baskets. But all had been carried out and dumped south of the pueblo, filling the flood water channel there and starting the two piles that grew into the main village refuse mounds.

It was in a remnant of that pre-excavation dump, fortunately surviving just outside the razed south arc of the Great Kiva, that Roberts and Amsden cut the two stratigraphic columns, Tests 1 and 2, repeatedly cited herein as having solved our problem of the mixed early and late pottery at Pueblo Bonito. Those two columns, a total of 25 feet, showed that one group of wares occur below the 8-foot level and a second group, above. From Test 1, 13 feet deep, 3,593 potsherds were recovered (U.S.N.M. No. 334174) and all black-on-white fragments below Stratum B were P. II types that Amsden and Roberts called Transitional or Degenerate Transitional. Of 2,934 fragments from Test 2 (U.S.N.M. No. 334175), no Straight-line Hachure, no proto-Mesa Verde, and only one Corrugated Coil sherd was found below the upper 4 feet 2 inches.

These two stratigraphic tests and the several constructional features brought to light by our 5-foot-wide exploratory trench are represented on figure 7. But the very diversity of those features prompted an extension of the trench northward through Old Bonito to the exterior where Late Bonitian architects first left their mark. The result, figure 14, thus provides a north-south profile of Pueblo Bonito that further illustrates its fascinating history.

Late Bonitian Rooms 202 and 203, of second-type masonry, were built upon a 3-foot accumulation of blown sand wind-piled against the rough, first-type stonework of Old Bonitian Room 5 and its second story, Room 4. Externally, the north wall of 202 overhangs

its 28-inch-high foundation by 5 inches; within, the foundation projects 10 inches, its top 8 inches below the adobe floor. The four walls were unplastered; there was a door in each, three of them open and that on the north side carefully sealed with masonry duplicating that on either side. The 9-foot ceiling had included hand-smoothed willows and cedarbark.

Room 203, a storeroom erected at the same time as 202, abuts the roofward-slanting exterior of Old Bonitian Room 5, hence the difference in width, top and bottom (fig. 10). Mud plaster on the old, first-type wall ends on an ill-defined surface 4 feet 5 inches below the floor, the surface upon which the blown sand had collected, but unplastered stonework continues another 3 feet with an inward slant of about 23 degrees and there rests upon clean sand, 7 feet 5 inches below the floor of Room 203. The vertical convexity of that old Room 4-5 stonework must be entirely external since Pepper (1920, fig. 10) illustrates its opposite side without a corresponding curve.

If that lower unplastered masonry is all foundation, as is possible, then the floor of Late Bonitian Room 203 is approximately $4\frac{1}{2}$ feet above that of Room 5—a figure that agrees with our observations in and under Room 304, some 50 feet to the east—and the floor of 203B would lie a foot or a foot and a half above the roof of second-story Room 4.

Immediately south of Rooms 4 and 5 there is a change in masonry, neither first- nor second-type as illustrated by Pepper (*ibid.*, figs. 80 and 81), and a lowering of ceiling heights. These abrupt changes together with the Mesa Verde-like pottery from nearby Rooms 32 and 36, suggest the former presence of families possibly immigrant from beyond the San Juan River. The drifting of individuals or family groups from one village to another is a long-established Pueblo custom.

Our B-B' cross section (fig. 14) shows a downward slope from floor level of Room 28B, across nonexistent Room 40 to the adjacent exteriors of Kivas R and Q. By our calculations the Kiva Q floor is about 4 feet lower than that of Room 5 and approximately 12 feet below the average West Court level (pl. 75, lower).

From Kiva Q and its south "annex" (a few feet east of B-B') the Court surface rises a couple feet and, in the process, covers a slab-lined fireplace about 3 feet below the surface together with a succession of razed or partly razed structures. Among these latter are the remains of a P. I pit-house (No. 2 on fig. 7)—three sandstone slabs 33 inches high with a slight inward slant, bound together

with mud and embedded upright in a broken floor 9 feet 10 inches beneath the surface (here approximately 2 feet below average). The larger part of that ancient dwelling had been destroyed presumably upon construction of what appears to have been an Old Bonitian Kiva, its associated floor at a depth of 11 feet 10 inches.

The upper north side of this presumed kiva, 40 inches thick and heavily plastered, sloped outward in the Old Bonitian manner. As the P. I pit-house had apparently been destroyed to make way for a P. II kiva so the latter, in turn, had been demolished in the path of a P. III Great Kiva.

There can be no question as to the period of this huge structure, profiled by our 1925 exploratory trench, but I might have erred at the time in classifying it as of probable third-type construction. The internal features we saw are comparable to those of Kiva A, which is third-type or later. Kiva Q, another Great Kiva, stands between in point of time. Masonry was my guide in trying to determine the order of development at Pueblo Bonito but wreckers of the Great Kiva under the West Court were so thorough they left no identifiable stonework.

During demolition the floor had been covered by an apparent intentional fill, predominantly of blown sand, 3 feet deep at the south and 2 feet at the north—blown sand containing a scattering of clay pellets and sandstone spalls—with a trampled surface on top. Nine feet 10 inches from the south bench a rough stone pillar 5 feet 8 inches in diameter had been stripped of its facing stones after the sand was carried in, leaving the latter standing free. The north side of this southeast roof support had been incorporated in an above-floor vault 6 feet 10 inches long by 4 feet 8 inches wide by 30 inches deep, its original length subsequently reduced by built-in offsets at each end averaging 4 inches wide by 8 inches high.

Two feet farther north and under the sandy layer is another masonry-lined vault, 8 feet long by 23 inches deep, filled with irregular pieces of friable sandstone and covered with slabs at floor level. This second vault, therefore, was a feature of the original structure and was filled and floored over prior to construction of its above-floor successor, that abutting the southeast pillar. A northeast column, likewise 5 feet 8 inches in diameter, had been built within the abandoned subfloor vault, leaving a 23-inch clearance on the south side but one of 5 inches only on the north. Like the first, this second pillar had been stripped of finished stonework; its

15-inch stub had been covered by the sand fill that extends south at north bench level.

This under-Court Great Kiva, 63 feet in diameter and averaging 10 feet 7 inches deep, had been built in an enormous pit expressly dug to receive it. Subsequently it was demolished, its hand-dressed wall stones were saved for use elsewhere, and its internal fixtures or at least what remained of them were buried under village waste that filled the hole and formed a new Court surface.

When that huge structure was erected its south wall quite by chance rose just outside a second P. I pit-house (No. 1 on B-B'), its floor at depth of 11 feet 9 inches. The second stratigraphic section cut by Roberts and Amsden through preconstruction West Court rubbish pierced that same pit-house floor.

A few feet to the south our 1925 trench exposed a pair of parallel walls, without foundations but averaging 16 inches wide, a foot high, 27 inches apart, faced on the inside only and the adobe pavement between 34 inches below Court surface. Fourteen feet beyond this pair is another, likewise without foundations but finished on both sides, their connecting floor, 23 inches below the surface. We have no explanation for these two pairs, almost wholly devoid of identifying masonry but nevertheless considered most likely to have been of fairly late construction (fig. 5).

The 12 feet of layered under-Court rubbish probed by Amsden and Roberts slopes down and to the south and doubtless continues, although its successive strata do not conform with those revealed by our trench outside Room 136, only 50 feet distant. In that trench, 10 feet below the present surface, we noted a lens of water-reworked occupational debris sandwiched between beds of indurated sand and sandy clay—the course of a former floodwater channel. On the opposite side of that channel the great bulk of the West Refuse Mound eventually rose 20 feet above, as described in Chapter VIII. Nine feet of sand, silt, and waste from Pueblo Bonito accumulated in that floodwater channel before the foundations of Room 136 were begun.

The Hyde Expeditions had made various West Court excavations. They cleared Kiva 67, 25½ feet in diameter by 15 feet deep, with its six pilasters each containing a ceremonial offering (Pepper, 1920, pp. 251-254). They also cleared an arc of Room 26 and exposed a single pilaster that had an offering on top but no receptacle. In our West Court explorations we encountered nothing resembling the published description of Room 26. The two sand-filled trenches

shown on figure 7 above Stations 270 and 317 represent cross-court tests, probably by the Hyde Expedition.

At the south end of B-B', Room 137 lies next east of Room 136 and the former village gateway beyond, between Rooms 137 and 140. Hyde's plan of Pueblo Bonito (*in* Pepper, 1920, fig. 155) represents 138 and 139 as a 2-tier unit adjoining 137, his Room 139 on the site of our Kiva 2-D. That former gateway was originally open and 7 feet 10 inches wide, the only known entrance to Pueblo Bonito. Subsequently it was barred by a single cross-wall 26 inches thick with a 32-inch-wide doorway in the middle, a doorway that was itself subsequently sealed. Our own observations hereabout show prior excavations on both sides of the cross-wall; hence my relocation of Room 138 on the south side, Room 139 on the north.

That cross-wall had no foundation but was based on sand 15 inches below the last recognizable West Court surface—the same sand layer that supported third-type veneering along the east side of the Court. Originally this east side was also of third-type construction, as may be seen where its former southeast corner is preserved in Room 140 (pl. 33, right). The veneering having toppled forward, we made such repairs as seemed desirable and in 1925 rebuilt the upper portion throughout much of the distance northward to Room 35*a* and the alleyway connecting the 2 courts (pl. 36, upper).

The area north and south of the former entrance had been thoroughly explored so we contented ourselves with narrow test pits. That south of the cross-wall revealed an 18-inch-wide foundation—the foundation that probably gave rise to Hyde's Room 138—extending from 137 to and under the southwest corner of Room 140. About 7 feet beyond, a dump of constructional debris lay with a southward dip of 29°. Constructional debris and household sweepings containing early-type potsherds predominated throughout our test.

At 6 feet 5 inches north of the cross-wall another east-west foundation, this one based 2½ feet below the surface, extended to within 13 inches of the Court side and there ended—razed, presumably, when the side wall was rebuilt. Here, as on the south, village waste comprised the under-Court fill, or at least the upper 4 feet of it. With the former entrance barred by a cross-wall, the alcoves on either doubtless sheltered ladders that could be drawn to the roof-tops in time of need.

That rebuilt bordering wall extends from Room 140 north to Kiva 16 and is composed both of laminate and dressed friable sandstone. Obviously constructed with salvaged materials and by vari-

ous workmen, construction differs from place to place. Banded fourth-type prevails here and there and is predominant north of the intercourt passageway. Nevertheless, I have classed it all as third-type stonework, a deliberate compromise. It replaced an earlier third-type wall that left its southeast corner dovetailed into the north-wall masonry of Room 140 (pl. 33, right)—the same third-type wall that underlies third-type Rooms 143 and 144 (fig. 5) and is reflected by the interior of Room 146, see above in plate 36, upper.

While our Zuni crew was repairing this Court-side wall in 1925 a friable sandstone block with a zigzag incised upon it was recovered in Kiva A and placed here. Such designs may be only vagrant fancies of an unenthusiastic mason but they do occur and they were repeated. The largest we noted extends over several contiguous stones in the south wall of Room 245 but there were others.

Great Kiva A and its surroundings on the opposite side of that wall are also classed as of third-type construction despite the fact all are late, perhaps later than their stonework suggests. All are built of salvaged materials and laminate sandstone is conspicuous throughout if not actually preponderant. Their stonework lacks the superior quality of that in rooms I have described as of fourth-type, but it may be as recent as they, if not more so. Among the sherds we recovered from a limited test, subfloor in Kiva A, five were typed as Mesa Verde and 15, Chaco-San Juan or McElmo Black-on-white. Here, once more, I have compromised my convictions as to the sequence of masonry at Pueblo Bonito.

Second-type walls from across the East Court, partially razed and superseded by third-type masonry, underlie Rooms 146, 148, and 149 and formerly continued across the West Court to Rooms 25 and 336. Other second-type East Court walls underlie Room 150 but emerge from beneath Rooms 213 and 214 as indefinite or, where finished stonework prevailed, as third-type.

More second- and third-type masonry is to be seen in the north part of the pueblo and has often directly supplanted that of the Old Bonitians. First-type stonework at the east ends of Old Bonitian Rooms 71, 78, and 86 was torn out and replaced with second-type and, as I read the record, that same second-type masonry formerly extended east to Rooms 62, 70, and beyond. Beginning with Rooms 69, 80, and 87, which adjoin 71, 78, and 86 on the east, all walls now standing are of third-type masonry—first, second, and third stories—but they have replaced, in whole or in part, others of first- or second-type (pl. 22, upper). The floor of third-type Room 87 is 7 feet

9 inches higher than that of Old Bonitian Room 86, next door, and overlies a partially razed contemporary of 86, its floor 6 feet 4 inches below (pl. 18, right).

We observed foundations bearing second-type masonry under the floors of Rooms 88 and 90 but other foundations had been so thoroughly stripped of useful building stones the means of positive identification has been lost. From the unnumbered room next north of 86 Late Bonitian architects built a new outside wall of third-type masonry, digressing widely from an earlier one that followed the external curve of Old Bonito (fig. 4). Remnants of that earlier wall survive subfloor, as noted above, and still other under-floor remnants evidence further changes of plan before that for the third-type addition was finally adopted. Later, still another outside wall, the third, was erected by the Late Bonitians (fig. 6.)

Third-type masonry replaced much of that previously built throughout this northern section (pls. 30, upper; 22, lower). It replaced second-type masonry in the unnumbered room north of 296 (pl. 29, left) and in others to the east of it: first, second, and third stories. It replaced second-type masonry in Kiva G (pl. 68, left) and throughout that rectangular, 14-room block that stands forth so boldly on the east side of the village (fig. 5). Third-type masonry that rarely equals our ideal (pl. 27, right) but utilizes building blocks reclaimed from such walls makes up a large proportion of the second addition, as planned and built by Late Bonitian architects. This second addition developed out of the Late Bonitians' first addition but its reuse of materials prepared for the first accounts for the resemblance between the two and often makes it difficult to distinguish one from the other, as stressed in the previous chapter.

Coupled with the disclosures of our West Court exploratory trench and its extension (figs. 7, 14), two other cross-sections, A-A' and C-C', contribute to knowledge of Pueblo Bonito history. Each cuts through the entire village, from one exterior to the other; each passes through rooms of our four masonry types and graphically illustrates their relationship.

Cross-section A-A' (fig. 13) pictures the growth of Pueblo Bonito from west to east. Rooms 320, 326, and 330 are of first-type stonework and terminate the west wing of crescentic Old Bonito. Adjoining 320 on the west is one of 3 unexcavated and unnumbered houses erected by the Late Bonitians when they first came to dwell in Chaco Canyon. Floor level in that unexcavated second-type house is an estimated 3 feet 10 inches below that of third-type Rooms 117

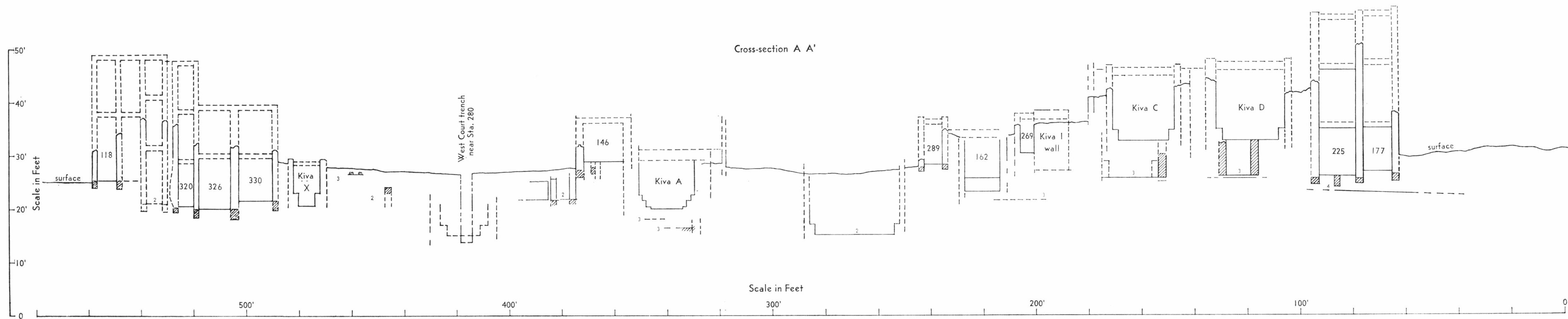
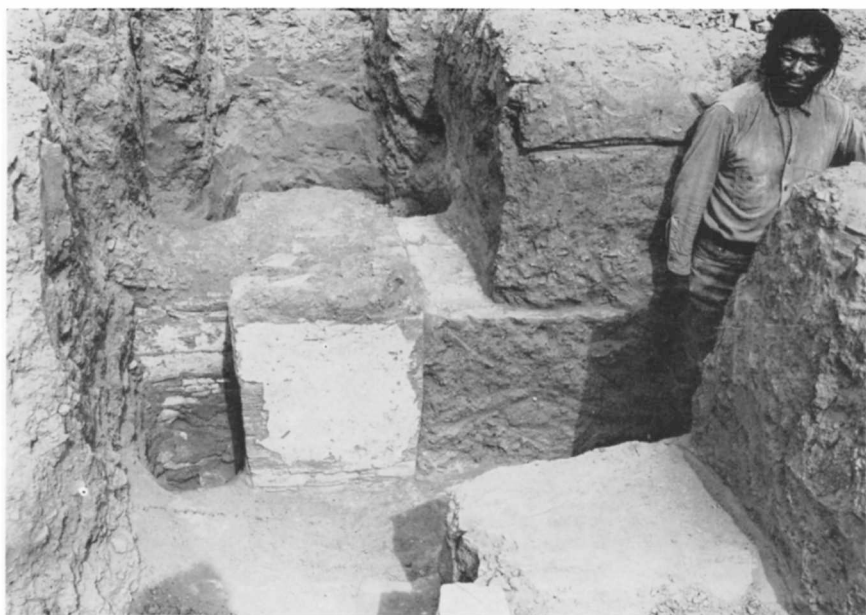


FIG. 13.—Cross section A-A' from Room 118 to Room 177 with earlier structures indicated by masonry type. (From the original survey of Oscar B. Walsh, 1925.)



A partially razed second-type-masonry wall abuts another 5 feet 8 inches beneath East Court level.



Partially razed second-type wall and its whitened door jamb, sub-court east of Room 149.

(Photographs by Neil M. Judd, 1926.)



PLATE 35

Left: Third-type stonework overlies a partly razed second-type wall deep below the East Court.

Right: A partly razed second-type wall with whitened plaster and a blocked doorway underneath the East Court.

(Photographs by
Neil M. Judd,
1926.)

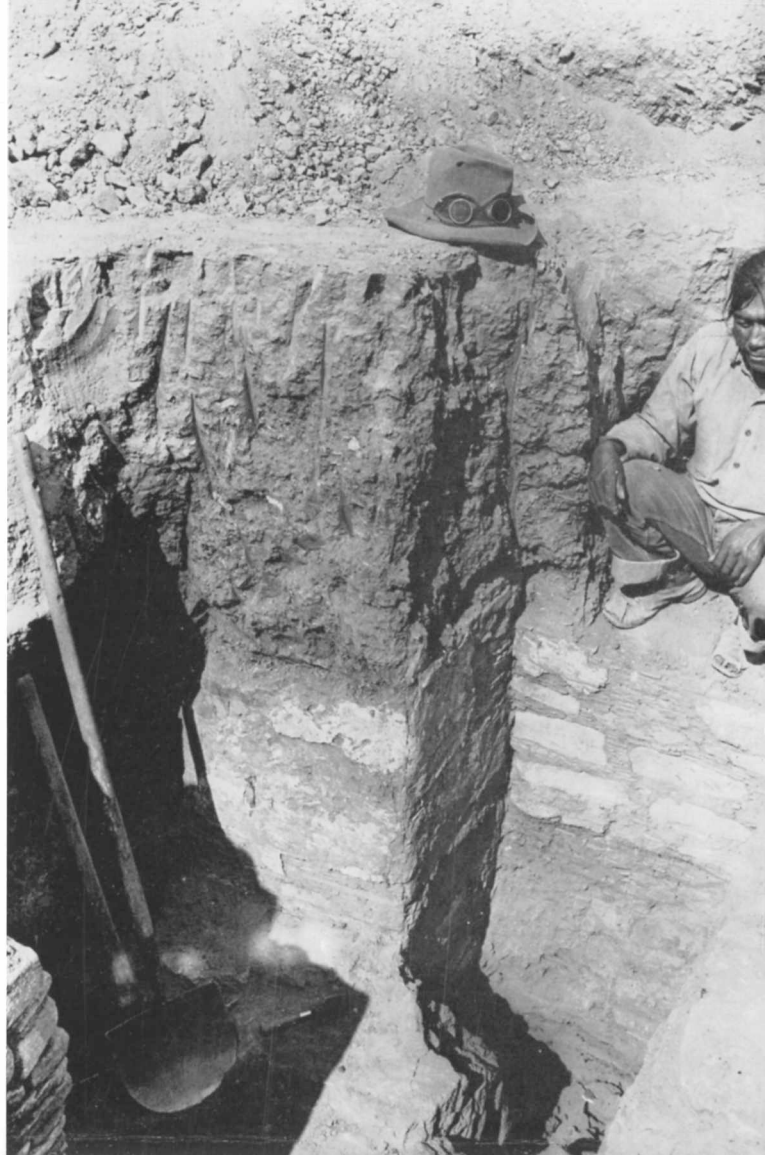
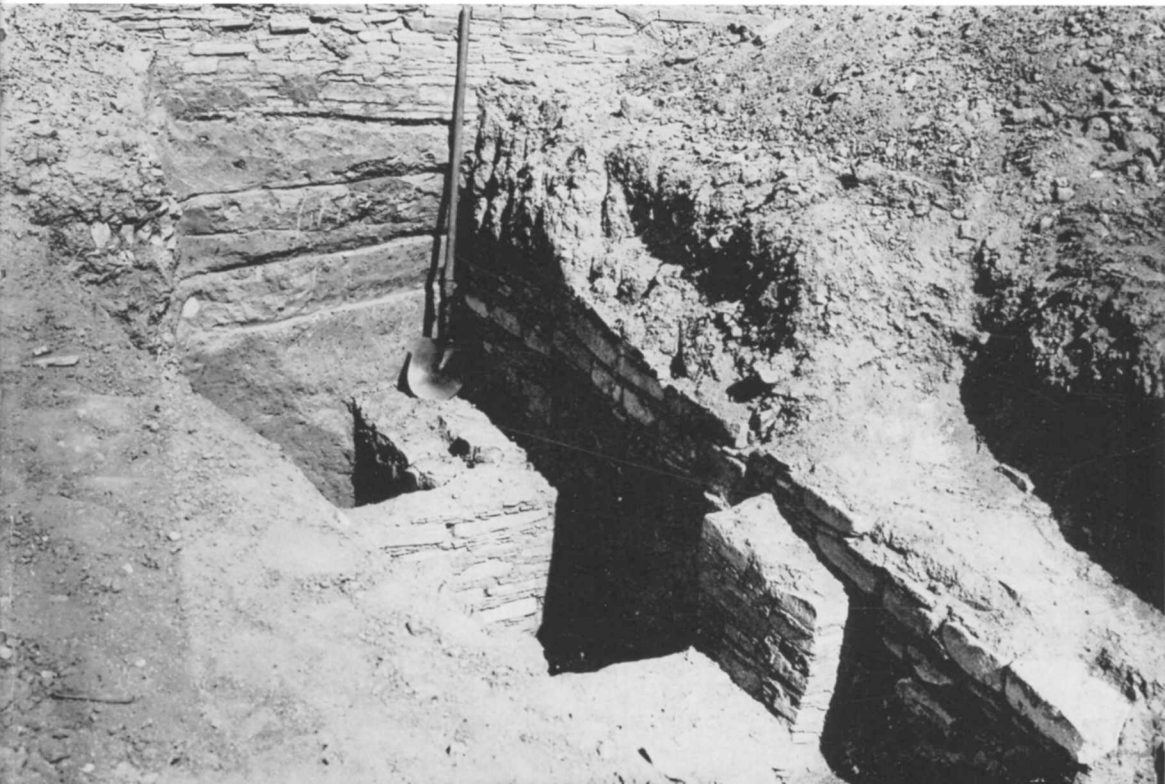




PLATE 36

Upper: The east side of the West Court, which the Pueblo Bonito Expeditions partially rebuilt in 1924, replaced older masonry similar to that in Room 144, above.
(Photograph by O. C. Havens, 1925.)

Lower: Paired second-type-masonry walls were partially razed at a height of $2\frac{1}{2}$ feet to support a later wall that underlies the west side of Room 146, above.
(Photograph by Neil M. Judd, 1926.)



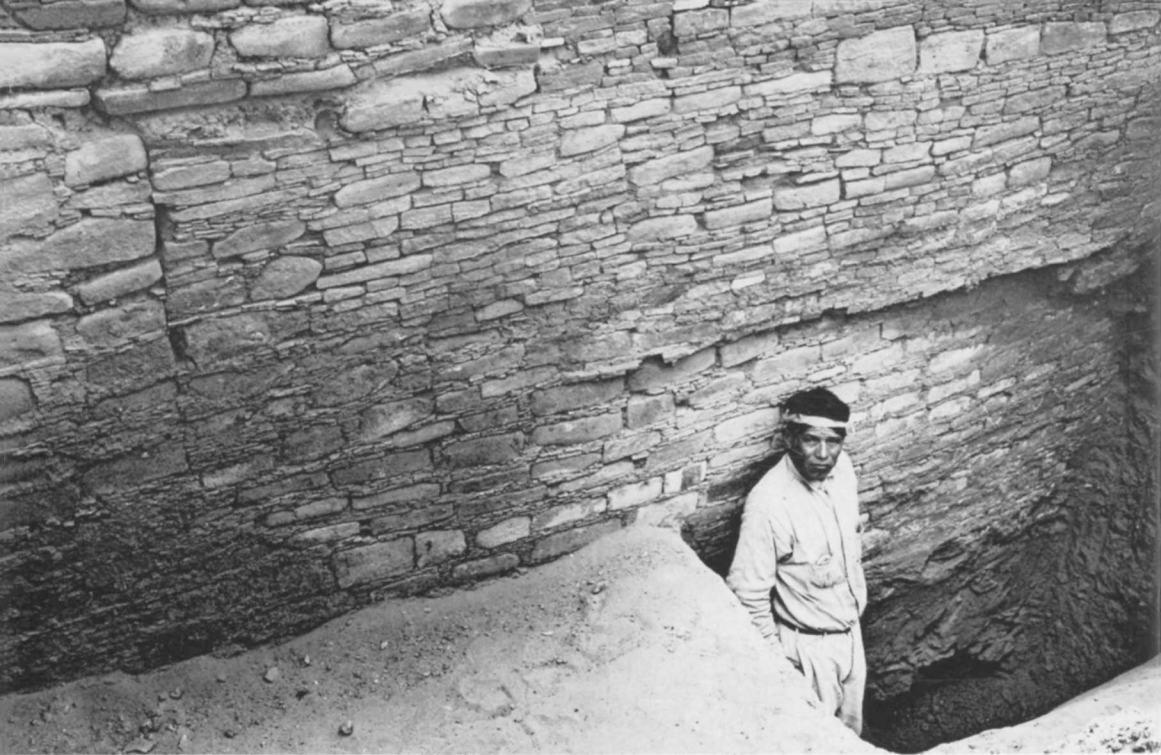


PLATE 37

Upper: The Late Bonitians began their second addition at the blocked west door of Room 115, 3 feet 9 inches above its floor level.
(Photograph by O. C. Havens, 1926.)

Lower: In the east wall of Room 117 third-type masonry replaces the original second-type, removed for an intended 6-room addition.
(Photograph by O. C. Havens, 1925.)



and 118 and about 8 inches above the floor of Old Bonitian Room 320.

Room-to-room measurements indicate that the flagstone floor of Room 320 is about 6 inches higher than that of 326; that the floor of 330 is 6 feet 5 inches below the West Court surface and roof level of Kiva X. On an earlier surface a few feet to the south we came unexpectedly upon a feature I first mistook for an open drain since its masonry sides averaged 4 inches high and 7 inches apart, were generally parallel and smoother inside than out, but irregular construction and adherence to an uneven surface soon identified it as the creation of children at play (NGS, Neg. 32640A).

Midway of the West Court our section A-A' crosses the north edge of a huge pit over 10 feet deep, originally prepared for a Great Kiva but subsequently filled with village waste after the kiva was dismantled. Whatever its local age that Great Kiva presumably was contemporaneous with a pair of second-type masonry walls that underlies Room 146 and was partially razed when the kiva pit was dug (pl. 36, lower).

Room 146 was built of third-type masonry, but this latter was earlier and differed considerably from the third-type masonry of Kiva A and its contemporary surroundings. Beneath the floor of Kiva A are the remains of other structures likewise identified as of third-type construction and thus part of the Late Bonitians' ambitious second addition. Earlier walls underlie Rooms 148 and 149, overlooking Kiva A from the north, and continue eastward at an average depth of $6\frac{1}{2}$ feet but they do not appear on our A-A'. Half way across the East Court, however, we encountered an abandoned kiva 12 feet deep and of indubitable second-type masonry, the variety widely employed during the Late Bonitians' first addition to the village.

Room 289, one of three built upon the latest East Court surface and therefore presumably late in point of time, was constructed of relatively large blocks of dressed friable sandstone but its masonry is not second-type. Beyond 289 our A-A' profile crosses various structures all of which fall within my definition of third-type stonework including the remains of earlier kivas deep beneath the floors of C and D.

We found Kiva D especially interesting not only because its predecessor lies $6\frac{1}{2}$ feet below floor level but also because two masonry repositories had been built under the floor and close against the face of that predecessor. One of those repositories (No. 1), containing several fragments of turquoise and shell and the imprints

of two round sticks, was covered with part of a door slab, $23\frac{1}{2}$ inches long and notched at two corners. The second repository was of cruder stonework, 9 inches in diameter and about 10 inches deep, but its offering was greatly superior and cupped within a large cockle shell (Judd, 1954, pl. 89).

Kiva D contained all the fixtures of a typical Chaco kiva—fireplace, sunken vault west of the fireplace, underfloor ventilator, and a shallow, bench-high recess at the south—but it differed from the average in having 10 pilasters, each a squared block of wood averaging 16 inches wide by 7 inches high and set back $3\frac{1}{2}$ inches, plastered but lacking the usual encasement of small-stone masonry. Another exceptional feature in Kiva D was an underfloor passage that led, by three masonry steps, to second-story Room 241B (pl. 62, upper).

Room 225, separated from Kiva D only by the latter's enclosing stonework and a corner room, 240, is one of that double row of east-wing houses the Late Bonitians built as their final addition to Pueblo Bonito. Its masonry is entirely of thin-bedded laminate sandstone with no banding and very little mud mortar in evidence. Lengthwise through the room and immediately under its floor is a bare foundation, 26 inches wide by 19 inches high, that appears to be part of an earlier addition, planned but never completed. A subfloor test in the northeast corner disclosed 6 successive strata of sand and sandy clay with silt layers between and clean sand at a depth of 9 feet.

We made no study of Room 240, but 239, at the northeast corner of the enclosure, revealed the cylindrical exterior both of Kiva D and its predecessor. Both are of vastly superior stonework to that normal for kiva exteriors and the upper portion exhibits many dressed friable sandstone blocks and a suggestion of second-type chinking. Two logs inserted into the lower part obviously were expected to brace the outside 3-story south wall of Room 244. This latter wall also includes many building blocks salvaged from razed second-type structures and many protruding stones, a customary feature of kiva exteriors (pl. 38, right). Room 239 was excavated and refilled before we knew anything of dendrochronology, hence my failure to take sections of its two bracing logs. Presumably they are still there.

Room 177 adjoins 225 on the east and, like the latter, was one of that group I believe to have been the Late Bonitians' final addition to Pueblo Bonito. It had a ceiling height of 8 feet 2 inches. There were two ventilators in the east wall and two opposite. Its east-side foundation, 8 inches below the floor, projected 2 inches and stood 20 inches high. A silt surface 41 inches below floor

level on the west side of the room passed under the east foundation at a depth of 49 inches. An outside 5-foot-deep test showed that silt surface continuing with a covering layer of sand upon which the east-wall foundation was built. About 5 feet out from the wall a pot-shaped storage cist 46 inches in maximum diameter and 50 inches deep had been dug through that silt layer and into the sandy clay beneath.

In Chaco Canyon tireless winds carry sand upcanyon by day and back again at night. From one direction or the other wind-blown sand had piled up against the east side of 177 before our survey was made and it is this sand, perhaps, rather than a down-valley slope that accounts for the fact the surface there is 5 feet higher than outside Room 118 at the opposite end of Profile A-A' (fig. 13).

Our third cross section, C-C', begins at the Braced-up Cliff, that colossus which for unmeasured years towered menacingly above the walls of Pueblo Bonito, and passes thence through Room 189 and diagonally across the East Court, above and below the last occupation level, to Kiva B, Room 141, and our exploratory trench through the West Mound. Like 225 and 177, Room 189 was a late addition to the village; one of a single row of fourth-type structures built upon abandoned foundations of the Northeast Complex and abutting the former exterior wall, of third-type masonry. Room 189 remains unexcavated but, outside, sand and rock and water-borne silt have piled up almost to ceiling level (fig. 15).

Room 98, previously excavated, had a ceiling height of 8 feet 10 inches. Portions of its third story were still standing a few years ago, the north door of 98B fitted with secondary jambs to support an outward-slanting doorslab (unpublished Hyde print No. 528). Subfloor in Room 98 a foundation without identifying masonry is so oriented as to connect it, indubitably, with a like foundation under Room 295 and thus associate both with an earlier but rejected Late Bonitian plan for an external row of third-type rooms (fig. 5).

Kiva L, a third-type chamber 10 feet deep, was especially instructive because the south walls of third-type Rooms 290 and 291 arched across its north bench on paired beams (pl. 57, left) and because its cribbed ceiling was practically intact. Dismantling this latter, we counted 195 selected pine timbers plus 135 shorter pieces in the fourteenth or uppermost layer and perhaps 20 more lost through collapse of the middle portion (pl. 56, upper) a total of over 300 trees felled. On the floor, a 3-inch layer of blown sand and, above it, a neighborhood dump that included 4,732 tabulated potsherds of which

Amsden and Roberts classified 16 percent as Old Bonitian and 67.3 percent as later.

Twenty-two inches under the floor of Kiva L, we came upon the floor and partly razed bench of a second-type kiva, one of those constructed by the Late Bonitians as a feature of their initial building program. Three years later, on July 29, 1926, the ventilator shaft of that razed subfloor kiva appeared during our East Court trenching operations south of Kiva L. Other structures of the same general period, or portions of such structures, were encountered nearby (fig. 4).

Just beyond these broken remains, section C-C' crosses the third-type wall that divides the East Court but unfortunately misses two important features, Room 190 the "heart" of Pueblo Bonito, and that partially razed, second-type kiva, 12 feet deep, that occupies a considerable portion of the Court south of the dividing wall.

Our explorations in Room 150 revealed no less than five subfloor foundations some of which continue eastward to connect with those under the East Court while others extend on various levels west under Room 218 or south and under 221. Despite limited resemblances to one masonry type or another all these underfloor wall fragments are judged to pre-date both Kiva A and Kiva B.

Room 141, on the south middle front, is one of three shielding Kiva B. That they are older than B is at least suggested by the fact their presence forced the kiva ventilator shaft out of its normal position and around to the east side. Over the wall, at the west end of Room 153, a 1921 pit to a silt surface $9\frac{1}{2}$ feet below floor level revealed Old Bonitian rubbish throughout. There were no late types among the 789 potsherds recovered. Quite obviously here was an outlying portion of the vast rubbish pile under the West Court that Roberts and Amsden examined four years later. It is possible, also, that Old Bonito was built on a slight elevation since the present surface outside Room 141 is 8 feet lower than that outside Room 189.

Room 141 and those on either side stood upon the north bank of a floodwater channel to which the rincón back of Chettro Kettle surely contributed—a channel that began upcanyon, continued past Pueblo Bonito and Pueblo del Arroyo, and on down valley. So far as we may judge, the Old Bonitians were not especially concerned with that channel but the Late Bonitians sought year after year to change its course and force its flood waters farther from their gateway.

Beyond Room 141 our line leaps the old channel, climbs the slope of the West Mound, bisects our 1925 trench diagonally, and continues

out upon the plain. Our survey for Section C-C' crossed that plain and its modern arroyo and ended at the near east side of The Gap but the extension added so little to figure 15 it has been omitted. Thus, as originally executed, C-C' profiled Chaco Canyon from one cliff to the other.

The Late Bonitians were tireless builders! Nothing daunted them! No undertaking was too great! Three separate times they increased the size of their village and once abandoned plans that would have doubled its ground area. With pine posts, crude stonework, and mud they braced a detached portion of the cliff back of Pueblo Bonito and thus gave it a Navaho name known today throughout the whole reservation—*tsě bi'ya hani' ă'hi* (Franciscan Fathers, 1912, vol. 1, p. 228), "the cliff braced up from beneath" (Judd, 1959). They dug a huge pit in the West Court, 69 feet in diameter by 10½ feet deep, and carries its contents, all 32,262 cubic feet of it, to dump into the floodwater channel south of the pueblo and start the two refuse mounds just beyond.

When village waste had accumulated to a depth of 11 feet, approximately 4 feet above the mid-valley plain as it exists today, the Late Bonitians built retaining walls part way around their two rubbish piles and later refaced those walls with third-type masonry and raised their height by added stonework. The Late Bonitians were, indeed, tireless builders!

I am not sure they built the ancient stairway back of Pueblo Bonito, but it is a reasonable presumption—the stairway whose lower steps were so eroded by water action we fitted 3-inch planking on the original seatings in 1922. A comparable stairway is to be seen near every other major P. III ruin in Chaco Canyon and broad pathways lead from one to another. The Navaho refer to these pathways as "roads" and my guess is no better.

At the top of the Pueblo Bonito stairway is a wind-swept area, oval and roughly 50 by 30 feet, ringed with piled stones and with three 5-inch deep dug basins in the middle (NGS Neg. 50596A). Hand-pecked steps lead dimly toward Pueblo Alto, on the skyline. About a mile to the northeast is the superb stairway Jackson sketched on May 10, 1877 (Jackson, 1878, pl. 63), and which he insisted upon climbing in 1925 just because he had done so 48 years earlier.

Since 1877 a middle section has broken away but the remainder survives, climbing upward from a most casual base. An instructive circumstance in connection with this particular stairway is the series of 8 incipient steps at upper right. Jackson indicated this series

lightly but his lithographer chose to ignore it (pl. 39, left and right). The cliff below is more precipitous but perhaps Chaco stair builders started at the top and worked down!

Jackson's stairway is one of the best, but what was its purpose? The diverse "roads" are equally beyond convincing explanation. There is the broad pathway extending southeast from Pueblo Alto with 10- to 20-foot-wide hammer-battered steps at every ledge (pl. 40, lower) and a pecked groove throughout much of its length (pl. 40, middle); there is the retaining wall edging a 30-foot cliff in a rincón back of Chettro Kettle and a stairway at the end of the trail. There is another step series across the canyon, irregular and cramped, and a cleared path from rimrock toward *Tsin Kletzin* (pl. 40, upper). There is the magnificent stairway overlooking Hungo Pavie and a conspicuous "road" dug through a sand ridge south of The Gap. Each was a prodigious undertaking of which the Late Bonitians or their contemporaries were thoroughly capable but each remains a mystery.

V. THE NORTHEAST FOUNDATION COMPLEX

What we called "The Northeast Foundation Complex" is just that—a complex of mud-and-stone foundations never built upon but intended for an addition that would have doubled the ground area of Pueblo Bonito. The plan was conceived by Late Bonitian architects but was abandoned by them in favor of a substitute plan. The abandoned foundations began as a thin wedge built against the external second-type masonry of Room 297 and extend thence irregularly eastward until, more or less abruptly, they came to an end 509 feet east of Room 176 (fig. 11).

We discovered this foundation complex quite unexpectedly while clearing away blown sand and fallen stonework outside the northeast arc of the pueblo (pl. 41, upper). Here the outer wall foundations, varying in height from 15 inches (Room 188) to 22 inches (R. 184), had been built between and against foundations projected from our outlying complex. These intruding foundations, like those of the outer row of rooms, rested upon 20-24 inches of blown sand containing a scattering of clay pellets and occasional potsherds, both early and late. Two feet lower, or 4 feet below the top of the foundations, we came upon a hard, fairly smooth silt surface. This "pavement" (to quote my 1923 notes) looked so artificial I decided to explore it further.

Beginning outside Room 184 we cut a 5-foot-wide trench and followed the pavement on a Magnetic North line 115 feet where, unexpectedly, we encountered a triangular bank of adobe mud packed against the lower terrace of the Braced-up Cliff. As we bared it, that adobe bank measured 8 feet high by 13 feet, front to back, and about 6 feet across its irregular top. A limited test at the foot of the triangle revealed underlying adobe of unknown depth—adobe that was gritty, hard, and broken as though composed of water-softened and trampled chunks of discarded mortar (pl. 42, left).

The abutting and interlocking foundation units exposed by that 5-foot-wide trench, and all those adjoining, suggested our name for the whole composite: "The Northeast Foundation Complex." Each foundation unit was composed of loosely assembled pieces of friable sandstone and mud mortar. So far as we could see they were just ordinary foundations, varying in width and height but otherwise differing in no way from foundations elsewhere (pl. 41,

lower). We followed them in both directions—west to their point of beginning and eastward until we tired of the pursuit.

The Complex began as a 22-inch-high wedge built against the plastered second-type masonry of Room 297 (pl. 43, lower). The extreme tip of the wedge, which collapsed during excavation, had been built upon 9 inches of blown sand covering 23 inches of compacted constructional debris—abode droppings and sandstone chips left by the builders of the second-type wall. Adobe plaster still adhered to that wall, 54 inches of plaster from foundation to top of the abutting 22-inch-high wedge. Above the wedge, weathering had erased the plaster, and thereafter an additional 2 feet of sand had accumulated.

At this point the Room 297 foundation, if any, was deeply recessed, but an apparent substitute lay 4 inches outside and at the same level. To explore this feature further, we made a second test at the northwest corner of 297 and here the substitute was missing while the room foundation, 16 inches high and offset 3 inches, had been built over and between massive sandstone blocks fallen from the north cliff in pre-Bonito times. Another such block was exposed a few feet to the east and beyond it, outside Room 188 and 4-4½ feet below the surface as we found it, a third part of that ancient rockfall had caused one of the north-south units to lift slightly as it crossed (pl. 44, left).

Because the intended foundations were built over and around them these huge blocks of fallen sandstone obviously gave the town planners small concern. But long years later, after Pueblo Bonito had been built and abandoned, another huge section crashed down from the same source, the west end of the Braced-up Cliff, and one jagged block rolled dangerously close to the northwest corner of Room 189 before coming to rest (pl. 44, left).

Beneath broken masonry was a shallow layer of blown sand that included scraps of burned wood and another 20 inches of constructional waste thinning out to zero at a distance of 10 feet. All this is now buried under wreckage of the Braced-up Cliff itself which finally fell, as the Bonitians feared it might, and laid waste the whole northeast quarter of their famous pueblo (Judd, 1959*b*).

Some 80 feet east of Room 297 a second unit of the Foundation Complex emerges from under the outer wall to parallel the first unit at a distance of 8 feet. The two are joined by a succession of north-south foundations spaced as though for rooms comparable in floor area to those in the second row of the pueblo, Room 297 east to

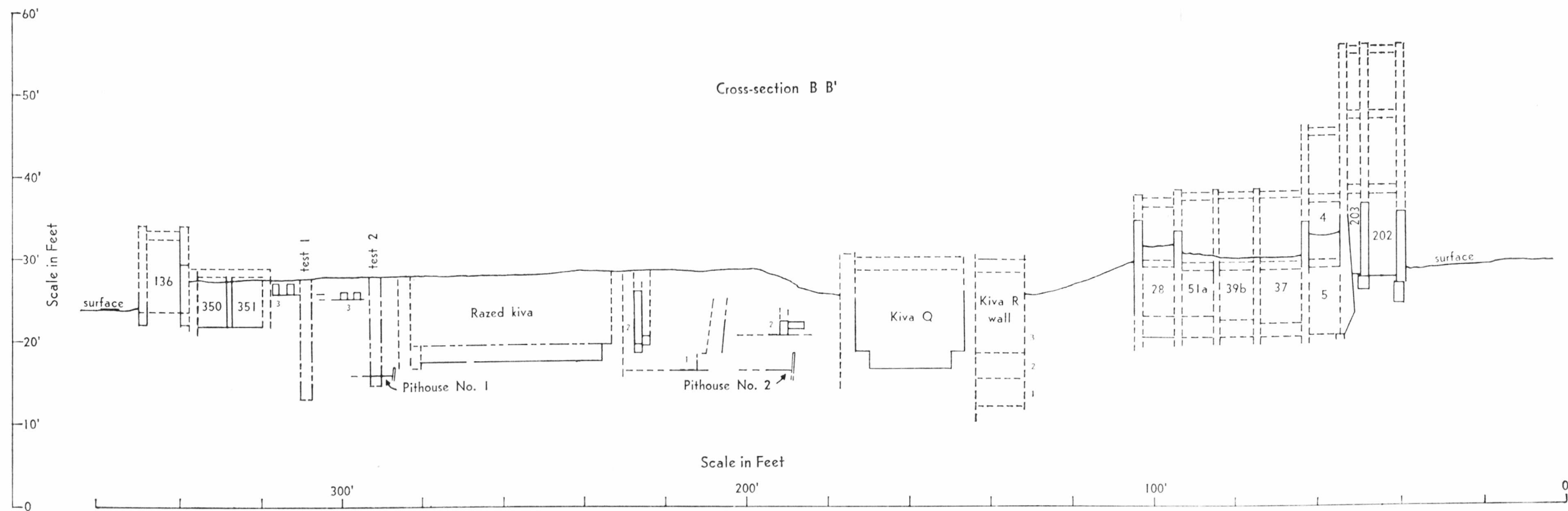


FIG. 14.—Cross section B-B' from Room 202 to surface outside Room 136.

294. At its north end the westernmost of these connecting foundations overtops the east-west unit by 9 inches, a difference leveled with fourth-type stonework—one of three instances in this area where finished masonry appears upon units of the Complex.

As the Complex continues eastward a conspicuous change occurs north of Rooms 183-187. On the ground no less than on our surveyor's plot (fig. 11) there appears a bewildering confusion of foundations. They supplant and intermix; they abut and overlap; they stop and change direction. One might guess that two or more architectural plans had clashed here; that the city planners had reached an impasse or become inextricably enmeshed in their own schemes. Abandoned handiwork was not demolished, as one might suppose; it was merely covered up and forgotten (pl. 45, upper).

We traced many of these outlying foundations under the outer wall of Pueblo Bonito and found them differing in no appreciable degree from other foundations. Those beneath Room 186 are especially instructive. The room floor had been spread directly upon five foundation units that intrude from the northeast and the northwest to abut older walls under the floor.

Most conspicuous of these older subfloor walls is the jutting corner of original Room 267, built of banded laminate sandstone in what I should call superior third- or fourth-type masonry (pl. 46, lower). Plastered outside and partially razed, the corner stands on its own 11-inch-high foundation at a depth of 4 feet 4 inches; 9 inches higher, the corner is abutted by another partially razed wall of comparable stonework, that continues west to underly the present southwest side of Room 187. Plaster on the face of this lower wall carries around the original 267 corner and rounds off with an apparent work surface that slopes down and away from the wall. A second, similar work surface lies 6 inches higher. Here, more clearly than elsewhere, we see units of the Northeast Foundation Complex abutting abandoned third-type walls in anticipation of an addition that was itself abandoned and immediately superseded by the present row of outside rooms.

Three inches below the floor of Room 186, right where its southwest foundation abuts the east side of original 267, an 8-inch-high stack of loose stones was concealed at time of construction. Built on sand, the pile fell during excavation and thus revealed a small turquoise offering placed there, according to one of our Zuni workmen, "to hold up the house."

Foundations of the Complex extending subfloor into Rooms 186

and 187 do not continue into 293 and 294, adjoining, and we made no observation in Rooms 188 and 189. A new feature, however, occurs outside the northeast corner of Room 187. There, built upon merging units of the Complex, are the 5-inch-high remains of a boxlike structure 55 inches long and averaging 18 inches wide. A second such receptacle, complete and of fourth-type masonry, stands $7\frac{1}{2}$ feet to the east against the middle outside wall of Room 186 (pl. 42, right). Its external measurements are 45 inches by an average of 19; inside, 27 by 12. It was floored by a single sandstone slab laid directly upon the underlying foundations and was ceiled 15 inches above with slab-covered small poles the ends of which had been inserted into the ruin wall. Whatever its intended function the box contained only a handful of miscellaneous deer and small mammal bones, two Old Bonitian black-on-white sherds, and an ironstone concretion.

These merging foundations unite with and abut others of their kind in an intricate pattern I could not unravel to my entire satisfaction. A number of parallel east-west units, 22-38 inches wide and 53-58 inches high, seem to stand forth in a dominating way; lesser foundations, 14-24 inches wide and 6-20 inches high, join them from north and south and all top off at the same general level. Irrespective of differences in width and height, all were built either on the underlying silt pavement previously mentioned or on its 20-24-inch blanket of blown sand. Working among them one gains an impression the broader, more substantial units may have been constructed first, the others following.

Three east-west foundations exposed by our 5-foot-wide trench north of Room 184 extend to and under the west side of Hillside Ruin (fig. 11). The first of these, 15 inches wide by 16 inches high, passes under Hillside 26 inches from its southwest corner and 2 feet 10 inches above the underlying silt pavement. Constructional debris 20-22 inches deep lay upon the foundation and was, in turn, buried under stratified sand that had piled up against the smooth-faced stones of Hillside (pl. 47, upper).

HILLSIDE RUIN

What we called "Hillside Ruin" is a fairly late settlement that extends from a sandstone outcropping at the end of the Braced-up Cliff terrace eastward approximately 300 feet to another outcropping. It probably has since received other names from other sources. Simpson (1850, p. 81) barely mentions the site; Jackson (1878,

p. 442) describes it as "a mass of ruins measuring 135 by 75 feet" with two circular rooms in the middle and an east-side wall about 300 feet long. We did not find this latter, our examination of the site being restricted to three narrow exploratory trenches at the west end, partial exposure of the irregular south front, and limited examination of one kiva.

This kiva, situated near the east sandstone outcropping, has an indicated above-bench diameter of 24 feet 8 inches and its masonry, as I described it at the time, approaches but does not quite equal our third type at Pueblo Bonito. Elsewhere, what little Hillside Ruin masonry we laid bare is decidedly non-Bonitian and rests upon a 7-inch-high adobe foundation that overlies extended units of our Northeast Foundation Complex. Hillside Ruin, later than Pueblo Bonito, stands upon a low elevation overlooking the network of foundations presently under consideration. I believe it to have been relatively short-lived and it clearly has been stripped of accessible building stones. Surface sherds I gathered are few in number and the black-on-white fragments are best described as proto-Mesa Verde.

PRINCIPAL EAST-WEST FOUNDATIONS

One of the major east-west foundations, 28 inches wide and 33 inches high where it abuts, subfloor, the inner west corner of Room 185, passes under the outside wall of that room and continues eastward more than 200 feet. This foundation and others of its kind are joined by lesser units to outline an assemblage of room-size areas and what obviously was intended as the foundation for a circular kiva. A test outside the southeast arc of this latter exposed a foundation angle both sides of which were built upon a smooth silt surface at depth of 4 feet 5 inches; a foot or more of adobe droppings lay upon that surface and stratified sand above, the upper 2 inches dark with humus.

This kiva outline, lacking finished masonry inside and out, is bisected by another major foundation that extends eastward past the jutting front of Hillside Ruin to an end we did not seek. In its course, however, this major foundation, here 58 inches high, is overlain by another kiva outline whose overall width of 7 feet suggests both bench and outer wall. The presumed bench face rests upon a 2-inch-thick adobe floor, 3 inches of sand, and an underlying thin layer of shale. Cut into the floor is a typical Chaco-type ventilator duct, 23 inches in both width and depth by 7 feet long, neatly lined with laminate sandstone. Its associated shaft, of third-

type masonry and 22 inches square inside, stands $15\frac{1}{2}$ feet from the north end of the duct and intrudes upon the incomplete outline of another and earlier kiva.

Outside the first of these two kiva foundations, but inside one presumably intended for its east enclosing wall, is a rectangular firebox, 29 by 26 inches and 25 inches deep. Its slab lining rises full height on the east side but is topped on the other three by 8-10 inches of masonry. Despite the foundation between, this sunken firebox probably was associated with the six next to be considered, five of them quadrangular and one circular.

These six (pl. 47, lower) were ranged along the south side of the major east-west foundation that underlies the Chaco-type kiva outline noted above. The single circular firebox measures 43 inches deep by 42 inches in diameter at the top and 50 inches at the bottom, while the other five vary in size from 33 by 38 inches (No. 3) to 41 by 54 inches (No. 2) and in depth from 16 inches (No. 5) to 29 inches (No. 1). All six are rudely constructed with walls 4-12 inches thick that top off at approximately the same level as the east-west foundation. Excess mortar inside the five rectangular pits was smeared over the stonework; that in the circular one was finger-pressed between stones. All six were filled with sand reddened by heat and containing minute particles of charcoal but no discernible wood ash; there was no fusing of mortar and no fragment of pottery or bone in either. My guess is that the entire group, seven in number, was in some fashion related to Hillside Ruin, but this is purely a guess.

A test pit between Nos. 2 and 3 disclosed a smooth adobe surface at depth of 58 inches and, above it, the ever-present constructional debris and blown sand. In the partially explored area immediately to the south we happened upon a small contemporary dump of this constructional waste, but I could see no point in searching further. All the foundations we had previously uncovered were pretty much alike. They were built of mud mortar and roughly spalled chunks of friable sandstone; they were foundations and nothing else. Here and there a bit of finished masonry is to be seen, the visible effort of an impatient mason. But nowhere in the whole Complex did we find an item of cultural interest other than occasional discarded hammerstones and potsherds. Of these only one seemed to justify a catalog number, the fragment of a black-on-white female effigy with half-inch black squares on the belly (U.S.N.M. No. 336089).

The main east-west foundations may have been constructed first for they are generally wider and higher than other units and they often stand directly upon the ever-present underlying silt layer. In contrast, the abutting lesser units rest upon 20-24 inches of sand overlying the silt strata. In 1923 when we first came upon these buried surfaces I invariably described them as "pavements" because they seemed too smooth to be of natural origin but later, after Bryan's 1924 and 1925 geological observations and my own independent findings, it became obvious each exposure was no more than a record of silt transported and deposited by sluggish floodwaters. The overburden might differ in depth and composition but the underlying layer remained the same, floodwater silt.

Jackson (1878, p. 442) notes an east-side wall extending south 300 feet from Hillside Ruin to meet at right angles another wall 180 feet east of Pueblo Bonito. Although this meeting is clearly indicated on his restoration of Pueblo Bonito (pl. 49, upper), I suspect an error on the part of the lithographer. Jackson was not given to erroneous observations. Three hundred feet from Hillside Ruin, or even from the cliff behind, would put the intersection well south of the lone wall foundation we traced 509 feet east (E 23° N) from Room 176.

McNitt (1957, p. 175) quotes his informant to the effect that building stone for the Wetherill residence and store "was brought from a tumbled prehistoric wall just east of Bonito," a recollection that may account for the irregular top of the lone foundation. We did not explore the considerable area between this bordering foundation and the series fronting Hillside Ruin, but we ran several trenches at the east end and, for ready reference, assigned identifying numbers here and there (fig. 11).

From Station 2, where it ends with a height of 14 inches and a width of 24, our lone bordering foundation extends arrow-straight toward the southeast corner of Pueblo Bonito. Its broken east end, 10 inches under the surface, is surrounded by blown sand; no constructional debris is apparent. Built of roughly fractured friable sandstone, this long wall-like foundation overlies every other on its path, including 22 inches of excellent fourth-type masonry at Station 3, and therefore is later than they. It measures 24 inches wide by 14 inches high at Station 2 and the same at Station 5 but a few feet further west the foundation stands 26 inches high and comes to the present surface (pl. 48, left). It is not improbable that this section, at least, appeared as a free wall in Jackson's time.

At Station 4, at the lower end of a long narrow room that extends

north to Station 6, a pair of rude 3-course foundations averaging only 8 inches high abuts 19 inches of good fourth-type masonry above its own foot-high foundation (pl. 49, lower). The lateness of the pair is thus established as they curve away to the south and west until the north member comes to an abrupt end approximately 150 feet from its beginning. Here, at Station 8, this north member is reduced to a mere two courses, its base 20-odd inches below the surface.

Beneath this 2-course foundation lie 3 feet of sandy clay containing conspicuous, fragmented chunks of adobe and, below that, an additional 2 feet of compacted sand. In our test pit at this point, 7 feet 4 inches deep, neither sandstone spalls nor potsherds were noted below the foundation, but sherds did occur, unidentified in my notes, in the sand above. The south member of the pair ends about 50 feet short of Station 8 at which point they are 25 inches apart, average 16 inches wide by 10 inches high, and are covered by 10 inches of blown sand, as at Stations 2 and 4.

Purely out of curiosity we cut a shallow trench alongside the paired foundations below Station 4. When we found they had been built upon water-laid sand and silt we abandoned the experiment in favor of a second trench, dug to intersect the two about midway between Stations 4 and 8. The results, which we dubbed "The Far East Trench" (fig. 24), proved unexpectedly illuminating. Underneath the pair, quantities of indurated sand and sandy adobe extended northward to merge with the fill of an undeniable watercourse. That fill, chiefly debris of reconstruction—sandstone fragments and chunks of adobe mortar from razed walls—had been carried out and dumped into an unwanted channel where, in due course, all was blanketed by Chaco Canyon's ever-present blown sand.

Too late I realized our "Far East" trench should have been continued to cross the long wall-like foundation for this latter obviously was built to meet some definite purpose. Whether that purpose was in any way related to the debris-filled channel nearby or to the silt layers we encountered in every 5-foot-deep test made throughout the Northeast Foundation Complex is a question that remains unanswered. Floodwaters from the *rincon* back of Chettro Kettle formerly were discharged down valley, and our lone wall could have been designed to divert such waters away from the village as was, presumably, one 5 feet under the present surface and extending 100 feet upcanyon from Pueblo del Arroyo (Judd, 1959*a*, p. 120). The same explanation does not, of course, apply to a similar rock wall reaching eastward from Pueblo Alto.

SIGNIFICANCE OF THE COMPLEX

Upon conclusion of our explorations I could find but one reasonable explanation for this whole vast Northeast Foundation Complex: It was built to support an extensive addition planned for Pueblo Bonito, an addition altered repeatedly during the planning stage but abandoned before construction really began. Late Bonitian architects needed, or thought they needed, to enlarge their portion of the settlement a third time. They began by building eastward from Room 297 a series of foundations that abut the foundations or the stonework of rooms previously erected.

If my repetitious use of "foundation" be wearisome let me admit an inability to describe such simple constructions by any other term. They are foundations and no more. Composed of irregular chunks of friable sandstone and an occasional dressed block from some razed building, all packed in an abundance of mud mortar, these interlocking units of the Northeast Foundation Complex differ in no wise from Late Bonitian foundations within the pueblo.

We traced some of them beneath the outer row of rooms and found them ending against other and earlier stonework. Sporadic fourth-type masonry identifies the builders. Wherever finished masonry occurs throughout these outlying foundations, with four exceptions to be noted presently, it is fourth-type masonry and identical with that comprising the existing outside wall of the pueblo from Room 297 east and south to 176. As the masonry of this outside wall identifies its own foundations so do scattered sections of finished fourth-type masonry identify the abandoned foundation complex.

The best example of finished masonry we observed during these widespread excavations is that at Station 1 (pl. 48, right). It is of superior fourth-type, 22 inches high by 26 inches thick and stands, with a 3-inch-wide offset, upon a typical foundation 4 feet 7 inches high and based 6 inches above a floor-like deposit of floodwater silt. That foundation is abutted from the west by another, about half as high but utterly devoid of wall-like stonework.

At the west end of that abutting foundation is a kiva 8 feet 5 inches deep with bench 29 inches wide by 24 inches high, as ascertained by a test pit in the northeast quarter, and an indicated above-bench diameter of 23 feet 10 inches. My field notes identify it as of third-type construction which is that of two other kivas in this outlying area: One at the east end of Hillside Ruin and the second, outside Room 179. This fact suggests the probability that Late Bonitian planners of a fourth-type addition to their pueblo had

previously demolished several third-type kivas to obtain building material.

Additional sections of fourth-type masonry 3-9 inches high survive at Stations 3, 4, 6, and 7, at various places identified by the letter "x" on our chart of the Complex (fig. 11) including the masonry box outside Room 186, an 18-inch-wide east-west wall remnant a foot and a half under the floors of Rooms 256 and 257, a subfloor foundation similarly oriented in Room 185, and a north-south wall section paralleling the west side of 244 at a distance of 30 inches.

The exposure bared at Station 6 is especially puzzling in that a facing of banded fourth-type masonry continuing north from Station 4 is here screened by an over-wall of friable sandstone and mud that looks somewhat finished externally but is, nevertheless, foundation-like throughout. At its north end this close-fitting over-wall is buried under 3 feet 9 inches of blown sand in which we noted successive gravel lenses and a scattering of clay pellets.

Station 7 is unique in that here 8 inches of fourth-type masonry remain upon a 26-inch-high foundation that consists of dressed friable sandstone chinked after the fashion of second-type stonework, its base 5 feet 4 inches below the present surface. On the east side of this composite, its bottom at a depth of $6\frac{1}{2}$ feet, is a 3-foot pile of constructional waste—the most likely indication of deliberate wall-razing we noted throughout the whole Complex.

This single example of second-type masonry—there may well be others we did not come upon—and three known kivas constructed in what I recorded as third-type provide further evidence that the Late Bonitians did not hesitate to tear down still useful structures when building materials were required for others in prospect. That salvaged materials at hand sometimes prompted a workman to do a bit of wall-building on his own seems only natural—a brief respite from the tedium of shaping foundations from mud and broken rock.

Figure 11 shows only that portion of the Northeast Foundation Complex we actually uncovered. We have no knowledge of what still lies buried. A cross section (D-46) between "A," on a main east-west foundation outside Room 185, and a like symbol near Station 2 at the east end of our trenching operations does not, in my opinion, contribute enough information to justify its reproduction herein. It remains on file at the U. S. National Museum together with all other diagrams and field notes of the Pueblo Bonito Expeditions. I might add, however, that 12 deep silt layers shown on that cross section lie at practically the same level, no more than 8 inches apart vertically.

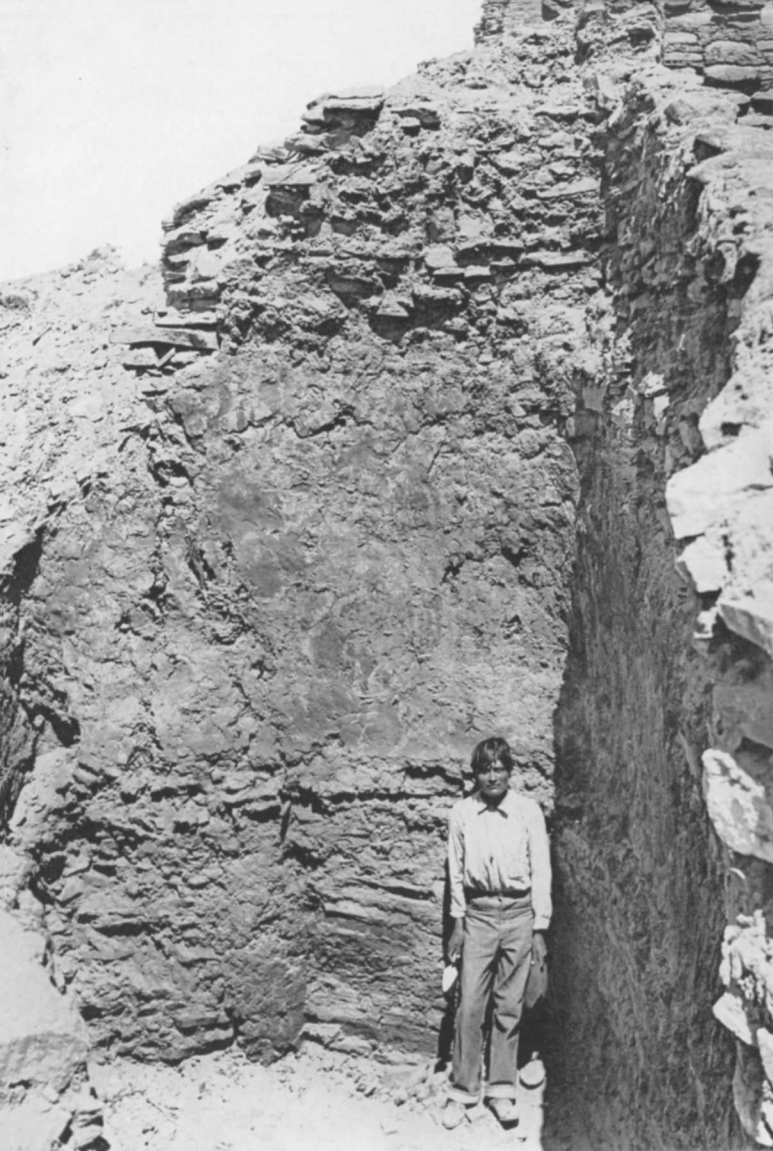


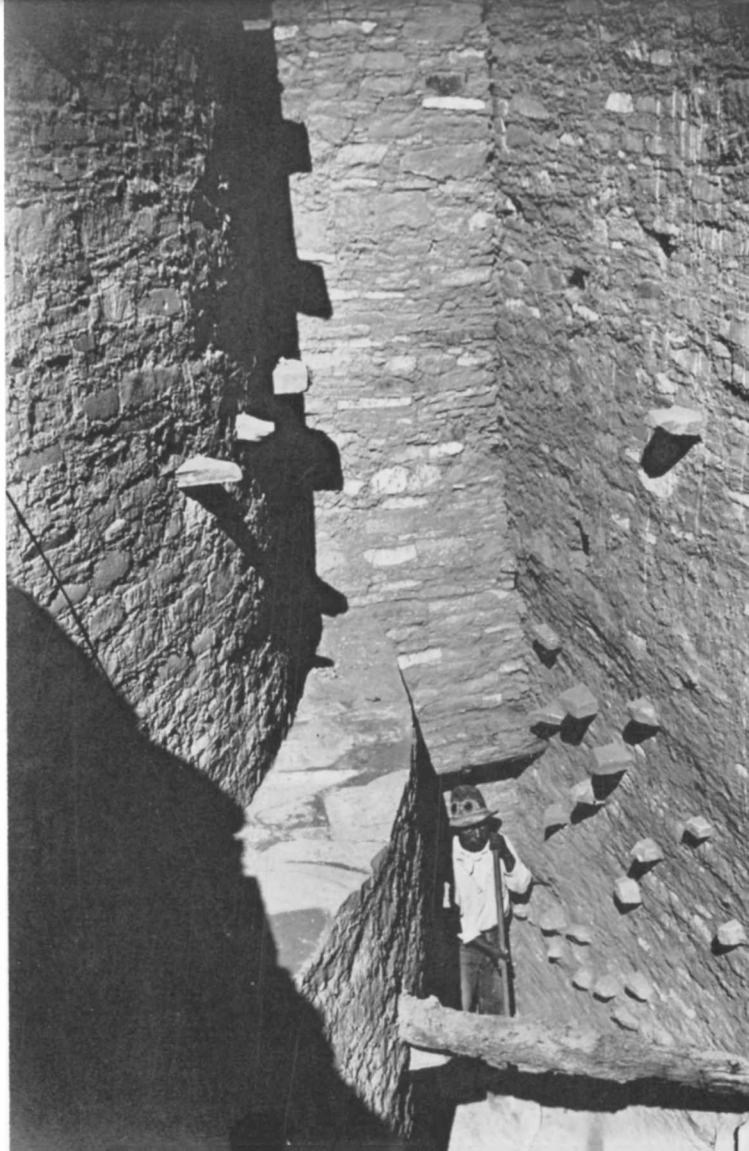
PLATE 38

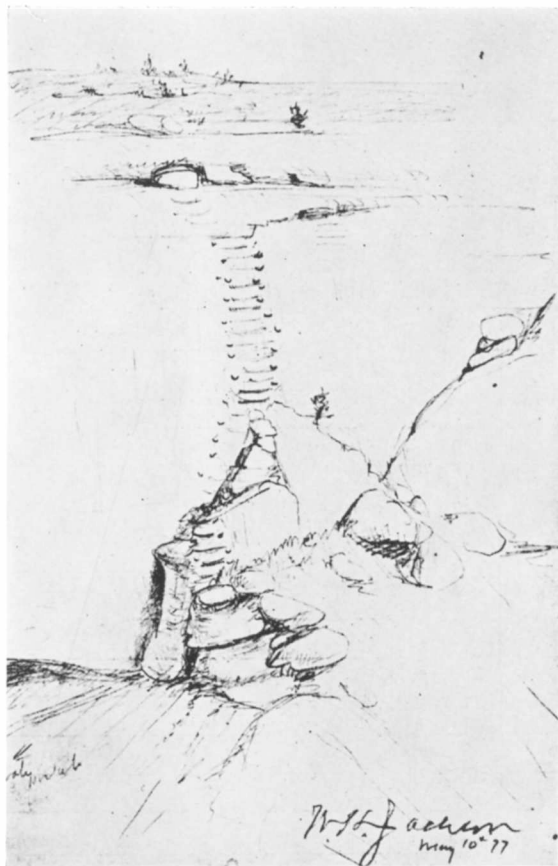
Left: In the northwest corner of Room 298 Old Bonitian masonry abuts the external angle of Room 13.

(Photograph by Neil M. Judd, 1923.)

Right: Over 19 feet of salvaged-stone masonry rises above floor level in Room 239.

(Photograph by O. C. Havens, 1921.)





A prehistoric stairway on the east side of the rincon north of Chettro Kettle.

(Original sketch by W. H. Jackson, 1877.)



Since 1877 the lower portion of Jackson's stairway has slumped away but toe-holds remain at the left, unfinished steps at upper right.

(Photograph by Neil M. Judd, 1927.)



Cleared "road," south cliff opposite Chetro Kettle. Pueblo Alto on skyline above standing figure.



Groove pecked in sandstone outcropping along "road" between Pueblo Alto and Chetro Kettle.



Pecked steps on "road" between Pueblo Alto and Chetro Kettle.
(Photographs by Neil M. Judd, 1926.)



The Late Bonitians' third and final addition to the pueblo overlies units of the Northeast Foundation Complex. National Geographic Society repairs appear in the 4-story wall at right. (Photograph by E. L. Wisherd, 1923.)



Foundations for the Northeast Complex were ordinary foundations covered by sand and silt. (Photograph by O. C. Havens, 1925.)

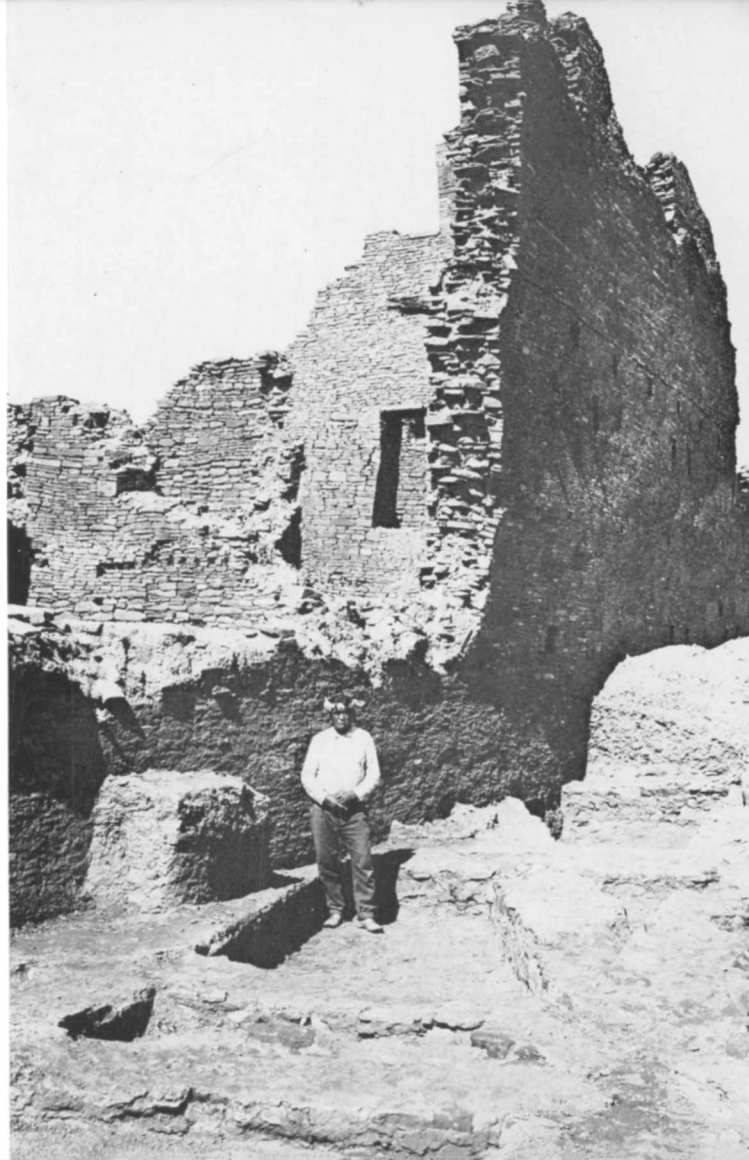


PLATE 42

Left: Late Bonitian masonry supported a terrace under the Braced-up Cliff and a bank of adobe mud buttressed the masonry.

Right: A stone-walled repository stood upon units of the Northeast Foundation Complex outside Room 186.

(Photographs by
O. C. Havens,
1923.)





Fourth-type veneering overlaps the second-type exterior of the unnumbered room next east of 297. Below, part of the abandoned Northeast Complex.

(Photograph by Thomas Nebbia, 1959.)



The Northeast Foundation Complex began as a thin wedge against the plastered second-type exterior of Room 297.

(Photograph by O. C. Havens, 1925.)

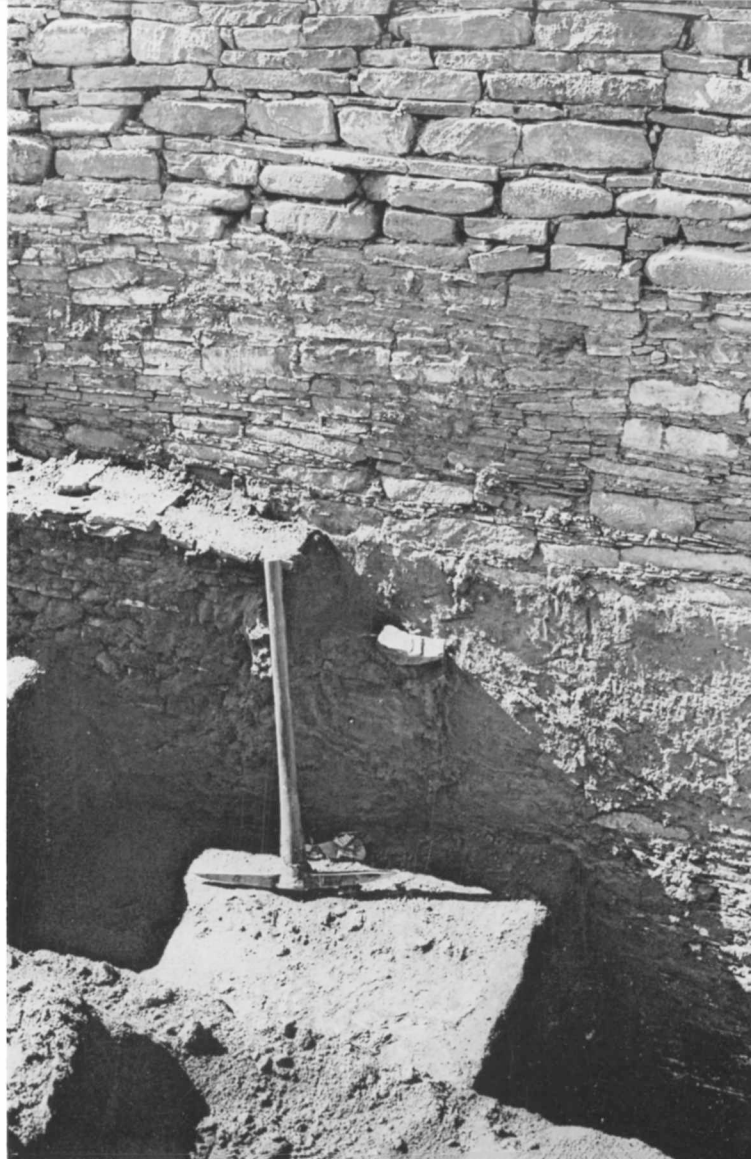


PLATE 44

Left: Long after Pueblo Bonito was abandoned sandstone fallen from the Braced-up Cliff endangered the village. An earlier fall had caused a unit of the Northeast Complex to rise in crossing.

Right: At its extreme west end the Northeast Foundation Complex abuts the second-type masonry of Room 297. National Geographic Society repairs, above.

(Photographs by
Neil M. Judd,
1923.)





View of the Northeast Foundation Complex from the Braced-up Cliff. In left foreground, stones piled for wall repairs; beyond, 3 tests against west side of Hillside Ruin.



The Northeast Foundation Complex from the northeast cliff. Pueblo Bonito in the background, with National Park Service cementwork around Kivas D and F.

(Photographs by O. C. Havens, 1925.)

After preparing this extensive foundation complex for an addition they never built, the Late Bonitian architects abruptly abandoned their plans in favor of a substitute addition. This latter, more conservative in conception, began where the rejected series was started, outside Room 297, extending thence in a single row to Room 186 and thereafter, in broader plan east and south to the corner of the pueblo.

VI. THE FOURTH-TYPE ADDITION

When the Late Bonitians scrapped their grandiose plan for an eastward extension of their village they immediately began a substitute. They built an addition that commenced outside Room 297, on the north, and extended around to Room 176 at the southeast corner. That the results should balance earlier additions on the west side of the pueblo may be only fortuitous, but together the two created the unique and harmonious groundplan that is peculiar to Pueblo Bonito (fig. 2).

No time was lost between abandonment of one project and initiation of the next. No blown sand had collected upon the abandoned foundations before the new exterior wall was started. This new wall had its own independent foundation, built in the same manner as those of the discarded series and of the same materials. Furthermore, the new foundation approximates in height those it replaced, tops off at the same level with them, and, wherever they come in contact, abuts the older units.

It was outside Room 184, while clearing away a 2-story-high accumulation of fallen stonework and blown sand, that we unexpectedly came upon these older, abandoned foundations (pl. 41, upper). Some of those older units, loosely built of mud and friable sandstone, extended under the outer wall of 184 and were abutted by its 22-inch-high foundation. Two feet lower, or about 4 feet from the surface, we discovered the pavement-smooth silt deposit that led to and under the Braced-up Cliff terrace (herein, p. 143; Judd, 1959*b*, p. 503). Thus an average 2 feet of blown sand containing a scattering of clay pellets and occasional potsherds had collected upon that buried silt stratum before Late Bonitian architects initiated their substitute for the east-side addition they had so recently abandoned.

A hundred feet to the west, outside Room 189, the buried silt lay at comparable depth but here constructional waste, blown sand, and fallen masonry above the outlying foundations was 2 to 2½ feet deeper (pl. 44, left). Hence the higher surface elevation shown on our cross-section C-C' (fig. 15) as compared with that outside Room 184. Overlying all were fragments of the cliff-fall Jackson (1878, p. 442) had noted in 1877 and Mindeleff had photographed 10 years later.

The foundation prepared for this substitute addition had its

beginning a few feet east of the point where the abandoned foundation complex began. However, instead of starting against the second-type exterior as its predecessor had done (pl. 43, lower), this new-wall foundation was built just inside the abandoned units and the new-wall masonry merges with the older (pl. 43, upper).

The line of this fourth-type replacement is still clear after 800 years. From a point about $6\frac{1}{2}$ feet above the foundation of Room 297 it slants upward and eastward to pass between the west ventilator and a formerly blocked door in the second story of the unexcavated and unnumbered room next east of 297 and on to ceiling level of the third story (pl. 28). The lower edge of this same fourth-type veneering extends down to the 22-inch-high wedge that began our Northeast Foundation Complex and continues eastward at the same level to conceal the former third-type exterior.

This concealed exterior, I am reasonably sure, likewise began at or near Room 297. Doubt remains because the three rooms between 295 and 297 are unexcavated and abutting foundation units of the Northeast Complex precluded close digging on the outside. Still, third-type foundations under Rooms 88 and 295 tend in that direction (fig. 5) and, despite use of more laminate than friable sandstone, much of the concealed stonework has a pre-fourth-type appearance.

Treasure seekers sometime prior to 1887, as dated by Mindeleff's photographs, laid bare this concealed masonry when they dug holes in the outside wall at intervals of 2 to 5 feet between Rooms 14*b* and 187. Since we repaired all this vandalism during the course of our investigations it is important to note here the thickness of the concealing stonework. It is 12 inches thick outside the first unexcavated and unnumbered room east of 297; 27 inches thick at the west end of the next room (pl. 50, left); 41 inches at the extended partition between the second and third rooms east of 297 (pl. 51, upper); and 45 inches thick a few feet beyond.

We should note, also, that while the added stonework outside the first and second unexcavated rooms east of 297 is solid at ground level a wedgelike open space remains next on the east, between the concealed wall and its fourth-type substitute. This open space, too narrow for living quarters, was repeated in the second and third stories. Without bonding stones tying them to the earlier building, the substitute wall and its abutments have since settled outward (pl. 52, left).

But west of this point, where the newer stonework veneers the older, tie poles were employed to prevent separation. The architects

of this fourth-type addition inserted neatly trimmed pine poles, 2 to 3 inches in diameter, into holes purposely made in the concealed wall and brought them forward horizontally through the added stonework to be cut off flush with its exterior (pl. 53). Both the diameter of these tie-poles and the intervals between them increase as the fourth-type veneering continued eastward until, approaching Room 295, it was able to stand without anchoring. We saw no longitudinal timbers embedded in this added stonework and no evidence of former balconies.

Another interesting fact disclosed by these vandal-cut openings is that first-story ventilators in the older, third-type wall had been extended through to the outside and that a long repository was provided transversely over at least three of them (pl. 50, right). The three repositories visible to us lay against the inner wall; all were empty, but their length suggested to us at the time (1923) that they had been designed to receive lengthy objects of some sort, perhaps one or more of the so-called "ceremonial sticks," fragments of which we had previously recovered throughout Pueblo Bonito (Judd, 1954, p. 268). The correctness of this surmise was later verified when Lewis T. McKinney, then custodian of Chaco Canyon National Monument, salvaged a lone example, 42½ inches in length despite a missing tip, from the north-wall wreckage of Room 293 following collapse of the Braced-up Cliff on January 22, 1941.

Two lesser offerings—turquoise chips, shell and bone beads, an arrowpoint, and a pair of abalone pendants (U.S.N.M. Nos. 336026-7)—were found among fallen masonry outside Room 186. One of the two pendants apparently had fallen from the second story, but both obviously had been bedded in the new masonry at time of construction. A similar sacrifice—two figure-8 bone beads and a pinch of turquoise chips—was found among building stones toppled from the east side of Late Bonitian Room 178B, and still another (Field No. 2353) had been buried in the north wall of Room 90. Placing sacrificial offerings in new stonework is an old Pueblo custom.

The foundation prepared for this latest revision of the outer north-east arc of Pueblo Bonito, with its extended ventilators and built-in repositories, is like all other local foundations—chance chunks of sandstone loosely bedded in adobe mud. Height and width may vary but mud and sandstone remain the component materials. At Room 184 the foundation is 22 inches high; it is 18 inches high at Room 187 and 15 at Room 188, adjoining. Our search for the beginning

of it farther west, where fourth-type masonry dovetails into second-type (pl. 53), was defeated by the westernmost extension of the abandoned Northeast Foundation Complex. Preservation of this abutting 22-inch-high section, its top 54 inches above the foundation of Room 297, seemed more important at the time than discovery of the point where its successor foundation began.

But the fact remains that this successor extends eastward at the same level as the 22-inch-high section and abuts other units of the abandoned complex as they continue under the new outside wall and end, subfloor, against the plastered masonry of an earlier third-type exterior.

We made no effort to follow every extension continuing from the outside but most of them are represented on figure 11. Those underlying Room 186, at the east end of the high north wall as it stood prior to collapse of the Braced-up Cliff are especially illuminating. Here a one-layer brown adobe floor had been spread directly upon six units of the old intrusive foundations. Three of these lie east and west; three, in the opposite direction.

Most prominent of the six averages 31 inches wide by 17 inches high; its south face emerges from under the northeast wall 2 feet from the east corner and passes under the northwest end 18 inches from the west corner. Paralleling this principal unit is a second, 25 inches wide at its northwest end and 29 inches wide at the other. Where this foundation continues under the northeast wall of 186 the face of a third unit takes off to disappear beneath the northwest wall 13 inches from its north corner. Here, joining the third unit and the second, is a block of foundation stonework 10 inches wide against the third unit and 15 inches wide against the second.

Three lesser subfloor foundations extend southwestwardly from the principal one, two of them to continue under the east half of the southwest side while the other abuts an earlier underlying wall. The first of these three, 24 inches wide, joins the principal east-west foundation 21 inches from its east end and extends under the southwest wall 26 inches from the south corner. The second unit, which averages 22 inches wide by 14 inches high, joins the main east-west member 10 feet 4 inches from its east end and continues under the southwest wall at a point 7 feet 5 inches from the south corner. It is the westernmost of these three lesser foundations that abuts the plastered face of an older, plastered and partly razed subfloor wall before the latter continues westwardly presumably to underlie the third-type wall now separating Rooms 187 and 293.

Plate 46, lower, illustrates this and other features beneath the floor of Room 186. The partially razed corner of Room 267 as originally constructed rises vertically 52 inches above its 11-inch-high foundation and is abutted from the west by the partially razed and plastered wall noted above. Built against this latter is the westernmost (under the gloves) of the 3 lesser units that extend southwest from the principal east-west subfloor foundation. Above all is the present southwest side of Room 186, its eastern half resting upon a contemporary foundation built against the east angle of the old 267 corner.

These several walls and foundations, above and below floor level in 186, are variously oriented, but this fact apparently meant nothing to the Late Bonitian builders. The plastered wall abutting the west face of the former 267 corner, for example, lies N. 62° W., a difference of 2° from the later wall above.

All these descriptive details may seem repetitious, complicated, and confusing. But, in trying to convey some understanding of the abandoned foundation complex and the manner in which many of its units continued under the outer wall of the village to end against earlier walls within, I find myself quite unable to avoid confusion and repetition. Consequently I deliberately omit much of our subfloor data from 186 and adjacent rooms and will let figures 5 and 11 tell the story as best they can.

We traced some of these abandoned foundations beneath the floor of Room 187 and found them ending against its south, or southwest, wall which was originally built of third-type masonry. We made no observation in Rooms 188 and 189 but one of the subfloor units in Room 184 continues independently southward to 175. Throughout its length this subfloor unit averages 19 inches high but its width varies from 24 inches in Room 259, to 30 inches at the south end of Room 243, to 26 inches in 225, and 24 inches where it meets the south foundation in 175.

Here, at its south end, this long foundation unit, presumably one of the abandoned outside series, rests upon 2 feet of clayey sand covering a smooth silt surface. Forty-seven inches lower, or $7\frac{1}{2}$ feet below floor level, we came upon a second silt surface in which were embedded a number of miscellaneous potsherds not specifically identified in my notes. That lower silt stratum and the 4 feet of village waste that overlay it undoubtedly mark an extension of the trash-filled channel fronting the pueblo (figs. 7 and 24, lower).

In Room 225, adjoining 175 on the north, foundations vary in height from 10 inches on the south to 17 inches on the east but all

top off 5 inches below floor level. That on the east is offset 2 inches while the other three are actually inset, 5 inches at the south and 2 inches at the west and north—variations that reveal the casualness of Late Bonitian foundation builders.

A test pit 9 feet 2 inches deep in the northeast corner of Room 225 disclosed five silt strata, each overlain by village waste and sand of diverse character and each sloping to the south and east. From that pit we gathered 548 miscellaneous potsherds, mostly Old Bonitian varieties, but 30 (5.5 percent) were Early Hachure and 16 (2.9 percent), Corrugated-coil Culinary. The uppermost of those five silt layers continued eastward under Room 177 and beyond; on it, 38 inches below the floor of 225, we noted the firm imprint of a right human foot, 8 inches long and 4 inches across the ball.

Sheer curiosity demanded further inquiry outside Room 177. Here, 13 inches below its 20-inch-high foundation and about 5 feet out from the wall, we came upon an unplastered, pot-shaped storage cist 50 inches deep by 21 inches in diameter at the mouth and 46 inches in maximum inside diameter. The bottom was scarred by various rootlike passages leading downward in diverse directions.

Just for the record, two ventilators appear in the broken east wall of Room 177 5 feet 2 inches above its foundation. The latter is inset 3 inches, and piled against it were 10 inches or more of mortar droppings overlain by stratified sand 5 feet deep next the wall but increasing to a depth of 8 feet a short distance to the east. At Station 2, 500 feet farther out, only 10-12 inches of blown sand overlies units of the abandoned foundation series exposed at that point (fig. 11).

Room 177 and the two inner rows adjoining it on the west are part of the fourth-type addition that extends north to 184, 185 and beyond. In the south corner of Room 186 a door 28 inches wide by 37 inches high (to eight 2-inch lintel poles) gives access to Room 261. Although the sill slab is only 27 inches across, it lies 20 inches above floor in 186 and 25 inches in Room 261, a difference of 5 inches. Both the wall separating these two rooms and the block of masonry filling the northwest angle of 261 to ceiling level (pl. 52, right) are of fourth-type construction and stand upon a one-layer adobe floor that immediately overlies units intruding from the abandoned Northeast Foundation Complex.

One of these foundation units crosses 261 subfloor to abut its southwest wall just where a solid section was added to parallel the northeast side and thus begin a second row curving southeast to

Rooms 225 and 175. At this junction, 41 inches below the floor of Room 261, a 15-inch-wide foundation offset marks approximate floor level of Rooms 265 and 267 as they were originally built (pl. 46, upper). Apparent work surfaces 10 and 24 inches above that offset are suggested by trampled constructional debris that diminishes in thickness in proportion to distance from the wall. That Late Bonitian construction did not always keep pace with building plans is again demonstrated in the east corner of 261 where a previously completed ventilator was reduced to a width of 4 inches by the abutting southeast wall.

Rooms 265 and 267 are part of a 14-room block that forms a conspicuous rectangle in the east half of the village. The studies we made inside and outside that rectangular block suggest its 14 rooms were originally constructed of second-type masonry but were subsequently and repeatedly changed. Floor level in Rooms 265 and 267, as represented by their foundation offset, was $3\frac{1}{2}$ feet lower than that of Room 261. The indicated floor level of Rooms 247 and 252, farther down the rectangle, was 5 feet 2 inches below that of Rooms 256 and 258, adjoining, and the original floor of much-altered Room 245, at the southeast corner of the 14-room block, may have been a full 6 feet lower than that of 244, next on the east.

Room 244 is a large room and the remains of earlier structures lie underneath. Its Late Bonitian builders utilized walls already standing on the south and west. Its east wall overlies the arc of a well-preserved second-type kiva 10 feet deep. At time of excavation I described the west-wall masonry of 244 as third-type although obviously patched areas reflected the fourth-type technique of the north and east sides. Plaster on these latter stops at floor level while the original west-side plaster terminates with a floor at depth of 4 feet 9 inches, 26 inches below the sill of a former door, while the masonry itself continues another 13 inches and there rests upon a wall remnant built on a 2-foot-high foundation the outer 4 inches of which is a veneer of mud and sandstone spalls. A floor associated with this remnant lies at a depth of 6 feet 9 inches but we carried our exploratory test 3 feet deeper without learning the significance of all we encountered.

Excavation of Room 239, on the opposite side of the wall, and subfloor inquiries in neighboring rooms showed, in part at least, why we found this section of Pueblo Bonito so perplexing. Evidence of reconstruction and the Late Bonitian propensity for reusing stones from razed walls was to be seen everywhere. We cleared 239 to what

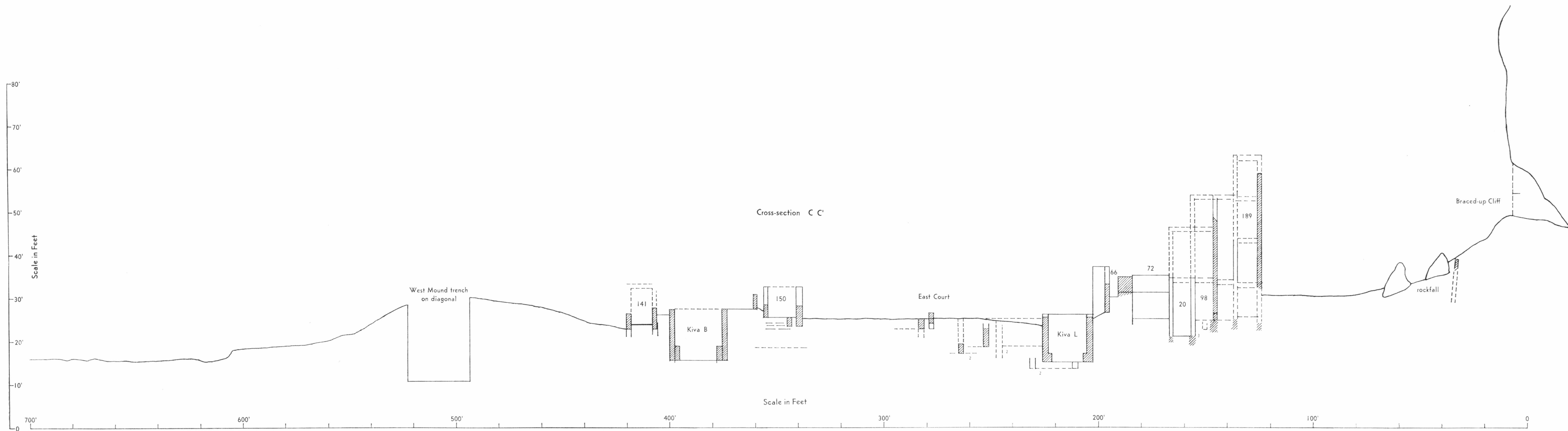


FIG. 15.—Cross section C-C' from the Braced-up Cliff through Room 141 and the West Mound trench on a diagonal. Sub-court structures indicated by masonry type. (From the original survey by O. B. Walsh.)

may have been a floor, or work surface, 9 feet 8 inches below ceiling level of Room 242, next on the east. Northwest corner masonry still stands 19 feet 3 inches above that floor (pl. 38, right). Both right and left, salvaged building blocks are to be seen, some protruding at irregular intervals as though to anchor the new stonework to the fill.

A 10-inch log, its ends embedded north and south, parallels the west end of 239 at a height of 5 feet 8 inches. Two 4-inch poles appear in the north wall at 10 feet with no seatings opposite and a row of five comparable pole holes, each with slab lintel, appears 4 feet higher, again without seatings in the stonework opposite. At a height of 8 feet 4 inches above floor level a slab-topped offset separates the external stonework of original Kiva D from that of its successor.

At the north end of Room 242, which adjoins 239, the floor of an abandoned Late Bonitian second-type kiva lies at a depth of $9\frac{1}{2}$ feet. Opposite, at the south end, a test to a silt layer 1 foot deeper revealed a succession of wind- and water-borne deposits on one of which, at depth of 8 feet 8 inches, stood a 4-foot-high bank of clean sand as smooth and vertical as though piled against a former wall. This feature continued eastward beyond room limits and was paralleled at a distance of 32 inches by another like bank.

In Room 244 a second and later coat of west-wall plaster rounds off to a floor at depth of 31 inches and built upon this, paralleling the west side at a distance of $2\frac{1}{2}$ feet, is a 20-inch-high section of fourth-type masonry. A like section, perhaps laid at the same time, underlies Room 256, next on the north, and continues eastward under 257 and 181 and thence to the outside. Work surfaces at depths of 12 and 27 inches presumably reflect construction of this fourth-type wall and the later north and east sides of the room.

Like others of its period, Room 244 had been stripped of its furnishings, but three beautifully inlaid bone scrapers, perhaps a deliberate sacrifice by the departing owners, were left side by side at midfloor (Judd, 1954, p. 148). Over them was a thin layer of blown sand and then the charred remains of three pairs of east-west beams, the pine poles, and the cedar splints of the former ceiling. On that same floor bare-footed builders had left two imprints, one in the southwest corner and another in the northeast. The latter, for the right foot, measured $8\frac{1}{2}$ inches long by $3\frac{3}{4}$, a bit longer but narrower than the imprint we had noted at a depth of 38 inches in Room 225.

A contemporary of Room 244 is Room 256, adjoining, and 256

was divided diagonally by a wattled partition that maintained access from roof level of Kiva F, through Rooms 250 and 251, to Room 257, also divided, and to storeroom 181. Before introduction of the Room 257 wattled dividing wall—13 posts, 2-3 inches in diameter, with imprints of willows bound to south face—the door to Room 182 had been blocked and plastered over and the northwest corner door (pl. 15, right), silled with hewn pine planks, had been sealed from Room 258. A 256 beam fragment (JPB, No. 10) provided Dr. Douglass with a tree-ring date of A.D. 1050 + x (Smiley, 1951).

The partition dividing Room 256 was supported by nine posts to which willows had been bound horizontally at intervals of about 15 inches and held in place by other willows lashed vertically to the posts (pl. 25, right). Plastered with mud on the north face only and still standing 5 feet high at its east end, this wattlework obviously was designed to hold in check an accumulation of occupational debris piled behind it. One of its nine supporting posts pierced a subfloor foundation carrying fourth-type masonry as it continued from Room 256 eastward under 257 and 181. Vastly superior to the crude post-and-mud walls of Old Bonito, these wattled partitions in Rooms 256 and 257 are more in keeping with the vertical jacalwork I have seen in Betatakin and Keet Seel, out in the Kayenta Country.

Fourth-type masonry at its best is found in this section of Pueblo Bonito. Portions of first-, second-, and third-story walls still stand and their ceilings, doorways, and ventilators reflect the very acme of Late Bonitian architectural experience. Friable sandstone, the chief component of second-type masonry, has here been almost wholly superseded by laminate sandstone, preferred because of its greater hardness and natural cleavage. As always in Late Bonitian walls, the hearting is rubble; the exterior, laminate blocks fitted so snugly that little mortar appears. But, however neat and precise this fourth-type masonry, it was invariably covered with brown adobe mud.

Ceilings in this latest addition were a composite of selected pine logs and poles, split cedar and cedarbark, with mud to cover all and provide a floor for the room above. One or two transverse beams sufficed for the average room; more in the larger. The ceilings of Rooms 228 and 245 were supported by two pairs of beams; that of 244 by three pairs.

The ceiling of Room 227, the lone survivor, is fairly typical of fourth-type Late Bonitian ceilings. A single pine beam, 10 inches in diameter, crosses the room from east to west at a height of 8 feet 5 inches (pl. 54, upper). Upon that beam and at right angles to

it are 40 selected ceiling poles averaging $2\frac{1}{2}$ inches diameter and placed close together, butt and whip ends alternating. Upon the poles and again at right angles to them is a layer of red cedar splints, 3-4 feet long and perhaps a couple inches wide, held in place by narrow splints above and lengthwise of the poles and bound to them by yucca-leaf thongs. Layered cedarbark covers the bound splints and then about 3 inches of mud, the floor of Room 227B. Close beside that great timber the butt of a comparable beam, ringed with a flint chip to limit axwork, protrudes 4 inches from Room 227-I.

In like manner two other beams, 9 and $9\frac{1}{2}$ inches diameter, project through the south wall 3 feet or more from Room 173. These 173 beams (JPB, Nos. 2 and 03) were felled in A.D. 1078 and 1076 (Smiley, 1951 revision), whereas the main east-west beam and the butt end from 227-I were cut in 1075 and 1053 + respectively. These four readings may represent construction dates or they may identify timbers salvaged for reuse here. As will be noted from the table on page 35, tree-ring dates from this latest addition to Pueblo Bonito cover a bracket of 79 years. Reuse seems obvious. Despite proximity of the Chaco forests, I suspect the ancient Bonitians were just as reluctant to discard a still serviceable beam as are present-day Pueblos.

Room 227, with its surviving ceiling and banded fourth-type masonry, once included the Kiva D corner I have numbered 235 for the latter's lower east side, below the rebuilt upper portion, is a continuation of that in Room 227 and its south side contains irregularly protruding blocks of laminate and friable sandstone in the manner of Late Bonitian stonework intended to be concealed. We repaired and replastered a large hole some predecessor had broken through the north wall of Room 227 and the National Park Service in 1926 covered the roof with a protective layer of concrete. Rooms 227 and 227-I were capped by a single second-story dwelling.

Doorways connecting groundfloor fourth-type rooms are generally straight-sided and true (pl. 14, right). Apparently planned in advance, their jambs usually began on top of the foundation and were carried upward with the walls, leaving the lower 12-20 inches to be filled in later when the sill-slab was positioned. It was the coarser quality of this below-sill stonework that prompted me, perhaps wrongly, to describe many Late Bonitian doorways as partly blocked. Normally, lintels for these doors consist of 8 or 10 selected pine poles bound together with split-willow or yucca leaf thongs and front poles, at least, normally extended a foot or more to either side, completely concealed in the wall masonry.

In many instances the chosen sill-slab was placed and its ends embedded in the jambs at time of construction, but occasionally, as in the case of the door connecting Rooms 173 and 227, a later change seemed desirable (pl. 15, left). Here the occupants clearly had removed the lower portions of both jambs in order to seat an inverted Old Bonitian tabular metate 21 inches wide. This substitute sill was placed to project $3\frac{1}{2}$ inches into Room 173 thus leaving on the opposite side of the 25-inch-thick wall a difference of $7\frac{1}{2}$ inches to be leveled with slab fragments. Width at still level is $2\frac{1}{2}$ inches greater than at the lintels, an inverted-keystone practice Late Bonitian architects employed in decreasing frequency with each successive advance in the quality of their masonry.

In this doorway between Rooms 173 and 227 secondary lintels at a height of 28 inches, the space above packed with mud and sandstone chips, suggest that the inside room was probably utilized for storage. Normally, the reverse would be expected. In most instances, ground-floor rooms in the outer row connect with those of the second row but not with each other (fig. 6). As may be learned from Appendix B, these connecting doors were customarily provided with secondary lintels and jambs that slanted outward to support a door-slab placed from the second row. This fact would, presumably, identify most outer-row rooms as granaries or storage places when Pueblo Bonito was inhabited although inner rooms were sometimes similarly equipped (pl. 13, left).

For some reason not disclosed by our investigations, a surprisingly large proportion of Late Bonitian wall openings, both doorways and ventilators, were wholly or partially closed with masonry. I suspect a climatic factor but this, after all, is purely a guess. The two Room 259 doors, for example, had been sealed and plastered over from within leaving access thereafter by means of a ceiling hatchway of which we saw no certain trace. Four doors in Room 258; including that in the southeast corner leading to Room 257—the only first-story diagonal doorway of which we have record in Pueblo Bonito—likewise had been closed during occupancy.

The corner door, providing access diagonally from one room to another, was a tardy innovation of the Late Bonitians. I have record of seven, all in this fourth-type addition and all in second-story rooms with the exception of that last mentioned, connecting Rooms 257 and 258 (pl. 15, right). That this latter was an afterthought, built while the two rooms were occupied, is established by the fact that construction blocked a former ventilator between 258 and 259, a circumstance reminiscent of another partly blocked ventilator in Room 261.

Two rooms, 225B and 242B, boasted two diagonal doors each. Those in 225B extended northeast and southeast; those in 242B, northeast and northwest. Direction obviously was not the determining factor in location. A lone example in the northwest corner of Room 173B (pl. 15, left) opens corner-wise into 228B, one of two fourth-type dwellings whose first stories were deliberately quartered to provide support for the elevated ventilator shaft of remodeled Kiva C.

When Pepper's field notes became available, his description of Hyde Expedition Room 73 (Pepper, 1920, p. 258), despite the mislabeling of figure 89 (*ibid.*, p. 204), was readily identified as the one we had previously numbered 228B. There is no other second-story room in the whole pueblo featuring both a southeast corner doorway and a former T-shaped door in the middle east wall, successively reduced and ultimately blocked. The wall plaster seen in Pepper's illustration had fallen prior to 1920 but identification is positive.

Similarly, our Room 229 is identifiable as the Hyde Expedition's Room 24 the first story of which, like 73, had been quartered and rubbish-filled when Kiva C was raised to the second-story level. Since our notes supplement Pepper's in several respects it seems desirable to call attention briefly to certain features previously overlooked.

In the first place, both 228 and 229, upper and lower, were originally dwellings with walls of banded fourth-type masonry and plastered. Subsequently, to provide for alterations to Kiva C, both groundfloor rooms were quartered by hastily built stonework that rests upon the original adobe floors, abuts the plastered side walls, and terminates at the second-story floor offset. In both rooms the quartering partitions are composed chiefly of salvaged blocks of dressed friable sandstone and remain unplastered; individual stones protrude step-like at irregular intervals. In both rooms the north-south partitions abut previously blocked doors to Rooms 171 and 172 or crowd upon the exposed ends of 171 and 172 beams. One of these latter (JPB, No. 58), from Room 172, was felled in A.D. 1061.

Introduction of the quartering stonework rendered both 228 and 229 uninhabitable so the families moved to the second story and utilized the lower units as dumps for household trash. From this waste the Hyde Expeditions recovered outworn sandals, broken earthenware vessels, fragments of basketry and matting. The lower walls in Room 229 had been whitewashed. Subfloor tests we made in the

southeast quarters of both rooms disclosed possible work surfaces at depths of 14 inches, sloping down to the east as they overlay 2 feet or more of constructional debris.

When the east half of 228 was first excavated, three superb pine beams were still in place, the east-west partition built up to and around them. Two of the three were paired close beside the north-south quartering wall, while the third lay next to the plastered east side. With no visible indication of decay, the three show advantageously in Pepper's excellent but unpublished prints, Numbers 249-251, but subsequently the second-story floor was demolished, the paired beams were sawed off and the third, pulled out. Samples we took from remaining portions of the pair, each $11\frac{1}{2}$ inches in diameter, gave a tree-ring date of 1073 + for that on the east (JPB, No. 56), but its companion (JPB No. 57) was too complacent to read. Empty beam holes suggest that the west half of the 228 ceiling was similarly supported.

In the floor beneath the pair and close against the south end of the room, two empty postholes lined with slab fragments on edge mark the positions of former posts 8 and 9 inches in diameter and Pepper's unpublished negative 249 shows a comparable post in situ under the south end of the east beam. Thus the anticipated, or proven, weight of the upper living rooms—portions of third-story walls are still present—was too great for three, or possibly six, north-south 11-inch beams.

Two magnificent dwellings were here sacrificed to architectural requirements in the redesigning of Kiva C. Portions of the north end in both rooms and the wall between were torn out to make way for the bulging convexity of the reconstructed kiva. Then the north-west quarter of 228 and the adjoining quarter of 229 were filled with debris of demolition to provide a base at the second-story floor level for the stonework, 6 feet wide and about half as thick, enclosing the new ventilator shaft.

Reconstruction is also evident in the second-story rooms. The north wall of 228B replaces the original and overhangs by 16 inches its counterpart, also a substitution, at the north end of 228A. Although patchwork is to be seen here and there, plaster on the original fourth-type masonry and former doorways indicates that both 228B and 229B continued in use with little or no inconvenience caused by the jutting ventilator stonework. There were the diagonal door connecting Rooms 228B and 173B (pl. 15, left); the much altered east-wall T-shaped doorway figured and partially described

by Pepper (1920, fig. 89, p. 258); another T-shaped door, now sealed by large blocks of friable sandstone, formerly breached the rebuilt north wall and provided access to Room 234B. Also, there was still another T-shaped doorway through the rebuilt north wall of 229B, or the outline of such a doorway, for its jambs were not preserved on the opposite side, in 231B, when Kiva C was elevated to its present position.

Construction and reconstruction of Kiva C not only forced the abandonment of Rooms 228 and 229 but also compelled the abandonment or alteration of several other dwellings hereabout as witness Rooms 231 and 234, two of those razed to allow for the original Kiva C. In representing some of these structures as built of fourth-type masonry and others of third-type, I again illustrate the inconsistency of my sequential classification. When Late Bonitian architects razed one structure to provide for another, the characteristics of the razed walls often were unconsciously introduced into the new stonework. Although the masonry of Kiva C is predominantly of laminate sandstone, dressed blocks of friable sandstone are conspicuous in its south and east arcs. So, too, with Rooms 228 and 229. Their walls are of fourth-type masonry, much of it banded, but their quartering partitions are predominantly of friable sandstone salvaged from razed second-type buildings.

The former T-shaped door between Rooms 228B and 227B is more or less duplicated in the first story. Both had been reduced piecemeal to a doorway of standard size and then completely closed. My own notes, from 228A, are not entirely in accord with those Ruppert reported from the opposite side and it is obvious that he, too, was uncertain as to the order in which the several reductions had been made. As he described it from 227A, this great doorway had a 7-pole lintel at a height of 7 feet 8 inches. The broad upper part, 28½ inches above the floor and 7 inches from the southwest corner of the room, measured 45 inches wide by 51½ inches high; the lower part, 23 inches wide, had jambs extending below floor level.

Apparently this high T-shaped doorway was reduced in two separate stages: (1) to an opening 26 inches wide by 3 feet high, its sill at a height of 42½ inches, and then (2) was further reduced to a width of 15 inches when secondary jambs were introduced to support a door-slab placed when from 228A. Sometime in this reduction process a blocking stone 9 inches wide by 2 inches thick was left protruding 5 inches to provide a step 14½ inches above the floor. Finally, the 15-inch-wide opening with its secondary jambs was permanently

sealed. From 228A, where the upper part is $5\frac{1}{2}$ inches from the corner, successive alterations had obscured the original outline and obliterated the lower, narrower portion.

Another former T-shaped door, also sealed, is to be seen in the wall separating ground-floor Rooms 226 and 227-I. Viewed from 226 the upper part is 3 feet 9 inches square and 18 inches from the north-west corner; the lower part is 23 inches wide by 34 inches high with jambs continuing to the foundation 12 inches below floor level (pl. 16, right). The lintel consists of five pine poles averaging 4 inches in diameter; five upright poles are included in the upper blocking. These dimensions are preserved on the opposite side, in 227-I, but here the stonework filling the upper portion was recessed 16 inches to provide a full-width shelf 35 inches above the floor and one of the blocking stones in the lower part was left protruding to serve as a 12-inch-high step.

The floor area of Room 226 is nearly three times larger than that of 227-I. Besides their common T-shaped door, each room had two doorways of ordinary size and these also had been blocked. Following abandonment, each room had collected 4 or 5 inches of blown sand and thereafter had been utilized briefly as a neighborhood dump. Conspicuous among the discards in Room 226 were 13 cedarbark rolls tightly wrapped with yucca cord and lying side by side as though, together, they might have formed a hatchway cover. Among occupational debris in 227-I were squash seeds and pinyon nuts, an Old Bonitian tabular metate, both early and late potsherds, and six deer skulls. Blocked doors in its east, south, and west walls had left Room 227-I completely isolated from its neighbors.

Although smaller than those in third-type dwellings, the six T-shaped doors in this latest section of Pueblo Bonito were all oversized except that in the third-story wall between Rooms 174C and 175C, of which only the north jamb now remains. Maximum width and height for the six are 3 feet 10 inches and 6 feet 8. Two are in ground-floor rooms, three in second-story rooms, and one in the third-story. Two open north and south; four, east and west. All except the third-story example are known to have been reduced piecemeal and finally closed altogether. It is to be noted, also, that these six are all inside; none opened to the exterior. Whatever the function they were designed to serve, that function had been met; thereafter each doorway was gradually reduced in size and ultimately sealed.

The quartering partitions in Rooms 228A and 229A were intro-



PLATE 46

Upper: Beneath the southwest wall of Room 261 (upper left) and an abutting unit of the Northeast Complex, a foundation offset marks floor level of Rooms 265 and 267.

Lower: A unit of the Northeast Foundation Complex (under gloves) abuts the southwest side of Room 186 at floor level.

(Photographs by Neil M. Judd, 1927.)





PLATE 47

Upper: A partially razed wall of dressed sandstone blocks, chinked with potsherds, marked the southwest corner of Hillside Ruin.

Lower: Five rectangular fireplaces fronted the broken walls of Hillside Ruin.

(Photographs by O. C. Havens, 1925.)





PLATE 48

Left: A lone foundation, 500 feet long, borders the Northeast Foundation Complex on the south.

(Photograph by Neil M. Judd, 1926.)

Right: At Station 1, Northeast Complex, 22 inches of excellent fourth-type masonry survives upon a $4\frac{1}{2}$ -foot foundation.

(Photograph by O. C. Havens, 1925.)





PLATE 49

Upper: Pueblo Bonito as reconstructed by W. H. Jackson, 1877. Hillside Ruin lies at the base of the cliff, right center. From the U.S. Geological Survey, 1878.

Lower: Paired foundations about fourth-type masonry at Station 4, Northeast Complex, and curve thence south and west. (Photograph by Neil M. Judd, 1926.)





PLATE 50

Left: The abandoned third-type exterior of the second Late Bonitian addition was revealed by pre-1887 treasure hunters.

Right: An extended ventilator at end of the second unexcavated room east of 297 with its overlying repository.

(Photographs by
Neil M. Judd,
1923.)

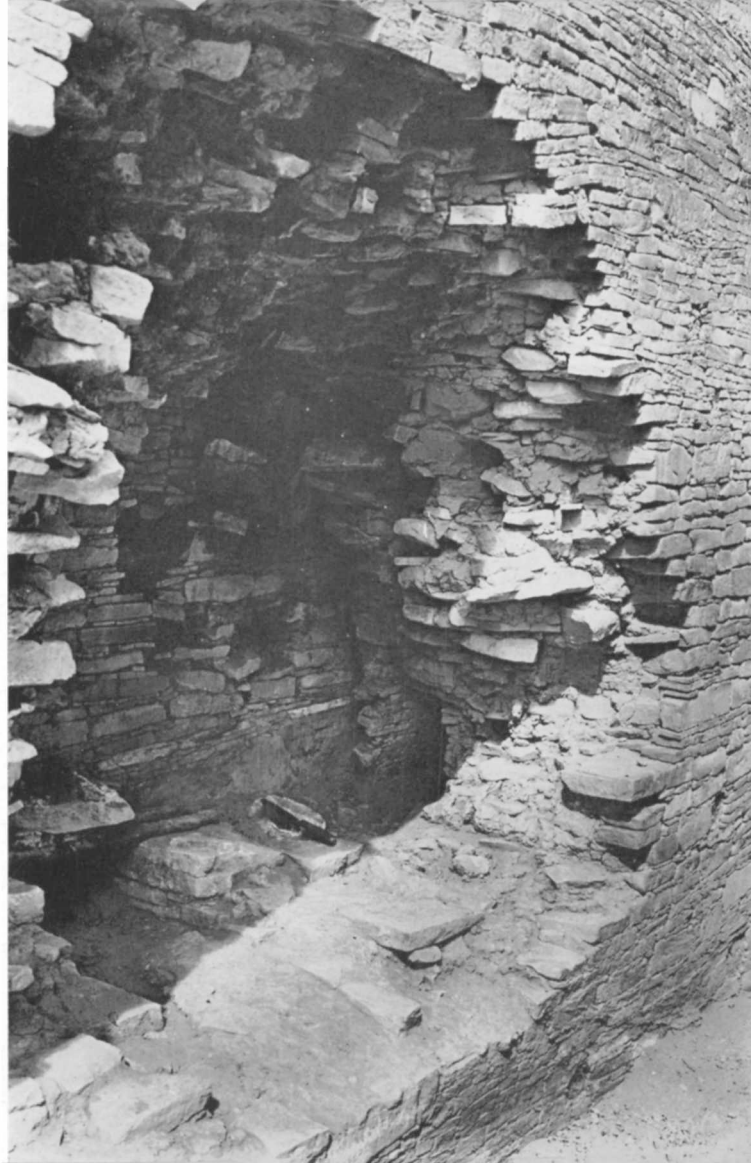




PLATE 51

Upper: Ventilators in the second and third (left) unnumbered rooms east of 297 were extended through the abutting fourth-type stonework to the exterior.

Lower: In their final addition the Late Bonitians provided a long repository above each ventilator as it reached to the exterior from the outer row of third-type rooms.

(Photographs by O. C. Havens, 1923.)

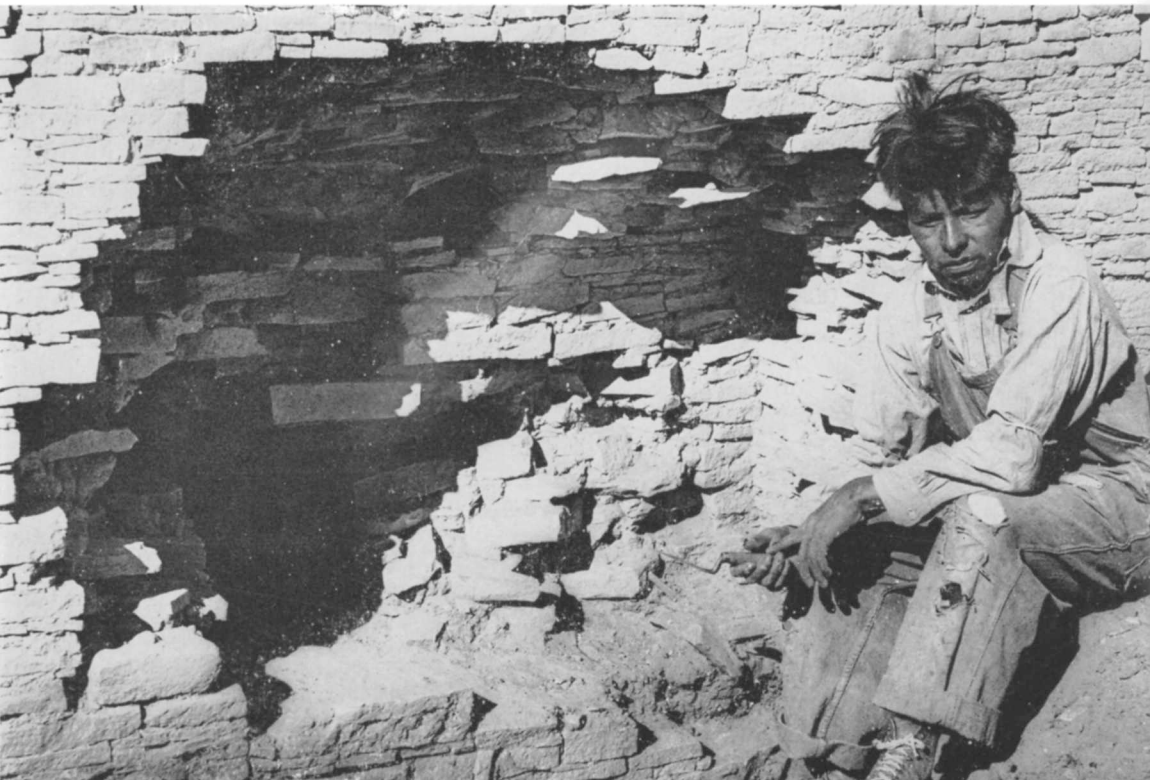




PLATE 52

Left: Without binding stonework, the Late Bonitians' final addition to Pueblo Bonito had settled away from the 3rd-type exterior of Room 295.

Right: At the northwest angle of Room 261 a beam end flush with the older west-wall masonry marks ceiling level of Room 267.

(Photographs by
Neil M. Judd,
1922.)

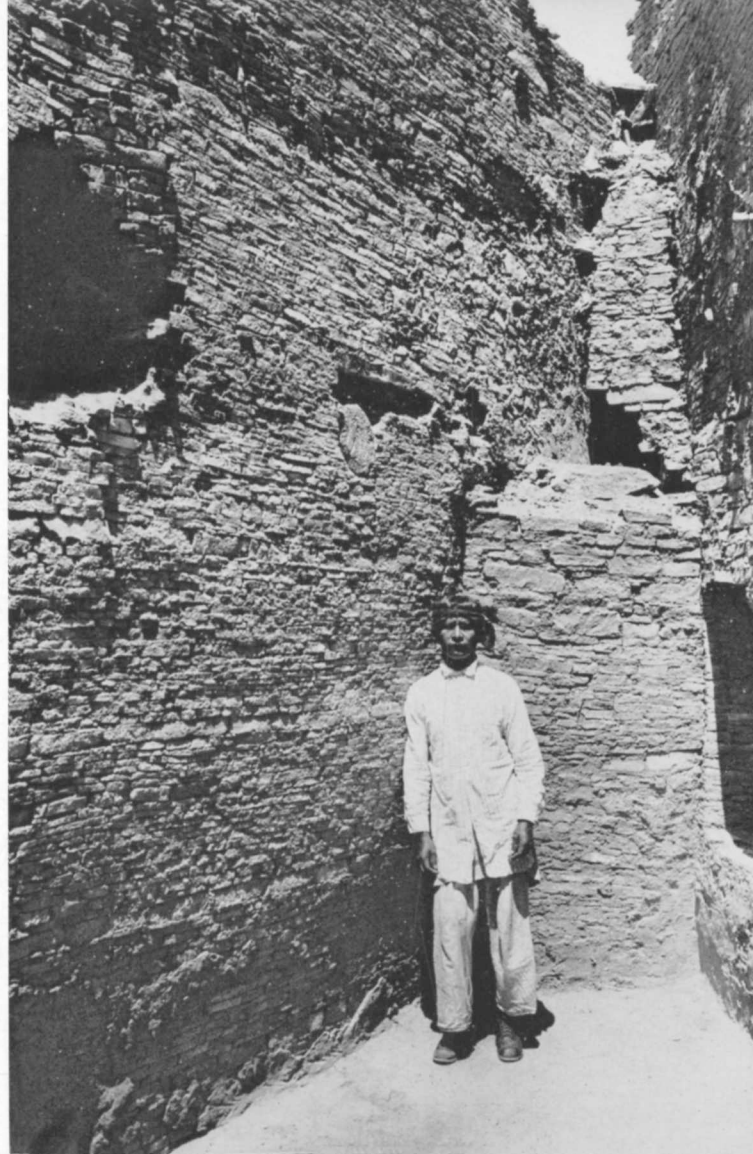




PLATE 53.—Late Bonitian architects inserted tie-poles at intervals to bond their fourth-type veneering (left) to the older stonework.

(Photograph by Charles Martin, 1920.)

duced after doors to the rooms adjoining on the south, 171 and 172, had been tightly closed with masonry. These two outside, groundfloor rooms are among those in which, for the Hyde Expedition, "nothing of special interest was developed" (Pepper, 1920, p. 339). The few we examined had already been excavated to or below floor level. No external wall now stands ceiling high, but we noted one ventilator in the middle south side of 159-160 and assume that the rooms on either side, during occupancy, were provided with one or two like openings.

Although such data as we recorded relative to these front rooms are briefed in Appendix B, it seems desirable to focus attention upon certain architectural features in passing. Room 170, for example, with east and west doors fitted for outward-sloping slabs, has a north-end platform at second-story level reached by recessed steps 28 inches wide. There is no trace of a screening front to this platform but a former door, now blocked, once opened through its north wall at a height of 18 inches and ancient repairs are evident in the northeast corner.

In the west wall of this room another former door, 2 feet wide by 40 inches high with lintels at platform level, once opened into Room 268. About a foot below this door and abutting the platform, as seen in Pepper's unpublished negative 646, is the uppermost of two masonry steps. Apparently embedded in this step-block and extending southward close against the west wall a few inches above the floor were 2 or 3 pine logs forming a bench-like fixture, a feature no longer present.

Room 268, its floor 4 feet above that of Room 169 adjoining, is another one-time dwelling evidencing alteration. Its east and south walls are of banded fourth-type masonry while the others consist largely of dressed blocks of friable sandstone salvaged from some second-type building. The north side abuts from both directions a plastered Late Bonitian wall that had been razed upon construction of Kiva H but in such manner as to leave its south end protruding 19 inches into Room 268. In the face of this rebuilt and replastered wall-end a small oval niche appears $2\frac{1}{2}$ feet above the floor.

A second section of the same partially razed wall stands as an isolated column $2\frac{1}{2}$ feet from the protruding portion. I resisted the temptation for subfloor exploration but in a vertical, west-wall channel 4 inches wide and 7 inches deep we recovered the remains of a hewn timber, reduced to a length of 5 feet 2 inches (JPB, No. 27), that gave Dr. Douglass a tree-ring date of A.D. 1080 (Smiley, 1951).

Between 170 and 153 are a number of rooms each of which was repeatedly and individually patched or otherwise altered. Each had been excavated to below its floor level and all data are lacking. From what remains of the stonework I believe this whole sequence was originally built of fourth-type masonry and then repeatedly repaired with materials salvaged from razed second- or third-type dwellings. The much-altered north walls of Rooms 160, 168, and 169, with their blocked doorways pointing right and left, up and down, include every variety of Late Bonitian stonework and leaves one with the impression they are architectural compromises that preceded or followed construction of Kivas 161 and 162.

At least seven former doorways are outlined in the north wall of Room 169, and each was changed at least once by introduction of new jambs, sill, or lintel poles and each eventually was sealed and plastered over. Most puzzling of these seven, if not the most altered, is that in the northwest corner (pl. 55, upper). As I interpret this complexity, the fourth-type masonry of the west wall provided one jamb while its opposite, 30 inches distant, was a mongrel over 4 feet high and slightly concave. Both jambs had been plastered but, despite successive changes, the doorway retained a northwestwardly trend. In 1925 the National Park Service made extensive repairs in Room 169 hoping thus to preserve the unique character of its much-altered north wall.

At floor level in Room 159-160, represented on Hyde's map with a diagonal partition, Pepper photographed a longitudinal layer of trim pine poles, 3-4 inches in diameter, no longer present. His illustration (Pepper, *ibid.*, fig. 144, p. 336) shows at least two blocked north doors and, low down, what could be the lintel of a third; also, a high east door to Room 168, with secondary jambs sloping eastward. The pole layer sags in the middle, rising to the four walls. Although the ends look to be square-cut I detect from the illustration no evidence of pole seatings unless it be at sill level of the east door, a height of approximately 3 feet, to judge from the length of the shovel handle.

Sagging of these floor poles suggests either an open space below or settling due to proximity of the old east-west watercourse. The latter seems the more reasonable explanation but the possibility of deep-lying structures may not be wholly disregarded. There is the lintel-like piece low in the north wall of 159-160 and, near the northwest corner of Room 168, a former narrow passageway 6½ feet high with four descending lintels, three of which are supported by

hewn pine planks, and an adobe sill $2\frac{1}{2}$ feet below approximate floor level (pl. 55, lower). This former passageway had been sealed from the outside, presumably when Kiva 161 was rebuilt, so we may suppose those four descending lintels covered a stairway leading down to an older structure under 161. A comparable flight of intermural steps connected Kiva D with Room 241B.

Midway in the north wall of Room 168 is a second tall, much-altered door with five masonry steps leading upward to the Kiva 161 roof level. I judge its original dimensions to have approximated 40 inches in width by 7 feet 7 inches high, but sill and jambs had been changed repeatedly and the opening finally reduced to one of T-shape, its sill at a height of 34 inches. We undertook to repair this reduced passageway, replacing its lintel poles and several courses of stonework above and carefully retaining the five masonry steps, the uppermost riser being 6 feet 3 inches from the inside north wall of the room.

Between Rooms 159-160 and 153 are half a dozen small rooms I have represented (fig. 6) as of fourth-type masonry despite abundant evidence of reconstruction with building stones salvaged from older structures. Room 153 abuts the third-type Kiva B enclosure from the east and Room 142 abuts that same enclosure from the south. As I studied the previously exposed and broken masonry hereabout it seemed to me that every wall had been patched, and rebuilt, and patched again.

Adjoining 153 on the east is Room 154, with its neatly blocked south door; then 155, with blocked doors in both north and south walls—the only groundfloor rooms in this late fourth-type addition, so far as I know, with former doors to the outside. The previously opened south door of Room 155 and the disintegrated wall opposite invited placement of our dump-car track for excavation of the East Court and its surroundings (pl. 5, upper).

Despite previous partial excavation, plaster still adhered to the four walls of 153 and the last coat apparently had been whitened. Earlier floors or work surfaces were noted at depths of 15 and 25 inches and a test pit to clean clay, $9\frac{1}{2}$ feet below the earliest of these two, revealed mixed occupational and constructional debris throughout. From this mixture and within the limits of our test we recovered 786 potsherds, all of types peculiar to the Old Bonitians. Obviously Room 153 had been built upon Old Bonitian trash, either the upcanyon slope of the pile buried under the West Court or upon

rubbish carried out and discarded at the edge of the 10-foot-deep floodwater channel that formerly passed Room 153.

The south walls of Rooms 153 and 154 stand upon a 17-inch-high foundation and outside, approximately at floor level, is a thin silt layer apparently deposited since that foundation was built. Twenty-three inches lower another, more obvious silt surface extends south a few feet and then dips sharply away from the ruin. At a distance of 15 feet and a depth of 6, that second surface is overlain by mixed village waste, including fragments of Old Bonitian pottery, all sloping southward and into, presumably, the one-time floodwater channel.

Room 153 abuts the east side of the stonework enclosing third-type Kiva B and Room 142 abuts its southeast corner. The east wall of 142, which is 23 inches thick and rises from a flagstone pavement about 3 feet below floor level, may have been third-type originally but it had been rebuilt with fourth-type masonry. This latter also appears to identify a puzzling outside complex of foundation-like stonework apparently built upon the upper silt layer, that at Room 143 floor level.

On this same layer, 5 feet 5 inches east of Room 142, we uncovered a masonry-lined repository 14 inches in diameter by 18 inches deep and once covered by a sandstone tablet with an 8-inch hole in the middle. The east half of this tablet and a corresponding portion of the repository had been broken away and were missing. A few feet beyond we came upon a rectangular pit, depth undetermined, presumably one of those dug in interest of the Hyde Expeditions (Pepper, *ibid.*, p. 23).

The 23-inch-thick east wall of Room 142 is square-ended 15 inches outside the room and there rests upon a large flat sandstone slab that is supported all around by fourth-type masonry. Although I have sought to locate this and nearby stonework on our plan of the pueblo I have no explanation to offer and only limited description.

To the eastward, Rooms 345 and 346, so-called, are remnants of indiscriminate stonework erected in the lee of fourth-type Rooms 156-158 and the jutting corner of 159. Their associated floors lie 5-8 inches below their north-wall foundations; the partition between, 10 inches thick and foundationless, may have been raised as a buttress since it follows the outward slant of the Room 157 south wall.

Despite the fact I have represented the westward extension of this latest addition as ending with Rooms 142 and 153 (fig. 6), evidence of repair and reconstruction is to be seen all about, both east and west. It is all Late Bonitian in point of time and again

emphasizes the fact that when Late Bonitian architects razed one wall to erect another, the character of the earlier was reflected in the later through use of salvaged materials. Only increasing reliance upon laminate sandstone marks the sequential advance of Late Bonitian stonework.

There is reason to believe that Rooms 142 and 153 were first constructed in what I have called third-type masonry and were later rebuilt in fourth-type. We know this to have been the case in Rooms 140 and 141 and those to the north, surrounding Kivas A and B. Taken together, the masonry of this central group most nearly meets the standards I originally set up for my third-type classification as indicated in figure 5 but a strong flavor of later handiwork prevails throughout. Furthermore, fragments of Mesa Verde, or a proto-Mesa Verde, pottery were recovered under the floor of Kiva A and Mesa Verde pottery was a late importation at Pueblo Bonito.

So, too, with the whole east side of the West Court. Originally built of third-type masonry, as may be seen in Room 140 where the old southeast corner survives (pl. 33, right), this wall was subsequently replaced with one of fourth-type stonework. When we began West Court clearing operations in 1924 and found this late, one-story wall toppled forward we restored it with its own fallen materials (pl. 36, upper). Therefore the Late Bonitians are themselves partially responsible if our restoration looks to be fourth-type while inner walls remain of the earlier variety.

Beginning with Room 34 and extending north to Kiva 16 and thence westward to enclose Rooms 28B, 55, and 57, the refacing job was so complete I have had no hesitancy in representing all of it as among the final undertakings of Late Bonitian architects (fig. 6). On the basis of Pepper's figure 28 (1920, p. 77) I have classified the interior of Kiva 16 as third-type although its encompassing walls are clearly later. The west side of the Kiva 16 square, the front wall of Rooms 28B, 55, and 57, and the enclosing walls of Kiva Z, include some of the best fourth-type masonry in the ruin—sandstone blocks so closely seated it is not always possible to press a knife blade between.

Rooms 28B, 55, and 57 are fourth-type replacements for burnt-out second-type rooms that the Late Bonitians had erected upon and against first-type Old Bonitian dwellings. The three lie at the second-story level, above Rooms 28 and 28a, and are therefore improperly represented on our groundfloor plan (fig. 6; see, also, Judd, 1954, pp. 23-28). But they cannot be omitted. Their continuing south

wall is slightly concave and rests directly upon the first-type stonework of 28 and 28a, originally one.

Rooms 55 and 57 were built upon pine beams inserted at ceiling level above the west half of 28 and the wall that separates them was further supported by a built-in, 9-inch timber (pl. 80, right). This latter (JPB No. 49) gave a tree-ring date of A.D. 1083, 12 years later than a beam-end (JPB 48) from the north wall of Room 57 but, nevertheless, suggesting the approximate period during which these two fourth-type Late Bonitian rooms replaced one of second-type construction.

Former south doors, later blocked and plastered over, had provided access to Rooms 57 and 28B from the terrace outside (pl. 73, left). Those to 28B, two in number, both T-shaped, and one replacing the other, are described by Pepper (*ibid.*, pp. 127, 199) as connecting with Room 40. I suspect an erroneous observation here for, as explained elsewhere (Judd, 1954, p. 27), Room 40 is nonexistent, and its "bin" is the entryway to a flight of stone steps leading down to Room 28 and thence to 51a.

A test pit in the northeast corner of this terrace revealed: (1) The nonbanded fourth-type exterior of 28B abutting the banded west side of the Kiva 16 enclosure; (2) the latter's so-called "bench," 12 inches high on a foundation of comparable height, abutting both the fourth-type exterior of 28B and the first-type exterior of 28a and (3) the 2-foot-high foundation of Room 28a standing, at depth of 10½ feet, upon the adobe floor of a quadrangular structure whose above-bench wall, razed at 7 inches, was merely mud-plastered earth.

A second test pit beneath the blocked Room 57 door revealed a 5-inch-wide offset marking Room 28 ceiling height, 4 empty beam holes 10 inches lower and, approximately at Room 28 floor level, a slab-lined fireplace 23 inches in diameter by 8 inches deep. Overlying this latter, between Kiva R and the post-and-mud exterior of Rooms 3a and 28, was an accumulation of village rubbish that included demolition waste, kitchen sweepings, and numerous potsherds both Old Bonitian and Late Bonitian.

Farther along the terrace, in the angle formed by the enclosing walls of Kivas Y and Z and perhaps contemporary with them, is a masonry-lined pit averaging 3 by 5 feet, inside, and 49 inches deep (pl. 18, left). Its interior was reddened by fire; its fill, sand and sandstone spalls with bits of charcoal in the upper half.

Like Rooms 28B, 55, and 57, Kivas Y and Z are Late Bonitian substitutions for earlier structures. In contrast, the single row

extending south from Kiva 16, Rooms 17-35a, represent Late Bonitian reconstruction rather than replacement. Room 17, which we had numbered and examined before Pepper's field notes were published, is identified by its store of oversized metates with our Room 211. Its subfloor paired foundations are among those we had traced northward from room to room without finding any clue as to their intended purpose.

South of Room 211 are two unnumbered compartments whose west walls had been built upon timbers crossing the east arc of third-type Kiva Q. When those timbers eventually rotted and collapsed they let fall into the ceremonial chamber below a number of deeply worn or outworn metates, both Old Bonitian and Late Bonitian, obviously intended, as were those in 211, for pulverizing white sandstone for wall decoration. We found a quantity of that sandstone in Room 212 and there was more in 27, adjoining. This entire row, as I judge from its masonry, was originally built by the Late Bonitians with third-type stonework but was subsequently repaired with banded fourth-type masonry.

Separating Rooms 34 and 35a is a narrow passage connecting the East and West Courts. Beneath its east end, while tracing the exterior of Kiva 2-B, we came upon a small subterranean cubbyhole, of crude construction but plastered, that may be the feature designated as Room 147 on Hyde's groundplan (*in* Pepper, 1920, fig. 155). All the finished stonework hereabout appears to have been third-type originally and subsequently much patched and sometimes replaced with banded fourth-type. Such repairs as we undertook in this area, and elsewhere, sought to duplicate masonry then standing. Late Bonitian stonework is so outstanding one is inclined to discount its age and origin. As my Zuñi companions remarked in 1920 upon the occasion of their first tour of Pueblo Bonito, "White men built those walls; Indians could not."

Shrines. The Hyde Expedition's Room 190 as illustrated by Pepper (*ibid.*, fig. 146) was a flag-floored, sub-surface cylinder of sandstone masonry that looks to be almost but not quite my fourth-type. It was a pit-shrine, a communal anchor so to speak, that bound the Late Bonitians to this particular place of residence. Masonry and location identify it as peculiarly Late Bonitian but its counterpart may be seen today, however inconspicuously, in every Pueblo village where the old religious practices are still respected, from the Hopi mesas on the west to the Rio Grande.

We have no recorded description of Room 190, but Pepper's ex-

cellent illustration indicates a depth of 2 to $2\frac{1}{2}$ feet, a diameter of 6 or 7. Large slabs floored the chamber and the middle one, more or less discoidal, was much lighter in color than the others. Unpublished Hyde prints 279, 407, and 543 show this discoidal piece to have been about 4 inches thick and, when first uncovered, it was ringed about with slab fragments on edge. Later the pavement was stripped away, the wall masonry crumbled and nothing now remains but a ragged hole in the ground near a remnant of the former cross-court wall (pl. 5, upper). Room 190 was indubitably a shrine, but I am less confident of those next to be considered.

Built upon several feet of sand (fig. 13) wind-piled against the plastered outside east and south walls of Room 176, at the southeast corner of the pueblo, is a cluster of six small masonry compartments that seem absolutely purposeless except as shrines. Apparently added one at a time, their floor levels vary and their stonework differs. As we found them they were without lateral openings or evidence of roofing; each was filled with clean wind-borne sand.

Northernmost of the six measures, inside, 4 feet 2 inches in length by 24 inches at the south end and 27 inches at the north. Its end walls abut the plastered exterior of Room 176. The north end, without foundation and externally of good second-type masonry (pl. 81, upper), was built upon 5 inches of blown sand 33 inches above the 176 foundation. Its inside south and west sides were plastered and painted, white above a dull red band.

Clearly this supposed shrine group is late, later than Room 176. Excepting the second-type facing noted above, all stonework is of third-type or banded fourth. Abutting the extreme southeast corner of the group is the west end, here 12 inches high by 24 inches wide, of the long, foundationlike wall that extends east 509 feet and overlies several units of our Northeast Foundation Complex. Room 176 and its contemporaries are later than the complex; our cluster of so-called shrines is later than 176 and the long, lone foundationlike wall, is later still. Whether shrines or not, these six small compartments outside Room 176 were among the final efforts of Late Bonitian masons.

VII. THE KIVAS OF PUEBLO BONITO

There are 37 kivas represented on the National Geographic Society's ground plan of Pueblo Bonito (fig. 2). Seven of these were examined by Pepper (1920) for the Hyde Expeditions; the remainder, including two (Y, Z) cleared by unknown individuals between 1900 and 1920, by the Society. We reexamined Kiva 162 in part; tested, but did not excavate, O, P, S, and 2-C. We have no idea how many were in use contemporaneously nor how many were still functioning at the final exodus from Pueblo Bonito. Only six (H, J, K, L, T, and 2-D) had become accepted dumps for neighboring household rubbish; only two (H and J) had been deliberately stripped of their ceiling timbers. Where fire is indicated it followed the accumulation of wind-blown sand. Other and older kivas preceded those now visible, as illustrated on figures 3-6. Ceremonialism was deeply rooted at Pueblo Bonito!

In present Pueblo villages there may be one kiva or several. Anthropological opinion differs as to the kiva's primary function, but it is generally agreed that each serves as a masculine retreat—a man's club that is not a club but a place in which members of an esoteric group can meet to rehearse prescribed rituals or just loaf around. Traditionally the kiva is a subterranean room, although sometimes, as at Pueblo Bonito, this relative position was simulated by razing two or more dwellings, building the kiva within, and leaving the house walls standing. Traditionally the kiva was circular although a rectangular form was sometimes favored.

Pertinent data relative to our 37 Pueblo Bonito kivas are given in the table on pages 178-179.

It will be noted that these are all very much alike but not precisely so. The majority are equipped with a central fireplace, an under-floor ventilating system, a subfloor vault west of the fireplace, and an encircling bench having 6 to 10 low pilasters and a shallow recess at the south. These several features unite to distinguish what I have termed "the Chaco-type" kiva. Upon the pilasters, which are rarely more than 9 inches high, a cribwork of overlapping logs rose to form a domed ceiling. Depth made ladders essential. The middle of the roof presumably was left open as a smoke vent and a means of ingress and exit.

<i>Kiva</i>	<i>Floor diameter</i>	<i>Est. ceiling</i>	<i>Bench w x h</i>	<i>Pilasters</i>	<i>w x h</i>	<i>Average setback</i>	<i>S bench recess</i>	<i>Subfloor vent</i>	<i>W vault</i>	<i>Wainscot</i>
A	45'1"	9'7"	a 12" x 7" b 11" x 10" c 15" x 17"	0			0	0		
B	21'5"	11'8"	20" x 42"	8	16"-	2"	X	X	X	planks
C	23'3"	12'	28" x 25"	10	20"-	3½"	X	X	X	planks
D	26'6"	13'	24" x 28"	10	16" x 7"	3½"	X	X	X	
E	17'	8'7"	27" x 26"	4	34½" x 5'10"	3½"	X	X		0
F	21'8"	9'6"	26" x 29"	6	14" x 10"	3½"	X	X	X	planks
G	21'5"	11'	35" x 24"	6	18" x 10"	2"	X	X	X	poles
H	18'2"	10'	18" x 31"	8	19"-	3"	X	X	X	
I	15'10"	9'6"	20" x 25"	8	16"-	0	X	X		
J	21'9"	10'6"	20" x 24"	8	19"-		X	X	?	
K	17'8"	9'6"	16" x 26"	8	16" x 10"	0	X	X	X	
L	18'	9'11"	30" x 26"	6	16" x 9½"	4"	X	X	0	poles
M	17'3"	9'	30" x 25"	6	16" x 9½"	4"	X	X	X	poles
N	17'10"	9'6"	28" x 27"	6	15" x 6"	4"	X	X	0	poles
O	unexcavated									
P	26'e	11'6"	35" x 28"	—						
Q	40'	10'	25" x 23"	0					X	
R	22'9"	9'10"	46" x 29"	6	17" x 8"	3"	X	X		
S	19'10"e	9'7"	31" x 26"e	—	23" x 6"	2"				poles
T	22'6"	9'6"	32" x 25"	8	21" x 6"	4"	X	X	X	poles
U	13'10"	8'	11" x 25"	0				X	0	
V	13'1"	8'	14" x 24"	6	21" x 29"	0	X	X		
W	15'2"	10'	17" x 26"	6	20"-	1"	X	X	X	
X	13'3"	7'6"	17" x 30"	6	17" x 31"	0	X	former		
Y	10'4"	7'6"	—	0			X	X		

<i>Kiva</i>	<i>Floor diameter</i>	<i>Est. ceiling</i>	<i>Bench w x h</i>	<i>Pilasters</i>	<i>w x h</i>	<i>Average setback</i>	<i>S bench recess</i>	<i>Subfloor vent</i>	<i>W vault</i>	<i>Wainscot</i>
Z	20'3"	9'	32" x 23"	6		—	X			
2-B	18'2"	11'	28" x 26"	6			X	X		
2-C	21'e	9'6"	27" x 18"	—				—		
2-D	19'11" E-W 16'4" N-S	7'6"	—	0				X		
2-E	12'7"	7'7"	13" x 34"	0			X	X		
16	20'6" (P)	24" (P)		6 (P)						
59	11'3"	8'		0			X	X		
67	25'6" (P)	—	26" x 24"	6 (P)						
75										
130										
161	17'	10'6"	18" x 30"	8		3"				
162	18'1"	10'	19" x 31"	8						

The Kiva A bench is composed of three steps: (a) that nearest the floor; (b) the middle; and (c) the upper. These levels merge one into the other as indicated in figure 16. Measurements begin 1 foot east of the stairway to Room 148, but total width and height, taken clockwise at 12 points, average 40½ by 34 inches.

Ceiling heights were estimated at the middle, where a single layer of poles capped the domelike roof of typical Chaco kivas; A, E, Q, U, W, Y, 59, 2-D, and 2-E presumably were flat-roofed.

The kiva appearing as 67 on Hyde's groundplan is not that described as such by Pepper. But just to the south of it is an unnumbered kiva (shown open in Pepper's figure 4) that does agree with Pepper's location, dimensions, and notes. Hence the correction of our figure 2, where the unmarked kiva becomes 67 and the Room 67 of Hyde's plan becomes Kiva Z. (See, also, Pepper, 1899.)

Tabulated data for 16, 59, 67, 75, 130, 161, and 162 were taken from Pepper's text. To lessen drainage problems, Kivas T, X, 2-D, and 2-E were refilled after excavation by the NGS.

The distinctive Chaco-type ventilating system is a 3-part combination: an air vent near the fireplace, an under-floor duct, and an external shaft with air intake. Fresh air drawn down the shaft and through the duct escaped at the vent and rose on fireplace heat and out at the roof opening. Because the vent lay at floor level a deflector was seldom required to screen the fireplace flame from in-rushing air. Indeed, we have record of only seven such deflectors (H, L, M, Q, T, 2-B and 2-E), none more than a few inches high and one of them in a non-Chaco kiva. Fireplaces, as we observed them, are usually circular but may be either masonry-lined or slab-lined.

Of all our Chaco-type kivas only L was as its builders left it, with ceiling intact or nearly so. We dismantled this ceiling piece by piece, counted 195 individual pine logs in the principal cribwork, 135 shorter pieces completing and leveling the fourteenth or uppermost layer (pl. 56, upper), and guessed that perhaps 20 more had been lost with collapse of the middle portion, a total of 350. If this total is typical, and there is no reason to believe otherwise, one can understand why the sparse Chaco forests ultimately were exhausted.

The Kiva L cribwork included 14 layers of clean pine logs or sections of logs that rose domelike from six basal pilasters $9\frac{1}{2}$ inches high. The four lowermost layers consisted of six logs each, paired and extending between alternate pairs of pilasters, but the number per layer gradually increased thereafter, as follows:

SEQUENCE OF ROOFING POLES, KIVA L

Pilasters *	1.	2.	3.	4.	5.	6.	1
Layer 1		—2—		—2—		—2—	
2	—2—		—2—		—2—		—2—
3		—2—		—2—		—2—	
4	—2—		—2—		—2—		—2—
5		—3—		—3—		—3—	
6	—4—		—3—		—4—		—4—
7		—4—		—4—		—4—	
8	—5—		—4—		—4—		—4—
9		—5—		—5—		—5—	
10	—5—		—6—		—5—		—5—
11		—5—		—5—		—5—	
12	—8—		—7—		—8—		—8—
13		—10—		—9—		—8—	
14	—8—		—12—		—10—		—10—

* Numbered counterclockwise from the south recess.

Each layer above the three lowest was braced both ways by a longer member (pl. 56, lower).

The outer ends of the upper layer were firmly fixed in the kiva masonry 7 feet 9 inches above its bench, and here, at wall top, two pine logs carried the south side of Rooms 290-291 across the north arc (pl. 57, left). Piercing the uppermost layer but built upon seven hewn boards inserted just below was a neat masonry cylinder, 16 inches in diameter by 12 inches high, with a hole in the middle, $1\frac{1}{2}$ by $2\frac{1}{2}$ inches, that opened directly into the kiva. My notes refer to this feature as "the speaking tube," but its purpose remains a mystery. It stood upon the northwest quarter of the roof about 7 feet from the edge; the upper logs had been cut away to admit the hewn boards. A miniature wall, 3 inches thick, 6 inches high, and 20 inches long on the same hewn boards and only 3 inches away, likewise remains a mystery but could have been part of a miniature enclosure.

Each of the six Kiva L pilasters was a 4-foot section of a red-cedar log about 10 inches in diameter, veneered at the sides with small-stone masonry, and plastered all over. The forward end of the log was set back 3-4 inches from the edge of the bench; its rear was inserted into a previously prepared opening in the kiva wall, lintel sticks above, and the excess space subsequently filled in. From core to outside mudwork each pilaster reflected the craftsmanship of a painstaking builder (pl. 61, left). Pine posts about 3 inches in diameter stood at the back, one on top the pilaster and one at either side. Those at No. 4 measured nearly 7 feet high but we observed behind them no trace of grass or other vegetal matter.

Built upon the bench against Pilaster 2 was a masonry block, 16 by 12 by 19 inches, an adjunct necessitated by compression of the overlying logs (pl. 58, lower). Other Kiva L pilasters had individual stones introduced to distribute like pressure. Clearly these ceiling timbers had been placed while still green and unseasoned.

On top of each pilaster log and under the paired poles was a gouged-out cavity about 2 inches in diameter by half an inch deep containing a sacrificial offering of beads and other objects of personal value. Each cavity was rabbeted for a close-fitting cover, wood or stone, discoidal or rectangular. Because the Kiva L pilaster offerings are complete and thus perhaps more informative than usual, I am listing them individually in the table on page 182.

In addition, we have three bench-front niches in Kiva L, each ceiled with hewn pine boards and each empty: (1) On the east side between Pilasters 2 and 3, unplastered, 40 by 20 by 17 inches deep with an $11\frac{1}{2}$ -by- $13\frac{1}{2}$ -inch-high opening 9 inches above the floor;

<i>Pilaster 1</i> (U.S.N.M. No. 335981)	<i>Pilaster 2</i> (U.S.N.M. No. 335982)	<i>Pilaster 3</i> (U.S.N.M. No. 335983)	<i>Pilaster 4</i> (U.S.N.M. No. 335984)	<i>Pilaster 5</i> (U.S.N.M. No. 335985)	<i>Pilaster 6</i> (U.S.N.M. No. 335986)
49 olivella beads	36 olivella beads	20 olivella beads	29 olivella beads	39 olivella beads	15 olivella beads and 2 fragments
148 "fig. 8" beads and 35 fragments	77 "fig. 8" beads and 30 fragments	50 "fig. 8" beads and 10 fragments	34 "fig. 8" beads and 30 fragments	149 "fig. 8" beads and 25 fragments	61 "fig. 8" beads and 20 fragments
48 disk bone and shell beads and 10 fragments	20 disk turquoise beads and 2 frag- ments	15 disk bone beads and 1 fragment	25 disk bone beads and 10 fragments	28 disk bone beads and 6 fragments	19 disk bone beads and 13 fragments
46 disk turquoise beads and 9 frag- ments	29 fragments tur- quoise, worked and unworked	11 disk turquoise beads and 1 frag- ment	24 disk turquoise beads and frag- ments	45 disk turquoise beads and 4 frag- ments	15 turquoise beads and 2 fragments
34 fragments tur- quoise matrix, worked	3 shell fragments	11 fragments tur- quoise, worked and unworked	23 turquoise and shell fragments, worked and un- worked	23 fragments tur- quoise, worked and unworked	19 fragments tur- quoise, worked and unworked
9 shell fragments		2 shell fragments		4 large shell beads and fragments	1 small quartz crystal
1 cylindrical bone bead		1 piece iron pyrites		9 shell fragments	1 lot macaw and other feathers bound with cot- ton twine
2 metallic stone fragments					1 lot seaweed (?)

(2) on the north side, 8 inches above the floor between Pilasters 3 and 4, a blocked niche measuring 10 inches wide by 16 inches; (3) on the west side, a rough-walled recess 33 by 18 inches deep with an 11 by 16-inch opening 7 inches above the kiva floor. Comparable niches were noted in eight other local kivas (F, G, M, N, R, U, X, and 2-E) but only one (in Y) above bench level.

The under-floor ventilator is perhaps the most characteristic feature of Chaco-type kivas, and that in L is thoroughly representative. Here the actual vent is 18 by 15 inches, the outlet from a slab-paved, masonry-lined duct 21 inches deep (pl. 60, upper). Roofed with hewn pine boards and a 3-inch layer of adobe mud flush with the room floor, the duct passed under the middle of the south bench recess to connect with an external shaft, the air intake. Two courses of sandstone, plastered at the sides, stood at the north edge of the vent, screening the fireplace.

Although built during the Late Bonitians' major constructional program (JPB No's 70, 79, and 81 gave tree-ring dates of 1047 and 1061), Kiva L eventually was abandoned and thereafter briefly utilized as a neighborhood dump. Of 4,732 sherds tabulated from these floor sweepings 16 percent are Old Bonitian and 67.3 percent Late Bonitian. Of those we examined, five other local kivas (H, J, K, T, and 2-D) likewise had degenerated to the status of community dumping places.

Under the floor of Kiva L were remains of an older, second-type-masonry kiva (fig. 4). Not until three years later, July 29, 1926, was the ventilator shaft of this older structure located, its partly demolished stonework 5½ feet below the East Court surface.

Subfloor ventilators in three of our kivas (I, X, 162) offer evidence of remodeling. In Kiva I, for instance, the rear wall of the south recess had been partially removed and replaced with wattle-work supported by two upright sticks and, at each end, by a 1-inch bundle of reeds. In Kiva X the customary under-floor tunnel had been filled and floored over and a substitute ventilator, 9½ inches wide by 17 high, cut through the back of the recess 6 inches above floor level. With apparent humor, the mason who did this work installed two sill stones, one white and the other red.

Despite the fact each boasts an under-floor ventilator in the Chaco tradition, five of our kivas (E, X, Y, 2-E, and 59) are really foreign to Chaco Canyon. The first two have high masonry pilasters after the manner of those in the Mesa Verde country, and so too does that underneath 162.

We were drawn to Kiva 162 by Pepper's illustration (1920, fig. 145) which shows a square, precisely rimmed ventilator opening, an under-floor duct, and what appears to be a second ventilator broken through the rear wall of the south recess. Beneath the tumble weeds and blown sand of 20 years we found both ventilators but the rim slabs had gone and where they should have been were the ruins of an older under-floor kiva of a different kind (pl. 60, lower).

Kiva 162 with its eight low pilasters and subfloor ventilator is clearly of Chaco type, but that beneath has four masonry pillars razed $5\frac{1}{2}$ feet above their floor and two south recesses—a shallow bench recess and another above, $3\frac{1}{2}$ feet deep by 8 feet 9 inches wide. The deep south recess and high masonry pilasters identify this under floor Kiva as an import from beyond the San Juan River.

Kiva D is a Chaco-type kiva with individuality. It has a subfloor passageway, 32 inches deep by 22 inches wide, that afforded secret access to second-story Room 241B. Paved with sandstone slabs and roofed with pine poles, that passageway ended in a flight of three masonry steps. The first two were 8 inches, front to back, but the third was 15—a hewn plank tread and a 2-inch longitudinal pole 7 inches below the Room 241B floor. There were a stone step and an inset plank at the west end of the passage and more hewn planks bridging the east end, under the bench (pl. 62, upper).

While scraping the floor of Kiva D we came upon an embedded sandstone tablet covering a masonry-lined repository 6 inches wide, 20 inches long, and 12 inches deep. Silt that retained several fragments of shell and turquoise and the imprints of two short, rounded objects of wood half filled the space. It has been constructed against the concave side of an earlier, under-floor kiva $6\frac{1}{2}$ feet from the passageway to Room 241B, a fact which is, of course, purely fortuitous. Against the same concave wall and a few feet nearer the Kiva D ventilator was a second repository, 9 inches in diameter by 10 inches deep, that contained the cockleshell and accompanying objects illustrated in our volume on the material culture of Pueblo Bonito (Judd, 1954, pl. 89).

The subfloor kiva, built of both laminate and dressed friable sandstone in what I have hesitatingly classed as third-type masonry, measured 21 feet 4 inches in diameter and may have been left unfinished since the customary bench is lacking. Significantly, the floor of this early kiva, $6\frac{1}{2}$ feet below that of D, is practically on the same level as that of Room 241A (fig. 18).

Ten pilasters supported the domed ceiling but they were not ordi-

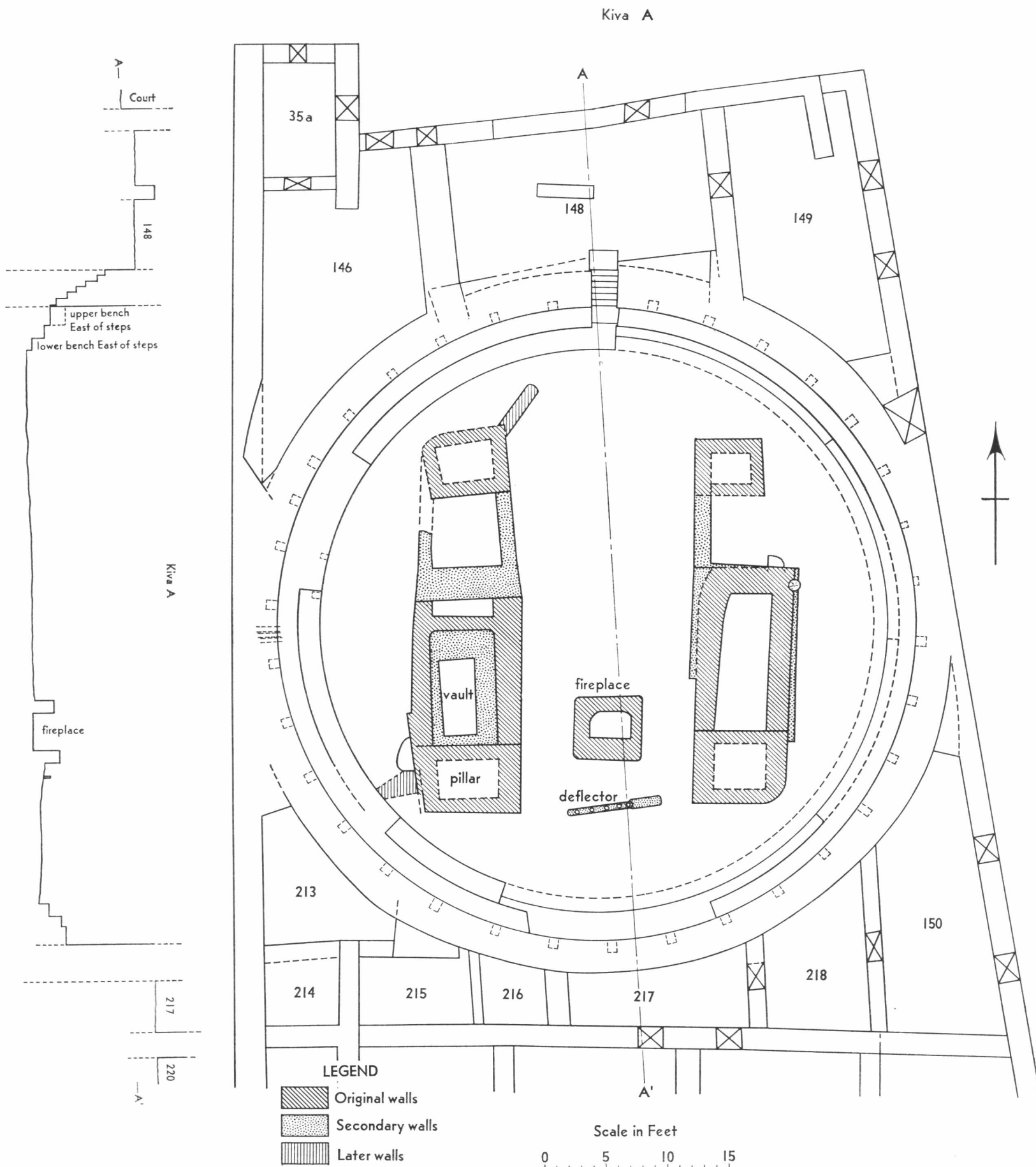


FIG. 16.—Great Kiva A with cross section A-A'.

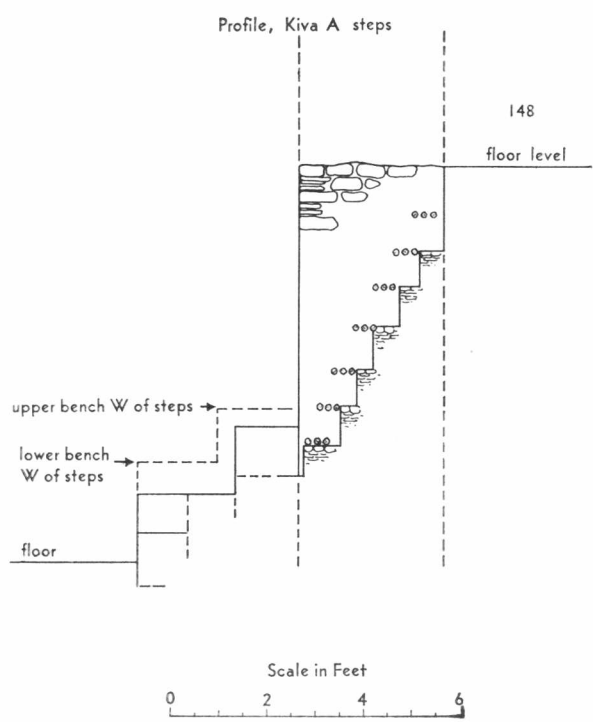


FIG. 16a.—Profile of Kiva A stairway from latest floor to Room 148.

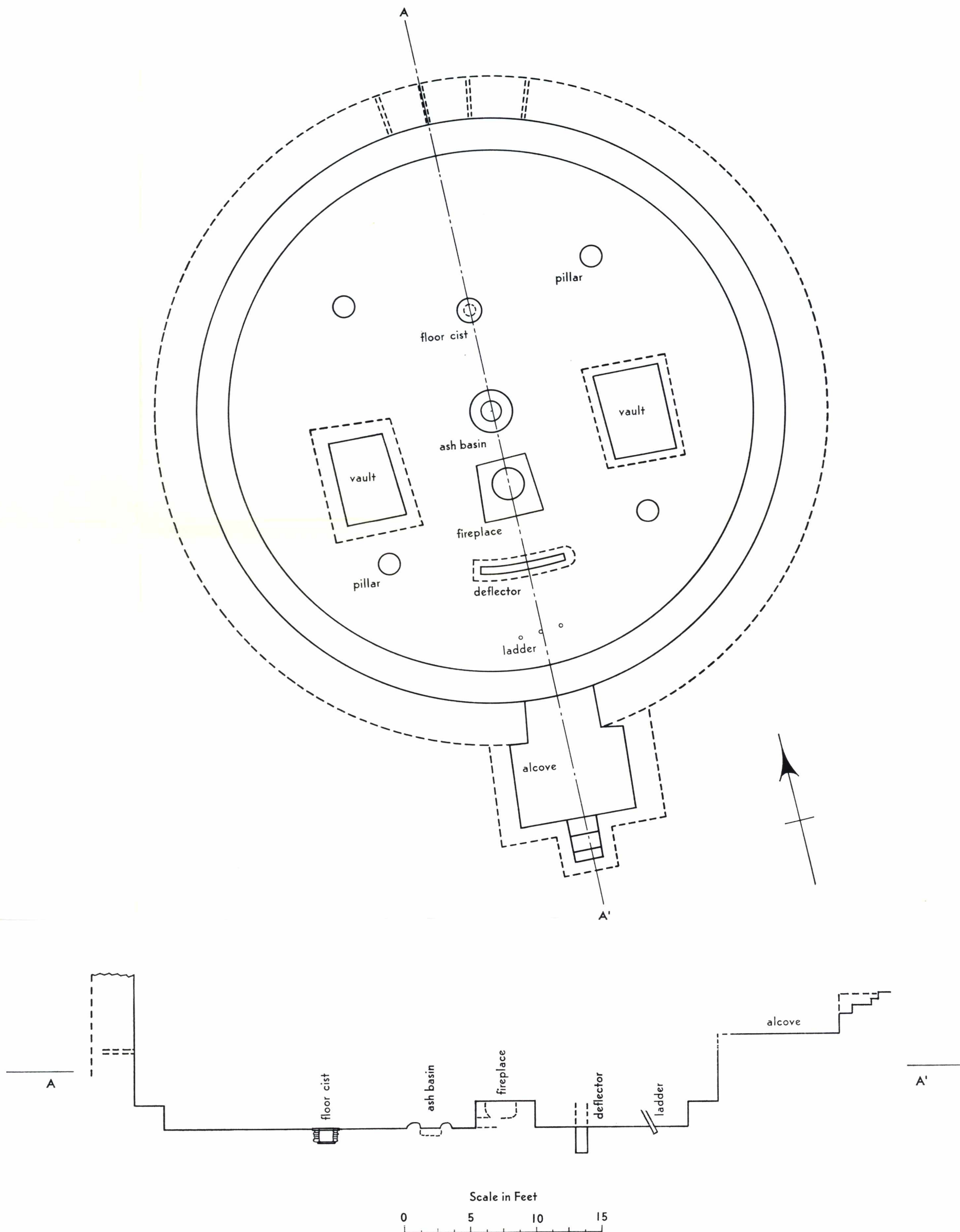


FIG. 17.—Great Kiva Q and cross section A-A'.



A single 10-inch beam supported the ceiling of Room 227 with the end of another protruding from 227-I.

(Photograph by O. C. Havens, 1921.)



Ceiling poles and hatchway of Room 327 as seen from above.

(Photograph by O. C. Havens, 1924.)



PLATE 55

Upper: Doors, built and repeatedly altered, had pierced the north wall of Room 169 in various directions. (Photograph by O. C. Havens, 1921.)

Lower: Late Bonitian builders crowded the north wall of Room 168 with doors of divers shapes and size. (Photograph by Neil M. Judd, 1926.)

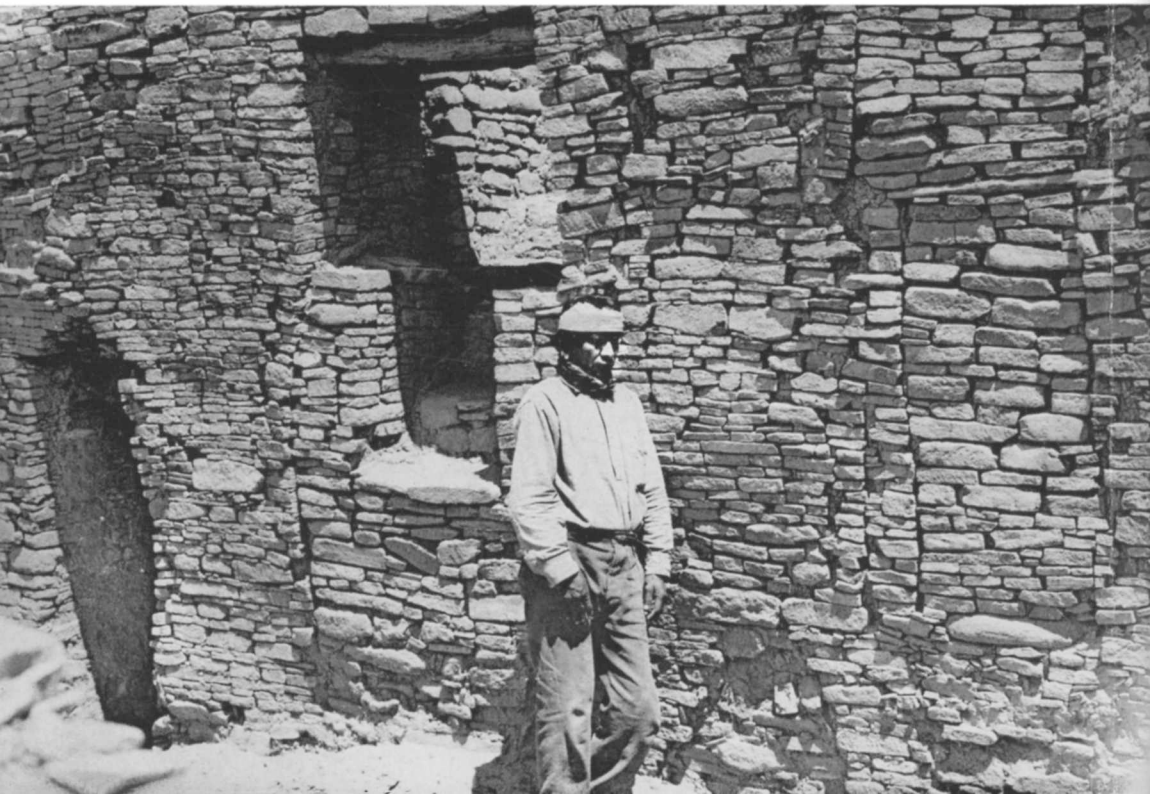




PLATE 56

Upper: The uppermost, or 14th, layer of roofing timbers survived in Kiva L but the middle portion had collapsed.

Lower: Cribbed ceiling timbers, Kiva L, with bench posts showing at left and the "speaking tube," lower right.

(Photographs by Neil M. Judd, 1923.)





PLATE 57

Left: Paired logs carried the south wall of Rooms 290-291 across the north arc of Kiva L.

Right: Kiva L cribwork with up-right bench posts at Pilaster No. 3 and, upper right, paired beams under south wall, Room 291.

(Photographs by Neil M. Judd, 1923.)

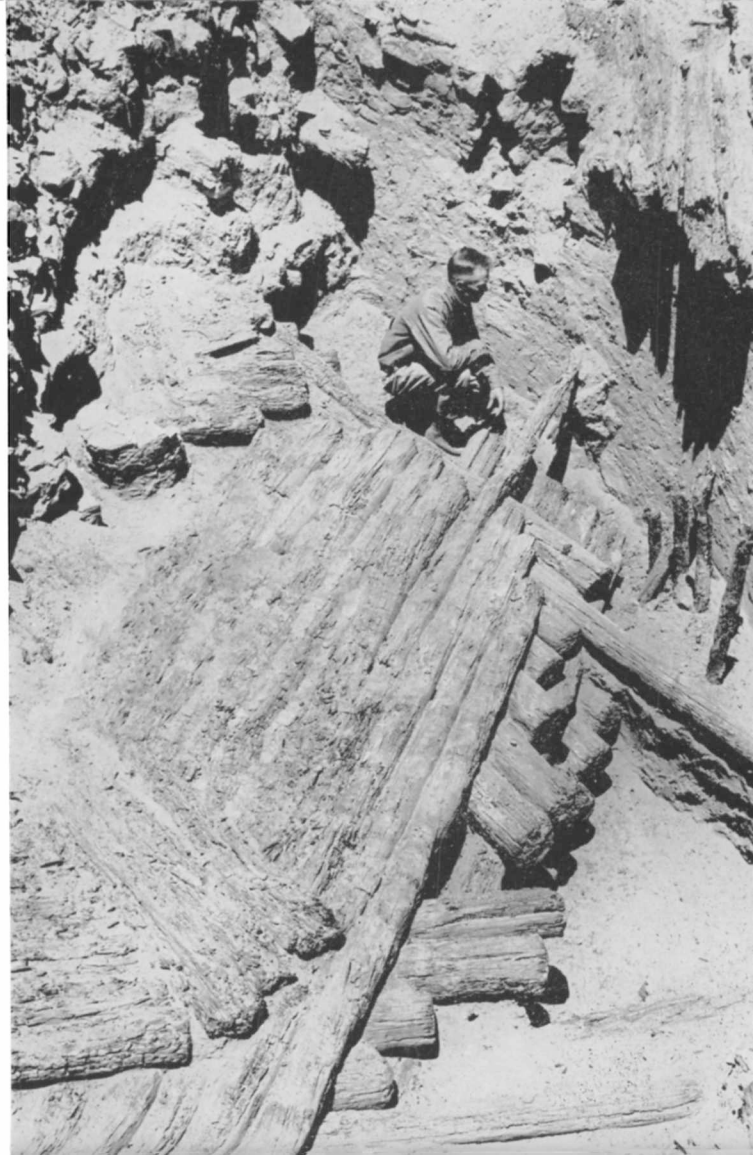




PLATE 58

Upper: Sacrificial offering, with wooden cover, Pilaster No. 1, Kiva L.

Lower: Pilaster No. 2, Kiva L, with buttress at left side and bench niche below.

(Photographs by Neil M. Judd, 1923.)





PLATE 59

Left: Pilaster 6, Kiva L, with overlying logs impressed by weight of those above.

Right: A Kiva L bench recess between Pilasters 4 and 5.

(Photographs by O. C. Havens, 1923.)

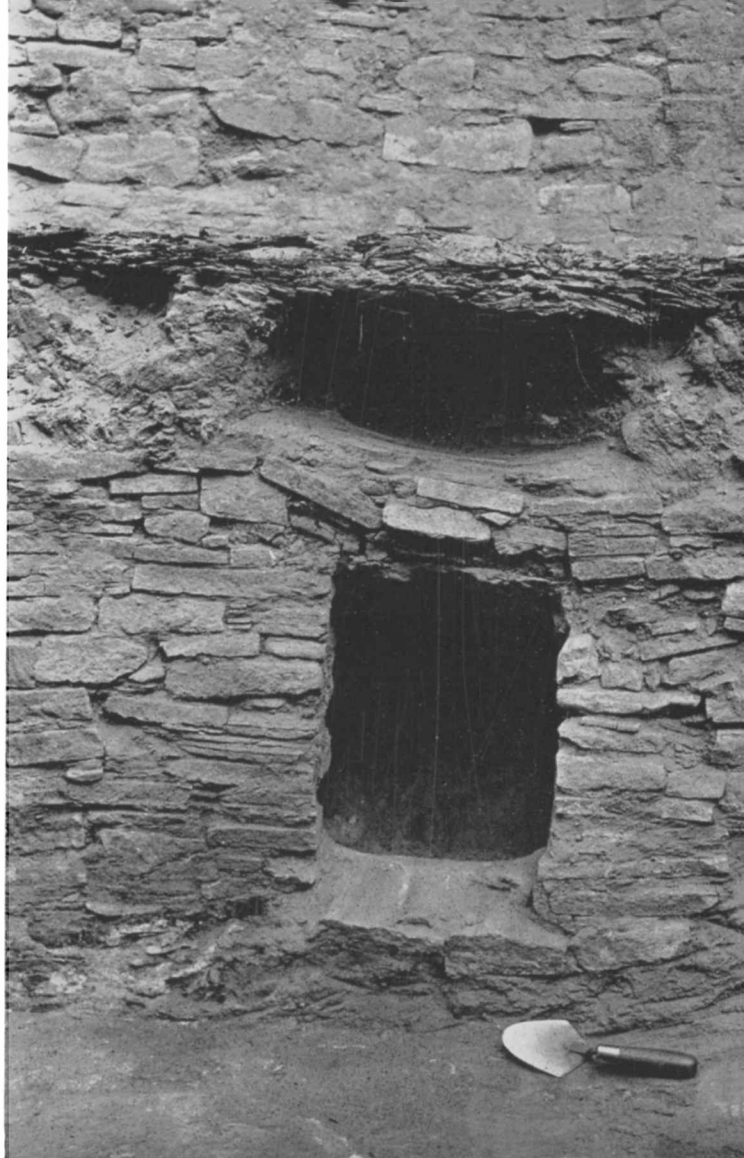




PLATE 60

Upper: Basal ceiling poles and Pilasters 1 and 2, Kiva L, overlook the fireplace, the subfloor ventilator, and the east bench niche.
(Photograph by Neil M. Judd, 1923.)

Lower: Underneath Chaco-type Kiva 162 were the remains of a partially razed, non-Chaco kiva.
(Photograph by Neil M. Judd, 1922.)





Stone-ax-cut and abraded cedar log from Pilaster No. 1, Kiva L.

(Photographs by B. Anthony Stewart.)



Cedarbark bundles, presumably used in ceiling construction, Room 250.

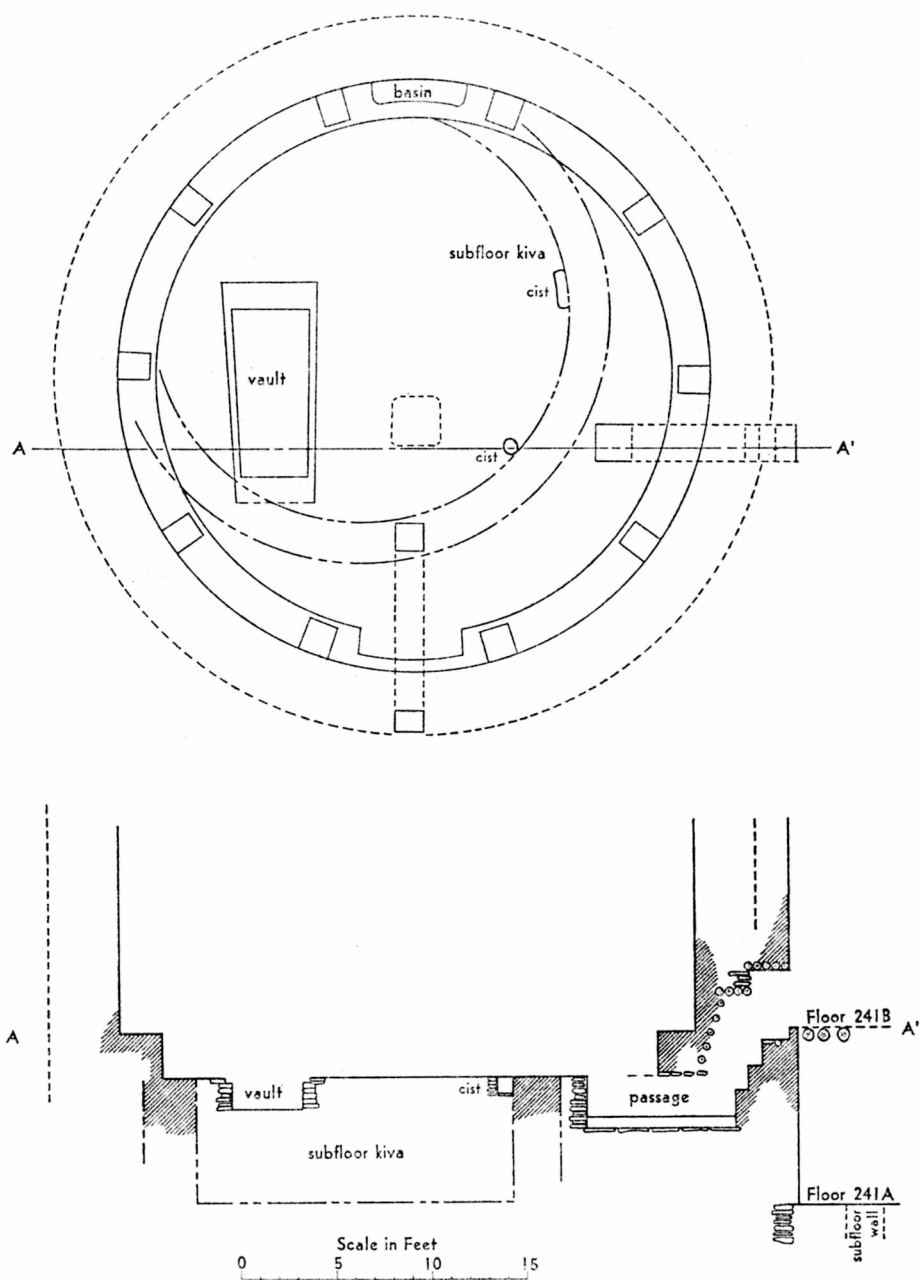


FIG. 18.—Kiva D with subfloor features and cross section.

nary pilasters. Instead of the usual log core with masonry at the sides, these 10 were solid blocks of wood and their mud covering was applied directly. They averaged 16 inches wide by 7 inches high, were set back 3-4 inches from the front of the bench and their rear ends were embedded in the kiva wall.

Fire had destroyed the Kiva D roof and most of its supporting pilasters, and when we made repairs in 1921 we removed the charcoal from several empty sockets and replaced it with stonework recessed about an inch. Sacrificial offerings were recovered from 7 of the 10 logs. A plastered basin with sloping sides, $4\frac{1}{2}$ feet long, 11 inches wide and 5 inches deep on the bench between Pilasters 5 and 6 may, conceivably, be a substitute for the usual north bench recess. Only one other kiva, F, had solid wood pilasters like those in D.

As in others of Chaco type, Kiva D has a central fireplace and a subfloor ventilating system the external shaft in this instance being concealed in the rebuilt masonry above its south recess. West of the fireplace is a better-than-average subfloor vault—8 feet 9 inches long by 19 inches deep, 3 feet 5 inches wide at one end and 4 feet at the other (pl. 62, lower). Its floor is ill-defined; 16-inch offsets appear at each end and lesser ones, 4 inches wide and half as deep, on either side. Embedded in the masonry just below these side offsets are remains of two single transverse poles that may, at one time, have supported a light covering. But this Kiva D vault, as usual, had been filled with clean sand and floored over. Upon conclusion of our 1921 examination we replaced the sandy contents with broken rock as a drainage aid. Although these west-side vaults are an expected feature of Chaco-type kivas, none was found in L, N, or U.

Kiva B had all the accouterments of a typical Chaco-type kiva: encircling bench with low pilasters and south recess, central fireplace, west-side vault, and subfloor ventilator (pl. 63, lower). This latter, however, instead of extending to and beneath the south recess bore due east there to meet a cylindrical ventilator shaft squeezed between the kiva stonework and the older west wall of Room 153 which we had previously traced $9\frac{1}{2}$ feet below floor level. Thus the presence of established buildings on the east and south may have forced this conspicuous irregularity.

Pueblo peoples are conservatives and followers of custom but local factors have sometimes compelled substitutions. In Kiva H the ventilator duct passes under the south recess and then turns abruptly to the left. In 2-E it turns sharply to the right. In Kiva 2-D the duct passed beneath the middle of the south wall even though there

was no recess present. Two one-time dwellings, 228 and 229, were sacrificed to provide at second-story level a ventilator shaft for reconstructed Kiva C.

Although its ventilating system deviated slightly from normal, the cribwork of Kiva B followed local custom in every particular: low pilasters as basal supports for a domed ceiling; paired logs between alternate pairs of pilasters and an additional timber introduced in the fourth layer. Of those measurable, length varied from 10 feet 5 inches in the lowest tier to 13 feet in the fourth. Here, in Kiva B, for the only instance in my experience, barked willows appeared between logs in the fourth layer. And here for the first time we noted olivellas with bits of turquoise inserted under the lip to keep the beads in line.

Behind the cribwork, close against the wall masonry and in a groove averaging 3 inches deep, the builders of Kiva B placed a sort of wainscoting of hand-hewn planks set upright and packed with bunchgrass laid horizontally (pl. 63, upper). Although none exceeded 34 inches in height, planks nearest the pilasters were best preserved; in general, wall masonry above the 37-inch level was burned and smoke-stained.

This wainscoting of hewn planks was repeated in Kivas C and F. Those in C averaged 20 inches high; stood in a 5-inch channel. Poles about 2 inches in diameter replaced planks in G, L, M, N, R, S, T, and 16. In every instance, poles or planks, bunchgrass had been packed behind. A sample from Kiva M, best preserved, was identified in 1933 by the late A. S. Hitchcock, principal botanist, U. S. Department of Agriculture, as *Oryzopsis hymenoides* (Roem. and Schult.) Ricker, "mountain rice grass" or "sand bunch-grass." The same filler was included in the ceiling of Old Bonitian Room 3d.

As to the purpose of these upright poles and planks and the grass behind them, I have no further data to offer, no theory to propound. If the combination be an inheritance from the past—poles occur repeatedly on the bench or at floor edge in Pueblo I pit-dwellings north of the San Juan River and 22 were counted in the remaining half of a P. I. house in Chaco Canyon (Judd, 1924, p. 405)—it is to be recalled that no vestige of either plank or pole remains in the P. II kivas of which we have record at Pueblo Bonito. With local pilasters rarely more than 9 inches high, very little of the wainscoting would be visible beneath the cribwork; hence ornamentation was not a factor.

Kiva 2-D, cited above, does not look like a kiva but can be noth-

ing else (pl. 64, upper). It is oblong, and east and west are broad recesses surprisingly alike in size and appearance. Both are 21 inches deep and 8 feet 2 inches wide in front; both are paved with bare sandstone slabs. There is an oval, slab-lined fireplace at midfloor and from the south side of it an under-floor ventilator duct extends to and beneath the middle of the south wall. We did not locate the opposite end.

Against the north side of 2-D and built upon its floor is a masonry-walled shaft, 10 by 13 inches inside, floored with part of a 2-inch-thick Old Bonitian metate, and having a 12 x 19-inch opening in front. In the kiva wall just outside this feature and 23 inches above the floor, is a small T-shaped niche, 8 inches high, plastered inside and dark from smoke.

Although indefinite as to type the masonry of 2-D is composed of both dressed friable sandstone and laminate sandstone and is probably later in Pueblo Bonito history than appearance suggests. Its walls were sooted before the latest coat of plaster was applied. Although its floor lies about 7 feet below West Court surface the enclosing stonework had been razed to an average height of $4\frac{1}{2}$ feet, the roofing timbers salvaged, and the empty room finally used as a communal dump.

Kiva J is one of standard Chaco type, but 3 feet 4 inches underneath its floor is a D-shaped predecessor that proved much more interesting (pl. 65, lower). This under-floor example was built from the inside and repeatedly plastered. It had no bench, no south recess, and no pilasters. Its central fireplace, 26 by 29 inches and 21 deep, had rounded corners and a low, wide-spreading adobe rim.

Thirteen inches south of this unusual fireplace is the unusual outlet for an unusual ventilator duct. That outlet, 18 inches on the west, 29 inches on the north, and 16 inches on the south, opens at its southeast corner into a subfloor duct, 32 inches deep, that narrows as it continues southeast, under the wall and 16 inches beyond, to an air intake that rises through the Kiva J floor. As noted on the accompanying plan (fig. 20), that intake is not aligned with its channel but lies a little to one side. There were no other features to this queer, D-shaped sub-floor kiva. The rude wall that divides it was a later introduction and without recognizable purpose.

Construction of the Kiva J ventilating system and west vault demolished the southwest quarter of the older room but did not disturb the arc of a still older, second-type-masonry kiva, subfloor in Rooms 165 and 273. Like Kiva H, Kiva J had been stripped of its

roofing timbers and robbed of its pilaster offerings with the sole exception of that in No. 3 (U.S.N.M. No. 335974). Apparently all useful timbers had been removed purposely since only the rear logs of the two lower layers remain in place and their ends are firmly embedded in the wall masonry. Ultimately, as so frequently happened, this dismantled room became a dumping place for household sweepings.

Kiva 59 (pl. 66, left), of the so-called "key-hole" variety, is the only one of its kind at Pueblo Bonito, unless we include "Y." Its unusual south recess, $3\frac{1}{2}$ feet deep, 6 feet 4 inches wide in front and 8 feet 8 at the rear, abuts an older house wall of third-type masonry and stands $8\frac{1}{2}$ feet without trace of roofing timbers. At either side a 4-inch-wide offset lies 19 inches above the floor and, a little higher, a plastered niche. That on the west, longitudinally concave within, measures 20 by 14 inches by 8 inches deep; its opposite, less distinct, had the same depth but is otherwise smaller. In the north wall of 59, opposite its south recess and 2 feet above floor, is a third niche, 42 inches wide, 14 inches high to its lintel sticks, and 16 inches deep. Fourteen inches south of the fireplace a 10 by 13-inch ventilator opens from an under-floor duct, 25 inches deep, that continues beneath the recess to an external air intake, half buried in the earthy fill of the Kiva T enclosure.

Kiva 2-E (pl. 66, right) differs from 59 in that its south recess, instead of rising full height from the floor, begins on top of a recessed bench. Upper and lower recesses measure 49 inches wide and average 9 inches deep. We cleared only the south half of 2-E but noted three bench-front niches: (1) 15 inches north of the south recess and 13 inches above the floor, a foot-square opening to an unplastered repository 28 inches long; (2) 22 inches beyond the first and with twice its sill height, a second niche 8 inches wide by 16 inches long and 4 inches high; (3) west of the south recess, too broken for measurement.

A subfloor ventilator tunnel in Kiva 2-E, originally 18 inches wide by 50 inches long, had been shortened to 3 feet 9 inches and its north end floored over. I would guess both reduction and closing were related to ventilation for a masonry deflector 6 inches high (our highest) rose between the original vent and the nearby fireplace. At its opposite end the duct makes an abrupt right-angled turn to the left to a ventilator shaft we did not discover.

The relatively high proportion of McElmo Black-on-white, Mesa Verde, and Kayenta Polychrome potsherds from its rubbish fill

argues for the late occupancy and abandonment of this non-Chaco room. In addition, a fragment picked up on the surface of the East Mound, just outside the village at this point, belongs to a proto-Mesa Verde bowl recovered from the same rubbish fill (U.S.N.M. No. 336366).

Kiva 2-E was roofed by a single, east-west beam seated directly upon the wall masonry and by lesser cross timbers whose distal ends rested in a 6-inch-deep offset at wall top. To this extent 2-E echoes its immediate predecessor, 13 feet in diameter, the remains of which lie a few feet to the east, its floor $9\frac{1}{2}$ feet beneath the area I numbered 286. This predecessor, its non-Chaco masonry likewise of large squared blocks of friable sandstone and plastered full height, had been roofed with cross-poles on a single beam, 8 inches in diameter, the east end of which rested upon two posts (JPB 97 and 98) one of them partly embedded in the front edge of the encircling bench. An under-floor ventilator followed the Chaco pattern.

There are other one-of-a-kind kivas at Pueblo Bonito. Kiva E, for example (not 2-E), has four masonry pillars as roof supports. These average $34\frac{1}{2}$ inches wide in front, a trifle wider at the rear, and stand 5 feet 10 inches above the encircling bench (pl. 65, upper). In front of the south bench recess, $15\frac{1}{2}$ inches deep and 5 feet 2 inches wide, is a Chaco-type sub-floor ventilator and a slab-lined fireplace with two sandstone firedogs in the middle. Rather than a north bench niche, there was one on the west side, 5 inches above the floor and 31 inches from the northwest pillar. Its opening, 17 by 16 inches high, had two small posts at the north jamb, one flush with the face and the second set 4 inches inside.

The six pilasters of Kiva X were unique in that each consisted of masonry 31 inches high, rising flush with the bench face and enclosing two logs, one above the other (pls. 67, upper; 68, right). In each case the lower log was about 4 inches in diameter and 5 inches above the bench; the upper logs were larger and were tenoned in the wall masonry at the top of the 31-inch-high pilasters. Cribbed ceiling timbers, paired after the manner of Kiva L, likewise were embedded in the wall masonry. Shorter pieces, leveling the upper layer, rested upon the wall top and were held in place by a row of single stones. These uppermost ceiling poles, their ends still in place, lay 6 feet 5 inches above the floor of Room 330, nearby, thus measuring the depth of Old Bonitian rubbish before construction of Late Bonitian Kiva X.

Another unusual fancy in pilaster construction is that in Kiva T

(pl. 67, lower). Here four 2-inch poles, walled at the front and sides with small-stone masonry, replaced the expected single-log core. Each pilaster rested upon a thin sandstone slab; we observed no sacrificial offering. In every other respect construction followed the customary Chaco-type pattern: under-floor ventilator, south bench recess, circular fireplace, and west-side vault. Ceiling timbers crossed upon alternate pairs of pilasters in the traditional sequence, the third layer increased by one. Upright poles stood at the rear of the bench. With walls composed wholly of friable sandstone, disintegration had progressed to such a degree that I considered it advisable to refill the chamber at conclusion of our study. But there was an earlier floor or work-surface at depth of 3 inches with a thin covering of shale chips.

What I have called "Kiva Y," opened by unknown persons prior to 1920, has an undeniable resemblance to 59. Like the latter it was erected in a former dwelling whose plastered masonry survives behind the intruding walls. Kiva 59, however, is a ground-floor chamber while "Y" lies at the second story level. Its third-type stonework abuts both the plastered exterior of Old Bonitian Room 112 and the southward extension of the second-type southeast side of Room 91. It has a subfloor ventilator, a square, masonry-lined fireplace, a north-wall niche, plastered and whitened, 29 inches above the floor, and a south recess 32 inches high and averaging 13 inches deep. Above this latter, however, a broad, recesslike shelf opens out on either side with a built-in ventilator shaft between. Together, these two broad shelves above bench height, resemble the deep south recess of northern kivas.

At time of its abandonment, Kiva R was one of pure Chaco type, but it began as an Old Bonitian cult room with outward-flaring sides and each subsequent modification, as I interpret the evidence, sought to retain the original bowl-like contour. The Late Bonitians built within and upon the original and twice thereafter undertook to better their own handiwork.

The main wall of Kiva R is predominantly second-type masonry, but the upper 3 feet, more or less, is a third-type renovation (pl. 24, left). At 7 feet 4 inches above its bench the wall sets back 16 inches to a riser that averages 11 inches, leaving an offset that retained remnants of former ceiling poles—a ceiling-pole offset repeated so frequently in Pueblo Bonito kivas I believe it to have been standard. Between Pilasters 3 and 4 the ends of three horizontal poles show one above the other, presumably introduced to bind the second-type stonework to what lies behind. Mud plaster covers the wall, bench to offset.

The latest Kiva R bench measures 29 inches high and varies in width from 40 inches at the north to 52 inches at the south (pl. 69, lower). Upon it are six pilasters averaging 17 inches wide by 8 inches high and set back about 3 inches from the front edge. At the rear, between pilasters, upright posts varying in number from 13 to 16 held close against the masonry a mass of sticks and brush, rather than the bunchgrass noted in other kivas. Sacrificial offerings were present in the pilaster logs and between some of the timbers crossed above them. One such included part of the bill of a redhead duck (*Nyroca americana*—Field No. 1486). A turquoise fragment from Pilaster No. 3 fitted others from No. 4. Elsewhere, parts of the same ornament were recovered from two or more pilasters.

There was no vault west of the Kiva R fireplace but at the north, 6 inches above the floor and opposite the south recess, was a neat little niche, 7 inches wide by 11 inches high and 15 inches deep, unplastered but containing a small Old Bonitian bowl and a battered murex shell (Judd, 1954, pl. 82, *a*, *b*).

Directly beneath that niche is a floor repository, $8\frac{1}{2}$ by $11\frac{1}{2}$ inches inside and 38 inches to its clay bottom. Its aperture was covered by a squared sandstone tablet sunk to floor level. Three years later, 1927, when we returned for further observations, we learned that the present Kiva R bench, 29 inches high, was preceded by two others and that our sub-floor repository actually extended to the bench of the original, a total of 4 feet 9 inches. Also, the repository gave access to an earlier niche, neatly plastered but empty, in the second-type kiva bench (fig. 22).

That portion of the original Old Bonitian bench exposed by our test pit measured 22 inches high but varied in width from 9 to 13 inches. Its associated floor, at 6 feet 7 inches, overlay a thick layer of shale chips and chunks of dried adobe from razed walls and roofs. Upon that floor, however, were four successive layers of sand and water-soaked mortar each layer, like the original, slanting toward the middle. The uppermost of these four, darker than its predecessors and ash-strewn, was, in turn, overlain by successive strata of wall plaster and shale.

Nineteen inches of first-type masonry, thickly plastered and whitened, rose vertically above the Old Bonitian bench and thus provided a solid foundation for the second-type bench that followed, 29 inches high. Above this latter were 9 inches of what I consider constructional debris and then the latest Kiva R floor with its enclosing bench of excellent laminate stonework (pl. 24, right).

A test on this latest bench between Pilasters 2 and 3 showed a soft sand and clay fill to the slab-surface of its second-type predecessor. This second-type bench likewise was filled behind its facing masonry but with spalled sandstone and mortar rather than with sand and clay only. My notes contain no reference to wainscoting poles on the second-type bench, as on the later one, but stress the outward slant of the main wall. This consisted of large blocks of dressed friable sandstone, chinked in the characteristic second-type manner. The only puzzle remaining is that 19 inches of vertical Old Bonitian stonework at the bottom.

An accumulation of windborne sand almost ceiling high, traceable remains of roofing timbers through that sand, and a noticeable lack of occupational debris upon the floor unite in suggesting that Kiva R continued in use until the last few families were ready to leave Pueblo Bonito.

Old Bonitian kivas, as made known by our incomplete studies, have wide benches and walls that flare outward like the sides of a bowl. None has any suggestion of vertical stonework above the bench. Hence my perplexity over that in the original of Kiva R.

As stated in Chapter II, our best example of an Old Bonitian kiva is the one we discovered at the northwest corner of the East Court, divided by the north enclosing wall of Kiva 2-C (pl. 23, right). Its indicated diameter is $22\frac{1}{2}$ feet; its main wall, on the west, stands 10 feet above the bench but 2 or more additional feet apparently were removed prior to construction of the unnumbered room between 211 and 212. The east side of this unnumbered room overhangs the old kiva interior by 18 inches; supporting beams, if any, had decayed.

The bench in this Old Bonitian kiva is surfaced with sandstone slabs and plastered. It measures 25 inches high and 34 inches wide and thus exceeds both in width and height that at the bottom of our Kiva R test. Only two pilasters are present in the surviving half, thus indicating four roof supports in the tradition of P. I and early P. II 4-post houses. The two average $10\frac{1}{2}$ inches wide by $6\frac{1}{2}$ inches high; each consists of a 6-inch log, set back 7 or 8 inches from the bench front and its butt end embedded in the wall masonry and packed about with shale chips. Although still 25 inches high, the white-plastered bench masonry in this old kiva extends to an earlier floor or work surface 13 inches lower—a surface overlain by a 5-inch layer of shale and covered by stone-impressed adobe chunks, presumably from razed walls. Thus whitened plaster and utilization of

shale chips—repeatedly noted in and under Late Bonitian buildings—are both Pueblo II traits at Pueblo Bonito.

Pilaster offerings were lacking in this Old Bonitian half-kiva as in the fragment beneath the terrace out in front of Room 324 (pl. 23, left). Pilasters are not mentioned in Pepper's description (1920, p. 269) of a first-type kiva under Room 83, but the outward slant of its rude stonework is again emphasized. Because the profiles of all P. II kivas we know at Old Bonito, including that under the south wall of Pepper's Room 83, reflect the bowl-like shape of their P. I ancestors, it is possible I overlooked some important factor when examining the three superposed kiva benches in that $6\frac{1}{2}$ -foot pit we dug below floor level in Kiva R (pl. 24, right).

The distinctive stonework of Old Bonito is to be seen repeatedly east of Room 83 (fig. 3), and I am confident Late Bonitian architects razed and replaced with their own more Old Bonitian dwellings and kivas throughout this section than our data indicate.

Kiva G, in the northeast quarter of the pueblo, offers superficial evidence of long occupancy like Kiva R and at least two revisions (pl. 70, upper). As I read the record, part of the original is represented in the convex middle section of the Room 62 second-type south wall and its continuation eastward where it forced a corresponding convexity in remodeling the west side of Room 264. Next, this original was replaced by a larger kiva, also of second-type masonry, whose 20-inch-thick wall is preserved on the west side of Kiva G and in the stonework above its south bench recess. The northeast quarter of this enlarged kiva abuts the exterior of rebuilt Room 62 and, curving southeast, is lost in confused stonework against the outer west side of 264.

Kiva G as it now exists was built within that enlarged second-type structure, but an elongation to the east resulted when the builders apparently attempted to utilize part of the kiva wall they were replacing. Finally, and only to correct this asymmetry, a mongrel stonework was introduced between Pilasters 1 and 3 (pls. 68, left; 69, upper) and westward as far as Pilaster No. 4 at a height of 6 feet 4 inches.

Normally the masonry of a kiva bench surpasses that of the wall above. In Kiva G the bench averaged 24 inches high by 35 inches wide; the upper half of it is composed entirely of laminate sandstone in what could be called either third-type or fourth-type, repeatedly plastered and whitewashed. Below Pilasters 2 and 3 we counted 21 coats of whitened plaster. Six pilasters stand upon the bench, each

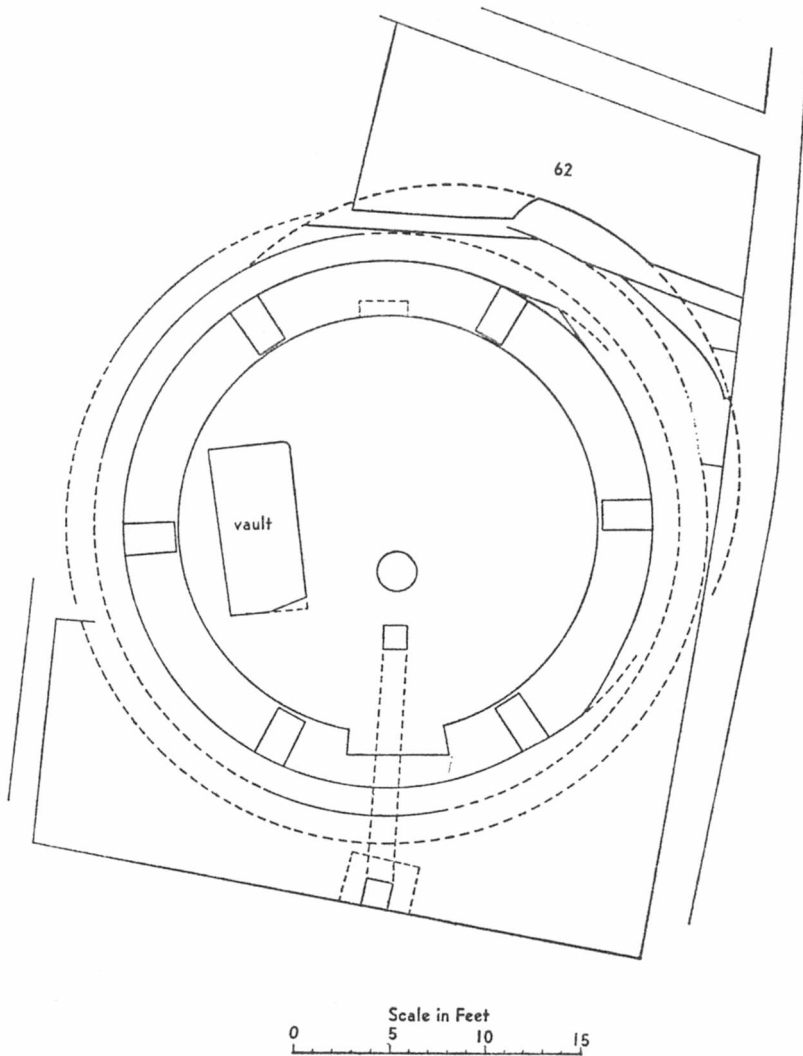


FIG. 19.—Kiva G, of second-type masonry was twice remodeled.

consisting of a log core 8-10 inches in diameter and sunk 2-4 inches into the bench top, veneered at the sides with small-stone masonry and thickly plastered. Above bench level the lower $3\frac{1}{2}$ feet of the kiva wall had been plastered once but this was concealed by a wainscot of 3-inch upright posts, placed about 8 inches from the wall 5-6 inches apart, and packed behind with bunchgrass. After a foot of blown sand had collected upon the floor (26 inches at the south) fire had destroyed grass, cribwork, and the pilaster logs. Charred offerings were recovered from all but No. 3.

Kiva G is a typical Chaco-type kiva with central fireplace, subfloor ventilator going under the south recess, a north bench niche, and a west-side vault, well floored and lined with masonry that included several stones-on-end. The north-bench recess measured 29 inches wide by 9 inches high and 13 inches deep; it was plastered inside and its floor whitened. Outside and below each jamb was a shallow depression, of unknown significance if any. But what interested us most of all was the lower half of the bench facing (pl. 70, lower). It looked to me at the time like Old Bonitian stonework, and I still believe it to be such, but in retrospect I realize a test pit should have been dug to the bottom to ascertain its depth. Kiva G was partially demolished when the Braced-up Cliff collapsed January 22, 1941 (Judd, 1959*b*), and it is possible this remnant of apparent P. II masonry was lost at that time.

We counted 37 circular kivas in Pueblo Bonito of which 28 are a local variety I have called "the Chaco type," 2 (A, Q) are super-kivas—Great Kivas as they are now known to the profession—and 7 (E, I, X, Y, 2-E, 59, and sub-162) are either foreign to Chaco Canyon or are examples of the dominant local type that were revised to meet the preferences of peoples migrant from northern mesas and valleys where high masonry roof supports, deep south recesses, and above-floor ventilators are standard kiva fixtures.

McElmo, or proto-Mesa Verde, pottery types were conspicuous in or near these seven foreign-influenced kivas and the same pottery types were preponderant at Pueblo del Arroyo, 300 yards down valley, where four of the seven Chaco-type kivas excavated for the National Geographic Society had been converted by their last occupants to the northern, above-floor-ventilator variety (Judd, 1959*a*, p. 172).

In addition, we have at Pueblo Bonito 9 or more rectangular rooms (3*a*, 71, 309, 315, 316, 328, 350, 351) that may, conceivably, have been closely associated with ritualistic practices. Such rooms are

repeatedly noted in the literature pertaining to Pueblo villages, ancient and modern, throughout the Southwest. Pepper (1920, p. 40) identified Room 3 as a rectangular kiva but the several features that prompted his identification—slab-lined fireplace, deflector, and “entrance to a passageway”—actually occur in the room above, 91,

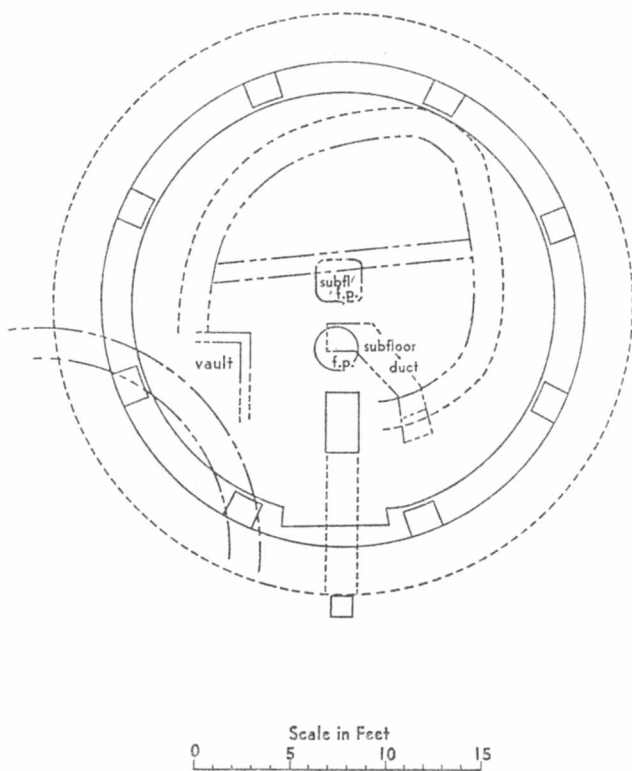


FIG. 20.—Kiva J with subfloor structures.

and as I interpret the published description Room 91 was no more than a second-story dwelling with a hatchway to Room 3, below, and an open door to Room 92, adjoining, with its store of beans, bean bushes, and corn on the cob. In one of my early articles on Pueblo Bonito (Judd, 1925, p. 260) I prematurely identified the Old Bonitians with quadrangular ceremonial rooms only to discover my error during excavations of 1924 and 1925.

If a majority of our Pueblo Bonito kivas are represented (fig. 5) as built of what I have called third-type masonry, it is, I believe,

largely because their stonework includes a great deal of second-hand material—dressed blocks of friable sandstone salvaged from razed second- and third-type kivas and contemporary structures whose remains underlie much of the pueblo (figs. 4-6).

SUPER KIVAS

Our two super-kivas, A and Q, are Late Bonitian creations and so, too, is their predecessor the remnants of which we found unexpectedly in 1925 12 feet under the West Court (fig. 7). In neither of the three structures did I see the slightest evidence of Old Bonitian participation. All are Pueblo III exclusively. Kiva A is younger than Q; it is, as a matter of fact, one of the last major construction projects undertaken by the Late Bonitians. If, in this presentation, I omit consideration of other Great Kivas, let it be remembered that this is a study of Pueblo Bonito architecture only and not a compendium of southwestern archeology.

GREAT KIVA A

Kiva A, central and most conspicuous feature of Pueblo Bonito, was excavated by the National Geographic Society in the summer of 1921. Contrary to published statements (Hewett, 1922, p. 125; et al.) the Hyde Expeditions of 1896-1899 did not excavate Kiva A but did clear the peripheral rooms overlooking the chamber from north and south. We saw no evidence of pre-1921 shovelwork within the kiva walls other than a trench that had bared 5 feet of west-side masonry.

In 1921 the Kiva A depression contained approximately 4 feet of sand and silt blown and washed in from all sides. Greasewood 4 to 5 feet high had taken root upon this fill (NGS Negs. 3018B; 7641A); fallen stonework had banked up against the encircling wall and from this pile we gathered the larger stones for future repairs (pl. 71, upper). Excavation was monotonous pick-and-shovel work; teams and scrapers removed the overturned earth.

The masonry of Kiva A is chiefly of laminate sandstone with intermittent banding and a noticeable lack of the softer, friable sandstone so abundant in Chaco Canyon. The highest intact masonry, at the west, stood 11 feet 5 inches above the floor. It was here, in this highest surviving section, that we noted three partially decayed 3-inch poles, presumably pine, embedded side by side in the stonework at a height of 9 feet 7 inches and burned off just within the wall facing. I assumed they represented the outer edge of the ceiling—the

last vestige of the original roof—so took care to replace them in exactly the same position during 1921 repair work.

Kiva A was designed with surprising precision. We measured its floor diameter at 45 feet 1 inch; 3 feet higher, at 51 feet 10 inches north-south and 52 feet 1 inch east-west. The floor was ringed by three encircling benches that vary in width and height and merge at irregular intervals. Trowel tests here and there showed that the upper bench had been built against the kiva wall, the second against the upper and the third, without foundation, against the second. As a means of convenient recording, I labeled the three, *a*, *b*, and *c*—the lower, middle, and upper—and measured width and height at 14 stations, clockwise from the east side of the north stairway. For such information as they may convey, I repeat six of the readings here-with:

12 o'clock			3 o'clock			6 o'clock		
	w	h	w	h		w	h	
<i>c</i>	12"	7"	13"	7"		13"	8"	
<i>a</i>	11"	10"	13"	26"		10"	12"	
<i>b</i>	15"	17"	17"	5"		17"	2"	
8 o'clock			9:30 o'clock			11:50 o'clock		
	w	h	w	h		w	h	
<i>b</i> }	20"	27"	42"	34"	}	21"	24"	}
<i>c</i> }	21"	10"				20"	14"	

Total width and height at the 14 stations average $40\frac{1}{2}$ inches and 34 inches, respectively.

As will be seen from the floor plan (fig. 16), the three Kiva A benches differ but little in width until about 6:45 where *b* narrows to 7 inches and then merges with *a*. From a little past 9 o'clock until about 10:20 the three unite into a single bench 42 inches wide by 34 high. In the face of this combination, 21 inches above the kiva floor are two small niches approximately 5 inches square and 8 inches deep. Both were open and empty.

Around the main wall at an average 32 inches above the upper bench are 34 larger recesses, likewise open and empty. They approximate 9 inches square by 10 inches deep, and each is capped by a sandstone slab. Between and below them in the east half of the chamber are five smaller niches, 4 of them at an average height of 19 inches and the fifth at $40\frac{1}{2}$. All are empty; none plastered. Comparable recesses may have been present in portions of the wall now fallen.

At the north where a recessed stairway 25 inches wide affords access to the so-called "altar room," 148, our encircling benches again separate, two on the west side, three on the east. On the upper (c) a 4-inch-high step with a 15-inch tread provides a sort of "land-

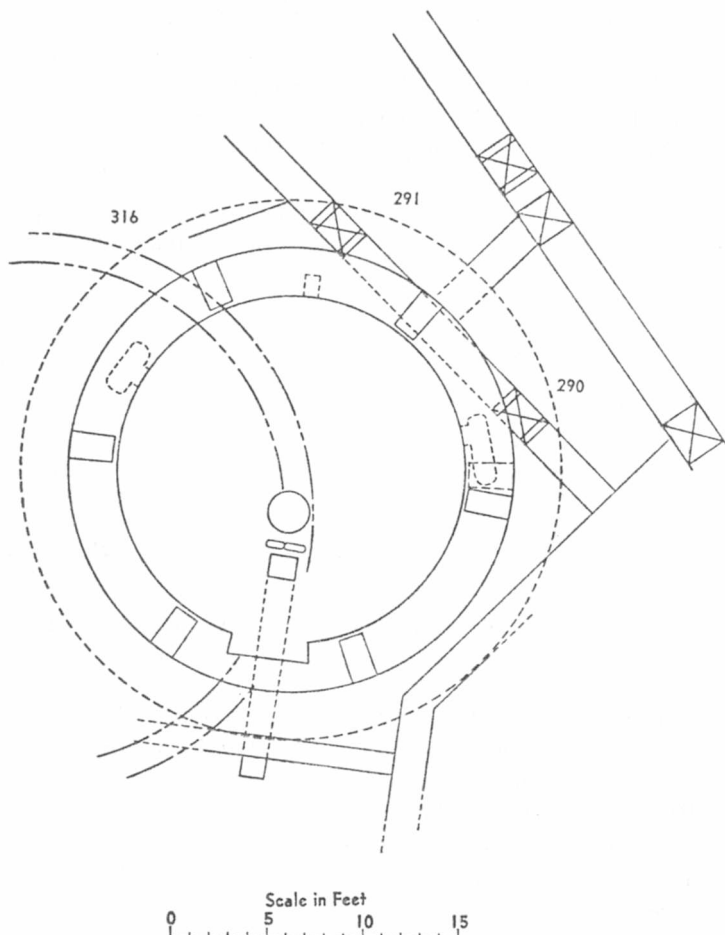


FIG. 21.—Floor plan of Kiva L with subfloor feature and overlying Rooms 290-291.

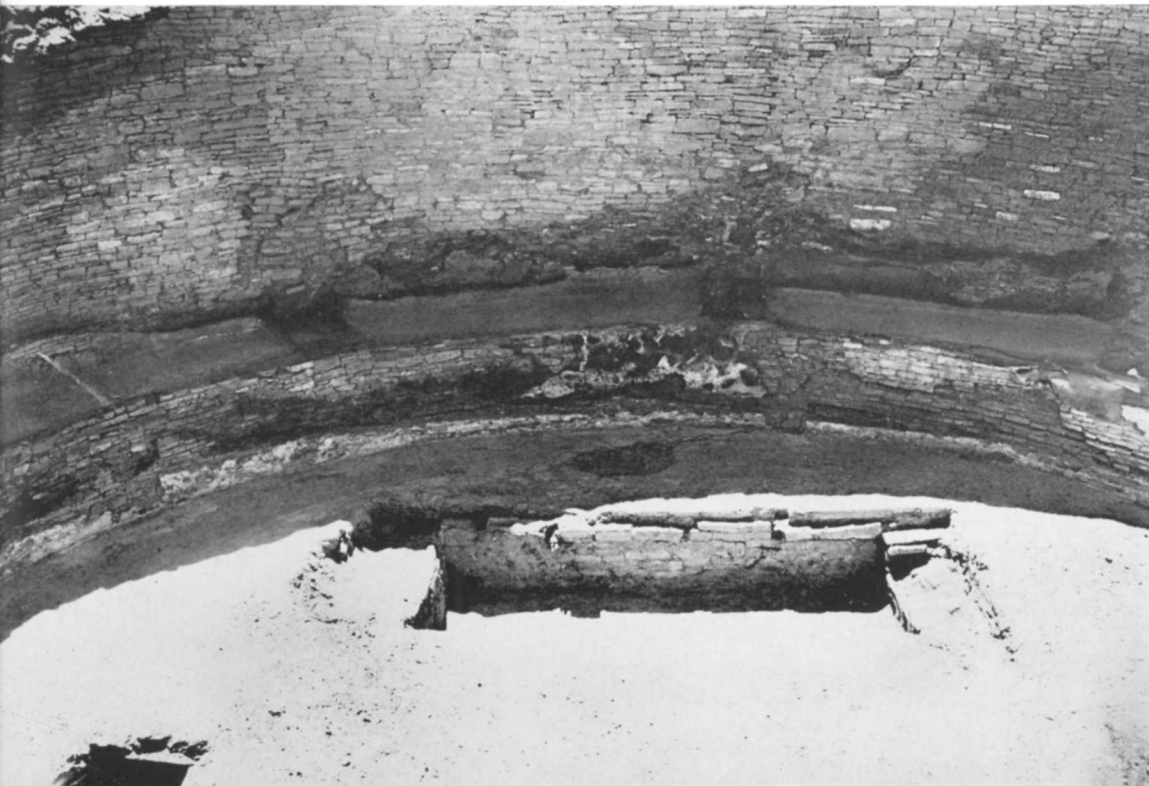
ing" for the flight of seven steps as they rise $6\frac{1}{2}$ feet to the Room 148 floor level (pl. 72, lower). Six of the steps are masonry and average 9 inches high by $6\frac{1}{2}$ inches deep. Three cedar poles about $1\frac{1}{2}$ inches in diameter lay lengthwise upon the front half of the lower step; three like poles embedded in the stairway jambs at the level of and in front



PLATE 62

Upper: The remains of an older kiva appeared beneath the floor of Kiva D and a subfloor passage to Room 241B (under ladder).

Lower: Squared pilaster timbers in Kiva D had been burned with their ceiling poles but the subfloor vault and ventilator survived.
(Photographs by O. C. Havens, 1921.)



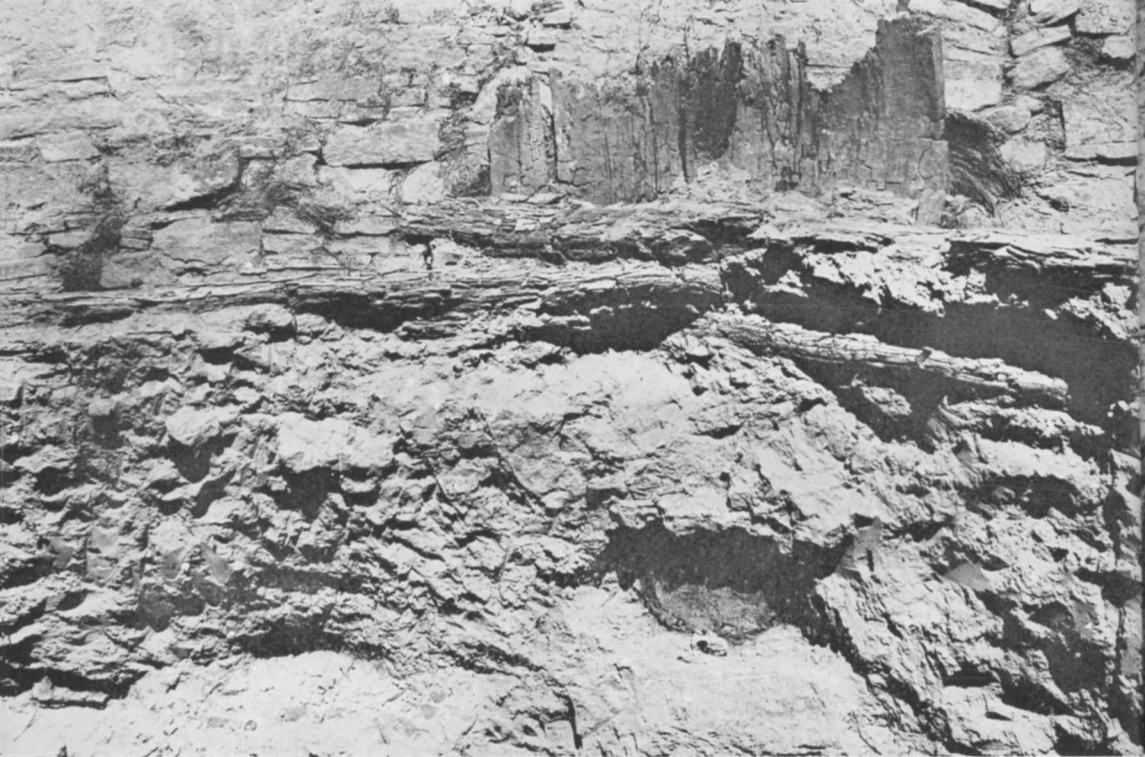


PLATE 63

Upper: Behind the cribwork in Kiva B were hand-hewn planks packed with bunchgrass.

Lower: Dwellings crowding Kiva B from the south turned its ventilator duct east to the air intake.

(Photographs by O. C. Havens, 1921.)





PLATE 64

Upper: Kiva 2-D was provided with an under-floor ventilator, a built-in air shaft at the north, and wide banquettes, east and west.

(Photograph by Neil M. Judd, 1926.)

Lower: Rooms 350 and 351 (right) were unexpected West Court discoveries.

(Photograph by O. C. Havens, 1925.)





Kiva E, restored, in foreground; Kiva J, with excavations in progress, beyond.



Beneath the floor of Kiva J was a D-shaped kiva, partly razed, with no bench and no pilasters.

(Photographs by Neil M. Judd, 1922.)

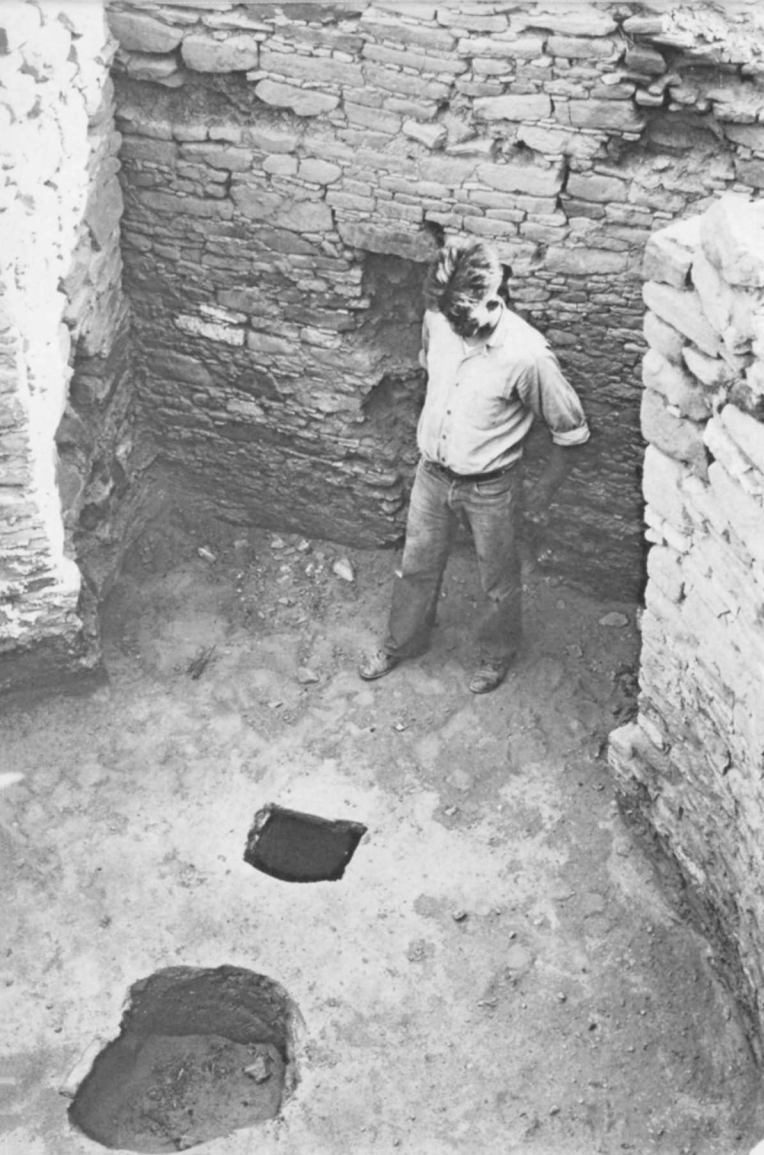


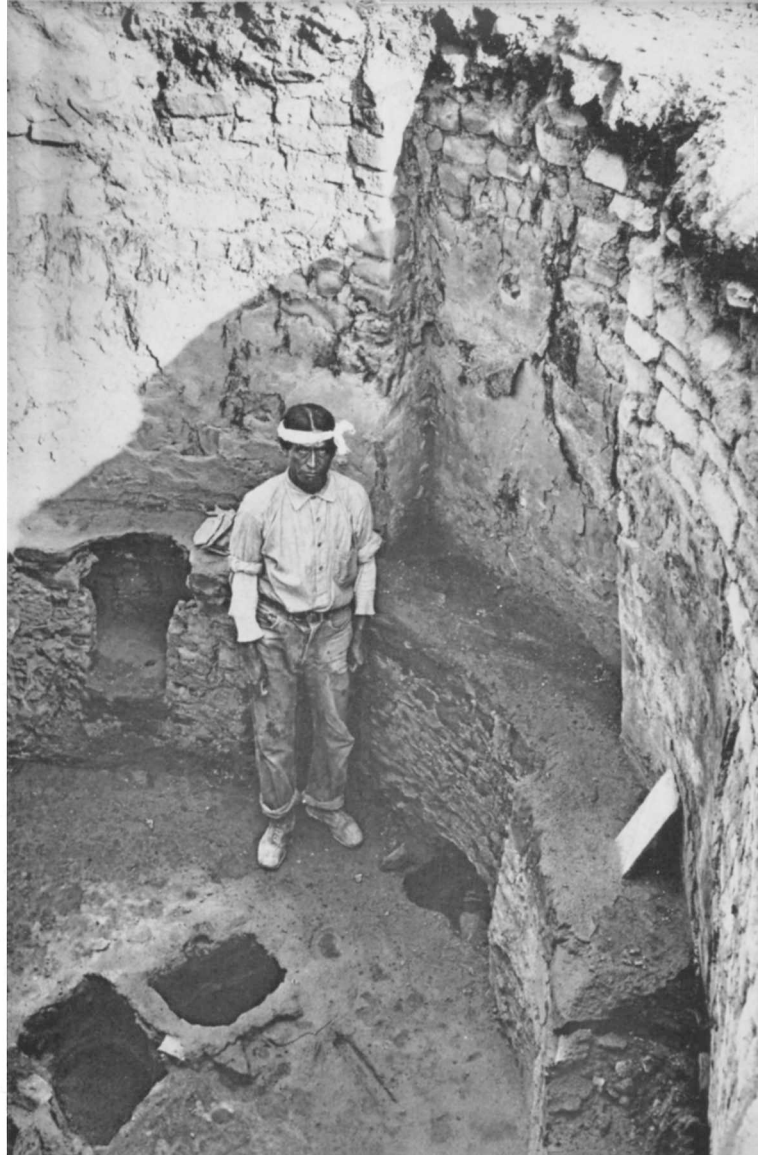
PLATE 66

Left: In Kiva 59 a broad south recess rose ceiling high with shallow niches at either side.

(Photograph by O. C. Havens, 1924.)

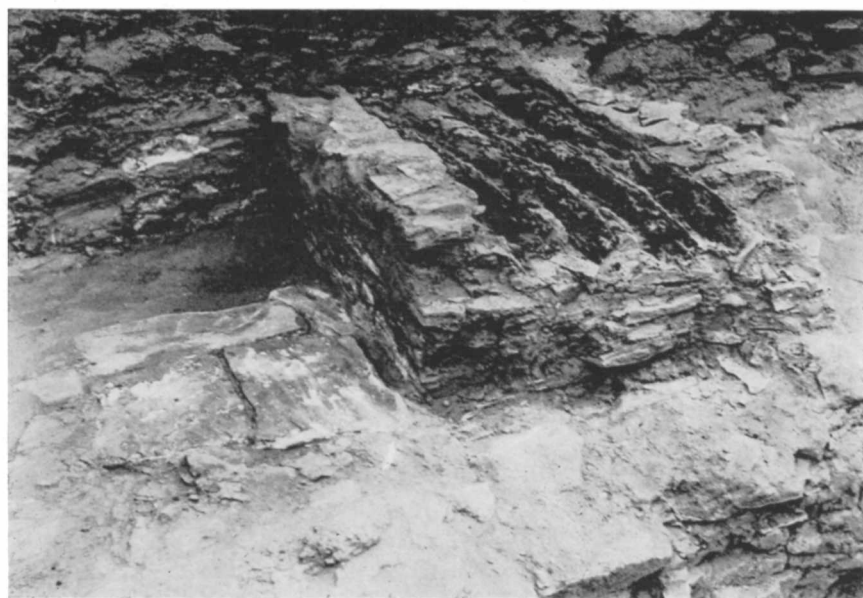
Right: Non-Chaco Kiva 2-E, at the southeast corner of the East Court, was equipped with a Chaco-like under-floor ventilator.

(Photograph by Neil M. Judd, 1923.)





Kiva X, foreign to Chaco Canyon, possessed unusual pilasters 30 inches high and a lateral ventilator.



A Kiva T pilaster with four 2-inch timbers instead of a single log.

(Photographs by O. C. Havens, 1924.)



PLATE 68

Left: Later stonework (left 2-thirds) abutted the original second-type masonry of Kiva G, to correcting an irregularity.

(Photograph by
Neil M. Judd,
1922.)

Right: Kiva X pilasters, 31 inches high, were unique with their plastered sides, 2 embedded logs, one above the other, and no setback.

(Photograph by
O. C. Havens,
1924.)

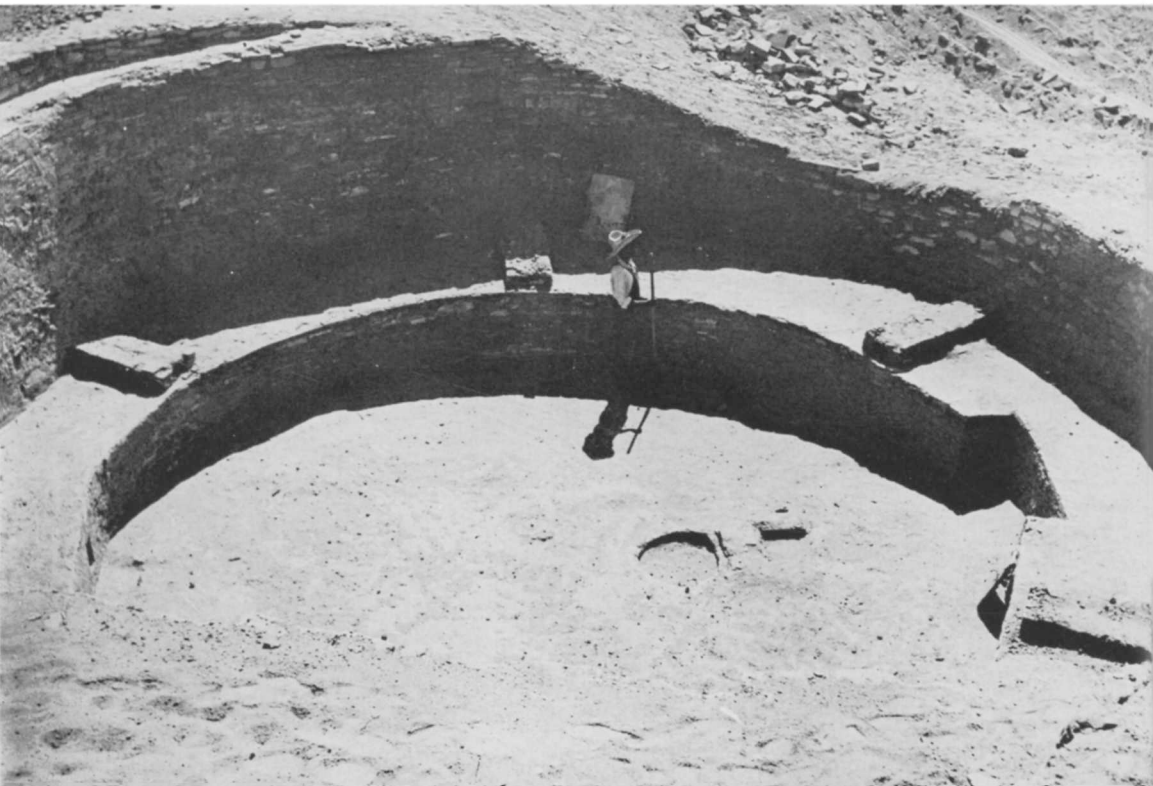




PLATE 69

Upper: Pilasters 2 and 3 (left), Kiva G, with bench posts and third-type-masonry repairs.
 Second-type north wall of Room 62, upper middle.
 (Photograph by Neil M. Judd, 1922.)

Lower: Fireplace, ventilator, and south bench recess of Kiva R with Pilasters 1 to 3 beyond and
 ceiling pole offset at upper left.
 (Photograph by O. C. Havens, 1924.)



of the remaining five masonry steps increased their tread to about 11 inches. Three poles only, without accompanying masonry, divided the 21 inches between the sixth step and the floor of 148 (fig. 16a). These cedar foretreads had all rotted, but their positions were clearly indicated and we replaced each one.

The "altar" in 1921 measured 4 feet 5 inches long, $11\frac{1}{2}$ inches wide, and 13 inches high. It was of masonry and presumably was formerly plastered. It stands a bit off center in 148 and not quite parallel with the north side.

The enormous roof of Kiva A had rested upon four masonry pillars. That at the southwest, best preserved of the four, measured 8 feet 9 inches on the north, $5\frac{1}{2}$ feet on the east, 7 feet 8 inches on the south, and 5 feet 7 inches on the west. In thickness the four sides varied from 14 inches on the south and west to 22 inches on the east. They were finished on the outside and the space within was filled with a rubblework strengthened by close-lying cedar poles that extended through from one exterior to the other. These poles were in alternating layers about 9 inches apart, north-south, east-west.

At floor level the east side of this composite pillar overhung by 4 inches a cylindrical base of rough stonework built in a dug hole 4 feet 3 inches deep, the space between pillar and bank being filled with shale chips. Opposite, under the northwest corner, we came upon the exposed portion of a large stone incorporated in the foundation. It was $7\frac{1}{2}$ inches thick, its edge had been rounded by battering, it may have been $2\frac{1}{2}$ feet in diameter. I did not explore further because it seemed to me the knowledge to be gained could not justify destruction of the overlying masonry and that of the vault adjoining. South of this stone and a foot above the kiva floor a casual wedge of mud and rock joined pillar and the lower bench.

The other three pillars differed from that at the southwest in overall dimensions but were otherwise very much alike. Each was quadrangular and stood upon a cylindrical foundation of coarse stonework built in a hole 3 to 4 feet deep and packed about with shale chips. Like that at the southwest, the southeast pillar was reënforced with cedar poles in alternating layers and its foundation, only 34 inches high, came to within 3 inches of the floor; its near corner rose 28 inches from the lower (*a*) bench. The two northern columns both evidenced reconstruction; both stood above the remains of earlier structures; both had finally collapsed into low piles of clay and rock.

Based on personal notes and on photographs made by the Museum of New Mexico shortly after excavation of Great Kiva A, Gordon

Vivian (1960, pp. 67-70) doubts the presence of shale under the four local columns because he saw none and he states that the southeast pillar (identified by his figure 31) had been rebuilt since excavation to provide a circular timber socket. The Pueblo Bonito Expeditions began and concluded their study of Kiva A as part of the 1921 program and the reported pillar alteration could only have been accomplished some time later. The southeast pillar, like that at the southwest, had been braced by crossed poles and those still present, however decayed, were left as we found them (pl. 74, upper).

Shale, occurring with low-grade subbituminous coal that sometimes approaches lignite in quality, is a product of the Menefee formation which underlies Chaco Canyon's Cliff House sandstone (Bryan, 1954, p. 4; Shaler, 1907). It was lavishly employed at Pueblo Bonito both as a wall packing about pilasters and elsewhere and as an under-floor spread but was never, to my knowledge, used as a fuel in the manner of the prehistoric Hopi (Colton, 1936; Hack, 1942).

Sunken, masonry-lined vaults of unknown purpose abutted the north side of the two southern pillars. That adjoining the southwest column although reduced to an average height of 12 inches on the east side and 22 on the west—the number of dislodged stones did not indicate any appreciable increase—appeared continuous with the pillar masonry as though built at the same time (fig. 16). Originally plastered and measuring 9 feet 5 inches long, 50½ inches wide, and 30 inches deep, this vault was subsequently reduced to 6 feet 4 inches long by 33 inches when abutting masonry was introduced at the north end, the remainder filled with clean sand covered with flagstones, and new masonry built upon the slabs (pl. 71, lower).

Apparently the sides of that southwest vault formerly continued north to enclose a companion but this latter had been razed and replaced by a third vault on a floor 8 inches higher. Lying across the doubled masonry between the older vault and its replacement was a sandstone slab 1½ inches thick, 24 inches wide, and 33½ inches long with two corners missing.

Comparable vaults with varying floor levels occupied the space between the southeast pillar and that at the northeast. This latter, like its opposite at the northwest, had been repaired once or twice but finally was reduced to a low square standing upon its foundation of rough stonework. In this instance the foundation had been built in a hole 4 feet deep the diameter of which was a foot greater than that of the foundation itself thus leaving a 6-inch space all around that was filled with loose shale to within 10 inches of the kiva floor.

A test pit at this point (pl. 73, right) disclosed remnants of two earlier kivas with floors at depths of 23 and 39 inches.

A second limited test farther along the east wall, at about 4 o'clock, showed the lower bench (*a*) averaging 12 inches in height with no foundation. Its lower 3 inches were abutted by constructional debris and above that were no less than 17 successive adobe surfaces or compacted sand layers, each ash-darkened and thickest next the bench as though piled there by circulating air currents. Farther removed, less dubious floors appeared 5, 11, 14, and $15\frac{3}{4}$ inches above the original work surface.

The southeast vault apparently was built on the first of these surfaces, that at 5 inches, while its northward extension was built on the ninth at 14 inches (pl. 74, upper). An 8-inch post formerly stood near the north end of this addition and just around the corner, underlying the masonry, was part of a thick stone, its edge rounded by pecking as was that beneath the outer corner of the southwest pillar. A foot or more of blown sand, chunks of burned roof adobe, and scattered pieces of charred wood crossed the vault and sloped thence to the top of the middle bench (*b*). Above it, water-washed sand and clay and fallen masonry sloped up to East Court level.

The southeast pillar foundation stood upon a silt surface in a hole 34 inches deep and was packed all around with shale fragments. On that same silt surface and underlying the lower bench was a 20-inch layer of household sweepings mixed with debris of demolition. From this mixture we recovered a number of McElmo Black-on-white potsherds, proto-Mesa Verde, and Little Colorado Polychrome—fragments that readily identify Kiva A as of late construction. Clean sand was encountered at 5 feet 10 inches.

Midway between this southeast pillar and that opposite, the southwest, stood a raised masonry fireplace 23 inches high and a little more than 5 feet square. Its outer corners were rounded; its basin was clay-lined, burned, and ash-filled. There was a draft deflector, or fire screen, $3\frac{1}{2}$ feet to the south—a screen consisting of wattlework 5 feet 2 inches long, height unknown, supported by five posts and with a 28-inch long adobe extension subsequently added at the east end. Not quite parallel with the fireplace and not quite aligned with the pillars on either side, this screen had been built on the fifth floor level, about 8 inches above the bottom of the fireplace—a fact evidencing its late installation (fig. 16).

In the open space fronting the fireplace, various test pits revealed formerly occupied surfaces and portions of wall masonry. On a

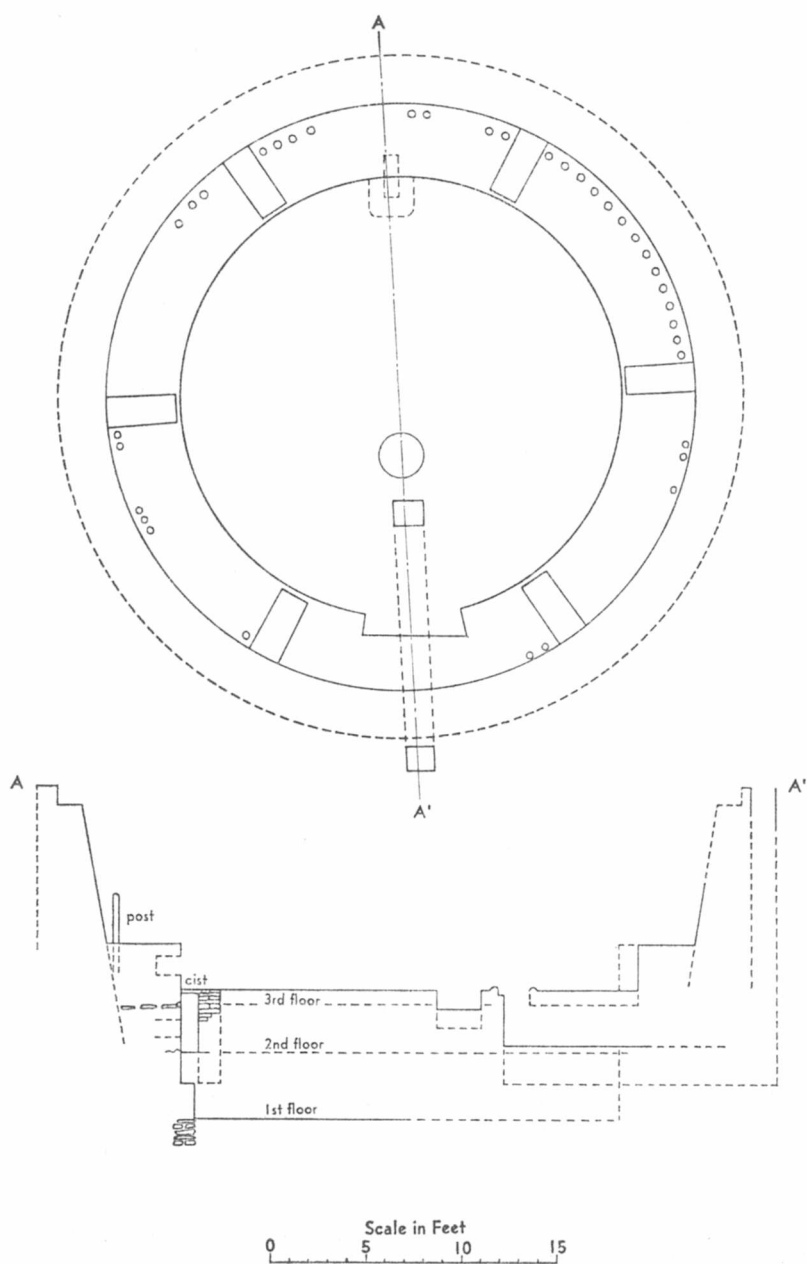


FIG. 22.—Kiva R with cross section, A-A', showing relationship of its predecessors.

floor at depth of 20 inches and partly underlying the west side of the southeast vault was a fireplace measuring 16 by 28 inches and 14 inches deep. A couple feet west of this but on an ill-defined surface 3 feet deeper, we encountered parallel walls of third-type masonry 22 inches apart and about 29 inches high, one 17 inches thick and the other 20. Still another wall fragment, 18 inches high, its broken end abutted by the foundation under the southeast pillar, extended thence west beneath the Kiva A fireplace on a floor at depth of 30 inches.

Beyond these under-floor features, and there were others, our attention was diverted momentarily by apparent rodent burrowings, varying in size but all filled with soft, ashy earth. At the northwest the hole prepared for the pillar foundation had cut through the arc of a partially razed earlier kiva, its floor at depth of 23 inches. Outside that arc and on a well-marked surface 8 inches deeper, we encountered an intentional dump of constructional debris. Through it a vertically cut bank, the marks of digging sticks still plain upon it, curved back under the doubled bench as though prepared for a larger kiva that was never built.

All that remained of the Kiva A roof in 1921 was a pair of decayed logs lying lengthwise upon the east vaults. To bridge the distance from one pillar to the other those logs must have been at least 30 feet long. Presumably they were paralleled by a second pair on the west side; presumably shorter pairs spanned the shorter distance at each end of the long logs; presumably lesser timbers covered the middle ceiling from east to west while others reached out from the paired beams to the surrounding wall and there were firmly seated in the upper stonework, as in Kiva L and others of its kind.

I assume the 3-inch poles embedded side by side in the west-wall masonry 9 feet 7 inches above the Kiva A floor were among such lesser, bordering timbers and that their opposite ends rested upon the paired beams. If those paired beams were each 12 inches in diameter their supporting pillars must have stood at least 8 feet high to allow for a $9\frac{1}{2}$ foot ceiling. It seems incredible that 4 mud-and-sandstone columns 8 feet high, even when strengthened by crossed poles, could support the enormous weight of a roof 45 feet across and a foot or more in thickness. But there is no alternative. We saw only one possible ceiling prop, the butt of an 8-inch post near the northeast corner of the east vault.

This matter of weight and ceiling height introduces the question of the relationship between Kiva A and its peripheral rooms, three on

the north side and five on the south. All eight had been cleared by the Hyde Expeditions prior to 1900 and we have no contemporary data regarding the operation. All were of relatively late construction. Each room overlies the remains of earlier structures; each appears to have been a sacrifice to religious necessity; each was a 3-walled room. In no instance did I see positive evidence of a fourth wall upon the kiva stonework.

Only in Room 148 was there the possibility of such a fourth side—a remnant now 14 inches high where it abuts the east-wall foundation and is floored over from there to the top of the stairway and the broken edge of the kiva masonry. Opposite at its west end, that possible south-wall remnant is covered by 3 inches of adobe pavement; an earlier floor at depth of 25 inches had been cut through apparently when the kiva was built, and the ends of two 5-inch logs lie embedded in the kiva stonework. So far as I could judge, and against my better judgment, Room 148 had opened directly into Kiva A.

Of the eight peripheral rooms only one, 318, was provided with a fireplace; only two, 317 and 318, were connected by an open doorway. All other doors, inside and out, had been blocked with building stones.

Just beyond the north end of Room 150 and a foot above its floor an 8-foot-long concavity in the abutting East Court masonry evidences construction of the latter against a previously standing convex curve. Opposite, on the west side of Kiva A, wall masonry in 1921 measured 11 feet 5 inches high. If that masonry formerly rose to ceiling level of Rooms 144 and 146 the bordering West Court wall would have been continuous throughout and would have stood approximately 7 feet above my estimated roof level of Kiva A (Judd, 1922*a*, p. 116). And such height on one side would normally require a compensating height on the other.

Nowhere in my 1921 notes do I find any fact to justify the thought that walls 16 to 18 feet high once enclosed Great Kiva A. With the possible exception of 148, the peripheral rooms apparently stood open and unroofed. Despite the bulk of excavation waste thrown from them into the kiva and partially represented by the piles of stone we salvaged for repair work (pl. 71, upper), I doubt that the kiva wall ever stood more than 2 or 3 feet above floor level of those rooms.

Room 148 is the exception. Architecturally, it remains enigmatic, unsolvable. Its floor lies 8 feet 3 inches above that of Kiva A, 16 inches below the Kiva A ceiling as represented by the 3 roofing poles

embedded in the west masonry. Either the sacred rites performed within 148 were exposed to all passersby, which would be most unlikely, or the Kiva A roof rose 18 feet to roof level of Room 148, equally unlikely. A roof sloping, say, from the north beams in Kiva A to roof edge in Room 148 would be architecturally unthinkable anywhere in the Pueblo country.

From what we found, I believe Great Kiva A was deliberately demolished and its roofing timbers withdrawn for use elsewhere. Hence the broken wall all around and the broken flooring adjoining in each peripheral room. The data in hand do not evidence destruction by fire. Neither before nor after abandonment was Kiva A utilized as a repository for neighborhood rubbish. It was not a dump. Besides the usual assortment of lost beads, paint stones, arrowpoints, and curious minerals, we recovered during excavation only 1,830 miscellaneous potsherds and only one piece of stone worthy of note. Without protest on my part, our enthusiastic Zuñi masons during 1924 repairs to the bordering West Court wall installed a Kiva A building block incised with a running zigzag.

From this recital, however inconclusive, the informed archeologist will have noted many striking similarities to the Great Kiva at Aztec Ruin, excavated and convincingly described by the late Earl H. Morris (1921).

GREAT KIVA Q

Kiva Q, our second Great Kiva at Pueblo Bonito, is older than Kiva A and less complicated. It had 4 large pine posts rather than masonry columns as roof supports. It had a single bench rather than three encircling the floor at base of wall. There are no peripheral rooms. Kiva Q lacks the numerous wall niches of Kiva A and the recessed stairway to a north "altar room." But, unlike A, it has a south alcove, or possible entrance-way, from which steps led to court level and it had a midfloor repository that might reasonably be considered a *sipapu*. This second Great Kiva is in the pattern of superkivas elsewhere but it has its own unique features (fig. 17).

The masonry of Kiva Q does not fit into our local scheme. It is predominantly of laminate sandstone with infrequent blocks dressed by pecking or rubbing. It is neither our second- nor our third-type but seems more closely related to the latter. Measured at time of excavation the floor averaged 40 feet in diameter and was encircled by a bench that varied considerably both in width and height but averaged 25 by 23 inches. Above-bench masonry, 38 inches thick,

stood 9 feet 7 inches high at the north side, 8 feet at the east, and 3 feet 8 inches in front of the south alcove. Although plaster survives here and there absence of sooting suggests that the walls were formerly covered full height.

Four pine posts, 15-18 inches in diameter, had supported the Kiva Q roof. That at the northwest, the only one we examined, stood upon a large sandstone slab in a neat masonry cylinder 36 inches in diameter by 9 inches deep, filled with shale fragments and covered by a closely-fitted slab pavement 7 feet 4 inches in diameter. The other three posts were similarly seated and likewise surrounded by flagstones, shale chips beneath. Those on the east side, best preserved, were about 3 feet high but too decayed for ring analysis (pl. 75, lower).

Although no trace remained of roofing timbers, large beams necessarily spanned the distance between posts as in Great Kiva A. Originally I estimated a ceiling height of 12 feet under the impression it must have been continuous with that of the alcove. Ten feet would have been a better guess. Our figure 7 shows the Kiva Q floor 11-12 feet below the 1924 West Court surface; the alcove deserves at least a 5 foot ceiling. We made no underfloor excavation.

On each side of the chamber is a masonry-lined, sunken vault, neater in construction than those in Great Kiva A and free from additions and substitutions. That on the east, 4 feet 8 inches wide by 6 feet 7 inches long and 13 inches deep, had walls 10 inches thick, topping off flush with the kiva floor. A companion vault on the west side measured $4\frac{1}{2}$ feet wide by 6 feet 5 inches long and 16 inches deep. Unlike that on the east, however, its masonry walls are 14 inches thick, stand 3 inches above the floor, and are of superior external construction. Further, this vault was paved with packed sand, a thin layer of shale chips on top.

Between the two vaults, 11 feet 10 inches from the south bench, is a masonry fireplace averaging 52 inches square by 29 inches high. Its fire pit, 28 inches in diameter and 12 inches deep, was floored with sand. On the north side at kiva floor level is a draft opening or flue, 8 inches wide by 10 inches high, its sill and lintel both of sandstone slabs. Twenty five inches north of this raised fireplace our Zuñi workmen cleared an unburned but ash-filled basin 18 inches in diameter, ringed with adobe 6 inches high and 39 inches across. It was, they insisted, the container for ashes from the principal fireplace.

A subfloor depository of neat masonry 12 inches in diameter by

8 inches deep and apparently built upon a slab at that depth, lies 11 feet north of the fireplace. It was covered by a thin sandstone slab 20 inches in diameter and, like that in nearby Kiva R, was empty. This feature occupies the same relative position of the *sipapu* in northern kivas, and I should be tempted to regard it as such except that the *sipapu* is foreign to Chaco Canyon kivas, even those of northern inspiration.

At 3 feet 9 inches south of the raised fireplace a slightly crescentic masonry-lined receptacle 6 feet 5 inches long, 6 inches wide, and 25 inches deep marks the position of a former deflector or firescreen. Within were the butts of nine 2-inch posts, tightly packed in shale, the supports of a probable wattlework screen.

Between this deflector and the south bench, 28 inches from the latter, three decayed poles with an overall width of 37 inches identify a former ladder, slanting toward the middle of the kiva ceiling. Each pole was seated in a hole, depth undetermined. Our Zuñi say that old-time kiva ladders always had three poles (pl. 75, lower).

Behind this 3-pole ladder and 62 inches above the Kiva Q bench, is a small alcove or antechamber, measuring 6 feet 4 inches on the east, 6 feet 5 inches on the west, 8 feet 9 on the south, and 8 feet 7 on the north. Since 18 inches of kiva wall had collapsed at this point, we do not know the size and shape of the connecting opening, if any. There is no trace of a north side to the alcove; no evidence of a stairway beneath. Therefore if the alcove opened into Kiva Q, it opened full width and at its own floor level. At its south end the antechamber has 3 steps 29 inches wide, the lowest 15 inches above floor, leading to the West Court. There may formerly have been other steps to the flight since the surface here is much eroded and slopes toward the kiva. At its inner southeast corner, the alcove masonry now stands only 30 inches high (pl. 75, upper) but a 5-foot ceiling does not seem unreasonable.

In his description of Great Kiva Q, which he renamed "Pueblo Bonito II" for his own convenience, Gordon Vivian (1960, p. 65) doubts the existence of this south alcove and otherwise complains because the situation as he found it in 1940 did not agree with his preconceived notions. He was especially annoyed with reconstructions at the antechamber, and rightfully so. It is a very incompetent job. But Vivian was too hasty in placing the blame! Had he troubled to inquire of his Park Service superiors he could have learned which of his colleagues repaired walls at Pueblo Bonito between 1924, when I excavated Kiva Q, and 1940, when he recorded his opinions. Vivian

surely knew that, then as now, except for Service personnel an official permit is required for any activity on a national monument. All 1924 repairs made in Kiva Q, and they were made under my supervision, are listed in Appendix C. Where they differ from Vivian's 1940 observations the latter are at fault. Restoration of the south antechamber, clearly seen in his figure 30, is not a product of the National Geographic Society's expeditions. Furthermore, our only underfloor inquiry was that at the northwest pillar.

In the north wall of Kiva Q, opposite the south alcove and 46 inches above the bench, we found seatings for four 5-inch timbers, their over-all width 11 feet 3 inches (fig. 17). Each contained shreds of decayed wood.

During 1924 wall repairs we unexpectedly came upon a cache of diversified objects with meaning only for the old ritualists who practiced in Great Kiva Q (Judd, 1954, p. 323). The lot (U.S.N.M. No. 336041) was concealed in an unplastered recess in the stonework above the easternmost of the 4 empty beam sockets or 5 feet 4 inches above the bench. Except for a west jamb $8\frac{1}{2}$ inches high, thus equalling the wall recesses of Great Kiva A, nothing remained of the opening through which, presumably, the objects had been passed. We saw no trace of other, comparable repositories.

Because this north wall was endangered through seepage we restored it to a height of $10\frac{1}{2}$ feet with a downward slope on the Kiva R. side. Our restoration at the north may have exceeded original ceiling height, of which no evidence remained, but I felt it necessary as a means of supporting the debris fill under the southwest corner of the Kiva 16 enclosure and the open courtyard fronting Room 28B (pl. 73, left).

Overhanging the east arc of Great Kiva Q, paired logs formerly carried the west wall of an unnumbered room between 211 and 212 and when those logs decayed they let fall not only the masonry they had supported but 23 metates and metate fragments stored in the room (Judd, 1954, pl. 31, upper). This overhanging wall was of later construction than that of Kiva Q, although I have classed both as third-type on the basis of their preponderant use of laminate sandstone. The same type of stonework appears in paired walls subfloor in that unnumbered room and in those on either side. Walls carried on paired beams are a recurrent architectural achievement of the Late Bonitians as witness those in Rooms 55, 247BN, 290, 291, and others noted herein.

When we began excavation of Great Kiva Q in 1924 its depression,

as in the case of Kiva A, contained 3 or 4 feet of wind-blown sand and silt in which chico brush had taken root. Building stones fallen from the enclosing masonry had collected around the edge but there was no evidence of a neighborhood dump. Other than the 23 milling stones and fragments found along the eastern side we recovered less than a dozen discarded stone implements throughout the fill. One of these was part of a notched cobblestone ax, noteworthy only because axes of any sort, irrespective of quality, are exceedingly rare at Pueblo Bonito.

Normally an excessive number of miscellaneous potsherds will identify a former trash pile but, in my opinion, out-worn and discarded household implements provide stronger evidence. Only a handful of such tools was found in Kiva Q while the sherds numbered 4,527. Among these Roberts and Amsden counted 3 as pre-Pueblo; the remainder as Old Bonitian or Late Bonitian, the latter preponderant with 24.9 percent Corrugated Coil and 11.8 percent Chaco-San Juan or Mancos Black-on-White. In addition there were scattered over much of the floor, and directly upon it, bits of squared claystone and turquoise—pieces from one or more treasured mosaic ornaments, crushed beyond repair.

Great Kiva Q had its predecessor, a completely razed structure we came upon unexpectedly in 1925 while digging a West Court exploratory trench. Only remnants of the north and south benches, parts of two pillars and the vaults between, and an irregular floor at depth of 10 feet 2 inches remained for our study. In the portion we exposed, practically every facing stone had been removed; hence we had but little on which to judge the age of that ruin. I guessed the razed stonework to have been of our third-type but it is more likely to have been second-type and an early project of Late Bonitian architects.

Our profile of that deep-lying remnant (fig. 7) is self-explanatory; details would be uninteresting and superfluous. With two bench points already known, we deliberately cut a third and from the three estimated floor diameter at 53 feet, hence the largest of known super-kivas at Pueblo Bonito. More precise information would have been desirable but, with 10 feet of packed clay to penetrate, one can be content with less. Marks of digging tools were still plain upon the clay bank at two points on the periphery of the 69-foot pit prepared for that Great Kiva and, just outside its former south wall, a previously undisturbed Old Bonitian rubbish pile 12 feet deep invited the stratigraphic study through which Roberts and Amsden contributed so greatly to the history of Pueblo Bonito and Chaco Canyon.

VIII. THE SOUTH REFUSE MOUNDS

Two conspicuous trash piles lie in front of Pueblo Bonito (pl. 3), and both are enclosed by contemporary masonry. Trash piles have a peculiar fascination for an archeologist because, to a degree, they reflect the lives and industries of the people responsible for their being. Since materials at the bottom would have been discarded first, a vertical section through such a trash pile should provide a partial understanding, albeit limited to the least perishable materials, of the local culture during the period of accumulation. Hence our initial archeological undertaking at Pueblo Bonito was a stratigraphic examination of the West Refuse Mound, larger of the two.

I was not aware at the time that such an examination had already been accomplished. It was mid-May 1921 when I received, through courtesy of Dr. Clark Wissler of the American Museum of Natural History, partial page proof of Pepper's Hyde Expedition notes, 1896-1899, and still later before I saw the results of Nelson's 1916 testing of the two Pueblo Bonito mounds (*in* Pepper, 1920, pp. 383-390). Nelson's findings are both confirmed and augmented by ours, as will be seen.

STRATIGRAPHY

A few days after we made camp I selected a previously undisturbed site near the crest of the West Mound, cleared away the uppermost 12-14 inches because it was loose and trampled, and dug a trench to clear sand at a depth of 20 feet (pl. 6, left). Our sampling was limited to a 3-foot square at the end of that trench, and the successive layers, irrespective of thickness, were determined by the materials between. Lenses of ash, vegetal matter, and blown sand provided clear-cut separations. We were seeking fragments of pottery, then as now a handy gage of cultural progress, but were not prepared to find early and late types—sherds typologically different and distinct—intermixed throughout the full 20 feet. Nor were we prepared to find, throughout, pieces of sandstone and chunks of discarded mud mortar in quantities dwarfing village debris. The West Refuse Mound was not a normal trash pile.

In that first attempt at stratigraphy we recovered 2,118 potsherds from 23 separate strata (U.S.N.M. No. 334180), and early and late

types were associated, top to bottom. Of the total, 820 fragments, or 38.7 percent, were black-on-white, and of these 345 were early varieties—types that Roberts and Amsden later designated Transitional, Degenerate Transitional, and Solid—while 48 percent were Hachure B, a late and preponderant variety at Pueblo Bonito. In Stratum T, an 18-inch thick layer beginning at depth of 15 feet 9 inches, there were 24 Early Black-on-white fragments and 29 of Hachure B. There were three proto-Mesa Verde fragments among the 2,118—one from Stratum H and two from N—but none I would consider Classic Mesa Verde. Only 93 sherds, 4.3 percent of the total, were of Plain-banded Culinary ware; 36.7 percent were Corrugated-coil. We recovered five Plain-banded and six Corrugated-coil fragments from Stratum U, between 17 feet 3 inches and 17 feet 8 inches deep. Such intermixture was illogical and frustrating.

There are those who still debate the distinguishing characteristics of “early” and “late” Pueblo pottery. My own 1921 yardstick, a combination of form and decoration, was based on several seasons’ fieldwork among ruins north of the San Juan River. I recognized as “early” that pottery assemblage which included Banded-neck cook pots, half-gourd ladles, squat pitchers with wide mouths, and deep round-bottomed bowls slipped with white and bearing such familiar black-paint designs as stepped squares or triangles, key-shaped figures, interlocking whorls, checkerboard, and waved or squiggled lines. “Late” pottery, to me, included the bowl-and-handle ladle, Corrugated-coil Culinary ware, ollas with down-raking handles, thick-walled bowls with dotted rims, zoned decoration, and polished surfaces. But in Chaco Canyon late black-on-white vessels had whiter slips and blacker paint than those with which I was familiar and an endless variety of rectilinear figures featuring straight-line hachure. To find these two groups intermingled throughout 20 feet of village waste was confusing in itself but the preponderance of constructional debris was confusion confounded. We cut a second stratigraphic section without clarifying the puzzle.

In 1922 we sectioned the West Mound a third time and made a more determined effort in the other. Two years later we tried both mounds again. In each of my seven attempts at Pueblo Bonito stratigraphy the results were identical: A preponderance of building waste intermixed with debris of occupation that contained both early and late pottery. How this mystery finally was solved has been related in a previous report (Judd, 1954, pp. 175-177), but, the better to understand our present subject, I may add that the Late Bonitians

were indefatigable builders. They were continually tearing down and replacing perfectly serviceable structures and the waste from such activities, along with their daily household sweepings, was carried out and dumped south of the pueblo. But, as we later learned to our astonishment, these discards had filled a broad, pre-Bonito floodway several feet deep before they began to pile up to form the two principal refuse mounds under consideration.

The Hyde Exploring Expedition in 1896 trenched both East and West mounds in search for Bonitian burials (Pepper, 1920, p. 26), and others on the same quest had been there before. Pepper does not elaborate upon these operations, but his pre-excavation view from the north cliff (*ibid.*, fig. 3, p. 20) shows both trenches, the larger crossing the West Mound opposite Rooms 138-140 and, on either side of it, lesser trenches exposing the north enclosing wall.

In July 1916, two years after his important pioneering studies in the Galesteo Basin, New Mexico, N. C. Nelson, of the American Museum of Natural History, sought stratigraphic data from these same Bonito mounds—the first inquiry of its kind undertaken here—and his findings were hastily summarized four years later for inclusion in the Pepper volume (*ibid.*, pp. 383-385). Nelson apparently took advantage of the two Hyde Expedition trenches for a vertical cut was to be seen at the side of each in 1920, the year of the National Geographic Society's Chaco Canyon reconnaissance (pl. 3).

As the one who introduced stratigraphy as a method of archeological analysis in the Southwest and who elsewhere had built a foundation for all subsequent research in this field, Nelson was both surprised and disappointed with the results of his observations in Pueblo Bonito refuse. He was disappointed because his sherd totals disclosed less evidence than he had anticipated, and he was surprised, as I was, by the incredible quantities of refuse from razed buildings.

Nelson's observations were restricted to two vertical columns, each 2 by 4 feet, which he divided arbitrarily into 6-inch layers for the recovery and study of potsherds. From the first column, in the West Mound and 16 feet deep, he recovered 1,083 fragments; from the East Mound column, 11½ feet deep, 1,040 fragments. These he sorted into four principal groups—corrugated, black-on-white, red, and shiny black—and then subdivided each lot on the basis of ornamentation. There were more than 20 varieties in the black-on-white group alone.

In the upper layers Nelson expected to find only black-on-white sherds bearing hachured designs, or a combination of hachured and

solid. From the lower layers he expected only those with thin, parallel lines and other early-type figures. To his surprise, however, there was direct association of the two groups throughout both columns. Mesa Verde-type sherds appeared first in the middle deposits; red ware and shiny black, scarce or absent at the bottom, occurred more frequently toward the top. Corrugated, present from top to bottom, comprised less than a third of the total sherd count (Nelson, *ibid.*, p. 384).

This association of early- and late-type pottery baffled me no less than it had Nelson. There seemed no explanation for the fact that here, in these two great refuse piles, fragments of globular, short-necked pitchers lay side by side with fragments of those having small bodies and high, cylindrical necks; that pieces of bowl-and-handle ladles lay juxtaposed with ladle fragments of half-gourd form; that sherds of bowls and ollas painted with stepped lines and triangles, volutes and interlocking whorls, checkerboard patterns, and squiggled hatching should occur with or even above those bearing designs in straight-line hachure. In addition, there remained the problem of building waste, unbelievable quantities of broken sandstone and chunks of wall adobe spread irregularly through household debris.

As stated above, we of the National Geographic Society's Pueblo Bonito Expeditions were quite unaware of Nelson's earlier studies here when we undertook in 1921 to learn the sequence of local pottery development. During our first four summers we made altogether seven serious attempts toward this end, and each time we were thwarted by the same inexplicable mixture of unrelated pottery types and by the abundance of waste from building operations. Not until 1925 when I invited Frank H. H. Roberts, Jr., and the late Monroe Amsden to join my field staff and take charge of pottery research was the puzzle solved. Early that season we had extended our West Mound trench to the ruin and northward through the length of the West Court (fig. 7). In so doing there were brought to light the remains of a Great Kiva built in an excavation dug 10 feet deep into an Old Bonitian trash pile and, nearby, an undisturbed remnant of that old pile.

Into that remnant Amsden and Roberts sank two yard-square stratigraphic sections, the first 13 feet deep and the second, 12. A few pre-Pueblo sherds were found near the bottom, but otherwise all the fragments recovered from the lower 8 feet were early types: Banded-neck cook pots; squat, round-bottomed pitchers; half-gourd

ladles and water jars with low-neck, if any—the black-on-white pieces decorated with mineral paint in a variety of rectilinear and curvilinear designs. Only from the upper third of those two 12-foot-deep sections were sherds recovered that bear design elements in Straight-line Hachure, a combination of Straight-line and Solid, Chaco-San Juan and, less frequently, those characteristic of the Mesa Verde plateau. Thus our West Court Trench revealed both the sequence of pottery types at Pueblo Bonito and one very obvious reason for the admixture of occupational and constructional debris in the two principal refuse mounds.

Early during their residence here the Late Bonitians chose to build a super-kiva where Old Bonitian housewives had long been accustomed to throw their household sweepings. That Great Kiva, 50 feet in diameter and 10 feet deep, served its purpose for a time and then was completely dismantled. Thus, in turn, approximately 39,000 cubic feet of Old Bonitian rubbish were removed to provide space for the kiva and subsequently, when the kiva was razed, all building materials not suitable for reuse were carried away and discarded. Much of this waste went to the south refuse mounds where, with like material from other sources, the two piles gradually increased in height as they spread out laterally—east, west, and south.

THE ENCLOSING WALLS

In successive efforts to confine these mounting accumulations and to limit their dispersal, the Late Bonitians erected rock fences or barriers around both mounds—fences that were raised or replaced as necessity required. But the interesting fact is that neither enclosure was begun until village waste had filled the old watercourse fronting the pueblo and piled up 7 or 8 feet above the valley floor as it existed at the time.

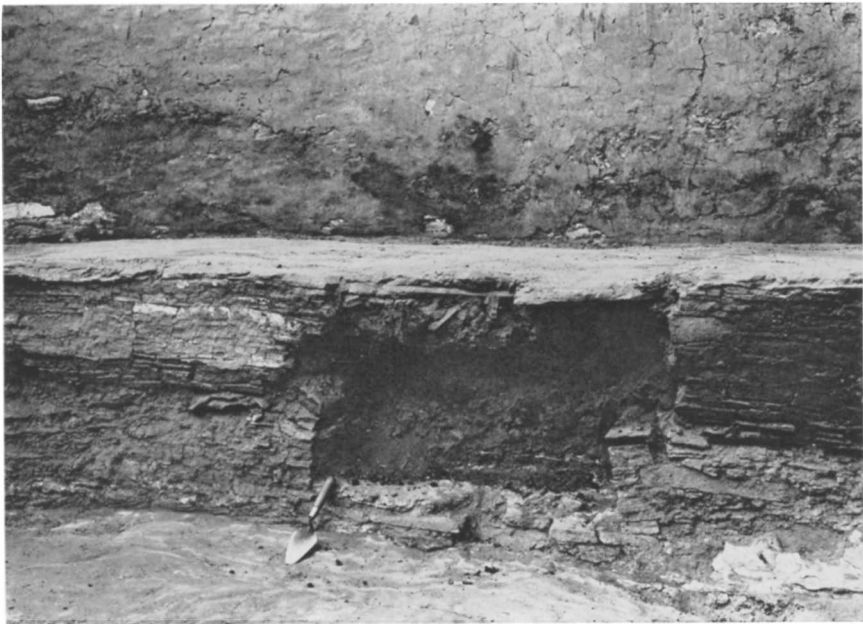
The retaining walls about Pueblo Bonito's two principal refuse mounds are not unique but they are more extensive, and more purposeful than any other known to me (fig. 23).¹ Architecturally they vary from nondescript stonework faced on the outside only to good second- and third-type masonry finished on both sides. Steps for the convenience of burden bearers led over the wall nearest the pueblo.

Because a sand-filled trench showed that the West Mound enclosure had been examined previously we turned our attention to that

¹ In preparing this drawing from two separate surveys an error of approximately 3 feet was disclosed. This difference has been adjusted in the space between mounds.



Remnants of earlier second-type masonry walls were buried at the northeast corner of Kiva G enclosure.



The north bench recess of Kiva G and, to left of it, crude masonry resembling Old Bonitian stonework.

(Photographs by Neil M. Judd, 1922.)

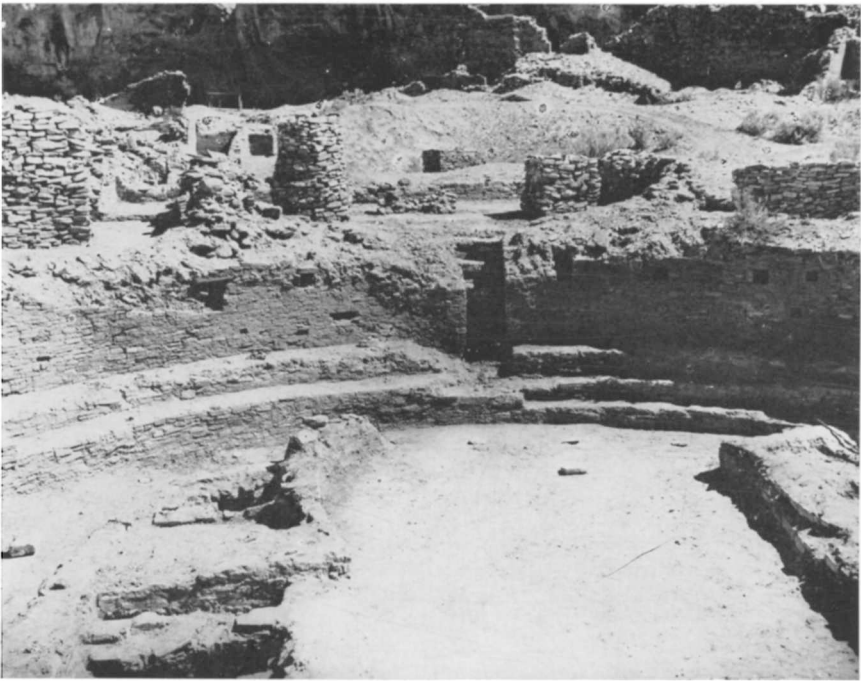


Great Kiva A and its surroundings after excavation. The West Mound trench is visible at middle left; stones were piled for wall repairs.

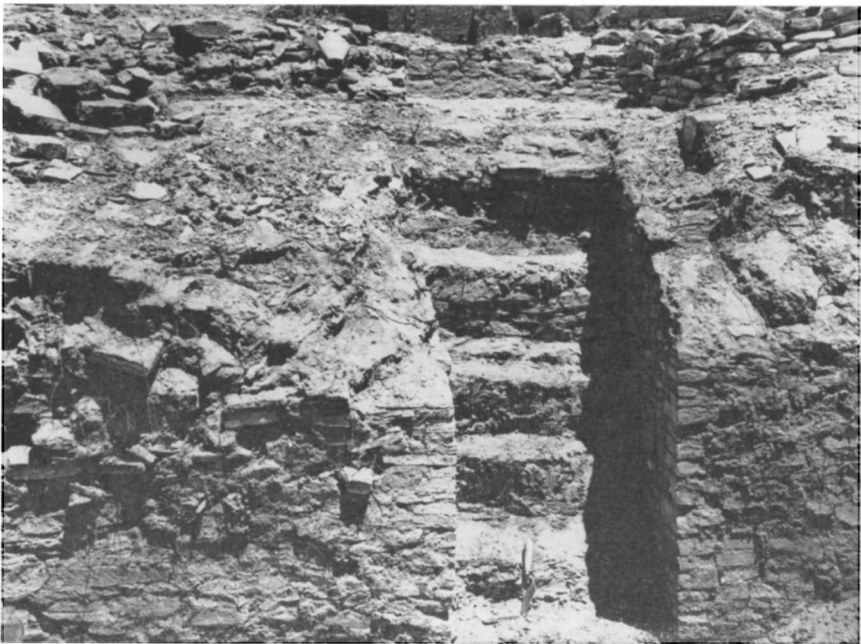


The south pillars, vaults, and other features of Great Kiva A were buried under water-soaked sand and silt.

(Photographs by O. C. Havens, 1921.)



Two masonry pillars and adjoining vaults occupy the north floor of Great Kiva A.
Above, stones piled for wall repairs.



Five masonry steps with wooden fore-treads led from the north benches of
Great Kiva A to Room 148.

(Photographs by O. C. Havens, 1921.)



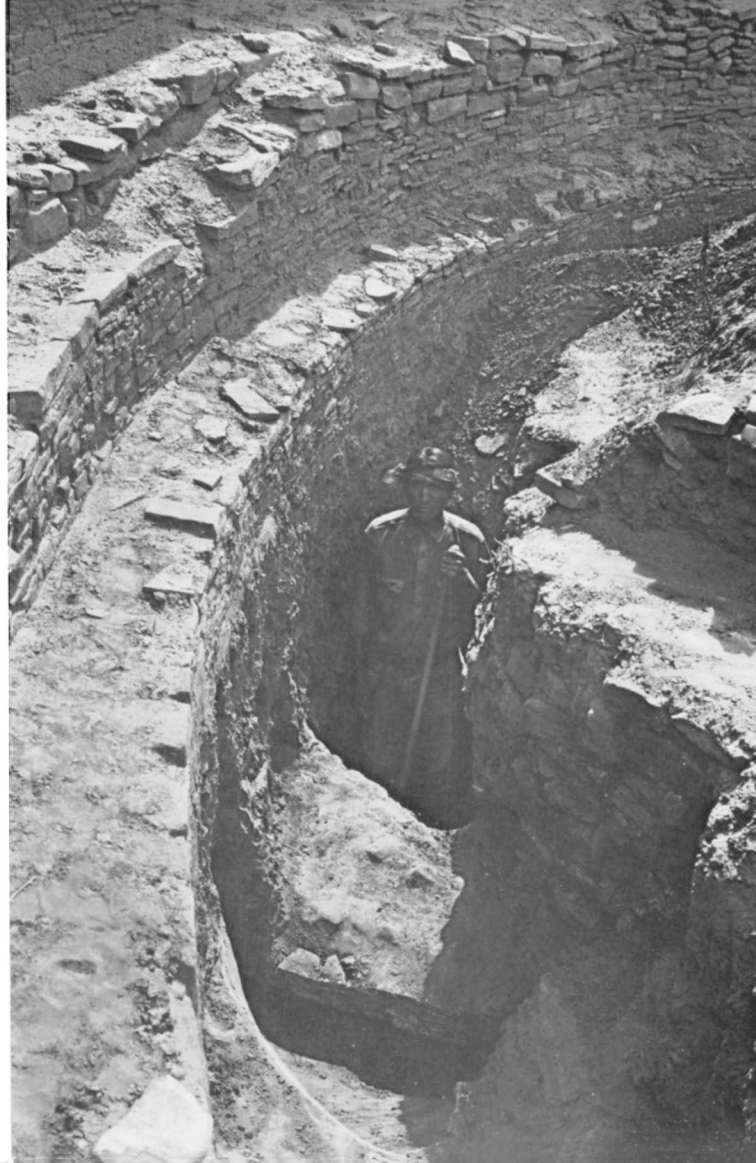
PLATE 73

Left: Repair-work in progress, northwest arc of Great Kiva Q, with fireplace and west vault in the foreground.

(Photograph by
O. C. Havens,
1924.)

Right: A 4-foot-high foundation built in a dug hole and packed about with shale supported the northeast pillar of Great Kiva A.

(Photograph by
O. C. Havens,
1921.)





Great Kiva A from the north, showing fireplace, deflector, south pillars, east and west vaults. Stones for wall repairs are stacked in Rooms 217-218.

(Photograph by O. C. Havens, 1921.)



The floor of Room 336 concealed older, partially razed walls and was itself covered by an intermural kiva, subsequently demolished.

(Photograph by O. C. Havens, 1924.)



PLATE 75

Upper: Overlooking the south side of Great Kiva Q was a small alcove with 4 steps to West Court level.

Lower: The south pillars, fireplace, side vaults, and 3-pole ladder of Great Kiva Q.
(Photographs by O. C. Havens, 1924.)





PLATE 76

Upper: Western flight of steps over north retaining wall, East Refuse Mound.

Lower: East steps, East Refuse Mound. North retaining wall shows behind workman.
(Photographs by O. C. Havens, 1924.)





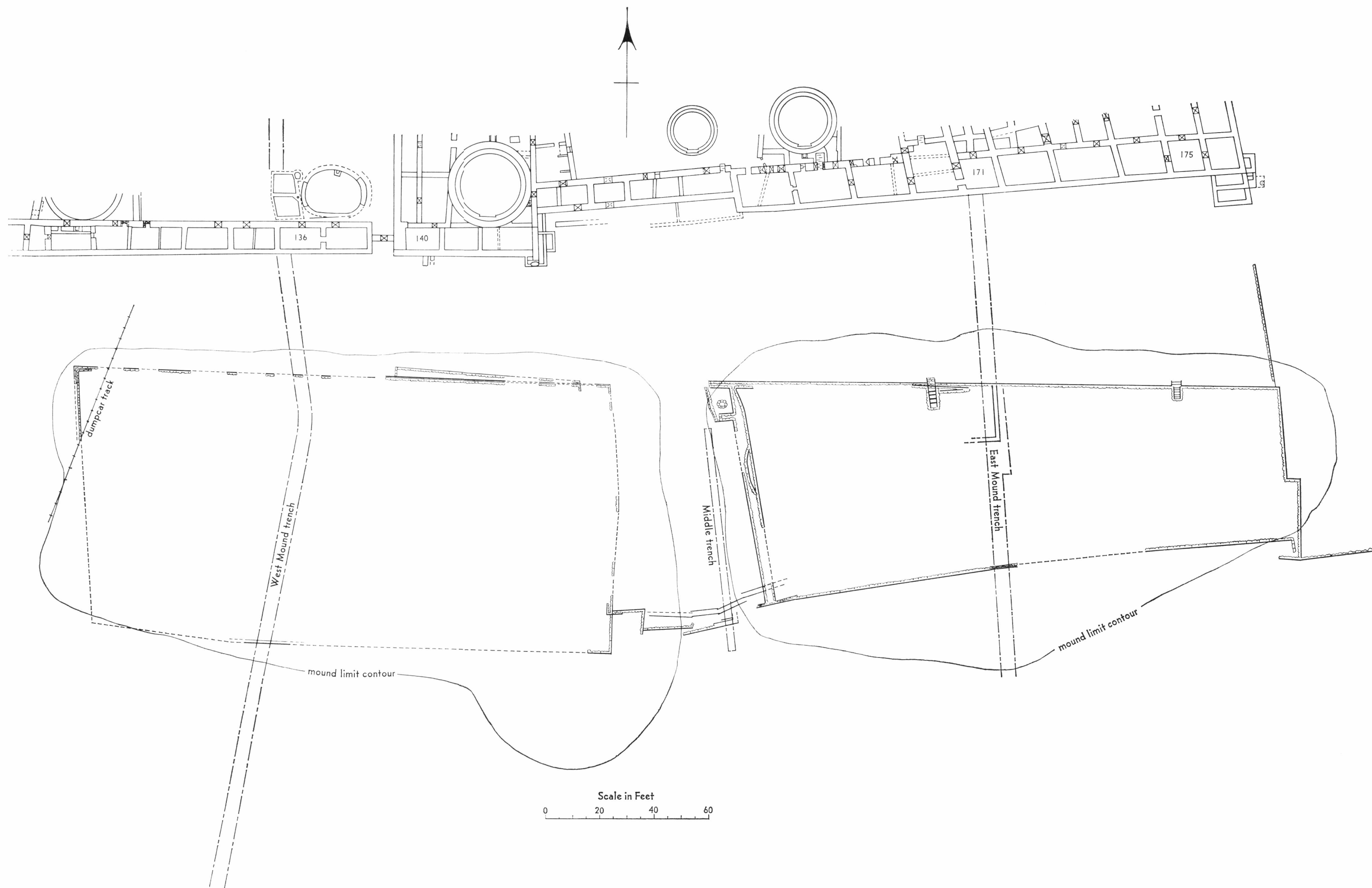
PLATE 77

Upper: The northeast corner of a second Late Bonitian retaining wall, East Refuse Mound.

Lower: A walled area at the northwest corner of the East Refuse Mound was occupied by a crude stone circle, purpose unknown.

(Photographs by O. C. Havens, 1924.)





 Pit No. 3

FIG. 23.—The South Refuse Mounds with enclosing walls and transverse trenches. (From the original survey of O. B. Walsh.)

surrounding the East Mound. Here a rock wall originally 206 feet long but now much disintegrated, screened the north side. At 80 feet from its west end a flight of eight stone steps led up and over (pl. 76, upper). The lowermost step, outside the barrier and without foundation, measured 28 inches wide with a 24-inch tread; the upper steps averaged about 15 inches wide and were protected from encroaching debris by casually placed end-stones. At this stairway the enclosing wall is double: an outer one of third-type masonry 18 inches thick and now 33 inches high built against second-type masonry 24 inches thick.

A second series of eight stone steps crosses the same wall 85 feet farther east (pl. 76, lower). In this case the retaining wall, 37 inches high on the east side of the steps and 28 inches on the west side, clearly had been breached to allow for the crossing. The upper steps average 25 inches wide and, like those of the first flight, rest directly upon mound refuse and are screened at the ends by dry-laid stones. The bottom step, 43 inches wide with a 22-inch tread, lies outside the wall and upon 4 inches of blown sand that covers a hard and fairly uniform adobe surface.

Excellent third-type masonry, built upon a 12-inch foundation and still 5 feet high, stands at the northeast corner of the enclosure (pl. 77, upper). The corner foundation, in turn, rests upon an adobe surface apparently continuing from that below the second series of steps, 35 feet to the west. However superior the stonework at the corner, it deteriorates rapidly southward along the east side: First, two to four carelessly laid upper courses; then carelessness to a greater depth (pl. 78, left). Halfway along its length the wall takes a 5-foot outward jog, then south again to a low barrier, an apparent improvisation, that extends east about 30 feet and there is reduced to two uncertain courses. The opposite end of this extension is lost under the earth dam of Wetherill's reservoir, but farther west a few salvaged sandstone blocks again provide a rude barrier (pl. 78, right).

The west end of this East Mound enclosure was originally constructed of second-type masonry. Subsequently a nondescript addition of three or more courses was piled on top. Still later, after the middle section of this addition had collapsed outwardly, a new and equally nondescript substitute was built 3 feet outside the original (fig. 23). At the new northwest corner a rock-fenced area was provided for some unknown purpose, its adobe floor dipping unevenly toward the west and the middle of it occupied by a crudely built stone circle 45 inches in diameter (pl. 77, lower).

An exploratory north-south trench at this point (fig. 24, b) revealed stratified village debris sloping down from east and west. To keep it in bounds, retaining walls had been erected at the near end of each mound but later debris had overflowed them. Subsequently both walls were raised a few courses and were again overflowed. Nevertheless, under these accumulations and apparently on the same adobe stratum as that in the fenced area noted above, we happened upon evidence of limited, unscreened domestic activity—a slab-lined fireplace 19 inches below the surface and 15 inches above the base of the West Mound enclosure.

At 85 feet south of its northeast corner this West Mound enclosure is abutted by a foundationless, nondescript wall 19 inches high by 22 inches wide—a wall that extends east and south until lost among broken stonework projecting from the East Mound. Although some of these fragmentary walls may have been built to check the outward spread of mound rubbish others clearly were designed to confine floodwaters and direct them past the village. Here, again, the accumulated floor sweepings, debris of demolition, and wind-blown sand slope down and away from the mound crest.

THE WEST MOUND TRENCH

Our West Mound Trench (fig. 7), which largely provoked this chapter, held many surprises. Foremost, as previously explained, was the admixture of early and late pottery and the presence of constructional waste throughout. Our stratigraphic columns of 1921, 1922, and 1924 were each cut to clean sand at a depth of 20 feet or thereabout (pl. 6, left). Early in 1925, still seeking an explanation for the confused nature of the mound debris, we extended the trench northward to Room 136 and thence through the West Court to Kiva Q. Later in the season, at Kirk Bryan's suggestion, it was extended southward to intercept his buried channel, a subject of much interest that summer (Bryan, 1954, p. 33).

In this 2-way extension we came upon evidence of a former east-west watercourse, an open gully under the south rooms of the pueblo, that invited the dumping of village waste. As this waste increased in bulk it not only filled the one-time channel but forced its transient floodwaters southward into a succession of substitute channels.

Between mound and ruin our trench averaged 11 feet deep. The bottom of it was a bed of clay-streaked sand with a scattering of gravel. The dumping of village rubbish began early and on top of one early pile we cut through a small, clay-lined hearth, made to

meet a temporary need (fig. 7, above Sta. 158). Village debris extended both north and south, some of it continuing northward under Room 136 as though dumped there intentionally to provide space for additional rooms. This thought may seem fantastic, but, whether intentional or otherwise, it is a fact that additional space was provided.

At 45 feet from Room 136 our trench crossed the north side of the West Mound enclosure. This clearly was an attempt to confine the accumulating village waste, and a tardy attempt at that. The lateness of the effort may be judged from the fact that 8 feet or more of such debris had collected here before the Late Bonitians began the barrier. They began it with their well-known second-type masonry but later, when the need for more height arose, third-type stonework was employed. The base of this replacement lies 2 or 3 feet above floor level of Room 136 and about 4 feet above the present plain in mid-valley which, as noted elsewhere, lies from 2 to 5 feet above that in existence when Pueblo Bonito was inhabited.

Between Stations 95 and 115 is a purposeful dump of constructional debris that has been eroded, both north and south, by water action. Across the top of this pile is a puzzling silt surface for which I have no convincing explanation unless it be that chunks of adobe mortar among the discards had been rained on and trampled and then left bare for a considerable period. Other such surfaces exposed by our trenching operations were, in general, far less extensive.

Two masonry walls at Stations 35 and 50, the latter the earlier of the two, clearly were erected to confine channeled floodwaters (fig. 7). Layered sand, clay, and gravel on the north side of each barrier establish the recurrent presence of running water. To the right of Station O, strata of laminated and clay-streaked sand slope down and toward the south, there to be lost among the unconformities of Bryan's buried arroyo. Farther to the right, between -25 and -45, miscellaneous potsherds were recovered at depths of 9 to 10 feet in the refill of that ancient arroyo. Beyond the end of our drawing and a short distance to the east more sherds, including Late Bonitian types, were recovered in Test Pit No. 3, 18 feet 3 inches deep, as described by Bryan (1954, p. 58).

To repeat, I made an unsuccessful stratigraphic test in 1922 at the upcanyon end of the East Refuse Mound. Later a second test was attempted at the crest of the mound and about 75 feet west of the first but it, too, proved a failure. However, this second effort brought to light an entirely unsuspected midmound feature, a par-

tially razed and buried wall of excellent second-type construction, 23 inches thick (fig. 24, *c* above Stations 85-105).

We lengthened our test pit to expose more of this wall and found a neat corner 20 feet from the inner north side of the enclosure (pl. 79, left). The wall had been built upon a compact adobe surface that dips west 10 or 12 inches in our 5-foot-wide trench, but continues southward above the diversified fill of a former broad watercourse. When razing the corner the Bonitian demolition crew allowed more waste to fall inside the angle than out.

THE EAST MOUND TRENCH

In 1925 we extended this East Mound Trench in both directions, south to Bryan's "post-Bonito channel" (Bryan, 1954, pp. 33-36) and north to the foundations of Room 171 (fig. 24, *c*). Between mound and ruin the trench averaged 10 or 11 feet deep and was irregularly floored with clay-streaked, stratified sand. This water-laid deposit at once identified itself as part of the same east-west watercourse profiled by the West Mound Trench. Here, as there, the former channel had become a common dumping place at an early date and gradually was filled with occupational debris from Bonitian dwellings and with waste from razed walls. Some of this channel-fill extended north beneath the ruin and south beneath the mound. Throughout, from bottom to top, successive layers of silt and wind-blown sand remain to evidence the passing years.

Ten feet below the original surface and beneath a curious body of compact, sandy clay interspersed with clay pellets, occasional potsherds and sandstone spalls, we came upon a shallow, ash-filled hearth (Station 125, fig. 24, *c*). It was larger and more conspicuous than the hearth we bisected above Station 160, West Mound Trench, but, like the latter, had been built on dry, stratified sand for limited use.

Our East Mound Trench ended against the south wall of Room 171, the foundation of which rests 4 feet below the apparent surface at time of abandonment. A layer of constructional waste immediately beneath the foundation extends southward a short distance and then is buried under a greater quantity of occupational refuse. A foot lower, or 8 feet below the probable original surface, our trench-end halved a second, clay-lined ash-filled hearth, this one measuring 34 inches wide by 4 inches deep (pl. 79, right).

Silt-streaked, water-laid sand spread out beneath the hearth; debris of demolition, above. A dozen feet to the south against the eroded

bank of a small sand- and gravel-filled gully, was the discarded fragment of a troughed metate, relic of the Late Bonitians. At intervals throughout the 10-foot fill, village waste lay in more or less isolated bodies as though gathered at one place and dumped at one time. Some of this material showed unmistakable signs of water action. On top of all lay broken masonry fallen from the upper stories of Room 171, the uppermost courses cast outward 25 feet or more. Partly overlying the outer limit of this fallen stonework, and therefore of more recent origin, was a quantity of burned sand, sticks, and cedar bark.

There can be no doubt as to the actuality of the former watercourse exposed by our East and West Mound trenches. Depth is comparable in both cases and the materials of the fill are the same: wind- and water-borne sediments and debris carried out from the village. The East Mound was already 8 or 10 feet high when some debris-conscious individual conceived the idea of a retaining wall. Eventually the mound accumulations crested out 10 feet higher, 12 feet or more above the present level of the plain. Our 1922 stratigraphic column at Station 64 (fig. 24, *c*) was dug to a depth of 8 feet below the plain without reaching the bottom of underlying constructional debris, clearly reworked by water action. A nearby 1924 test (U.S.N.M. No. 334181), 10 feet 7 inches deep, ended upon the adobe layer at the base of the partially razed, second-type wall previously described. Nevertheless, sherds from these two columns show that the East Mound is later than its companion since early-type fragments are noticeably fewer in number. Also, the proportion of constructional debris seemed larger—a factor that led Nelson (*in* Pepper, 1920, p. 385) to identify the East Mound as the later of the two.

In contrast to the north retaining wall that on the south is a makeshift affair built upon what appears to be a man-made heap of jointed sandy clay piled above an adobe bank at Station 50 (fig. 24, *c*). Both the bank and the clay pile have been eroded, north and south. On the north, water-laid sand and silt mark the course of a 30-foot-wide waterway filled with village waste and a southward-sloping mass of compacted sand containing numerous clay pellets and a scattering of sandstone spalls. Then follows a round-bottomed channel-fill of laminated silt, a sort of mud conglomerate balled and soaked by water. Beyond the barrier, in the midst of nonconforming beds of silt, sand, and village rubbish, is another apparent watercourse probably antedating Bryan's post-Bonito channel.

Sand is everywhere in Chaco Canyon and floodwaters leave silt layers. But it was the sheer bulk of village debris rather than silt and sand that defeated our early efforts to read stratigraphy in Bonito's south refuse mounds. We dug a deep trench through each—two trenches that laid bare the composition of both mounds and the manner of their development. Laminated sand, gravel, and round-bottomed waterways show where water once flowed. The leveling influences of wind and water are everywhere apparent. Pockets of blown sand occur throughout the two piles; silt streaks and puddled adobe remain as evidence of seasonal showers. And as this village waste continued to pile up, sandstone walls were built to curb its dispersal. Walls nearest the pueblo were highest and strongest. End walls, wherever we examined them, were noticeably weaker and those on the south were weaker still.

It is the presence of these enclosing walls as much as mound content that determines the age of the two south refuse piles. Both content and walls are primarily products of Late Bonitian industry. Old Bonitian housewives habitually dumped their sweepings immediately in front of their dwellings—at least until the Late Bonitians took over. A mixture of Old Bonitian and Late Bonitian rubbish from bottom to top of both mounds fixes their beginnings as subsequent to arrival of the Late Bonitians. It was this latter group that filled the old floodway immediately south of the pueblo, a fact evidenced by the abundance of their distinctive Hachure B. pottery which Roberts found in two 5-foot-wide stratigraphic sections, 3 and 4, between Room 136 and the West Mound. It was the Late Bonitians that built retaining walls about both mounds and then continued to pile up village waste until it overflowed the barriers and attained a height of 20 feet or more.

IX. ALLUVIATION AND AGRICULTURE¹

That portion of Chaco Canyon in which we are primarily interested is a 15-mile-long section walled by massive beds of Cliff House sandstone. Shales lie above and below the Cliff House, and the disintegration of sandstone and shale has filled the canyon with clay and sand to an estimated depth of 100 feet or more. Of this valley fill approximately one-third lies exposed in the banks of the present arroyo—a flood-carved gully that had its beginnings in the middle 19th century (Bryan, 1954, p. 15). This exposed third provides an index to past geological conditions, but nowhere is there evidence, at any time in the past, of a living stream in Chaco Canyon. The entire valley fill, 100 feet of it, has been piled up, inch by inch, by wind and rainwash.

In consequence of his investigations Bryan concluded that the present arroyo is part of a fourth cycle of alternating erosion and sedimentation. We are not especially concerned here with the origin of the canyon itself nor with the processes by which it was initially filled with alluvium, then eroded again, and subsequently refilled. But the arroyo identified with the third period of erosion may not be ignored since it provides a very plausible reason for the abandonment of Pueblo Bonito and other communal dwellings along its course.

The inhabitants of these multiple-storied settlements were farmers. They cultivated fields of corn, beans, and pumpkins wherever soils were suitable and moisture adequate. Agriculture was their livelihood. The builders of the great Chaco Canyon pueblos were flood-water farmers because they had no choice. Lacking a permanent stream for irrigation purposes they necessarily depended upon the runoff following midsummer showers.

But summertime showers in Chaco Canyon are neither reliable nor predictable. They may advance promisingly to within half a mile,

¹ The present chapter is based in large part upon a study of Chaco Canyon geology made for the Pueblo Bonito Expeditions in 1924 and 1925 by the late Dr. Kirk Bryan. Although that study was never carried to the point originally planned, such data as were then available appeared posthumously in 1954 as the second of the Expedition's scientific reports. Therein, on Anderson's 1922 topographic map of the canyon, Bryan illustrates the relationship of the present arroyo to its 12th-century predecessor, his "buried" or "post-Bonito" channel.

as we witnessed repeatedly, and then turn abruptly aside and leave the valley floor dust dry. Although the local climate has long bordered on the arid, we have ample evidence that precipitation was once more plentiful. Perennial grasses and greasewood formerly flourished here; pines and cedars grew in side canyons and on the mesas above. Cottonwoods and willows once traced a green ribbon down midvalley, and some few were still there as late as 1920, the year of the Society's Chaco Canyon reconnaissance. Vegetation multiplies when the water table is high and a ground cover both hinders runoff and quickens the deposition of silt and sand. Navaho elders recall a time, or say they do, when water could be had anywhere in the valley with a little digging.

Surface vegetation, however, has not always been lush enough to hold Chaco floodwaters in check. There were times of drought or near drought when shrubs and grasses withered and the runoff ran faster. Below-average rainfall is recorded repeatedly in the annual growth rings of timbers salvaged from Pueblo Bonito. Douglass (1935, p. 49) points to a period of subnormal rains extending from A.D. 1005 to 1036 or even later. The 10-year drought between 1090 and 1101 was a severe one and may have had a more devastating effect upon local plant life than is possible now to measure. Conceivably it could have initiated the 12- to 15-foot-deep "buried channel" that so intrigued Bryan—the channel that destroyed an annually increasing amount of Bonitian farmland and, in so doing, probably hastened migration of the Bonitians.

DROUGHT AND THE BURIED CHANNEL

Bryan first chanced upon this buried watercourse near the southeast corner of Pueblo del Arroyo without knowing at the time that a nearby exposure had previously been discovered by W. H. Jackson (1878, p. 444). At this site, the section 4 of his map, Bryan (1954, p. 54) described the old channel as 13 feet 5 inches deep and its gravelly bottom 15 feet below the existing surface. The difference in the two figures illustrates the fact that, after the 13-foot gully had been completely refilled, an additional 19 inches of sand and silt were spread upon the refill. Elsewhere the overburden is thicker and the gully, deeper. The bottom of it lies 18 feet below the surface in Test Pit No. 3, on the plain fronting Pueblo Bonito (pl. 7, upper).

A short distance upstream from section 4 and on the opposite bank, Jackson (*ibid.*, p. 443) in 1877 observed a small ruin whose foundations were "5 or 6 feet below the general level of the valley."

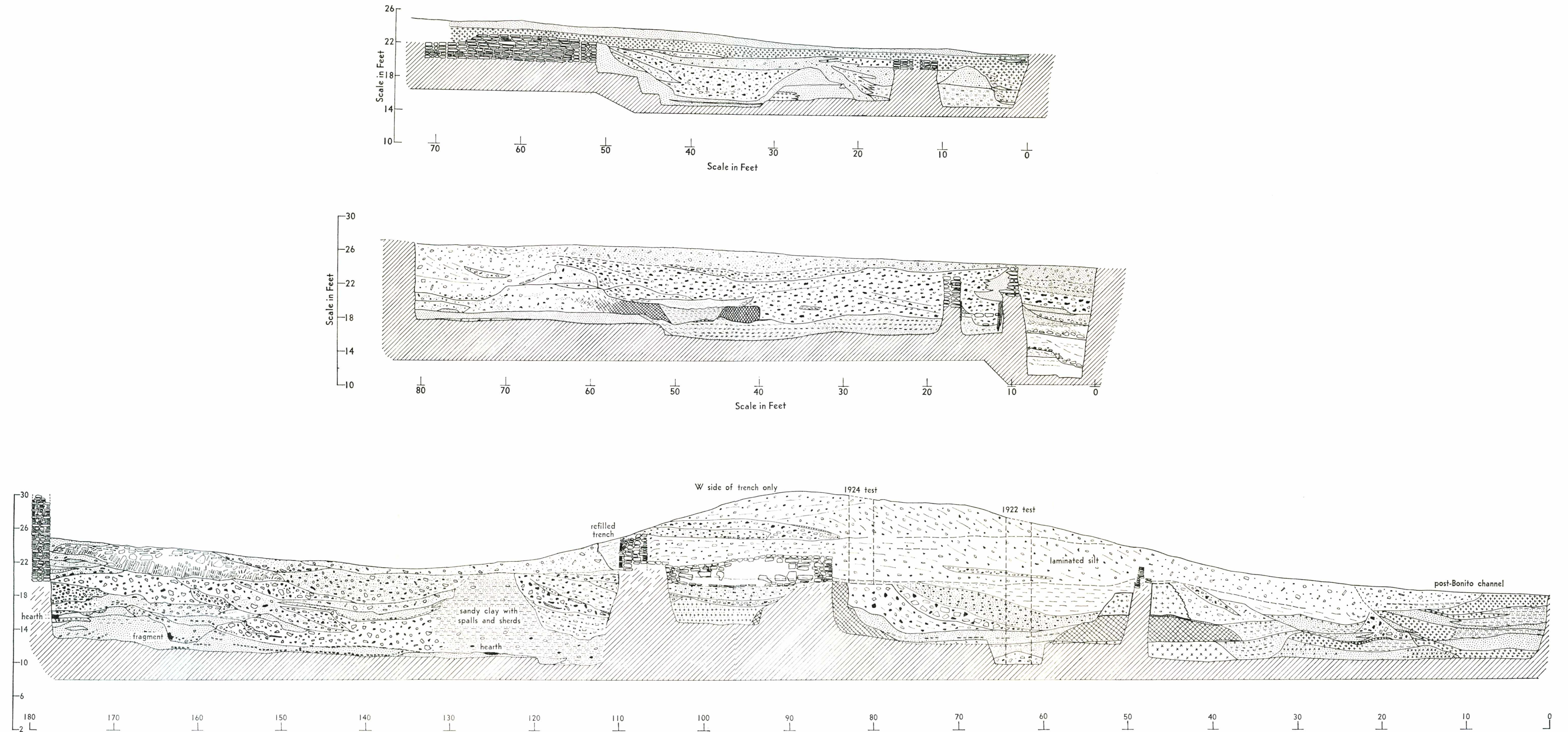


FIG. 24.—The “Far East Trench” (upper); the “Middle Trench”; and the “East Mound Trench” from the post-Bonito channel to the foundations of Room 171.



PLATE 78

Left: To increase its height, stones were piled loosely upon the east retaining wall, East Refuse Mound.

(Photograph by
O. C. Havens,
1924.)

Right: A makeshift wall enclosed the East Refuse Mound on the south.

(Photograph by
Neil M. Judd,
1922.)



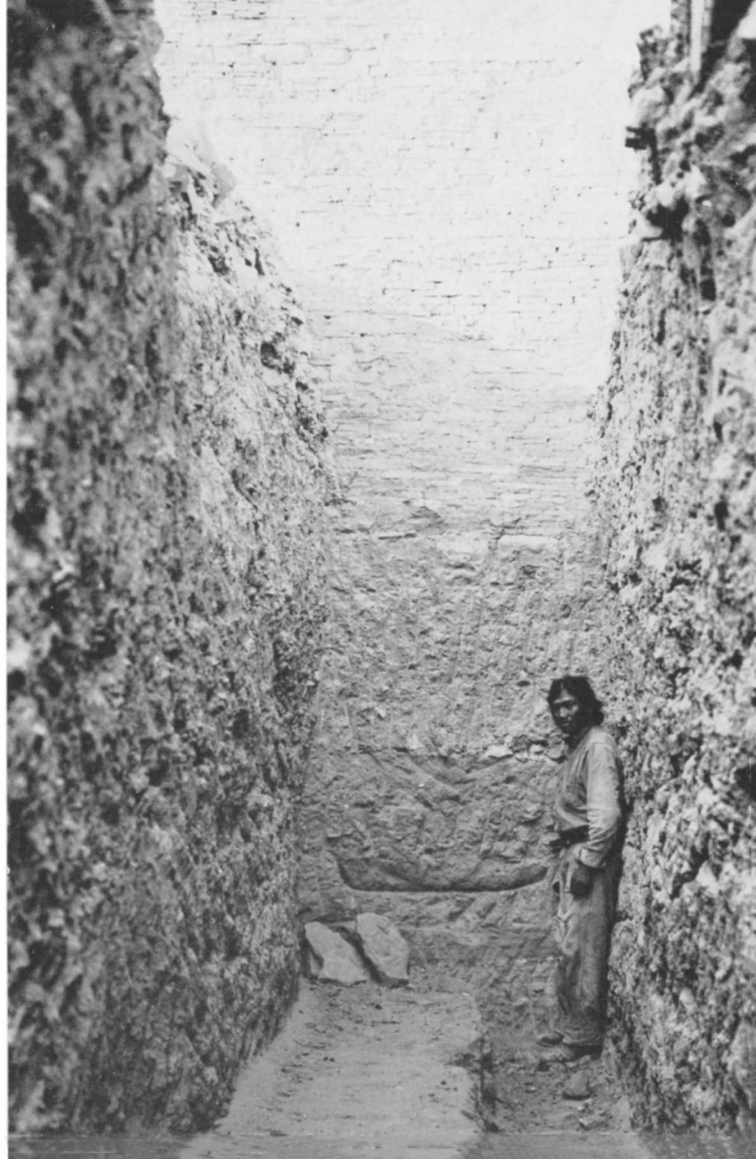


PLATE 79

Left: A partly razed second-type-masonry structure was buried under village waste, East Refuse Mound. North retaining wall at workman's elbow.

Right: Four feet beneath the south foundation of Room 171, our extended East Mound exploratory trench bared a broad open hearth.

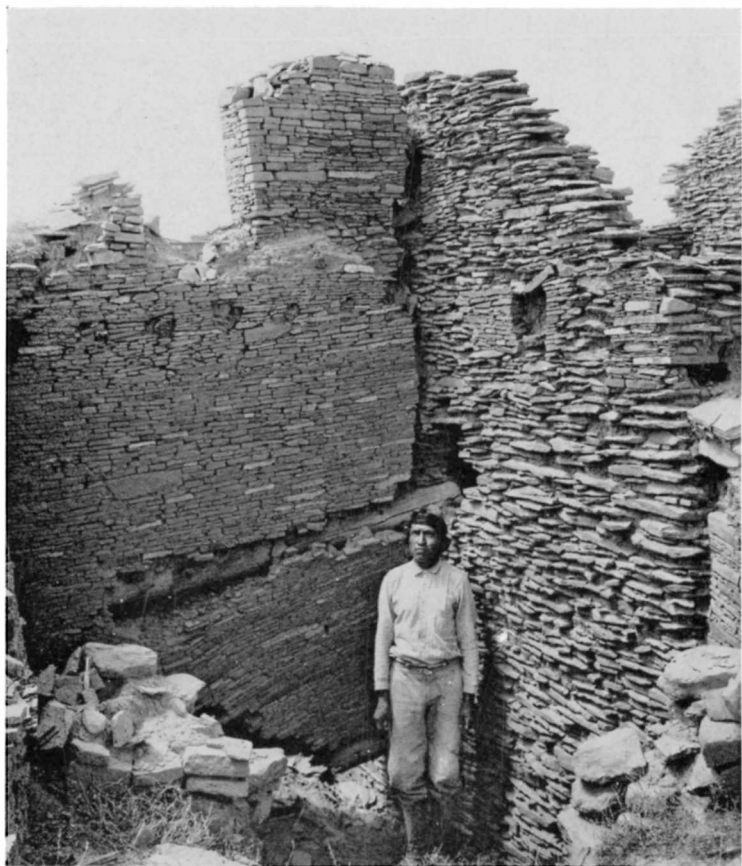
(Photographs by
O. C. Havens,
1925.)





Until January 22, 1941, the Braced-up Cliff towered above the fourth-story wall of Room 14*b*.

(Photograph by Neil M. Judd, 1926.)



A fourth-type wall between Rooms 55 and 57 was supported upon 2 timbers their ends inserted into the stonework of Old Bonitian Room 58.

(Photograph by Neil M. Judd, 1922.)



PLATE 81

Upper: A supposed multiple shrine, built upon blown sand 3 feet above the east foundation of Room 176.

(Photograph by Neil M. Judd, 1923.)

Lower: Beams seated in pecked holes roofed this small talus room, west end of the Braced-up Cliff.

(Photograph by Neil M. Judd, 1927.)



This little P. III house has since been destroyed but beneath it, as seen in 1920 and later, layered alluvium extended to right and left, the patient deposits of floodwaters flowing over a grassy plain (Bryan, 1954, pl. 6, upper). In Chaco Canyon where the gradient has always been a modest one, summertime floods formerly advanced slowly and dropped their silty burden on the way.

Bryan traced his buried channel up and down canyon a distance of approximately 5 miles and recorded his observations at 23 numbered sites. While so doing he repeatedly found proof of human occupancy coincident with deposition of the main valley fill. He collected Pueblo I potsherds as much as 20 feet below the surface, while those attributable to P. III, the period of Pueblo Bonito and its contemporaries, rarely occurred below 4 feet. Of known P. I pit-houses in the canyon, two stood with roof levels at a depth of 6 feet or more (Judd, 1924, p. 403; Roberts, 1929, p. 71; Bryan, 1954, p. 32).

The fact that water-borne sediments were sometimes laid down so gently that even charcoal in ancient hearths was not appreciably disturbed evidences both a low gradient and a long-continuing grass-covered surface. We did no testing south of the present arroyo, but on the north side we met floodwater silt layers repeatedly. Although not always deposited as evenly as those underlying the little P. III ruin near Bryan's section 4, they are undeniable.

When exploring the Northeast Foundation Complex (fig. 11), we exposed 22 inches of excellent Late Bonitian masonry at Station 1 upon a sturdy foundation 4 feet 7 inches high (pl. 48, right). At 6 inches deeper, or 7 feet from the present sandy surface, is a pavementlike sheet of floodwater silt, smooth as a kitchen floor. And wherever we dug deep enough throughout that whole foundation complex we came upon the same or a similar silt layer.

Close under "Hillside Ruin" are five quadrangular fireplaces (pl. 47, lower). A test pit 4 feet 10 inches deep between the second and third revealed another adobe pavement, floor-smooth but covered by debris of reconstruction and wind-blown sand. Presumably that pavement is a continuation of the one we had previously encountered outside Room 184—the pavement that prompted our 5-foot-wide trench to the lower terrace below the Braced-up Cliff (pl. 42, left); the same pavement, presumably, as that at a depth of 4 feet outside Room 187 where it is overlain by 20-24 inches of blown sand.

SILT DEPOSITS

In every deliberate test pit, within the ruin or outside, we invariably came upon one or more of these silt layers. My field notes frequently refer to them as "pavements" because they were so smooth and hard as to seem man-made. When more than one was encountered only the amount of the overlying materials set each apart. For example, 35 inches under the floor of Room 225 we exposed the pavementlike surface of a 5-inch-thick adobe stratum with a slight downward slope to the east and south; beneath it were three lesser surfaces separated from one another by from 9 to 20 inches of sand, clay, or occupational debris. A similar, or perhaps the same, southward-sloping surface was noted 37 inches under the floor of adjoining Room 241.

Another silt layer 4 inches beneath the northeast steps, East Refuse Mound (pl. 76, lower), may be a record of the same flood that deposited a like layer 19 inches below the present surface at the northeast corner of the West Mound enclosure despite the fact nothing comparable appeared in the extended East Mound trench (fig. 24). Although the main valley fill offers no evidence that the surface gradient ever differed appreciably from what it is today, I neglected to test this possibility fully. I neglected, for example, to run a level between the two silt layers last noted or between that under Station 1, Northeast Foundation Complex, and the silt surface surrounding Pueblo del Arroyo and underlying at a depth of 5 feet the small P. III ruin Jackson saw on the opposite bank.

That buried silt layers should appear more clearly defined in some trenches than in others is understandable, considering the characteristics of floodwaters and flood-borne silt. That the overburden should be sand in its infinite variety is obvious, knowing that Chaco Canyon is bordered by sandstone whose disintegration provided the canyon floor. Thin clay streaks, gravel lenses, pellets, and chunks of water-washed adobe identify in this overburden places where floodwaters ponded.

As Bryan (1954, p. 25) observed, these pavementlike silt beds are generally of limited area although an occasional one may extend a quarter-mile or more. They are the leavings of runoff wandering laterally from the main flow—silty sand retarded by grassy ground cover. In lesser measure we noted this same retarding effect at present-day Navaho fields where a chico bush, a handful of bunchgrass, or a chance rock sufficed to check or turn the advance of a muddy rivulet. Unretarded, floodwaters in greater volume might

carve a deeper path for a short distance; they might destroy all or part of the paths carved by earlier floods. Turning first one way and then another, such divergent courses were the "discontinuous channels" of Bryan's Chaco Canyon observations.

FLOODWATERS

He repeatedly calls attention to features that distinguish these lesser waterways. They were a characteristic of the second cycle of alluviation, spreading out disjointedly while the main valley fill was building up. They tend to be round-bottomed wherever confined laterally, with a crescentic fill of sand, clay, and clayey gravel; they occur most frequently in midvalley but often reach out on either side and one actually underlies the south rooms of Pueblo Bonito. This latter may have been directed in its course by some undisclosed upcanyon obstacle for it was remarkably persistent. We came upon it quite unexpectedly during the digging of our extended East and West Mound trenches (figs. 7, 24, *c*).

In both exposures the one-time floodway is floored with coarse sand in which clay streaks, pellets, and gravel lenses occur. But these water-borne deposits are overlain by quantities of household sweeping and the discards of constructional activities—sandstone spalls and chunks of dried adobe mortar bearing the imprints of building materials. The source of all this wastage was Pueblo Bonito itself. Some of it had been dumped there early, as witness the lenticular bed of household sweepings 10 feet below the surface at Station 180, West Mound trench (fig. 7), and the metate fragment at comparable depth above Station 164 in the second trench, 250 feet distant (fig. 24, *c*). Witness, also, the two deep-lying hearths built on the dry bed of the channel to meet the momentary need of local picnickers or traders from far countries.

Obviously here was a former channel that had held transient water from time to time and that had become a common dump-ground for the village people living nearby. As village rubbish mounted, the floodwaters were diverted and new courses eroded. I do not pretend to experience in such matters, but later stream channels certainly are indicated by the higher, more or less crescentic layers of jointed clay and silt-streaked sand seen in the East trench between Stations 55 and 80.

Our Middle Trench (fig. 24, *c*), an exploratory venture between the East and West mounds, was neither long enough nor deep enough to bare the full history of this intermediate section. The laminated

sand and clay to the right of Station 50 clearly mark the bed of a former watercourse, subsequently filled with debris of demolition and it is possible the two walls beyond were erected to curb the outward drift of that debris. The outermost wall is a little higher and later than the other. But between and below the two is a narrow channel in which water once flowed, 5 feet below the present valley floor.

Running water had threatened the earlier wall from the outside and, presumably to prevent undercutting, a willow mat, its component rods horizontal, had been suspended against the lower stonework. But the water continued on its way, leaving clay-streaked sand and gravel, until one of the local engineers brought it under control by erecting a wattled wall opposite the mat. Rotted sticks, apparently juniper, stood here at the time of our excavation, still thickly coated on both sides with sun-dried mud. Three sandstone blocks above the laminated silt may have been placed there to provide footing for the mason who built the second wall. Outside this latter, filling what appears to be an old arroyo bed, is a succession of sandy-clay, gravel, rocks, and water-washed village debris.

Our two major trenches likewise revealed evidence that Pueblo Bonito farmers undertook at times to harness midsummer floodwaters and turn them to advantage. A channel on which man clearly exerted a directing influence appears above Station 60 in the West Mound trench (fig. 7). The bottom of it, gouged through occupational debris filling an earlier and broader watercourse, lies 6 or 7 feet below the present level of the plain and is marked by a quantity of broken rock purposely thrown there. Above the rock is a 2-foot-thick deposit of cross-bedded sand and, above the latter, a wide crescent of laminated sandy clay. While this second layer was collecting, a masonry wall was built along the south side of the channel.

Shortly thereafter, as I read the record, this masonry wall toppled outward and was lost under the continuing clay layer before a less vigorous stream carved a shallower course outside the first and a bit higher. To restrain this successor, or perhaps merely to check the spread of household waste, a second and less stable wall was hurriedly erected (above Sta. 35). Beyond this second barrier, to the right of Station 10, are the ill-defined limits of Bryan's post-Bonito arroyo which, in Test Pit No. 3, measured 18 feet 3 inches deep—well below the channels described above.

What may be a continuation of this same walled waterway was disclosed in the East Mound trench between Stations 20 and 35

(fig. 24, *c*), its silt-streaked bottom 4 or 5 feet below the present level of the plain and its margin again eroded by the post-Bonito, or third-cycle, channel.

Bryan (1954, p. 45) believed these successive channels were entirely artificial because they paralleled the south side of the two refuse mounds, were confined on the downhill slope by masonry, and were repaired or replaced whenever a section filled up or washed out. He believed they were designed to convey upcanyon floodwaters to fields beyond the village—a practice followed by the inhabitants of Peñasco Blanco and Kinbiniyol (Judd, 1954, p. 59). That floodwaters continued to flow this way despite Bonitian efforts to turn them aside is obvious from the layers of laminated sand and silt they laid down in passing. That they persisted in their accustomed course long after Pueblo Bonito had been vacated is further suggested by the water-borne gravels Dodge (*in* Pepper, 1920, p. 24) observed in some of the south-side rooms.

Thus a new and pertinent chapter in the history of Pueblo Bonito has been disclosed by these prehistoric floodways, rubbish-filled and forgotten until bared by our exploratory trenches. It is noteworthy that the south wall of the pueblo, its foundation 2-2½ feet *above* the present level of the plain, rests upon a 10-foot-deep rubbish fill the beginnings of which lie 8-8½ feet *below* that same plain level (fig. 7). As the village continued to increase in population and ground area its accumulating refuse piled up 18 and 20 feet, forcing westward-flowing floodwaters farther and farther toward midvalley until they converged to form Bryan's 12th century arroyo.

How long floodwaters had followed this east-west course where Pueblo Bonito now stands is still open to conjecture. Our geologists would venture no opinion. We did not attempt to dig deeper than the floor of our two trenches and this appears to be as deep as Dodge (*in* Pepper, 1920, p. 24) ventured. However, John Wetherill during a visit to Pueblo Bonito on November 2, 1929, told me that his brother, Richard, had dug a hole 43 feet deep between the ruin and the south refuse mounds before finding clean sand.

East of Pueblo Bonito, 400 feet beyond Room 176, a shallow trench exposed still another round-bottomed channel (figs. 11, 24, *c*). Its presence adds weight to Bryan's belief that upcanyon runoff, including that from the rincon back of Chettro Kettle, was sometimes purposely directed past Pueblo Bonito to down-valley plantings. I am loath to suggest that the long, lone foundation wall from Room 176 to Station 2, or that the curved pair south of it, had any-

thing to do with directing or diverting those floodwaters but it is possible.

SOIL AND WATER ANALYSES

Since the subsistence problem of prehistoric Pueblo Bonito was one of our paramount subjects for inquiry, we dug a number of pits in order to test the character of soils formerly available for cultivation. Our first pit was located northwest of the ruin, about halfway to the north-cliff stairway. Others were dug on the east side, north of the upcanyon road. Because none of these seemed to offer more than blown sand and silt they were promptly refilled against possible injury to wide-ranging Navaho horses and only one, No. 3, left open.

Test Pit 3, 9 feet 3 inches deep and situated on the plain midway between Pueblo Bonito and the Expedition camp, looked more promising than the others, and so it was fenced and held for further study (pl. 7, upper). At the suggestion of C. S. Scofield, soil chemist and a member of the National Geographic Society's Committee on Research, earth samples were taken at 10-inch intervals, bottom to top, and sent for analysis to J. F. Breazeale of the Office of Western Irrigation Agriculture. Mr. Scofield warned, however, that the soils represented by those samples would have less agricultural value than anticipated if, like Chaco well and flood waters previously analyzed, they were found to contain a high percentage of sodium in proportion to calcium. (Scofield, 1922, discusses irrigation and alkali salts.)

Although I have already quoted freely from it, Mr. Breazeale's report of September 27, 1924 (Judd, 1954, pp. 10-12), on the 11 soil samples from Pit Number 3 is so pertinent to our present subject partial repetition seems justified:

All the soils contain a little black alkali, that is, a mixture of sodium carbonate and sodium bicarbonate, and they all contain approximately the same percentage, 0.144%. . . . In their behavior the soils remind me very much of soils that have probably originally contained some other alkali, such as common salt . . . leached out through a long period of time. . . . A long leaching of most good soils with such water as I have been analyzing for you from Chaco Canyon, would probably produce just such effects as I see manifested in this set of soil samples.

As you well know, the first requisite in irrigation agriculture is water penetration, for unless we can get water into a soil we stand little show of getting any crop out of it. So I first set about to see if I could make the soils take water. I rigged up a set of one-inch glass tubes [10 to 12 inches long] and poured 6 inches of [pulverized] soil into them, and added distilled water to the top. . . . The water penetrated the soil column very slowly. Soil No. 11,

or the sample taken from 0 to 10 inches deep, probably contained a little organic matter, for it percolated faster than the others . . . required about 24 hours to wet the 6-inch column. In the field this, of course, would be much longer. Nos. 10, 9, 8, and 7 went slower than No. 11. It required about 48 hours for these columns to become wet. This takes us to 50 inches deep. . . . Below that level the soils seemed almost impervious, that is, all the samples will probably require a month each for the water to move downward through the 6-inch layer. I do not think I have ever handled a soil quite so impermeable to water as are these last six samples.

The Chaco Canyon soil, in all the levels that you sampled, is badly deflocculated and for the reason that it contains an excess of sodium and a scarcity of soluble calcium. . . .

I can say without any doubt that these soils . . . will not take water. I do not believe, even under the most favorable conditions, that such soils can be successfully cultivated. . . . If all the soils that were available to agriculture in Chaco Canyon are as bad as these samples, I think you have one reason at least to explain why the Bonitians left the valley. I do not believe an Indian, with his primitive methods, could handle any soil like this.¹

A year after receiving the foregoing report Pit No. 3 was deepened at the suggestion of Dr. Bryan and Late Bonitian potsherds were collected at depths between 10 and 15 feet (Bryan, *ibid.*, p. 58). These finds established the fact that, unwittingly, I had located this particular 1922 test within the banks of Bryan's post-Bonito channel. Our soil samples, therefore, represented a varied alluvium transported from a distance and not fields cultivated by the Bonitians.

Nevertheless, that transported alluvium originated in the same place, upcanyon, as had the annual accretions comprising the main valley fill. And some of those annual accretions, upcanyon, assuredly were cultivated. But, if all local soils were as impervious to water as were those from Test Pit 3, and we have no reason to believe otherwise, farming for a livelihood in Chaco Canyon would have proven increasingly discouraging and, as Breazeale points out, the Bonitians would have had ample reason for moving elsewhere.

Each of our 11 samples from No. 3 pit, originally 9 feet 3 inches deep, was not only deficient in soluble calcium but contained sodium bicarbonate, or black alkali, in approximately the same amount, 0.144 percent. If as little as 0.144 percent of black alkali can so tighten a soil that days rather than minutes are required for water to percolate through, then local agriculture eventually would have been recognized as altogether unproductive and unprofitable. In Breazeale's pithy summation: "Unless we can get water into a soil we stand little show of getting any crop out of it."

¹ I desire once again to acknowledge my obligation to Messrs. Scofield and Breazeale for their cooperation in these studies.

FLOODWATER FARMING

The fact remains, however, that the Bonitians lived a long while in Chaco Canyon and that farming was their livelihood. Lacking a living stream, they necessarily depended upon floodwaters for irrigation. Bryan believed that the best agricultural lands available to them were the alluvial fans at the mouths of the rincons. But scattered areas in midvalley were also favorable—the sandy borders of discontinuous channels and places where water temporarily ponded. Experience dictates the selection of such places.

Inherited knowledge and understanding of soils and drainage are prerequisites in the choice of areas suitable for floodwater farming. Those overflowed by slow-moving floodwaters are everywhere preferred areas. The flow must wet the ground without uprooting plants or smothering them under washed-in sand. It is the freshly deposited film of sandy silt that renews these floodwater fields. Hence the operator must know how to gage the amount of runoff and check erosion; he must anticipate the muddy onrush and stay on the job until it has passed, according to the most successful Navaho farmer we visited in the Chaco area (Judd, 1954, p. 55).

As a result of his study of local topography and following observations among the Pima, Papago, and other desert tribes, Bryan (1929, 1941, 1954) believed that Chaco Canyon in Bonitian times was eminently suited for floodwater farming and that it would be equally suitable today if annual precipitation were what it was formerly and if there were no modern arroyo.

This present-day arroyo, now 30 feet deep and 100 to 300 feet wide, presumably began about 1850 and has proved more destructive than either of its predecessors. If it follows a like cycle it, too, eventually will fill with transplanted alluvium; additional soil will blanket the refill and a new ground cover will take root. Indeed, as I write these lines, those very processes are being expedited by the National Park Service in a studied program of erosion control that includes introduction of check dams and the replanting of willows and cottonwoods. Since stockmen have moved their herds elsewhere and Navaho sheep and goats are restricted, it should be possible once again to reestablish a green carpet lengthwise of Chaco Canyon, but the pine forests that furnished timbers for Pueblo Bonito and its neighbors cannot be reclaimed.

CLIMATIC CHANGE

Bryan was not alone in believing that the climate of Chaco Canyon had changed toward the less humid sometime after the Bonitians settled there. Presumably these agricultural folk were drawn to the valley by its broad, flat acres, by an abundance of water just beneath the surface, and by pine forests on bordering mesas. But they soon exterminated the forests and they eventually learned that the flat acres of the valley were altogether unproductive. They may have noted also that floodwaters bearing upcanyon silt did not always arrive when expected and that crops failed for lack of moisture and replenished soil.

It was possibly a period of subnormal precipitation at the end of the 11th century rather than destruction of the Chaco forests that initiated the erosion culminating in the third-cycle arroyo, Bryan's "post-Bonito channel." Yet annual growth rings in many constructional timbers from Pueblo Bonito are so uniform in thickness as to indicate the pines had grown where moisture was fairly constant year after year. This fact, plus the quantities of tule or bulrushes (*Scirpus actutus* Muhl.) and coarse grasses utilized with those timbers, led Bryan to the conviction that rainfall in Chaco Canyon formerly exceeded his 1925 10-inch estimate. He offered no geological support for this conviction, but the botanical evidence alone led N. H. Darton, another geologist and a guest of the Expedition at its 1922 symposium, to share Bryan's belief in a climatic shift from the dry toward the less dry. Bulrushes grow in wet places.

Previously and for different reasons the theory of climatic change throughout the Southwest had been advanced by Hewett, Henderson, and Robbins (1913), Huntington (1914), Gregory (1916), and others. But, as emphasized by Kidder (1924, p. 54), these advocates did not always consider the fact that an Indian requires far less potable water than a white man and is content to irrigate his fields with the runoff following summertime showers. Together, Darton and Bryan believed that as little as one additional inch of precipitation annually would go far toward restoring the habitableness of Chaco Canyon. Together, black alkali and the 12th-century arroyo brought an end to local agriculture; floodwaters subsequently refilled that arroyo and buried the old Bonitian farmlands under an additional 2-5 feet of upcanyon alluvium.

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APPENDIX A

TABLE OF ROOM DIMENSIONS¹

By HENRY B. ROBERTS

¹ Rooms 1-190 were numbered as excavated by the Hyde Expedition. The Pepper measurements here given are from B. T. B. Hyde's table of room dimensions (*in* Pepper, 1920, pp. 352-8); those in parentheses, from Pepper's text on the same rooms. Capitals usually occur with room numbers on the Pepper ground plan, prepared by Mr. Hyde (*ibid.*, p. 23), whereas lower-case letters accompany the same numbers in text and table.

Rooms explored by the National Geographic Society begin with number 200; capital letters accompanying room numbers, including Pepper's, indicate second (B), third (C) and fourth (D) story rooms, with those few exceptions to which attention is specifically drawn.

In the present tabulation, NGS room dimensions were taken at floor level; those not so obtainable, and those estimated, are indicated by the letter *e*. Differences between Hyde's measurements and ours are probably owing to irregular masonry. Ceiling heights are from latest floor to ceiling poles.

Kiva dimensions appear on page 178. The triangular spaces about kivas usually mark the corners of former dwellings. In several instances these corners appear to have been receiled and temporarily utilized but in all, or nearly all, such instances the roofs were subsequently removed and the spaces rubbish filled. Adjacent larger areas, e.g., Rooms 220 and 221, served as lesser courts.

FOOTNOTES ACCOMPANYING APPENDIX A

TABLE OF ROOM DIMENSIONS—*continued*

² Pepper (1920, p. 39) places R. 3a east of 3; 3b, north of 3a; 3c, west of 3b; 3d, above 3c (pp. 43-45) but, comparing visible masonry with his text, we would locate 3a northeast of R. 3; 3b northeast of 3a; 3d above 3b. Neither description nor recorded measurement positively identifies R. 3c but, situated "directly west [NW] of R. 3b" and entered "through a hole which someone had broken in the west [NW] wall" [of 3b] (p. 44), it must be the "lower part of [R. 111] . . . broken into through the south [SE] wall in 1896" (p. 330).

Room 91 is the second story of R. 3 (p. 297); R. 92 adjoins 91 on the north [NE] (p. 298) as the second story of R. 3a which latter was subsequently cleared and renumbered 97 (p. 304).

³ Room 4 is a second story chamber, above R. 5.

⁴ Room 6 underlies 6a.

⁵ Since the east wall of R. 8 "is composed of stakes" it seems probable that 9B extended over first story rooms 8 and 9.

⁶ Erroneously numbered 14-25 on Hyde's groundplan.

⁷ Room 14a lies above 14b; neither is connected with R. 14-85. Pepper's figures 23 and 24 (pp. 72-73) show the north masonry of R. 303B, not 14a. His text (p. 70) has a wall "of the old type" in the foreground; one "of a later period" beyond.

⁸ Numbered but not excavated by Pepper; examined by NGS as R. 298.

⁹ Pepper's description of R. 17 identifies it with that reexcavated by the NGS as R. 211. Similarly, his R. 18 appears to be our 210.

¹⁰ Rooms 21 and 22, partially worked by Pepper but inaccurately placed on Hyde's groundplan, are those explored by the NGS as Rooms 247BN and 249B, respectively.

¹¹ Pepper (1920, p. 93) places R. 23 "near Room 25" but gives neither description nor measurements. "Room 106," according to his published notes (ibid., p. 324-5), "is situated just east of Room 25; its north wall forms the south wall of that room." The description which follows can only apply to that shown on Hyde's groundplan as R. 23; Pepper's unpublished negatives, Nos. 359 and 366, confirm this identification. These facts, plus the agreement between Hyde's tabulated dimensions for R. 106 and NGS figures for his R. 23, prompts us to interchange his numbers for the two rooms.

¹² Room 24, although incorrectly shown on Hyde's groundplan, as described by Pepper is unquestionably NGS Room 229B. Hyde's 16' is more than ceiling height.

¹³ Rooms 32 and 33 are first story chambers under Rooms 52 and 58, respectively.

¹⁴ Room 35 is south of R. 1; Pepper, apparently describing the second story chamber, says (1920, p. 179) "the lower room was a trifle smaller than the upper one." Room 35a, north of R. 146, was not described by Pepper.

¹⁵ Rooms 39a and 39b are first story structures west of 39 separated by light partitions; R. 39B may have covered all three rooms.

¹⁶ Hyde gives two sets of figures for R. 40. NGS tests disclosed neither west nor south wall on this site. The "bin" described by Pepper (1920, p. 200) and shown in his unpublished negative, No. 194, is a stepped entryway to R. 28.

¹⁷ Rooms 48B, and 49B and 50B overlie R. 48 (Pepper, 1920, p. 208), but 49B is doubtful.

¹⁸ Pepper mentions a rubbish filled room of first type masonry under 55 and 57. Room 28, originally including 28a, extends westward under Rs. 55 and 57. These latter are on a level with R. 28B (Pepper, 1920, p. 127), over 28a and the eastern half of 28.

¹⁹ Room 56 is the first story of R. 63.

²⁰ From Pepper's text, Room 73, incorrectly located on Hyde's plan, is unquestionably our R. 228B. Hyde's second set of figures for the southeast quarter of the divided first story chamber is not explained.

²¹ Originally a kiva overlying partly razed second-type structures, R. 76 was twice reconstructed for dwelling purposes; 76B was rectangular.

²² Room 82B overlies 82 and 77.

TABLE OF ROOM DIMENSIONS—*continued*

²³ A second story chamber over R. 97 (see note 2).

²⁴ See note 11.

²⁵ Unpublished Pepper negatives, Nos. 550 and 552, identify R. 117 as the triangular room immediately north of that marked 117 on Hyde's groundplan. Rooms 118-129 likewise have been identified through Pepper negatives and relocated on the NGS plan.

²⁶ On Hyde's groundplan, R. 139 is represented north of 138, a site partially occupied by Kiva 2-D. Unpublished Pepper negatives, Nos. 594, 595, and 655, identify the R. 138 of Hyde's plan as 137; Rooms 138 and 139 as the spaces south and north, respectively, of the single wall that bars the former passage between Rooms 137 and 140. North and south of this wall are sub-court foundations as shown on figure 5.

²⁷ Room 142, not described by Pepper, should be divided by a 9" thick partition.

²⁸ Room 227B overlies 227 and 227-I, the latter being a first-story structure not anticipated when the rooms were numbered prior to excavation.

²⁹ Rooms 247 and 252 were originally one room, later divided by the passageway, 250. The second story of this long room was also partitioned, perhaps earlier, by a wall resting upon a beam introduced at floor level, 17' from the north end of R. 252B. Further, the space south of this partition was divided by a similar wall, supported by the southernmost ceiling beam in R. 247; thus were formed the north and south chambers noted here as R. 247BN and 247BS. Positions of the two divisions, which had collapsed with decay of their supporting timbers, were indicated during 1921 repairs. (See Note 10).

³⁰ By construction of a rough partition, a single chamber was divided into the rooms numbered 248 and 249. And the latter, at about the same time, was divided by an introduced floor into what are here designated 249A₁ and 249A₂. In the lower of these two divisions (249A₁) macaws were housed. Room 248 was rubbish filled. A beam at floor level supported the wall between Rs. 248B and 249B.

³¹ The wall separating Rs. 247B and 252B rested upon a log placed above the second story floor offsets, 17' from the north end of the latter room; thus 247 is longer than its two second story apartments and 252B covers 252, 250 (a passageway) and 17" of 247.

³² Posts in the space numbered 286, at the southeast corner of the East Court, may have supported a flat brush roof. Beneath the floor of this open living room were the partially razed walls of a kiva which had been replaced by Kiva 2-E.

³³ The first story of R. 299 was the Hyde Expedition's storeroom (Pepper, 1920, p. 27); wires still hang from its ceiling. The adjoining room, 300, is heavily smoked; a recent stone bench fills the east end. Room 14b served as kitchen pending completion of the 1897 Wetherill trading post against the outer north wall (*ibid.*, p. 21, fig. 4).

³⁴ Too small even for storage purposes, R. 305 had no doorway; it was filled with debris of reconstruction and blown sand but was ceiled at the same level as 209. The upper stories may have been utilized.

³⁵ Room 307B overlies 307 and 307-I.

³⁶ Like 286, the space numbered 310 was utilized as an open workroom. Nine metates, some discarded and others positioned for use, were found on ten successive pavements.

³⁷ Another unenclosed work space, 313, was partially screened by an abandoned room whose second-type masonry supports the fourth period stonework of 312.

³⁸ As in the case of 249, R. 335 was divided into upper and lower chambers, here denoted as 335A₁ and 335A₂.

³⁹ Rooms 345 and 346 were either unfinished or almost wholly razed, more likely the former.

⁴⁰ Space 347 is the dooryard of R. 324. Rooms 348 and 349, originally a single, subcourt room, were formed when a rough partition, faced on the north side only, closed off the south half (349) and left the remainder for unknown purposes. A circular ventilator shaft connecting with 348 rose south of the dividing wall, buried in debris of reconstruction to the court level. Later R. 348 became common dumping ground.

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
1		11'5"		5'1"		11'5"		5'9"		6'
B	11'5" <i>e</i>		5'1" <i>e</i>		11'5" <i>e</i>		5'9" <i>e</i>		7'8" <i>e</i>	
C	11'5" <i>e</i>		5'1" <i>e</i>		11'5" <i>e</i>		5'9" <i>e</i>		7'4" <i>e</i>	
2		10'3½"		5'½" (5'1½")		10'3½"		5'4½"		6'3"
B	10'4" <i>e</i>		5'1" <i>e</i>		10'4" <i>e</i>		5'5" <i>e</i>		7'8" <i>e</i>	
C	10'4" <i>e</i>		5'1" <i>e</i>		10'4" <i>e</i>		5'5" <i>e</i>		7'4" <i>e</i>	
3 ²		(15'4")		(12'6")		(15')		(11'5")		(8'5")
a		(10'2")		(14'4")		(10')		(12'6")		
b	6'	(6'4")	10'	(10')	6'	(6')	13'	(12'1")	7'5"	
c		(10'9")		(12'4")		(10'9")		(10'5")		
d	5'11"	(5'11")	10'1"	(10')	5'8"	(5'8")	11'7"	(10'5")	7'9"	
4B ³		11'5"		5'5"		10'11"		5'4"		6'7"
C	11'6" <i>e</i>		5'6" <i>e</i>		11" <i>e</i>		5'5" <i>e</i>		7'4" <i>e</i>	
5		10'9"		8'3"		10'7" (10'6")		8'2"		8'2"
6 ⁴	10'11"		6'		10'10"		5'6"		8'2"	
a	10'1"		5'3"		10'6"		5'		7'8" <i>e</i>	
C	10'1" <i>e</i>		5'3" <i>e</i>		10'6" <i>e</i>		5' <i>e</i>		7'4" <i>e</i>	
7		14'11"		5'6"		12'7"		3'4"	9' <i>e</i>	
B	15' <i>e</i>		5'9" <i>e</i>		12'9" <i>e</i>		3'8" <i>e</i>		7'6" <i>e</i>	
C	15'2" <i>e</i>		5'10" <i>e</i>		12'10" <i>e</i>		4' <i>e</i>		7' <i>e</i>	
8 ⁵		7'		6'8"		7'		7'	7' <i>e</i>	
9		13'7"		8'		14'8"		7'	7' <i>e</i>	
B	21' <i>e</i>		7' <i>e</i>		20' <i>e</i>		6' <i>e</i>		6'5" <i>e</i>	
C	21' <i>e</i>		7'6" <i>e</i>		20' <i>e</i>		6'6" <i>e</i>		7'8" <i>e</i>	
10		13'2"		7'3"		12'6"		8'4"		7'
B	13'2" <i>e</i>		7'3" <i>e</i>		12'6" <i>e</i>		8'4" <i>e</i>		6'5" <i>e</i>	
C	13'2" <i>e</i>		7'3" <i>e</i>		12'6" <i>e</i>		8'4" <i>e</i>		7'8" <i>e</i>	
11		13'5"		7'9"		15'8"		6'8"		(6')
B	13'5" <i>e</i>		7'9" <i>e</i>		15'8" <i>e</i>		6'8" <i>e</i>		6'5" <i>e</i>	
C	13'5" <i>e</i>		7'9" <i>e</i>		15'8" <i>e</i>		6'8" <i>e</i>		7'8" <i>e</i>	
12		12'6"		9'		12'4"		8'2"		14'
B	13'3"		8'2"		12'3"		8'2"		6'5"	
C	13'3" <i>e</i>		8'2" <i>e</i>		12'3" <i>e</i>		8'2" <i>e</i>		7'8" <i>e</i>	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
13		8'6"				8'4"			7'e	
B	8'8"		10'		7'		8'8"		6'5"e	
C	8'8"e		10'e		7'e		8'8"e		7'8"e	
14-85 ⁶	23'7"e		11'5"e		21'2"e		11'e		9'e	
B	23'9"		11'7"		21'4"		11'3"		7'6"e	
14b ⁷	12'8"		6'1"		12'6"		6'2"		8'9"	
a	13'		6'2"		12'9"		6'9"		7'3"e	
C	13'e		6'6"e		12'9"e		7'e		6'	
D	13'e		6'6"e		12'9"e		7'e		6'e	
15 ⁸										
17 ⁹										
18		6'2"		4'4"		2'6"		7'2"		5'7"
				(4'11")						
19	11'2"e		14'6"e		7'e		14'e		6'e	
B	11'4"e		15'e		7'2"e		14'6"e		7'8"e	
20		10'7"		12'6"		10'		12'3"		12'
B	10'7"e		13'e		10'e		12'9"e		9'8"e	
21 ¹⁰		10'2"		10'		10'		11'		
22		10'		10'		10'		10'		
23 ¹¹	6'4"e		19'2"e		6'6"e		19'8"e		10'e	
B	6'8"		19'2"e		6'10"		19'8"		8'e	
24 ¹²		10'6"		14'6"		12'		12'2"		16'
		(11'10")		(12'6")		(12')		(12'2")		
25	7'3"	9'	16'8"	16'10"	14'4"	8'1"	16'6"	18'10"	11'4"	
		(7'3")		(17')		(14'4")		(16'3")		
B	7'3"		17'e		1'14"e		16'10"e		10'e	
27	6'1"	(6'10")	11'10"	(11'10")	6'2"	(6'8")	11'9"	(11'8")	7'e	
28 ¹⁸	30'6"e	25'7"		7'10"	26'6"e	25'		7'8"	8'6"e	14'
a		13'		7'10"		13'		8'2"	8'6"	(6')
B		(25'7")		(7'10")		(25')		(7'8")	6'4"	
29	12'e		4'e		8'6"e		7'e		6'e	
B	12'2"e		4'e		8'8"e		7'e		7'8"e	
32 ¹³		(8'11")		(4'7")		(8'8")		(7'3")		(5')
33		6'		5'10"		6'3"		6'10"	6'e	

TABLE OF ROOM DIMENSIONS—continued

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
34	6'1"	6'10" (6'7")	17'6"	11'10" (17'7")	6'2"	6'8" (6'6")	17'10"	11'8" (18')	7'e	6'
35 ¹⁴	11'6" <i>e</i>		11'9" <i>e</i>		11'5" <i>e</i>		11'11" <i>e</i>			6'2"
B		12'		12'3"		11'11"		12'5"	7'8" <i>e</i>	
C	12'2" <i>e</i>		12'5" <i>e</i>		12'1" <i>e</i>		12'7" <i>e</i>		7'4" <i>e</i>	
<i>a</i>	5'10"	6'6"	9'11"	10'2"	5'9"	6'	9'9"	10'6"	7'e	5'
36		11'9"		12'4"		12'10"		12'1"		7'
B	11'11" <i>e</i>		12'6" <i>e</i>		13'e		12'3" <i>e</i>		7'8" <i>e</i>	
C	11'11" <i>e</i>		12'6" <i>e</i>		13'e		12'3" <i>e</i>		7'4" <i>e</i>	
37		10'7" (11'9")		11'11" (12'4")		11'3" (12'10")		12'2" (12'1")		6'6"
B	11'11" <i>e</i>		12'6" <i>e</i>		13'e		12'3" <i>e</i>		7'8" <i>e</i>	
C	11'11" <i>e</i>		12'6" <i>e</i>		13'e		12'3" <i>e</i>		7'4" <i>e</i>	
38		32'2"		10'2"		27'8"		13'9"		6'
B	32'4" <i>e</i>		10'4" <i>e</i>		27'10" <i>e</i>		14'e		7'8" <i>e</i>	
C	32'4" <i>e</i>		10'4" <i>e</i>		27'10" <i>e</i>		14'e		7'4" <i>e</i>	
39 ¹⁵		21'1"		9'8½"		20'3"		8'3"		
<i>a</i>		7'8"		8'10" (8'5")		7'6"		8'5" (8'10")	6'e	5'9"
<i>b</i>		7'4"		8'7" (8'10")		7'6"		8'10" (8'7")		6'
39B	37'7" <i>e</i>		9'10" <i>e</i>		36'9" <i>e</i>		8'9" <i>e</i>		7'8" <i>e</i>	
40 ¹⁶		22'6"		11'		22'6"		11'		6'
41		7'9"		13'6"		7'11"		11'4"		5'9"
B	7'9" <i>e</i>		13'6" <i>e</i>		7'11" <i>e</i>		11'4" <i>e</i>		7'8" <i>e</i>	
42		14'		9'5"		(14'—)		9'10"	6'e	
B	14'e		9'5" <i>e</i>		13'e		9'10" <i>e</i>		7'8" <i>e</i>	
43		5'		6'4"		5'8"		7'1" (7'11")		(7')
B	5'e		6'4" <i>e</i>		5'8" <i>e</i>		7'11" <i>e</i>		7'8" <i>e</i>	
44		13'10"		5'1"		14'		5'2"	7'e	
B	14'e		5'1" <i>e</i>		14'2" <i>e</i>		5'2" <i>e</i>		6'6"	
C	14'2" <i>e</i>		5'1" <i>e</i>		14'4" <i>e</i>		5'6" <i>e</i>		6'e	
45		19'		7'5"		17'8"		6'10"	6'e	
B	19'e		7'7" <i>e</i>		17'8" <i>e</i>		7'e		7'8" <i>e</i>	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
46		5'6"		7'2"		5'		7'2"		6'2"
B	5'6" <i>e</i>		7'2" <i>e</i>		6' <i>e</i>	6'	7'2" <i>e</i>		7'8" <i>e</i>	
47		6'		(10'9")		6'		10'9"		7'
B	6' <i>e</i>		10'9"		6' <i>e</i>		10'9" <i>e</i>		7'8" <i>e</i>	
48 ¹⁷		13'5"		7'11"		11'		6'10"		12'
B		8'6"		7'5"		8'2"		7'3"		5'
		(5'4")		(8')		(5')		(7'3")		
49B		9'		1'10"		9'		2'		6'
50B		4'3"		7'9"		4'8"		7'8"		7'
				(7'8")				(7'9")		
51		11'6"		9'2"		10'9"		8'4"	6' <i>e</i>	
<i>a</i>		7'9"		8'2"		6'		8'2"		5'7"
B	20'5" <i>e</i>		9'2" <i>e</i>		17'11" <i>e</i>		8'2" <i>e</i>		7'8" <i>e</i>	
52B ¹³		9'3"		5'11"		9'6"		6'4"	7'8" <i>e</i>	
		(6'4")		(9'3")		(5'11")		(9'6")		
53		11'6"		14'2"		10'5"		13'5"	6' <i>e</i>	
B	11'8" <i>e</i>		14'2" <i>e</i>		10'7" <i>e</i>		13'5" <i>e</i>		7'8" <i>e</i>	
54		24'7"		10'		25'3"		8'5"	6' <i>e</i>	
B	24'9" <i>e</i>		10'2" <i>e</i>		25'5" <i>e</i>		8'7" <i>e</i>		7'8" <i>e</i>	
C	24'9" <i>e</i>		10'2" <i>e</i>		25'5" <i>e</i>		8'7" <i>e</i>		7'4" <i>e</i>	
55B ¹⁸		7'2"		8'		6'4"		7'3"		6'5"
C	7'2" <i>e</i>		8' <i>e</i>		6'4" <i>e</i>		7'7"		7' <i>e</i>	
56 ¹⁹		6'7"		16'3"		5'3"		13'10"		5'8"
										(5'6")
57B ¹⁸	7'4"	7'8"	6'11"	7'	6'7"	6'10"	7'3"	7'		7'10"
C	7'11"		7'2"		6'10" <i>e</i>		7' <i>e</i>		7' <i>e</i>	
58B ¹³		6'		5'7"		6'		6'2"		(6'9")
C	6'7"		5'9"		5'11"		6'2"		7'4" <i>e</i>	
60		10'		15'5"		13'5"		6'5"	7'4" <i>e</i>	
		(10'3")							8'10" <i>e</i>	
<i>a</i>		(7')				6'		5'3"		
B	10'3"		16'		14' <i>e</i>		15'10"		9'8" <i>e</i>	
61		11'1"		11'6"		9'4"		10'4"		6'3"
B	11'3" <i>e</i>		11'8" <i>e</i>		9'6" <i>e</i>		10'6" <i>e</i>		7'8" <i>e</i>	
C	11'3" <i>e</i>		11'8" <i>e</i>		9'6" <i>e</i>		10'6" <i>e</i>		7'4" <i>e</i>	

TABLE OF ROOM DIMENSIONS—continued

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
62		19'11"		7'5"		20'9"		10'		8' (av. 10'9")
B	20'e		7'4"e		21'e		10'e		6'e	
63B ¹⁹		6'2"		16'1"		5'9"		16'1"		7'7"
C	6'2"e		16'3"e		5'9"e		16'3"e		7'4"e	
65		11'9" (11'7")		11'7" (10'1")		10'3" (12'7")		12'7" (8'5")		9'e
66		9'9"		11'1"		9'4"		9'9"		(9')
68		11'10"		14'		14'2"		13'8"	9'e	
a		(11'4")		(3'2")		(11'7")		(3'2")	9'e	
69		9'10"		18'		10'6"		18'7"	9'e	
70		6'1" (2'10")		6'10" (7'10")		11'10" (14'10")		8'5" (9'10")		5'
B	6'3"		6'6"		14'9"		9'10"		9'e	
71		10'2"		18'8"		8'4"		15'11"	7'6"e	
B	10'6"		18'7"		9'10"		16'		7'6"e	
72		20'7"		5'3"		10'3"(?)		2'8"	8'e	
73 ²⁰		15'11"		13'6"		18'		9'3"		
								(12'5")		
NE				5'7"		8'9"		6'2"		
SE		7'6"		9'3"		5'9"		10'6"		
		9'4½"		11'		9'3"		9'5"		
76 ²¹	9'8"	7'5"		16'1"(?)		7'5"(?)	14'10"	16'1"	8'6"	9'
B	11'		15'9"		11'2"		15'6"		9'8"e	
77		10'3"		5'8"		10'3"		6'7"	9'e	
78		8'11" (10'10")		21'		8'2" (8'1")		18'9" (18'8")		(7'2")
B	11'5"		20'6"		10'1"		19'5"		7'6"e	
80		10'2" (9'11")		18'5"		9'11" (10'2")		18'5"	9'e	
B	9'10"		18'2"		10'		18'2"		9'8"e	
81		(7')		(5'10")		(8'10")				
82		10'		11'9"		10'		10'9"	9'e	
B ²²	10'4"		18'5"		10'3"		18'5"		9'8"e	

TABLE OF ROOM DIMENSIONS—continued

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
83		11'9"		20'8"		10'7"		18'		6'
B	12'e		20'8"e		10'11"e		18'e		7'6"e	
84		10'3"		9'7"		9'7"		9'2"		6'e
B	10'5"e		9'9"e		9'9"e		9'4"e		7'8"e	
C	10'5"e		9'9"e		9'9"e		9'4"e		7'4"e	
86		9'2"		15'		8'8"		14'6"		10'
B	9'3"		15'1"		8'7"		14'8"		7'1"	
C	9'5"e		15'1"e		8'9"e		14'8"e		8'4"e	
87		8'10"		17'2"		8'4"		17'		9'10"
B	8'10"		17'2"		8'4"		17'		9'6"e	10'
C	9'2"e		17'2"e		8'8"e		17'e		8'e	
88		8'2"		16'8"		7'11"		16'11"		10'3"
B	8'4"e		16'10"e		8'2"e	8'	17'2"e	17'2"	9'6"e	9'2"
C	8'6"e		16'10"e		8'4"e		17'2"e		8'e	
89		7'11"		16'9"		7'11"		16'9"		10'
B	8'5"e		16'9"e		8'5"e		16'9"e		9'6"	
C	8'11"e		19'9"e		8'11"e		16'9"e		8'e	
90		10'3"		18'5"		10'1"		18'6"		8'
B	10'8"e		18'5"e		10'5"e		18'6"e		9'8"e	
91B ²		14'10"		13'		14'11"		12'		7'8"e
92B ²³		9'9"		14'6"		5'6"		13'7"		7'8"e
93		19'4"		7'2"		15'8"		5'11"		8'6"
B	19'4"e		7'2"e		15'8"e		5'11"e		9'e	7'8"
94		21'5"		5'11"		20'9"		4'8"		10'e
B	21'9"e		5'11"e		21'1"e		4'8"e		9'e	
95		17'4"		6'7"		16'11"		6'8"		10'e
B	17'8"e		6'9"e		17'3"e		6'10"e		9'e	
96		20'2"		6'3"		19'7"		6'2"		9'8"
B	20'2"e		6'7"e		19'7"e		6'6"e		9'e	
97 ²		10'2"		14'6"		6'5"		13'3"		7'e
98		8'3"		17'1"		8'6"		16'8"		8'10"
B	8'3"		17'1"		8'8"		16'11"		9'8"	
C	8'7"e		17'1"e		9'e		16'11"e		8'e	
99		8'9"		14'10"		8'SE 4'11"S		16'10"		8'10"
		8'9½"		14'10"				17'2"		

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
99B	7'10"		25'9"		13'11"		17'4"		9'8" <i>e</i>	
C	8'2" <i>e</i>		26'1" <i>e</i>		13'11" <i>e</i>		17'8" <i>e</i>		8' <i>e</i>	
100		4'2"		17'		4'6"		16'	10' <i>e</i>	(11')
B	3'10"		17'5"		4'5" <i>e</i>		16'10"		8' <i>e</i>	
C	3'10" <i>e</i>		17'5" <i>e</i>		4'5" <i>e</i>		16'10" <i>e</i>		7' <i>e</i>	
101		14'8"		5'10"		12'4"		2'9"	10' <i>e</i>	
B	15'8"		6'8"		12'1"		3'3"		9' <i>e</i>	
102		18'6"		8'2"		16'5"		9'6"	9' <i>e</i>	
B	18'8" <i>e</i>		8'4" <i>e</i>		16'7" <i>e</i>		9'8" <i>e</i>		8' <i>e</i>	
C	18'8" <i>e</i>		8'4" <i>e</i>		16'7" <i>e</i>		9'8" <i>e</i>		7' <i>e</i>	
103		16'10"		8'5"		16'5"		8'4"	9' <i>e</i>	11'
B	17' <i>e</i>		8'7" <i>e</i>		16'7" <i>e</i>		8'6" <i>e</i>		8' <i>e</i>	
C	17' <i>e</i>		8'7" <i>e</i>		16'7" <i>e</i>		8'6" <i>e</i>		7' <i>e</i>	
104		4'2"		5'8"		3'2"		6'9"	7' <i>e</i>	
B	3'3"		5'10"		2'7"		8'4"		5'7"	
C	3'11"		6'9" <i>e</i>		3'5" <i>e</i>		6'8"		3'4"	
D	3'11"		5'11" <i>e</i>		3'5" <i>e</i>		5'10"		6' <i>e</i>	
105		10'		12'5"		12'2"		16'8"	12'8"	
B	10' <i>e</i>		12'8" <i>e</i>		12'3" <i>e</i>		16'8" <i>e</i>		10' <i>e</i>	
			4' <i>e</i> NE							
106 ²⁴		13'7"		16'10"		12'7"		16'9"	12' <i>e</i>	
B	13'7" <i>e</i>		17'2" <i>e</i>		12'7" <i>e</i>		17' <i>e</i>		10' <i>e</i>	
107		10'9"		7'7"		9'2"		6'9"	9' <i>e</i>	
B	11'3"		7'		9'11"		6'9"		8' <i>e</i>	
C	11'3" <i>e</i>		7' <i>e</i>		9'11" <i>e</i>		6'9" <i>e</i>		7' <i>e</i>	
110 ²	6'	(6'4")	10'	(10')	6'	(6')	13'	(12'1")	7'5"	
B	5'11"	(5'11")	10'1"	(10')	5'8"	(5'8")	11'7"	(10'5")	7'9"	
C		5'10"	10'	10'		5'7"		11'4"	7' <i>e</i>	
D	6'1" <i>e</i>		10'10" <i>e</i>		5'10" <i>e</i>		11'9" <i>e</i>		6' <i>e</i>	
111 ²		(10'9")		(12'4")		(10'9")		(10'5")		
B	5'10"	6'	13'	13'6"	6'2"	5'10"	10'9"	11'10"	7'9" <i>e</i>	
C	5'11"		13'9"		5'9"		12'3"		7' <i>e</i>	
D	5'11" <i>e</i>		13'9" <i>e</i>		5'9" <i>e</i>		12'3" <i>e</i>		6' <i>e</i>	
112	35'6" <i>e</i>		13'8" <i>e</i>		32'9" <i>e</i>		14'6" <i>e</i>		10' <i>e</i>	
B	35'6"		14'2"		32'9"		14'6"		8' <i>e</i>	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
113	18'6" <i>e</i>		9' <i>e</i>		18'4" <i>e</i>		9' <i>e</i>		10' <i>e</i>	
B	18'10"		9'3"		18'4"		9'2"		7'7"	
C	18'10" <i>e</i>		9'3" <i>e</i>		18'4" <i>e</i>		9'2" <i>e</i>		8' <i>e</i>	
114	18'1" <i>e</i>		5'10"		16'5"		5'1"		10'4"	
B	18'4" <i>e</i>		5'10" <i>e</i>		16'8" <i>e</i>		5'1" <i>e</i>		9' <i>e</i>	
115	18'2"		5'1"		17'11"		6'1"		10' <i>e</i>	
B	18'4" <i>e</i>		5'2" <i>e</i>		18'2" <i>e</i>		6'3" <i>e</i>		9' <i>e</i>	
116		5'6"		17'3"		5'9"		18'6"	11'	
B	5'6" <i>e</i>		17'9" <i>e</i>		5'9" <i>e</i>		19' <i>e</i>		9' <i>e</i>	
117 ²⁵	1'1"	9'	32'3"	18'	10'3"	9'	32'8"	19'	12'4"	
B	1'1"		32'9"		10'3"		33'2" <i>e</i>		10' <i>e</i>	
118	8'2"	9'	17'6"	18'	8'4"	9'	17'8"	19'	12' <i>e</i>	
B	8'2" <i>e</i>		17'11" <i>e</i>		8'4" <i>e</i>		18'2" <i>e</i>		10' <i>e</i>	
119	8'3"	9'	16'5"	19'	8'3"	9'	17'1"	19'	12'8" <i>e</i>	
B	8'3" <i>e</i>		16'11" <i>e</i>		8'3" <i>e</i>		17'7" <i>e</i>		10' <i>e</i>	
120	8'3"	10'	17'3"	16'7"	8'6"	10'4"	17'1"	15'4"	12' <i>e</i>	
B	8'3" <i>e</i>		17'9" <i>e</i>		8'6" <i>e</i>		17'7"		10' <i>e</i>	
121	8'8"	9'	16'10"	16'	8'7"	8'	16'10"	17'	12' <i>e</i>	
B	8'8" <i>e</i>		17'4" <i>e</i>		8'7" <i>e</i>		17'4" <i>e</i>		10' <i>e</i>	
122	8'6"	8'	16'9"	17'	9'1"	8'	16'6"	16'	12' <i>e</i>	
B	8'6" <i>e</i>		17'1" <i>e</i>		9'1" <i>e</i>		16'10" <i>e</i>		10' <i>e</i>	
123	8'10"	7'	16'7"	16'	8'9"	7'	16'10"	16'	12' <i>e</i>	
B	8'10" <i>e</i>		17'1" <i>e</i>		8'9" <i>e</i>		17'4" <i>e</i>		10' <i>e</i>	
124	8'7"	8'	16'7"	9'	8'2"	8'	17'	9'	12' <i>e</i>	
B	8'7" <i>e</i>		17'3" <i>e</i>		8'2" <i>e</i>		17'6" <i>e</i>		10' <i>e</i>	
125	8'6"	9'	9'7"	10'	8'2"	9'	9'4"	10'	12' <i>e</i>	
B	8'6" <i>e</i>		10'1" <i>e</i>		8'2"		9'10" <i>e</i>		10' <i>e</i>	
126	12'7"	12'	8'11"	10'	12'8"	12'	9'	10'	10'6" <i>e</i>	
B	13' <i>e</i>		8'11" <i>e</i>		13'2" <i>e</i>		9' <i>e</i>		10' <i>e</i>	
127	12'10"	13'	10' <i>e</i>	10'	13'5"	13'	11' <i>e</i>	10'	12' <i>e</i>	
B	13'2" <i>e</i>		10' <i>e</i>		13'9" <i>e</i>		11' <i>e</i>		10' <i>e</i>	
128	14'5"	15'6"	9'10"	10'	14'9"	15'6"	11'7"	10'	9'6" <i>e</i>	
129	16'6"	16'	7'5"	10'	17'	16'	8'10"	10'	9'6" <i>e</i>	
131	10'2"	13'	8'	9'	10'2"	13'	8'	9'	9' <i>e</i>	
132	7'9"	10'	8'	9'	7'6"	10'	8'	9'	9' <i>e</i>	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
133	14'11"	11'	8'	9'	15'6"	11'	8'	9'	9'e	
134	7'5"	11'	8'	9'	6'10"	11'	7'11"	9'	9'e	
135	6'10"	10'	8'	9'	7'5"	10'	8'	9'	9'e	
136	14'7"	10'	8'	9'	14'7"	10'	7'11"	9'	9'e	
137	15'	15'	8'11"	9'	15'	15'	8'	9'	9'e	
138 ²⁶		8'		8'		8'		8'		
139		8'		6'		8'		6'		
140	12'5"	11'6"	8'9"	9'	11'11"	11'6"	8'5"	9'	8'e	
141	13'5"	13'6"	8'8"	9'	13'8"	13'6"	8'9"	9'	8'e	
142 ²⁷		19'		9'		19'		9'		
142E	12'3"		8'6"		12'3"		8'6"		8'e	
142W	5'11"		8'6"		5'11"		8'6"		8'e	
143	5'10"	6'	17'4"	16'	6'	7'	16'10"	17'	8'e	
144	5'9"	6'	17'3"	16'	5'9"	6'	17'1"	16'	8'e	
146	10'4"	7'	13'6"	11'	12'4"	Kiva	24'	20'	7'e	
147						11'		10'		
148	21'	24'	11'6"	18'	20'11"	Kiva	11'5"	13'	7'e	
149	10'4"	10'6"	21'5"	22'	3'9"	K4	15'11"W	17'	7'e	
							10'SW			
150	2'3"N	K	23'	24'	9'10"	9'	15'1"	15'	7'e	
	9'NW									
151	10'10"	9'6"	6'1"	6'	11'6"	10'	7'5"	6'	9'e	
152	11'8"	10'	12'10"	14'	13'1"	12'	12'8"	13'	9'e	
153	7'8"	7'6"	7'4"	7'6"	7'8"	8'	7'3"	7'6"	9'e	
154	10'1"	8'6"	7'5"	7'6"	10'6"	8'6"	7'6"	7'6"	9'e	
155		11'		7'6"		11'		7'6"	9'e	
156	8'6"	9'	7'	7'6"	7'11"	9'	7'	8'6"	9'e	
157	7'11"	10'	6'11"	8'	8'6"	10'	7'	10'	9'e	
158	17'10"	18'6"	7'8"	8'	18'3"	18'6"	7'7"	8'6"	9'e	
159		10'		13'		5'		11'6"	10'e	
160		7'		11'6"		15'		13'	10'e	
159B }										
160B }	19'3"e		11'10"e		19'4"e		11'9"e		9'8"e	
163	10'10"	10'	6'8"	9'	11'7"	11'	7'2"	9'	7'6"e	
164	9'11"	9'6"	6'6"	6'6"	10'4"	10'	5'10"	6'6"	7'6"e	

TABLE OF ROOM DIMENSIONS—continued

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
165	8'	8'9"	13'2"	13'	9'5"	9'	13'1"	13'	7'6" <i>e</i>	
166	10'3"				19'3"		3'9"		7'6" <i>e</i>	
167	2'7"		8'7"		3'6"		9'7"			
168	18'10"	18'6"	11'9"	12'	19'	18'6"	11'10"	12'	10' <i>e</i>	
B	19' <i>e</i>		12' <i>e</i>		19' <i>e</i>		12' <i>e</i>		9'8" <i>e</i>	
169	19'2"	18'	11'6"	12'	19'1"	18'	11'7"	12'	10' <i>e</i>	
B	19'8" <i>e</i>		11'6" <i>e</i>		19'7" <i>e</i>		11'7" <i>e</i>		9'8" <i>e</i>	
170	14'	17'	18'7"	19'	15'2"	16'	17'2"	18'	7'9"	
B	14'6" <i>e</i>		24'11" <i>e</i>		15'8" <i>e</i>		24'8" <i>e</i>		9'8" <i>e</i>	
171	11'10"	11'6"	11'5"	12'	11'10"	13'	11'5"	11'6"	10'6" <i>e</i>	
B	12'2"		11'7" <i>e</i>		12'2" <i>e</i>		11'7" <i>e</i>		9'8" <i>e</i>	
C	12'8" <i>e</i>		12'1" <i>e</i>		12'8" <i>e</i>		12'1" <i>e</i>		8' <i>e</i>	
172	18'4"	15'	11'4"	12'	18'	16'	11'4"	12'	10'6"	
B	19'4"		11'8" <i>e</i>		19' <i>e</i>		11'8" <i>e</i>		9'8" <i>e</i>	
C	19'9" <i>e</i>		12' <i>e</i>		19'5" <i>e</i>		12' <i>e</i>		8' <i>e</i>	
173	21'	21'	11'10"	13'	21'2"	21'6"	12'2"	13'	8'4" <i>e</i>	
B	21'3"		11'8" <i>e</i>		21'5" <i>e</i>		12' <i>e</i>		10' <i>e</i>	
C	21'9" <i>e</i>		12' <i>e</i>		21'11" <i>e</i>		12'4" <i>e</i>		8' <i>e</i>	
174	16'5"	16'6"	11'8"	12'6"	15'9"	15'	11'4"	12'6"	8'6" <i>e</i>	
B	15'8"		12'6" <i>e</i>		14'6" <i>e</i>		12'10" <i>e</i>		10'2"	
C	16'2" <i>e</i>		12'10" <i>e</i>		15' <i>e</i>		13'2" <i>e</i>		8' <i>e</i>	
175	11'10"	12'	11'9"	13'	11'6"	12'	11'7"	13'	8' <i>e</i>	
B	11'10"		12'1" <i>e</i>		11'6" <i>e</i>		11'11" <i>e</i>		10' <i>e</i>	
C	11'10" <i>e</i>		12'5" <i>e</i>		11'6" <i>e</i>		12'3" <i>e</i>		8' <i>e</i>	
176	10'3"	10'	11'7"	13'	11'6"	10'	11'9"	13'	8' <i>e</i>	
B	10'5"		11'9" <i>e</i>		11'8" <i>e</i>		11'11" <i>e</i>		10' <i>e</i>	
C	10'5" <i>e</i>		12'1" <i>e</i>		11'8" <i>e</i>		12'2" <i>e</i>		8' <i>e</i>	
177	10'2"	10'	19'3"	20'	10'4"	10'	18'	18'	8'2"	
B	10'2"		18'11"		10'2"		18'		10' <i>e</i>	
C	10'2" <i>e</i>		19'3" <i>e</i>		10'2" <i>e</i>		18'4" <i>e</i>		8' <i>e</i>	
178	10'2"	9'	19'8"	1'8"	10'3"	9'	19'2"	17'	7'4"	
B	10'10"		19'8"		9'11"		18'11"		10' <i>e</i>	
C	10'10" <i>e</i>		19'6" <i>e</i>		9'7" <i>e</i>		18'11" <i>e</i>		8'" <i>e</i>	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
179	10'4"	9'6"	19'6"	17'6"	10'1"	9'6"	19'8"	18'	8'6"	
B	10'3"		19'6"		10'2"		19'5"		10'	
C	10'9" ^e		19'6" ^e		10'8" ^e		19'5" ^e		8'e	
180	10'2"	9'6"	16'4"	16'6"	10'5"	9'6"	15'2"	16'	7'6"	
B	10'2"		16'9"		10'7"		15'6"		9'8"	
C	10'6" ^e		16'9" ^e		10'11" ^e		15'6" ^e		8'e	
D	10'10" ^e		16'9" ^e		12'3" ^e		15'6" ^e		8'e	
181	9'11"	10'	16'4"	16'7"	10'2"	10'4"	15'2"	15'4"	7'6"	
B	10'2"		16'2"		10'3"		15'6"		10'6"	
C	10'8" ^e		16'2" ^e		10'9" ^e		15'6" ^e		8'e	
D	11'e		16'2" ^e		11'1" ^e		15'6" ^e		8'e	
182	10'1"	10'	16'9"	19'	9'11"	10'	16'9"	19'	7'6"	
B	10'1"		16'3"		10'		15'8"		10'6" ^e	
C	10'1" ^e		16'7" ^e		10'e		16'e		8'e	
D	10'1" ^e		16'9" ^e		10'e		16'2" ^e		8'e	
183	10'2"	10'	16'6"	15'	10'1"	10'	14'10"	15'	7'2"	
B	10'2"		16'9"		10'1"		15'		10'	
C	10'2" ^e		16'10" ^e		10'2" ^e		15'2" ^e		8'e	
D	10'2" ^e		17'e		10'2" ^e		15'4" ^e		8'e	
184	10'1"	9'6"	16'10"	13'6"	10'3"	9'6"	15'	12'6"	7'4"	
B	10'		16'11"		10'1"		14'11"		9'2"	
C	10'2" ^e		17'3" ^e		10'1" ^e		15'1" ^e		8'e	
D	10'2" ^e		17'3" ^e		10'1" ^e		15'1" ^e		8'e	
185	10'1"	8'	16'9"	17'6"	10'1"	8'	16'8"	17'6"	7'2"	
B	10'5" ^e		16'9" ^e		10'1" ^e		16'5"		9'6"	
C	10'7" ^e		17'2" ^e		10'3" ^e		16'10" ^e		8'e	
D	10'7" ^e		17'6" ^e		10'3" ^e		17'2" ^e		8'e	
186	10'1"	8'	16'8"	19'	10'2"	8'	16'5"	19'	7'2"	
B	10'3" ^e		16'4" ^e		10'6" ^e		16'5"		9'e	
C	10'5" ^e		16'8" ^e		10'8" ^e		16'9" ^e		8'e	
D	10'5" ^e		16'10" ^e		10'8" ^e		16'11" ^e		8'e	
187	9'5"	9'	13'10"	11'	9'11"	8'6"	12'9"	11'	6'11"	
B	9'7"		13'7"		9'1"		12'9"		9'8" ^e	
C	10'1" ^e		13'7" ^e		9'7" ^e		12'9" ^e		8'e	
D	10'1" ^e		13'9" ^e		9'7" ^e		12'11" ^e		8'e	

TABLE OF ROOM DIMENSIONS—continued

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
188	Unexcavated									
B	7'10"		17'4"		9'1"		17'		9'8" <i>e</i>	
C	8'2" <i>e</i>		17'4"		9'5" <i>e</i>		17' <i>e</i>		8' <i>e</i>	
D	8'2" <i>e</i>		17'6" <i>e</i>		9'5" <i>e</i>		17'2" <i>e</i>		8' <i>e</i>	
189	Unexcavated									
B	6'5"		15'8"		7'9"		15'9"		9'8" <i>e</i>	
C	6'9" <i>e</i>		15'8" <i>e</i>		8'1" <i>e</i>		15'9" <i>e</i>		8' <i>e</i>	
D	6'9" <i>e</i>		15'10" <i>e</i>		8'1" <i>e</i>		15'11" <i>e</i>		8' <i>e</i>	
200	10'6"		6'		10'		5'11"		9'10"	
B	10'10" <i>e</i>		6' <i>e</i>		10'4" <i>e</i>		5'11" <i>e</i>		8'	
C	10'10" <i>e</i>		6'2" <i>e</i>		10'4" <i>e</i>		6'1" <i>e</i>		7' <i>e</i>	
201	9'10"		1'9"		9'10"		1'6"		9' <i>e</i>	
B	9'10" <i>e</i>		2'6" <i>e</i>		9'10" <i>e</i>		2'6" <i>e</i>		8' <i>e</i>	
C	9'10" <i>e</i>		2'8" <i>e</i>		9'10" <i>e</i>		2'8" <i>e</i>		7' <i>e</i>	
202	10'5"		6'5"		10'4"		6'2"		9'10" <i>e</i>	
B	10'9" <i>e</i>		6'5" <i>e</i>		10'8" <i>e</i>		6'2" <i>e</i>		8' <i>e</i>	
C	10'9" <i>e</i>		6'7" <i>e</i>		10'8" <i>e</i>		6'4" <i>e</i>		7' <i>e</i>	
203	10'1"		1'10"		10'1"		1'8"		9' <i>e</i>	
B	10'1" <i>e</i>		2'9"		10'1" <i>e</i>		2'1" <i>e</i>		8' <i>e</i>	
C	10'1" <i>e</i>		2'11" <i>e</i>		10'1" <i>e</i>		2'3" <i>e</i>		7' <i>e</i>	
204	10'2" <i>e</i>		6'7" <i>e</i>		10'2" <i>e</i>		6'7" <i>e</i>		9'10" <i>e</i>	
B	10'6" <i>e</i>		6'7" <i>e</i>		10'4" <i>e</i>		6'7" <i>e</i>		8' <i>e</i>	
C	10'6" <i>e</i>		6'9" <i>e</i>		10'4" <i>e</i>		6'9" <i>e</i>		7' <i>e</i>	
205	Unexcavated									
206	Unexcavated									
207	Unexcavated									
208	Unexcavated									
209	11'9"		6'2"		11'6"		6'2" <i>e</i>		9'6"	
B	12' <i>e</i>		6'2" <i>e</i>		11'9" <i>e</i>		6'2" <i>e</i>		7'3" <i>e</i>	
C	12' <i>e</i>		6'6" <i>e</i>		11'9" <i>e</i>		6'6" <i>e</i>		6' <i>e</i>	
D	12' <i>e</i>		6'6" <i>e</i>		11'9" <i>e</i>		6'6" <i>e</i>		6' <i>e</i>	
210			5'E		3'1"		7'		6' <i>e</i>	
			6'7"NE							
211	5'8"		16' <i>e</i>		5'8" <i>e</i>		16' <i>e</i>		7' <i>e</i>	
212	6'4" <i>e</i>		9' <i>e</i>		6'4"		9' <i>e</i>		7' <i>e</i>	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
213			3'6"E 15'5"NE		10'5"		12'3"		7'e	
214	5'11"		5'11"		5'11"		5'7"		7'e	
215	9'		5'4"		9'7"		5'6"		7'e	
216	5'7"		4'6"		4'11"		6'		7'e	
217	13'11" <i>e</i>		6'11"		14'5"		4'4"		7'e	
218	10'5" <i>e</i>		13'10"		8'8"		7'10" <i>e</i>		7'e	
219	10'10"		17'9"		10'		17'6"		8'e	
220	13'1"		6'6"				14'e			
221	13'		21'4"				6'9"			
222	9'10"		16'11"		8'8"		17'1"		8'e	
223					9'4"		8'1"			
224	2'9"		6'		7'9"		1'5"			
225	11'7"		19'5"		11'9"		18'2"		8'9"	
B	11'9"		19'6"		12'		17'6"		9'10"	
C	12'1" <i>e</i>		19'8" <i>e</i>		12'4" <i>e</i>		17'8" <i>e</i>		8'e	
226	17'6"		16'5"		16'7"		13'5"		8'3"	
B	17'4"		15'11"		16'5"		12'11"		9'10"	
C	17'8" <i>e</i>		15'11" <i>e</i>		16'9" <i>e</i>		12'11" <i>e</i>		8'e	
227-1 ²⁸	9'2"		12'9"		9'5"		11'3"		9'5"	
227	9'4"		10'10"		9'3"		9'5"		9'1"	
B	20'3"		12'3"		20'4"		9'2"		8'2" <i>e</i>	
C	20'7" <i>e</i>		12'5" <i>e</i>		20'8" <i>e</i>		9'4" <i>e</i>		8'e	
228										
SE	9'2"		7'3"		10'5"		5'9"		9'8"	
SW	6'4"		4'4"		5'11"		3'11"		9'6" <i>e</i>	
NW	6'e		5'6" <i>e</i>		6'2" <i>e</i>		6'e			
NE	8'7"		5'2"		8'11"		6'		9'10"	
B	17'8"		13'4"		18'3"		12'2"		9'7"	
C	17'10" <i>e</i>		13'8" <i>e</i>		18'5" <i>e</i>		12'6" <i>e</i>		8'e	
229										
SE	4'7"		5'2"		5'7"		4'3"		7'9"	
SW	4'9"		4'11"		3'11"		4'8"		7'8"	
NW	6'		4'7"		4'11"		7'		7'8" <i>e</i>	
NE	5'10"		5'2" <i>e</i>		5'10"		5'		7'8" <i>e</i>	

TABLE OF ROOM DIMENSIONS—continued

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
229B	12'2"	Unexcavated	12'2"		10'		11'9"		9'11"	
C	12'4" <i>e</i>		12'8" <i>e</i>		10'2" <i>e</i>		12'1" <i>e</i>		8' <i>e</i>	
230	4'2"		20'3"							
231					9'6"		12'			
232	10' <i>e</i>						12' <i>e</i>			
233	5'8"		13'				3'10"		6' <i>e</i>	
234			11'4"		12'					
235	10'2"		2'6"		9'5"		3'11"		6' <i>e</i>	
B	10'2"		4'6"		14'6"		3'11"			
236	3'4"				7'		15'10"			
237	5'4"		16'8"		5' <i>e</i>		16'8" <i>e</i>		7' <i>e</i>	
238	15'6" <i>e</i>		3'6" <i>e</i>				12' <i>e</i>			
239	17'2"		9'2"		8' <i>e</i>		3'5"			
240										
241	11'10"		19'8"		11'8"		18'9"		8'8"	
B	11'5"		19'9"		11'7"		19'2"		9'8"	
C	11'5" <i>e</i>		20' <i>e</i>		11'7" <i>e</i>		19'5" <i>e</i>		8' <i>e</i>	
242	11'6"		19'2"		11'8"		19'3"		8'4"	
B	11'9"		19'7"		11'7"		19'5"		9'7"	
C	12'1" <i>e</i>		19'7" <i>e</i>		11'11" <i>e</i>		19'5" <i>e</i>		8' <i>e</i>	
243	11'8"		19'7"		11'5"		18'6"		7'7"	
B	12'1" <i>e</i>		20'5" <i>e</i>		11'9" <i>e</i>		19'4" <i>e</i>		9'3" <i>e</i>	
C	12'2" <i>e</i>		20'6" <i>e</i>		12'5" <i>e</i>		19'9" <i>e</i>		8' <i>e</i>	
244	16'		19'4"		17'3"		19'3"		7'2"	
B	16'5"		19'6"		17'1"		19'7"		9'4"	
C	16'5" <i>e</i>		19'10" <i>e</i>		17'1" <i>e</i>		19'11" <i>e</i>		8' <i>e</i>	
245	9'7"		14'5"		9'2"		14'4"		6'9"	
B	10'		14'2"		9'4"		14'3"		8'6" <i>e</i>	
246	9'5"		14'3"		9'6"		14'2"		11'4"	
B	9'9"		14'3"		9'7"		14'5"		7'8"	
247 ²⁹	9'1"		20'5"		9'3"		20'10"		7'8" <i>e</i>	
BN	10'2"		11'3"		9'7"		10'6"		8'3" <i>e</i>	
BS	9'9"		4'3"		9'10"		4'10"		8'3" <i>e</i>	
248 ³⁰	9'3"		9'5"		9'4"		9'		13'	
B	9'9"		5'		9'10"		4'5"		8'6" <i>e</i>	

TABLE OF ROOM DIMENSIONS—continued

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
249A ₁	9'6"		6'10"		9'4"		7'6"		7'9"	
A ₂	9'6"		6'10"		9'4"		7'6"		5'2" _e	
B	10'		10'3"		9'9"		11'3"		8'6" _e	
250	9'3"		3'1"		9'3"		2'3"		4'7"	
251	9'9"		17'6"		9'6"		17'		6'2"	
B	9'11" _e		17'6" _e		9'8" _e		17' _e		8'6" _e	
252	9'6"		10'9"		9'5"		11'4"		6'6" _e	
B ³¹	9'5"		16'11"		10'		17'		8'6" _e	
253	4'9"		10'4"		4'9"				6' _e	
254			8'2"		18'6"		6'7"			
255	8'7"		5'8"		8'3"		5'10"		5'1"	
256	13'10"		19'4"		15'8"		19'2"		7'6"	
B	13'4"		19'10"		15'6"		18'10"		9'9"	
C	13'4" _e		20' _e		15'6" _e		19' _e		8' _e	
257	11'8"		19'9"		11'8"		19'2"		7'7"	
B	11'8"		19'5"		11'10"		18'9"		9'2"	
C	11'10" _e		19'5" _e		12' _e		18' _e		8' _e	
258	8'7"		19'8"		13'4"		18'6"		7'8"	
B	8'7"		19'2"		13'4"		19'		9'3" _e	
C	8'7" _e		19'6" _e		13'4" _e		19'4" _e		8' _e	
259	11'9"		19'6"		11'7"		17'9"		7'7"	
B	11'10"		19'3"		11'8" _e		17'6"		9'1"	
C	12' _e		19'5" _e		11'10" _e		17'8" _e		8' _e	
260	11'2"		18'9"		11'5"		17'7"		7'5"	
B	11'3"		19'		11'4"		17'7"		9' _e	
C	11'7" _e		19' _e		11'8" _e		17'7" _e		8' _e	
261	3'4"		21'6"		11'7"		15'4"W		7'7"	
B	1'9"		23'7"		11'6"		7'6"SW		8'6" _e	
C			25'7"		12'2" _e		18'9"W			
							7'6"SW			
							21'8"W		8' _e	
							7'6"SW			
262	9'2"		18'		9'1"		17'9"		6'6"	
B	9'2" _e		18'3" _e		9'2" _e		18' _e		8'6" _e	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
263	9'8"		17'3"		9'8"		17'6"		10'5"	
B	9'8" <i>e</i>		17'5" <i>e</i>		9'8" <i>e</i>		17'8" <i>e</i>		8'6" <i>e</i>	
264	9'9"		17'5"		9'6"		17'3"		9'3"	
B	10' <i>e</i>		17'8" <i>e</i>		9'9" <i>e</i>		17'6" <i>e</i>		8'6" <i>e</i>	
265	9'10"		17'2"		9'9"		17'5"		10'7"	
B	9'9"		17'6"		9'11"		17'2"		8'6" <i>e</i>	
266	10'3"		19'2"		9'9"		20'4"		10'4" <i>e</i>	
B	11'10"		18'10"		10'6"		20'2"		8'6" <i>e</i>	
267	9'10"		16'11"		9'11"		17'11"		9'4"	
B	9'7"		17'8"		9'7"		18'8"		8'6" <i>e</i>	
268	21'2"		9'7"		22'11"		9'11"		5'6" <i>e</i>	
B	21'2" <i>e</i>		10' <i>e</i>		22'11" <i>e</i>		10'4" <i>e</i>		8' <i>e</i>	
269	3'1"		2'8"E 7'NE		7'11"		6'6"		6'4" <i>e</i>	
270	11'4"						17'			
271			8'		12'4"		5'6"			
272	11'5"		5'8"		11'5"		6'6"		6'4" <i>e</i>	
273	10'11"		8'2"		11'4"		6'7"		7'8" <i>e</i>	
274	2'5"		12'8"		7'8"		11'11"		7'3"	
B	1'9"		13'8"		7'		12'11"		9' <i>e</i>	
C	1'9" <i>e</i>		13'10" <i>e</i>		7' <i>e</i>		13'1" <i>e</i>		8' <i>e</i>	
275	5'9"N 3'6"NW		4'4"		7'2"		4'1"		4'2"	
276	7'9"		8'2"							
277	3'7"		3'10"		2'6"		2'11"		4' <i>e</i>	
278			2'3"		14'3"				8' <i>e</i>	
B	3'11" <i>e</i>		2'3" <i>e</i>		14'3" <i>e</i>		2'2" <i>e</i>		8' <i>e</i>	
279	11'1"		3'5"		10'6"		3'3"		7'6" <i>e</i>	
B			5'5"		13'2"		3'			
280			10'4"		1'9"		7'8"			
281			6'7"		11'		5'6"			
282	7'9"		6'		9'6"		8'8"		8' <i>e</i>	
283	1'8"		11'5"		2'5"		11'2"			
284			3'10"		3'7"		4'6"			
285	7'6"		4'6"		7'		5'4"		6' <i>e</i>	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
286 ³²	14'4"		18'8"		13'8"					
287	7'1"		12'3"		7'		12'8"		7'6" <i>e</i>	
288	7'		12'		6'11"		11'8"		7'6" <i>e</i>	
289	7'2"		12'		7'1"		11'9"		7'6" <i>e</i>	
290	6'3"		11'10"		4'1"		12'		7'6" <i>e</i>	
291	7'8"		17'4"		6'5"		16'4"		7'6" <i>e</i>	
292			8'		6'9"		5'10"			
293	8'4"		1'5"E		9'10"		9'9"		8'4"	
			14'10"NE							
B	8'7"		17'4"		12'3"		9'5"		9'8" <i>e</i>	
C	8'7" <i>e</i>		17'4" <i>e</i>		12'3" <i>e</i>		9'5" <i>e</i>		8' <i>e</i>	
294	7'8"		16'11"		8'3"		16'		8'6"	
B	8'		16'11"		8'8"		16'6"		9'8" <i>e</i>	
C	8'4" <i>e</i>		16'11" <i>e</i>		9' <i>e</i>		16'6" <i>e</i>		8' <i>e</i>	
295	7'7"		16'10"		7'7"		16'6"		8'4" <i>e</i>	
B	7'7"		16'10"		7'9"		16'6"		9'8" <i>e</i>	
C	7'10" <i>e</i>		16'10" <i>e</i>		8' <i>e</i>		16'6"		8' <i>e</i>	
296	8'10"		16'1"		8'10"		15'8"		7'6"	
B	9'2"		16'9"		9'5"		16'3"		6' <i>e</i>	
C	9'4" <i>e</i>		16'11" <i>e</i>		9'7" <i>e</i>		16'5" <i>e</i>		7' <i>e</i>	
297	Unexcavated									
B	5'8"		16'		5'3"		16'		7'10"	
C	6'4" <i>e</i>		16' <i>e</i>		5'8" <i>e</i>		16' <i>e</i>		8' <i>e</i>	
298	8'2"		14'		8'8"		13'6"		6'2"	
B	8'8"		13'7"		8'11"		13'11"		6'	
C	8'10" <i>e</i>		13'9" <i>e</i>		9'1" <i>e</i>		14'1" <i>e</i>		7' <i>e</i>	
299 ³³	13'9"		5'9"		12'3"		5'11"		9'9"	
B	13'8"		5'7"		12'5"		6'		7'3" <i>e</i>	
C	13'10" <i>e</i>		5'11" <i>e</i>		12'7" <i>e</i>		6'4" <i>e</i>		6'8"	
D	13'10" <i>e</i>		5'11" <i>e</i>		12'7" <i>e</i>		6'4" <i>e</i>		6' <i>e</i>	
300	11'3"		2'8"		10'5"		2'10"		9' <i>e</i>	
B	11'10"		3'8"		10'11"		3'9"		7'3" <i>e</i>	
C	11'10" <i>e</i>		3'10" <i>e</i>		10'11" <i>e</i>		3'11" <i>e</i>		6'8" <i>e</i>	
301	Unexcavated									
B	10'9"		6'2"		10'8"		6'2"		7'3" <i>e</i>	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
301										
C	10'11"		6'6"		10'10"		6'6"		6'7" <i>e</i>	
D	10'11" <i>e</i>		6'10" <i>e</i>		10'10" <i>e</i>		6'9" <i>e</i>		6' <i>e</i>	
302	Unexcavated									
B	10'8"		3'9"		10'8"		4'4"		7'3" <i>e</i>	
C	10'8" <i>e</i>		3'11" <i>e</i>		10'8" <i>e</i>		4'6" <i>e</i>		6'7" <i>e</i>	
303	Unexcavated									
B	12'6"		5'		13'		7'		7'3" <i>e</i>	
C	12'6" <i>e</i>		5'2" <i>e</i>		13' <i>e</i>		7'2" <i>e</i>		6' <i>e</i>	
304	11'5"		5'11"		11'5"		2'10"		7'10"	
B	11'9" <i>e</i>		6'9"		11'9" <i>e</i>		3' <i>e</i>		7'3" <i>e</i>	
C	11'9" <i>e</i>		6'11" <i>e</i>		11'9" <i>e</i>		3'2" <i>e</i>		6' <i>e</i>	
305 ³⁴	10'9"		2'2"		11'2"		0'11"		7'10" <i>e</i>	
B	10'9" <i>e</i>		3'2"		11'2" <i>e</i>		1'5"		7'3" <i>e</i>	
C	10'9" <i>e</i>		3'8" <i>e</i>		11'2" <i>e</i>		1'8" <i>e</i>		6' <i>e</i>	
306	6'3"		8'6"		8'6"		8'7"		5'10"	
B	6'4" <i>e</i>		8'7" <i>e</i>		8'7" <i>e</i>		8'8" <i>e</i>		7'8" <i>e</i>	
307	15'4"		7'7"		14'7"		8'2"		5'10" <i>e</i>	
-I	2'10"		8'4"		3'5"		8'1"		5'10" <i>e</i>	
B ³⁵	18'9"		8'		19'		8'9"		7'8" <i>e</i>	
308	9'		10'8"		11'1"		10'		5'	
B	9' <i>e</i>		10'10" <i>e</i>		11'1" <i>e</i>		10'2" <i>e</i>		5'10" <i>e</i>	
309	17'8"		12'9"		17'2"		10'10"		6' <i>e</i>	
B	17'8" <i>e</i>		12'10" <i>e</i>		17'2" <i>e</i>		11' <i>e</i>		5'10" <i>e</i>	
310 ³⁶	29'2"									
311	9'2"		2'2"		7'2"		3'7"		5' <i>e</i>	
312	7'3"		14'7"		7'1"		15'10"		7'6" <i>e</i>	
313 ³⁷	15'10"									
314	9'4"		9'4" <i>e</i>		6'11"				6' <i>e</i>	
315	5'		15'		9'		13'11"		7'8" <i>e</i>	
316	6'10"		15'		11'4"		14'1"		8' <i>e</i>	
317	17'8"		8'10"		17'2"		9'10"		7'10"	
B	17'9"		9'5"		17'3"		9'1"		8' <i>e</i>	
C	17'9" <i>e</i>		9'5" <i>e</i>		17'3" <i>e</i>		9'1" <i>e</i>		8' <i>e</i>	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
318	17'8"		9'10"		17'3"		8'6"		9'	
B	18'4"		10'9"		17'10"		9'2"		8'e	
C	18'4"e		10'9"e		17'10"e		9'2"e		8'e	
319	9'		14'8"		8'4"		15'		8'6"	
B	8'4"		15'5"		8'3"		15'5"		8'e	
C	8'4"e		15'5"e		8'3"e		15'5"e		8'e	
320	7'9"		15'9"		7'		16'5"		7'11"	
B	7'6"		16'		6'9"		16'9"		8'5"	
C	7'6"e		16'e		6'9"e		16'9"e		8'e	
321	5'2"		4'4"							
322	12'5"						11'			
323	36'		14'		34'2"		12'10"		8'6"	
B	35'11"		14'5"		34'8"		13'4"		8'e	
324	12'9"		5'10"		12'5"		7'6"		7'6"e	
325	12'6"		27'10"		13'2"		31'8"		9'e	
B	13'7"		27'10"e		13'8"e		31'11"		8'e	
326	13'4"		28'		11'7"		29'		9'7"	
B	13'10"e		28'e		12'3"		29'1"		8'e	
327	12'2"		9'3"		12'4"		11'		4'3"	
B	13'		10'		13'11"		10'9"		7'e	
328	11'9"		8'3"		12'3"		10'7"		7'9"	
B	13'8"		8'10"e		13'5"		10'10"e		7'e	
329	13'		11'9"		12'3"		11'10"		6'6"	
330	12'11"		12'9"		12'6"		12'7"		8'1"	
B	12'7"		13'4"		12'9"		13'6"		8'e	
331	5'2"		5'		5'2"		5'11"		6'e	
332	5'4"		6'		5'2"		6'		6'e	
333	13'		16'9"e		12'9"		17'1"		12'e	
B	13'e		16'9"		12'9"e		17'1"e		10'e	
334	12'9"		16'9"		12'9"		16'8"		12'e	
B	12'9"e		16'8"e		12'9"e		16'8"e		10'e	
335A ₁ ³⁸	12'9"		17'1"		12'7"		16'11"		6'e	
A ₂	12'9"		17'1"		12'7"		16'11"		5'7"e	
B	12'4"e		16'9"e		12'7"e		16'11"e		10'e	
336	14'3"		16'		14'4"		13'4"		12'e	

TABLE OF ROOM DIMENSIONS—*continued*

Room No.	N or NW		E or NE		S or SE		W or SW		Ceiling Height	
	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper	NGS	Pepper
337	8'4"		9'8"		8'6"		9'11"		10'10" <i>e</i>	
B	8'6" <i>e</i>		9'8" <i>e</i>		8'8" <i>e</i>		9'11" <i>e</i>		10' <i>e</i>	
338	12'11"		9'9"		13'		9'10"		10'10"	
B	13'2" <i>e</i>		9'9" <i>e</i>		13'3" <i>e</i>		9'10" <i>e</i>		10' <i>e</i>	
339	13'7"		9'6"		13'6"		9'7"		12' <i>e</i>	
B	13'10" <i>e</i>		9'6" <i>e</i>		13'9" <i>e</i>		9'7" <i>e</i>		10' <i>e</i>	
340	15'3"		9'4"		16'3"		9'4"		9'6" <i>e</i>	
341	14'3"		9'6"		13'8"		9'7"		9'6" <i>e</i>	
342	5'8"		9'2"		6'7"		9'4"		9'6" <i>e</i>	
343	15'1"		8'4"		15'		8'10"		6'6" <i>e</i>	
344	11'11"		8'3"		11'2"		8'8"		9' <i>e</i>	
345 ³⁹			7'							
346	21'5"		6'6"		22'		7'2"			
347 ⁴⁰										
348	8'2"		5'10"		8'		6'5"		6' <i>e</i>	
349	8'		4'7"		7'		4'8"		6' <i>e</i>	
350	7'6"		7'2"		8'2"		7'6"		6' <i>e</i>	
351	6'9"		5'8"		8'5"		6'11"		6' <i>e</i>	

* Footnotes follow the compilation.

APPENDIX B

EXCAVATION NOTES, PUEBLO BONITO ¹

Room		
6	Ceiling :	Cottonwood and pine beams; end beams removed, replaced with cottonwood branches and willows, leaving 6" sq. opening in each corner; beam holes plugged with mud.
	Floor :	Paved with flagstones; sandstone slabs 12-20" h. at wall base.
	Doorway :	SE. wall: 3' 9" above floor, 20" w. x 26" h. x 24" across sill; 4 cottonwood sticks form lintel. Projecting wall slabs form steps 22" and 27" above floor; third step, 5" h. provided by post 4½" dia. set in floor 8" from wall.
6a (above R. 6)	Doorway :	SE. wall: 4' 3" from SW. corner, 28" above floor, 16" w. at top, 18" w. at sill x 26" h. x 26" across sill; wall 19" thick; 3 lintel poles 2" dia.
	Wall niche (?) :	N. wall: 29" from NW. corner, 32" above floor, <i>ca.</i> 7" dia.; filled and plastered over.
	Floor openings :	SW. corner: 5 x 7"; adobe rim enclosed slab cover now missing. NW. and NE. corner openings closed with slabs; that in SE. with adobe.
14b	Ceiling :	Described by Pepper (1920, p. 79).
	Doorways :	S. wall: plastered jambs; 7 lintel poles 2½" dia. E. wall: lintel poles, 3½" dia. reach across room; jambs originally plastered. W. wall: jambs plastered; 5 lintel poles <i>ca.</i> 2" dia. N. wall: <i>ca.</i> 2' above floor; lintels 2" dia. x 5'; jambs and sill originally plastered; probably blocked but removed before 1849. N. door has been enlarged, sill lowered; E. and W. doors closed and plastered over when Hyde Expedition converted 14b into kitchen. Whitewash and later plaster covered names Simpson and others carved on S. wall Aug. 28, 1849.
	Hatchway :	SE. corner: blocked.
14a (above 14b)	Doorways :	N. wall: 5' 3" from NE. corner, 18" above floor, 29" w. x 37" h., blocked. E. wall: blocked (see W. door R. 301B.) S. wall: W. jamb only (see R. 303B).

¹ In pursuing its investigations at Pueblo Bonito, the National Geographic Society re-examined certain rooms previously excavated by the Hyde Expeditions, 1896-1899. The notes which here follow for Rooms 1-190, recorded during those investigations, are to be regarded merely as supplemental to data published in Pepper, 1920.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
25		Walls partially rebuilt; new roof added since Pepper's (1920) description.
28B		Extends over 28 and 28a. S. wall: 2 T-doors, both blocked.
34	Fireplaces:	NW. quarter: 1) 6" from N. wall, 20" from W. 10" x 16"; 2) 38" from N. wall, 6" from W. 12" x 13"; 3) 4' 9" from N. wall, 18" from W. 10" x 12"; each 5" d., paved and lined with slabs.
	Wall niche:	W. wall: 10' from NW. corner, 33" above floor, 8½" w. x 8" h. x 9" d., plastered.
35a	Doorways:	N. wall: 27" from NE. corner, <i>ca.</i> 17" w., blocked. E. wall: 4' 8" from SE. corner, 24" w., blocked. S. wall: 24" from SE. corner, 25" w., blocked.
60B	Doorways:	NE. wall: 1) 19" from N. corner, 31" above floor offset, 27" w. x 26" across sill x 29" h. to top of broken wall; 2) 8' from N. corner, 29" above offset, 27" w. x 31" h. plus x 25" across sill with 3" secondary masonry jambs; 3) flush with SE. wall, 31" above offset, 26" w. x 22" h. plus x 28" across sill, formerly had 2½" masonry secondary jambs.
	Wall niche:	NE. wall: 28" from N. corner, at floor level, 20" w. x 14" h., blocked.
60a		Originally part of R. 70; separated from latter by foundation for SE. side of 60B.
64		Reclaimed portions of 2 kivas; dwelling above.
	Doorways:	SW. wall: flush with W. corner, 5" above probable floor level, 25" w. x 40" h.; E. jamb retains plaster. NW. wall: 5' 7" from W. corner, S. jamb of once-blocked door.
	Wall niche:	NE. side, in convex curve, 23" w. x 15" h. x 22" d., plastered.
	Ventilator (?) :	Possible vent., concave NE. wall, 10" from N. corner, 34" above base, 15" w. x 20" h., blocked.
68	Doorways:	NE. wall: 1) 23" from E. corner, 2½' above floor, 21" w., blocked; 2) 3' 10" from E. corner, 2½' above floor, 21" w. blocked; 3) 7' 11" from E. corner, 3' above floor, 27" w. x 34" h., sill an inverted tabular metate; blocked to form <i>ventilator</i> 3' 10" above floor, 20" w. x 16" h., blocked. SW. wall: 1) 49" from S. corner, 21" above floor, 12" w. x 20" h.; 2) 7½' from S. corner, <i>ca.</i> 23" above floor, 15" w. x <i>ca.</i> 28" h.; below it, 2 plastered masonry <i>steps</i> 38" w. x 15" h.; 3) 7" from W. corner, 39" above floor, 19" w., blocked.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
68	Wall niches:	SE. wall: 28" from E. corner, <i>ca.</i> 2" above floor, 9" w. x 11" h., split cedar lintel, slab sill; lower half blocked. NE. wall: 16" from N. corner, 12" above floor, 10" x 10".
70		W. side is plastered foundation for upper fourth-type wall. NE. wall "supported on poles," in line with SW. side of R. 99. Door thru original N. wall opened 3½' above floor in R. 99.
74		At SW. corner Kiva 75 enclosure, built upon partly razed Old Bonito walls. Decayed 10" beam embedded in SW. wall with overlying poles suggests former floor.
76		Part of kiva reclaimed as dwelling; new floor at bench level.
Doorway:		SW. wall: 7' 2" from W. corner, <i>ca.</i> 14" above later floor, 29" w. x <i>ca.</i> 3' 10" h., reduced to 24" w. x 29" h. by new sill <i>ca.</i> 8" above later floor, new E. jamb and new lintels with masonry above; probably blocked.
82	Doorways:	NE. wall: T-shaped, lower part 8' from E. corner, 24" above floor, 28" w. x 35" h.; upper part, 49" w., blocked. SW. wall: 4' 2" from W. corner at floor level, W. jamb only; 2) apparent T-shaped, lower part 33" from W. corner 20" h.; upper part reduced by new jamb on 3" w. E. shoulder; later blocked.
87		Floor 7' 9" above R. 86 floor. NW. end, ceiling pole stubs at 9' 10"; at SE. end, poles from R. 88 protrude through wall at 10' 2".
Subfloor:		Walls shown by Pepper (1920, fig. 124) are Old Bonitian, plastered and sooted; their floor at 6' 4"; foundations, 7-18" h., in part rest upon boulders from early cliff-fall; clean sand at depth of 9' 10".
88		NW. end, ceiling poles at 10' 3" extend into R. 87.
Doorways:		SW. wall, T-shaped, lower part 5' 4" from NW. corner, 20" above floor, 29" w. x 36" h.; upper part 49" w. NE. wall 7' 1" from E. corner, 14" above floor, 29" w. x 4' 4" h.
Ventilators:		NE. wall at both ends.
Subfloor:		Immediately under floor, foundations with 5-7" of 2nd-type masonry based at depth of 2½'; floor with 1st-type masonry at 8' 5"; other foundations, unidentified, built in dug trench 20" w. x 19" d.
89	Subfloor:	Unidentified foundation, 20" w. x 17" h., extends under NW. and SE. walls.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
90	Subfloor:	Incorporated in SW. foundation 7' 3" from S. corner is one bearing single course of 2nd-type masonry. Other subfloor foundations unidentified.
100		First 3-story room in outer 2nd-type Late Bonitian row.
	Doorway:	None at N. end. E. wall, 21" from NE. corner, 22" above floor, 3" wider at sill; 7 lintels av. 1½" dia.
	Subfloor:	S. half E. side is 1st-type masonry based 5' 9" below 2nd-type N. half and 6' 1" below room floor.
105		Third-type Late Bonitian room abutting 2nd-type wall of which only lower NE. section remains.
	Ceiling:	7 E.-W. beams, poles and cedar shakes above; W. third rebuilt since Pepper (1920, p. 322).
	Doorways:	N. wall: 49" from NW. corner, 11" above floor, 25" w. x 4' 9" h. to pole lintels. S. wall: 4½' from SW. corner, 14" above floor, 25" w. x 4' 5" h. to lintel poles, blocked; secondary lintels 6" lower support adobe fill; no secondary jambs remain. W. door: 6½' from SW. corner, ca. 17" above floor, 26" w. x 42" h., neatly blocked. Middle E. wall: forced opening marks probable door.
	Subfloor:	At depth of 8", floor of unfinished 3d-type kiva, wall 14" w. x 6" h.; deeper, various foundations, probably 3d-type.
106		The R. 23 of Hyde's groundplan (Pepper, fig. 155).
	Subfloor:	Continuing from original W. side of R. 25 2d-type wall 23" w. x 38" h. crosses diagonally on 26" h. foundation based 5' 8" below floor; other associated foundations.
115	Doorways:	External: N. jamb 3' h. of door neatly blocked with matching 2d-type masonry; remainder replaced with 3d-type above sill level, 3' 9" above foundation, 29" h.
116	Doorways:	NE. wall: 23" from E. corner, 16" above floor, 22" w. at top, 26" w. at sill x 3' 7" h. NW. wall: 8' 6" from N. corner, 25" w. at top, blocked inside with second-type masonry but concealed outside by third-type. S. wall: 26" from SE. corner, 24" w. at top.
117		Triangular room identified by unpub. Pepper prints 550, 552. Third-type walls abutting 2d-type of convex E. side.
	Doorways:	E. wall: 1) 6' 4" from NE. corner; 2) 6' 4" from SE. corner. Each 23" w. at lintel; each

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
117		neatly blocked with matching 2d-type masonry. Middle S. wall: original replaced by wood-frame door.
	Subfloor:	At S. end, 2d-type E. wall has 21" h. foundation 3' 9" below floor. Under-floor foundations continuing to outside replaced by S. and W. 3d-type walls.
118	Doorways:	N. wall: (see S. door, R. 117). E. wall: 39" from SE. corner, 26" w., blocked. W. wall: 4' 5" from SW. corner, 26" w., blocked.
119	Doorway:	E. wall: 7' from NE. corner, 16" above floor, 25" w. x 40" h.
	Subfloor:	Various foundations, no identifying masonry, connect with external 3d-type stonework.
120	Doorway:	E. wall: 6' from NE. corner, 15" w., blocked.
	Subfloor:	Various foundations, no identifying masonry.
122	Doorway:	E. wall: 7' 2" from SE. corner, S. jamb of former door.
123	Doorway:	E. wall: 7' 3" from NE. corner, 26" w. x 35" h., blocked.
124	Doorway:	Middle E. wall, blocked.
125	Doorway:	E. wall: 3' 11" from SE. corner, 25" above floor, 26" w. x 36" h.
126	Doorway:	S. wall: (see N. door, R. 338). W. wall: (see E. door, R. 125). Middle E. wall: door to R. 127.
128	Doorway:	E. wall: 15" from NE. corner, S. jamb of blocked door partly concealed by abutting N. wall.
	Subfloor:	Under original floor at depth of 10", arc of 3d-type kiva 12' 5" deep continuing from Rs 340-341.
131		Originally one with R. 132.
	Doorway:	N. wall: 5' from NW. corner, 18" w., blocked to form <i>wall niche</i> 9" d.
133	Doorway:	N. wall: <i>ca.</i> 24" from NE. corner, <i>ca.</i> 30" w., blocked.
134		Separated from R. 135 by built-in partition av. 8½" thick.
	Doorway:	N. wall: <i>ca.</i> 15" from NE. corner, <i>ca.</i> 30" w., blocked.
136	Doorway:	N. wall: <i>ca.</i> 5' 6" from NE. corner, <i>ca.</i> 30" w., blocked.
	Subfloor	N. wall foundation, 10" h., inset 1"; S. foundation, 17" h., inset 2". Floor level <i>ca.</i> 4' below W. Ct. level.
137	Doorway:	N. wall: 10' 2" from NE. corner, 19" above floor, 25" w. x 23" across sill. Beneath door, 9' 3" from NE. corner, masonry <i>step</i> 3' 5" w.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
137		x 9" h. with convex front 27" w. at ends, 3' 6" w. in middle.
	Fireplace:	18" from N. wall, 6' 1" from E., 28" w. x 21" N.-S. x 8" d, masonry lined, clay floor. N. wall, 8" from NW., former E. Ct. corner. Outer S. side, same level, 11' from SW. corner, masonry buttress 22" w. x 39"; 2nd buttress 10" farther.
140		
	Doorway:	N. wall: blocked (see S. door, R. 222).
141	Wall niche (?) :	N. wall, 15" from NW. corner, <i>ca.</i> 18" w. x 16" h x 13" d.
143	Doorway:	E. wall: 7' 8" from NE. corner, 17" above floor, 25" w., blocked.
	Fireplace:	10" from W. wall, 7' 1" from N., 13" x 17" E.-W. x 4" d., slab lined.
	Subfloor:	Earlier floors at 33" and 54"; on latter is 21" h. west-wall foundation and its parallel, 19" w. x 23" h., the original east side of West Court.
144	Doorway:	E. wall: 6' 9" from NE. corner, 20" above floor, 26" w.; plastered masonry secondary 4" jambs for R. 219 doorslab.
	Subfloor:	Floor <i>ca.</i> 2' above last W. Ct. level; 14" below R. 219 floor. Earlier floors at 33", 54" overlie various foundations supposedly 3d-type, continuing from W. Ct.
146	Doorways:	N. wall: 1) 19" from NW. corner at floor level, 26" w., blocked; 2) 17" from NE. corner, 27" w., blocked; 3) abutted by E. wall, 19" w., blocked.
	Subfloor:	Kiva A wall, 3' th., apparently did not rise above floor level; stones protrude below. E. wall, no foundation, abuts kiva curve 8" below floor. Masonry-lined "trench" 22" w. x 37" d., continues subfloor from R. 35a; its W. side, 19" th. and 20" from NW. corner, extends S. 12' 2" and was razed 32" from W. wall of room. "Trench" partly occupied and overlain by 16" w. wall razed at 8" h., the apparent W. side of former room whose plastered N. side meets jutting E. wall of 35a and passes under E. side of R. 146 7' from its NE. corner. 7½' S. of this plastered wall its associated floor at depth of 2' was broken through apparently when Kiva A was built.
147		No surface structure. Just under surface, rude foundation on 2 horizontal logs abuts R. 148 foundation 26' from R. 35a; extends N. 12' to abut Kiva 2-B. Latter's vent shaft rises against R. 148 12' from 35a. Various foundations and partly razed walls at various

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
147		depths. Small room with rimmed fireplace 10" x 12" at depth of 33".
148		"Altar room" of Kiva A; S. wall apparently razed at floor level and floored over. Steps descend to Kiva A (which see). Masonry "altar" 4' 5" E.-W. x 11½" w., now only 13" h., stands 7' 4" from W. wall, 4' from N.; 4' 7" at E. end.
	Doorways:	N. wall: 4' 3" from NE. corner at floor level, 25" w., blocked. E. wall: 5' 4" from NE. corner at floor, 24" w. x 36" h., blocked.
	Subfloor:	S. and W. walls at floor level no foundation, S. wall built on 2 logs 5" and 6" dia., that parallel W. at 10" and extend to E.-W. wall, 15" th., plastered both sides, that passes under W. side of room 6' 1" from NW. cor. on floor at depth of 25". Latter cut thru at S. apparently when Kiva A was built. Tests show various subfloor walls and debris of occupation with Old Bonitian sherds and metate.
149	Doorways:	W.: (see E. door, R. 148). E. wall: 1) 6' from NE. corner at floor level, 28" w., blocked; 2) 13' 7" from NE. corner, 10" above floor, 25" w., blocked.
	Subfloor:	Earlier wall parallels E. at 2'; razed 3" under floor and 16' from NE. corner apparently upon construction of Kiva A. In it, 5' 2" from N. end, a former door jamb; wall built on 2 parallel 2nd type walls av. 16½" w., that contin. from E. Ct., 26" apart and 37" below floor level, the 1st 10' 7" from NE. corner, extending to and under W. side of room 9' 5" from NW. corner. Neither observed in R. 148. 3 or more 5" N.-S. logs embedded in Kiva A stonework 17" below 3rd type W. wall. In SE. corner crude masonry buttress 17" w. x 32" h. abuts Kiva A on surface at depth of 46".
150		At N. solid masonry 1' below floor abuts E. wall and Kiva A curve, 39" th.; N. of this point walls merge. No trace of plaster.
	Doorways:	E. wall: 1) 4' 4" from SE. corner, 16" above floor, 27" w.; 2) 14' 4" from SE. corner, 19" above floor, 28" w. W. wall: 5' 10" from SW. corner at floor level, 29" w. All blocked.
	Subfloor:	Earlier floors at 17, 21, 25, 32, 36, and 49". E., W., and S. walls on 17" level; on 25" level, S. wall overhangs by 6" unlined unrimmed, ash-filled hearth 66" dia. x 10" d. Tests show 5 sections of subfloor foundation,

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 150 no identifying masonry, at various depths: one, on 25" level, emerges from E. Ct. 9' 8" from SE. corner, razed 4½' beyond; another, 15" w., emerges from under S. wall 31" from SE. corner and abuts an E.-W. wall fragment that parallels S. side of 150 at distance of 34".
- 151 Doorways: Plaster to base of all walls. No foundations. S. wall: 30" from SE. corner, 10" above floor, 18" w. x 12" across sill. W. wall: blocked (see E. door R. 221).
 Wall niche: S. wall: 16" from SW. corner, 3' above floor, 17" w. x 8½" h. x 9" d., slab lintel.
 Bench: SW. corner: 16" on W., 12" on S. x 14" h.; abuts plastered walls.
 Bin: Abuts E. wall, 35" from NE. corner 16" N.-S. x 12" w. x 9" d.; slab lined and floored.
 Subfloor: Rude concave wall, 13" th., often plastered, smoked on E. face, emerges from under S. side 35" from SE. corner and underlies E. wall 3' 7" from same corner.
- 152 Doorways: N. wall: (see S. door R. 151). E. wall: 1) 17" from NE. corner, 25" w., blocked before flagstones were laid; 2) 12" from NE. corner, 18" above alcove floor, 22" w., blocked. S. wall: T-shaped door, upper part 21" from SE. corner, 15" above floor, 34" w. x 37" h., blocked; lower part 26" from SE. corner, 23" w., sill 14" below floor, reduced by adobe jambs to leave *oval opening* 18" w. with lintels 25" above floor.
 Ventilator (?): S. wall: 6' 11" from SE. corner, 26" above floor, 9½" w. x 8" h., connects diagonally with R. 153.
 Wall niches: N. wall: 4' 7" from NW. corner, 21" above floor, 9" w. x 6" h. x 10" d. E. wall: 6' 3" from SE. corner, at floor level, 8" w. x 11" h. W. wall: 1) 3' 9" from NW. corner, 6" above floor, 16" w. x 14" h.; 2) 3" from NW. corner, 3" above floor, 13" w. x 14" h. x 18" d. (inside width 21"); 3) 6" from NW. corner, 21½" above floor, 10" w. x 9" h. x 13" d.
 Fireplace: Masonry lined 4' 7" from S., 5' 11" from W. walls, 17" w. x 28" h. x 12" d.
 Floor cist: Against S. wall: 26" from SE. corner; masonry lined, plastered, 13" w. x 23" x 11½" d., in front of and 3" above sill slab of blocked T-door.
 Partitions: Jutting from E. Wall: 1) 2' 8" from SE. corner, 3' 7" E.-W. x 9" w. x 22" h.; 2) 3' 7"

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 152 from NE. cor., 3' 8" E.-W. x 9" w. x 24" h. forming alcove paved with slabs 9" above 152 floor.
- Subfloor: Earlier floors at 23", 3' 8", 6' 10". E. foundation rises from floor at 6' 10"; N.-S. wall, 12" th. abuts whitened plaster under S. foundation on floor at 3' 8" forming W. end of subfloor cist *ca.* 4' from SE. corner.
- 153 E. wall abuts on N. and S. All plastered; W. end whitewashed.
- Doorway: W. wall: 11" from NW. corner, 24" w., blocked.
- Wall niche: N. wall: 28" from NW. corner, 4' 1" above floor, 5" w. x 4" h. x 5" d.
- Subfloor: Earlier floors at 15 and 25" overlie O.B. debris of occupation to depth of 9½'. Silt layer 6" below S. foundation, extends out 10' then dips S. Under NW. corner, narrow masonry channel and structure *ca.* 4' dia. abutting Kiva B exterior may be earlier vent shaft.
- 154 Doorways: N. wall: 2" from NW. corner, at floor level, 20" w. x 24" h. (see S. door R. 152). S. wall: blocked.
- Wall niches: N. wall: 37" from NE. corner, 9" above floor, 12" w. x 12½" h. x 23" d. S. wall: flush with SW. corner, 2" above floor, 8" w. x 11" h. x 9" d.
- 158 Doorways: N. wall: 1) 18" from NE. corner, sill probably at floor level, 19" w.; within, 3 masonry steps av. 6" h. lead up to E. Ct.: lowest tread 11"; second, 6"; third, 8"; 2) 7' 1" from NE. corner, 27" w. x 29" h.; jambs extend 10" below floor level; reduced to 20" w. by masonry on W.; later blocked leaving 6" x 15" NE.-SW. *ventilator* (?) under lintels.
- 163 Doorways: E. wall: 2' 4" from NE. corner, 22" above floor, 21" w. x 3' 5" h., partly blocked. W. wall: 2' 9" from NW. corner, 15" above floor, 24" w. x 26" h., partly blocked.
- 164 Doorways: E. wall (see W. door R. 273). N. wall, 4' 3" from NE. corner.
- Subfloor: Under E. half, 14" th. wall of second-type kiva (see R. 273).
- 165 Walls of dressed friable s.s., very little chinking.
- Subfloor: Inner face of 2nd-type kiva wall, 14" th. 2½' below approximate floor level underlies S. side 5' 3" from SE. corner and E. side 10' 7" from same corner (see R. 273).

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 166 Narrow 3rd-type passage formerly connecting R. 282 and E. Ct. S. side curves to S. wall of R. 281; sharply to outside of 165. W. end abuts N. and S.
- 167 Mixed masonry; E. and S., 3rd type.
- 168 Doorway: E. wall, 22" w., blocked.
Previously excavated to below floor level. Noteworthy for its much altered walls. Masonry of banded 4th type.
- Doorways: NW. wall: 1) 2' 9" from W. corner, sill 30" below floor, 23" w. x 6' 6" h.; 4 descending lintels, 3 being dressed planks; blocked from outside; 2) 7' 5" from W. corner, at floor level, 3' 4" w. x 7' 7" h.; later reduced to 22" w. by built-in sections 5' 4" h. on each side forming T-shaped door with new sill 2' 10" above floor; within, 5 masonry steps 37" w. and plastered lead to roof level of Kiva 161; 3) 31" from N. corner, 27" above floor, 26" w. x 3' 11" h. later reduced to 20" w. by new W. jamb; and finally blocked leaving *niche* 6' 3" above floor. NE. wall: 4' 7" from N. corner, 37" above floor, 26" w., blocked. SW. wall: 5' 4" from W. corner, 3' 10" above floor, 16" w. x 36" h. Ancient repairs between this door and W. corner. (Hyde negative No. 648 shows all NW. doors except T-door blocked and plastered over.)
- Wall niches: NW. wall: 1) at N. corner, 3' 5" above floor, 14" w. x 13" h.; 2) 21" from N. corner, 6' 3" above floor, 35" w., blocked. NE. wall: 14" from E. corner, 21" above floor, 14" w. x 12" h. x 16" d., plastered.
- 169 Previously excavated to below floor level.
- Doorways: In NW. wall at least 7 former doors indicated, all much altered and finally blocked. NE.: 6' from N. corner, 5" above wall base, 29" w. x 3' 4" h., blocked. SW. wall: 4' 4" from W. corner, 41" above base, 24" w. x ca. 38" h., blocked.
- Wall niches: SE.: 6' 3" from E. corner, 12" w. x 10" h. NE. wall: 3' 9" from N. corner, 7' above floor, 9" w. x 12" h.
- 170 Previously excavated to below floor. NW. end occupied by "platform" av. 7' d., full width.
- Doorways: In face of "platform," 3' 7" from W. corner, 18" above floor recessed steps 28" w. to R. 170B. NE. wall: 1) 19" from E. corner, 3' 6" above floor, 27" w. x 3' 4" h., secondary jambs and lintel for door slab from R. 170;

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
170		2) 4' 4" from E. corner, 5" above floor, possible door 28" w.; 3) 8' 1" from E. corner at floor level 27" w. x 5' 3" h., blocked. SW. wall: 1) 3' 5" from S. corner, at floor 27" w. x 3' 4" h., reduced to 22" w. by new NW. jamb, then blocked; 2) 2" from W. corner lintels at "platform" level, 24" w. x 3' 4" h., blocked; below sill, 2 masonry steps. Unpublished Hyde Neg. 646 shows 2-3 pine logs <i>ca.</i> 6" above floor extending from W. steps to S. corner.
	Bench (?) :	
170 B		At "platform" level.
	Doorways :	NW. wall: 4' 3" from W. corner, 18" above floor, 24" w. blocked.
	Hatchway :	In front of "platform," 28" w.
171	Doorways :	NW. wall: 4' 5" from W. corner, 21" above floor, 27" w. x 4' 6" h., blocked. SW. wall: 1) 10" from W. corner, 21" above floor, 26" w. x 5' 3" h., blocked; 2) 5' above floor (see NE. door R. 170).
171 B	Doorway :	NW. wall: (see S. door R. 229B).
	Ventilators :	NW. wall: E. end, 12" sq. (<i>e</i>). NE. wall: N. end 14" sq. (<i>e</i>).
172	Doorway :	NW. wall: 8' 4" from N. corner, 19" above floor, 29" w. x 4' 10" h., blocked.
172 B	Doorway :	NW. wall: blocked (see R. 228B).
	Ventilators :	NW. wall: 1) W. end, <i>ca.</i> 12" sq.; 2) N. end, blocked. SW. wall: N. end, 14" sq. (<i>e</i>).
172 C	Doorway :	Middle NW. wall: 30" w. (<i>e</i>).
174	Doorways :	NW. wall: (see S. door R. 226). NE. wall: 4' 1" from N. corner, 12" above floor, 28" w. x 4' 8" h., blocked.
174 B	Doorway :	Middle NW. wall: (see R. 226B).
	Ventilators :	NW. wall: blocked, (see R. 226B).
174 C	Doorway :	Middle NE. wall: N. jamb of T-shaped door.
175	Doorways :	NW. wall: blocked, (see S. door R. 225). NE. wall: 4' 10" from N. corner, 9" above floor, 27" w. x 4' 10" h., blocked. SW. wall: 4' 10" from W. corner, 3" above floor, blocked from R. 174 to form plastered <i>recess</i> , 27" w. x 8" d. x 4' 8" h.
	Subfloor :	S. foundation, 16" h., built on silt layer that dips sharply outside. N.-S. foundation 24" w. x 19" h. on same silt layer underlies NW. wall 5' 4" from N. corner; meets S. foundation 4' 4" from E. corner; second silt layer at 3' 7"; debris of demolition to 7½'.
175 B	Doorway :	Middle NW. wall: (see S. door R. 225B).
175 C	Doorway :	SW. wall: N. jamb of T-shaped door.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
176	Doorway: Ventilators:	SW. wall: blocked, (see NE. door R. 175). NE. wall: 1) 4" from N. corner, 15" sq.; 2) 2" from E. corner, 14" sq.; both 4' 8" above floor and blocked.
176 B	Doorway:	W. corner: (see SE. corner door R. 225B).
177	Doorways: Ventilators:	W. wall (see E. door R. 225). E. wall, each end, 4½' above floor, blocked.
	Subfloor:	W. wall, each end 4' 4" above floor, blocked. N. foundation 16" h. offset 2"; W. foundation 15" h., offset 1"; E. foundation 20" h. offset 2". Offsets av. 8" below floor. Silt layer at depth of 41" on W. side is 49" d. on E. On this layer <i>ca.</i> 5' outside, is pot-shaped cist 50" d. x 46" dia.
177 B	Doorways:	W. wall, 1" above floor offset (see E. door, R. 225B).
	Ventilators:	W. wall 4' from NW. corner, <i>ca.</i> 3' above floor, 15" w. x 18" h.; lintel, 4 poles between dressed planks.
178	Doorway:	W. wall: blocked from R. 241, to form recess, 27" w. x 33" h. x 15" d.
	Ventilators:	E. wall: 1) 4½" from NE. corner, 4' 6" (<i>e</i>) above floor, 13" w. x 16" h.; 2) 2" from SE. corner, <i>ca.</i> 4' 6" above floor, 14" sq.; both blocked. W. wall: flush with N. wall, 13" w. x 15" h.
178 B	Doorway:	SW. corner: (see NE. corner door R. 225B).
179	Doorway:	W. wall: blocked from R. 242 to form <i>recess</i> 10" d.
	Ventilators:	E. wall: 1) 2" from NE. corner, <i>ca.</i> 4' 6" above floor, 14" sq.; 2) 2" from SE. corner, <i>ca.</i> 4' 8" above floor, 12" sq.; both blocked.
	Subfloor:	Second-type kiva, wall 25" th. (see Rs. 242, 243, 180). In NE. corner, occupational debris with blown sand to 6' d. About 5' outside, 3rd type kiva 10' d., 22' 8" dia., bench 32" w. x 25" h. ditched at rear for wainscoting. On surface between kiva and 179 wall, clay-lined fireplace 8" dia. x 2" d.
179 B	Doorway:	N. wall: blocked from R. 80 leaving <i>recess</i> 12" d.
	Ventilator:	N. wall: W. end.
180	Doorway:	W. wall: (see E. door R. 243).
	Ventilators:	W. wall: 1) 6" from NW. corner, 4½' above floor, 13" w. x 10" h.; 2) flush with SW. corner, 4' 4" above floor, 13" sq., blocked. E. wall: 1) 4" from NE. corner, 4½' above floor, 13" w. x 14" h., blocked to leave <i>recess</i> 13" w. x 8" h. x 7" d.; 2) 5" from SE. corner, 4' 5" above floor, 12" sq., blocked to leave 6" sq. opening to outside.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
180 B	Doorways:	Middle N. wall: blocked. W. wall: (see E. wall, R. 243B). SW. corner: (see NE. corner, R. 242B).
	Ventilators:	W. wall: two.
180 C	Doorway:	Middle W. wall.
	Ventilators:	W. wall: two.
181	Doorway:	SW. wall: 6' 11" from S. corner, 26" above floor, 21" w. x 24" h.
	Ventilators:	SW. wall: two (see NE. wall R. 257). NE. wall: two. All 4 blocked.
	Subfloor:	E.-W. foundation 19" w. x 20" h. with 4th-type masonry underlies W. side 4' 10" from NW. corner; E. side, 7' 9" from NE. corner. In N. end test, sand with charcoal and occasional Chaco sherds to 6' 8".
181 B	Doorways:	Middle SE. and SW. walls: both blocked.
	Ventilators:	SW. wall: 2, both blocked.
182	Doorways:	SW. wall: blocked, (see NE. door R. 257). NW. wall: blocked (see R. 183).
	Ventilators:	NE. wall: 2, both blocked.
	Subfloor:	N.-S. foundation with 5" 4th-type masonry 11" from E. side. Under NE. quarter, foundation 24" w. x 20" h. no identifying masonry.
182 B	Doorways:	SW. wall: 2 opening into Rs 257 and 259. NW. wall. NE. wall: to exterior. All blocked.
183	Doorways:	NW. wall: 4' 4" from W. corner, 14" above floor, 26" w. x 3' 5" h. x 27" across sill; secondary jambs. SE. wall: 3' from S. corner, 10" above floor, 27" w. x 3' 10" h., blocked. SW. wall: 6' 3" from W. corner, 10" above floor, blocked.
	Ventilators:	NE. wall: 1) 3" from N. corner, 4' 2" above floor, 13½" sq.; 2) at SE. corner, 4' 2" above floor, 14" sq.; both blocked.
	Subfloor:	4 underfloor foundations av. 22" w., no identifying masonry.
183 B	Doorways:	Middle NW. wall: 30" w. x 4' h. SW. wall.
	Ventilator:	SW. wall: W. end.
184	Doorways:	SW. wall: blocked, (see NE. wall R. 260). SE. wall: (see NW. wall R. 183).
	Ventilators:	SW. wall: (see NE. wall R. 260). NE. wall: 1) 4" from N. corner, 4' 2" above floor, 14" sq.; 2) 4" from E. corner, 4' 3" above floor, 12" w. x 14" h.; both blocked.
	Subfloor:	Several underfloor foundations enter from 4 sides, leaving middle free; no identifying masonry.
184 B	Doorways:	SW. wall. SE. wall: (see NW. wall R. 183B).
	Ventilator:	SW. wall: W. end.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
185	Doorways:	NW. wall: 4' from W. corner, 17" above floor, 28" w. x 3' 11" h., blocked. SW. wall: 7' 3" from S. corner, 18" above floor, 27" w. x 42" h. x 26" across sill, reduced to 20" w. x 36" h. by secondary lintels and jambs in R. 261.
	Ventilators:	NE. wall: 1) 2" from N. corner, 4' 8" above floor, 12" w. x 10" h. to slab lintel; 2) 3" from E. corner, 13" w. x 11" h. to pole lintels. SW. wall: 1) 5" from S. corner, 4' 4" above floor, 13" sq. to pole lintels, blocked by abutting R. 261 SE. wall; 2) 11" from W. corner, 6' 4" above floor, 10" w. x 12" h. to slab lintel.
	Subfloor:	8 underfloor foundations, varied width and height; with 6" of 4th-type masonry.
185 B	Doorway:	SW. wall: (see NE. door R. 261B). Middle NW. wall.
	Ventilators:	SW. wall: 1) near S. corner, blocked from R. 261 leaving <i>recess</i> ; 2) W. end, blocked.
186	Doorways:	NW. wall: 3' 9" from N. corner, 10" above floor, 26" w. x 4' 2" h. x 24" across sill, 8—3" lintel poles. SW. wall: (see NE. door R. 261). SE. wall: 4' from S. corner, 17" above floor, 28" w. x 47" h., blocked.
	Ventilators:	NE. wall: 1) 9" from E. corner, 4' 5" above floor, 13" w. x 11" h. to lintel poles, blocked; 2) 4" from N. corner, 4' 6" above floor, blocked.
	Subfloor:	6 underfloor foundations abutting 3rd-type SW. wall and original corner of R. 267.
186 B	Doorways:	Middle NW. and SE. walls. SW. wall: flush with W. corner, 25" w., blocked.
187	Doorways:	NW. wall: 3' 5" from N. corner, 12" above floor, 26" w. x 4' 2" h. SE. wall: 3' 8" from E. corner, 13" above floor, 27" w. x 48" h. x 25" across sill, 8—3" lintel poles.
	Ventilators:	NE. wall: 1) 4" from N. corner, 4' 2" above floor, 14" w. x 13" h.; 2) 2" from E. corner, 4' 3" above floor, 14" w. x 12" h.; both blocked. SW. wall: 4" from W. corner, 4' 2" above floor, 13" w. x 14" h., blocked.
	Subfloor:	Base of NE. wall, at floor level; of SW. wall, 3' 7" below. 2 underfloor foundations, no masonry, abut lower SW. wall.
187 B	Doorways:	Middle NW. and SE. walls.
	Ventilators:	NE. wall: W. end. SW. wall: 5" from W. corner.
187 C	Doorway:	Middle NW. wall.
	Ventilator:	NE. wall: W. end.
188		Unexcavated.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
188 B	Doorways:	NW. wall: 32" from N. corner, 14" above floor, 27" w. x 4' 8" h. x 24" across sill. SE. wall: 3' 5" from E. corner, 20" above floor, 27" w. x 4' 6" h. x 26" across sill.
	Ventilators:	NE. wall: 1) 14" from N. corner, 5' 6" above floor; 2) 12" from E. corner, 5' 8" above floor, 16" w. x 18" h.; both blocked.
	Shelves:	Holes at both ends NE. wall indicate former shelves.
188 C	Doorway:	Middle SE. wall.
	Ventilators:	NE. wall: 3, all blocked. Unexcavated.
189		
189 B	Doorways:	SE. wall: (se NW. door R. 188B). SW. wall: 2" from S. corner, 20" w., blocked to form <i>recess</i> 9" d. NW. wall: 23" from W. corner.
	Ventilators:	NE. wall: 1) 4" from N. corner, 5' 4" above floor, 11" w. x 15" h.; 2) 2" from E. corner, 5' 5" above floor, 11" w. x 18" h. SW. wall: 1) 7" from S. corner, 12" w. x 15" h.; 2) 2" from W. corner, 12" w. x 15" h. All blocked.
189 C	Ventilators:	NE. wall: 2, both blocked.
200	Ceiling:	Included dressed willows and cedar bark.
	Doorways:	NW. wall: 4' 7" from W. corner, 3' 3" above floor, 22" w. x 31" h., 8-2" lintel poles, blocked. NE. wall: 26" from E. corner, 25" above floor, 21" w. x 32" h. x 17" across sill, 6 lintel poles. SE. wall: 3' 10" from S. corner, 20" above floor, 17" w. at top, 20½" w. at sill x 33" h. x 19½" across, 8-2" lintels. SW. wall: 26" from W. corner, 22" above floor, 20" w. x 35" h. x 16" across sill, 8 lintel poles.
201	Doorway:	NW. wall: 4' 5" from N. corner, 23" above floor, 16" w. x 31" h. x 18" across sill.
202	Ceiling:	Dressed willows and cedar bark in fill.
	Doorways:	NW. wall: 3' 10" from W. corner, 2' 6" above floor, 28" w. x 37" h., blocked. NE. wall: 23" from E. corner, 24" above floor, 23" w. x 16" across sill. SE. wall: 5' from S. corner, 22" above floor, 21" w. x 33" h. x 17" across. SW. wall: (see NE. door R. 200).
	Clothes Pole	
	Seatings:	SE. wall: 1) 7' 3" from E. corner, 5' 7" above floor, 4" w. x 3" h.; 2) 2' 9" from S. corner, 5' 5" above floor, 3" w. x 5" h. NW. wall: 2, same size.
	Subfloor:	NW. foundation 2½' h., 8" below floor; built against it, masonry offset, 10" w. x 12" h. SE. foundation, 20" h., on sand with sparse debris of occupation.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
203	Ceiling: Doorway: Clothes Pole Seatings:	Dressed willows and cedarbark in fill. NW. wall: (see SE. door R. 202). NW. wall: 37" from N. corner, 5' 4" above floor, 5" w. x 4" h., connects with one in R. 202. SE. wall: 16" from E. corner, 5' 2" above floor, 5" w. x 3" h. x 19" d.
	Subfloor:	NW. foundation 17" h. with 10" offset, built on 3' blown sand av. 12" from S. wall. Latter, 1st type, built on clean sand 7' 5" below floor level; upper 4' plastered, slopes roofward; lower 3', unplastered, slopes out <i>ca.</i> 23°.
204	Doorways:	SE. wall: 4' 2" from S. corner, 21" above floor, 13" w. at top, 17" at sill x 2' 7" h. x 19" across; 8-2" lintel poles. NE wall: 23" from E. corner, 21" above floor, 35" h. SW. wall: (see E. door, R. 202).
	Clothes Pole Seating:	SE. wall: 18" from S. corner, 5' 6" above floor, 3" w. x 4" h. x 6" d.
209	Doorways:	Middle N. wall, orig. blocked. E. wall: 26" from SE. corner, 20" above floor, 25" w. x 33" h., blocked. S. wall: 5' 7" from SE. corner, 28" above floor, 15" w. at top 20" w. at sill x 32" h. x 18" across. W. wall: 29" from SW. corner, 21" above floor.
	Clothes Pole Seating:	S. wall: 2' 9" from SW. corner, 5' 7" above floor, 5" sq. x 6" d.
210		Mixed masonry, plastered and whitened; N. end is part of O.B. kiva.
	Doorways:	N. wall: 14" from NW. corner, <i>ca.</i> 18" above floor, 19" w. x 26" h., blocked to leave <i>ventilator</i> 12" h. S. wall: 11" from SW. corner, 25" above floor, 20" w. x 19" across sill.
	Subfloor:	Razed O.B. kiva, <i>ca.</i> 19' dia. at depth of 3½'; bench repeatedly plastered and whitened, 37" w. x 28" h.; one pilaster exposed, set back 4". Kiva 16 E. side stands on floor.
211		Pepper's R. 17; mixed late masonry.
	Subfloor:	Paired foundations, no masonry, av. 18" w., 27" apart.
212		In S. half 8" d. pile of potter's clay ringed with 51 manos and fragments, 1 hammer.
	Subfloor:	Paired foundations, no masonry, av. 15" w., 24" apart.
213		Masonry indeterminate; E. and S., without foundations built on floor; S. side abuts E. and W.
	Subfloor:	Abutting W. wall 38" below floor, sandy pavement covered by debris of reconstruction. On surface at 34", wall 17" w. underlies S. end 21" from SW. corner; was razed 9' N. acc't. construction of Kiva A. At S. end,

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 213 jamb of former door remains in extended wall from Rs. 214-215; below sill slab, 17" plastered masonry with 9" w. offset above 15" of plastered masonry, apparently 3rd type. W. of this razed wall, 3' 7" from S. end and at depth of 32", a slab-lined *fireplace* 26" x 14" x 7'd.; on E. side, floor at depth of 20" underlies both E. and S. walls.
- 214 Masonry, 3rd type and plastered. N. end, unfinished, abuts E. and W. Floor 18" above W. wall foundation and 13" above last West Court surface.
- 215 3rd-type masonry plastered and whitened. E. half of N. wall solid masonry against Kiva A curve.
- Subfloor: Earlier floors at 5, 31, 34, and 39". E. side a thin partition; whitened plaster, S. side, based on 3rd floor. On 39" floor, 2 *firepits*: 1) slab-lined and plastered, 43" E.-W. x 39" x 40" d. filled with burned sand; 2) masonry-lined and plastered, 37" E.-W. x 35" x 36" d., filled with 16" burned sand and debris of occupation containing Corrugated-coil and Late Hachure sherds.
- 216 SE. corner plastered and whitened. W. side a partition built on floor; no plaster. N. side, kiva curve, 34" th., razed to floor level. Various masonry walls, plastered and sooted, floors not cleared.
- 217 Doorways: E. wall: 36" from SE. corner, at floor level, 26" w. S. wall: 1) 8" from SE. corner, at floor level, 24" w; 2) 5' 6" from SW. corner, 13" above floor, 23" w.; both blocked.
- Subfloor: Earlier floors at 7, 16, 22, 28, and 32". Kiva A. curve is uniform 3rd type to surface at 22"; rough, below. On 7" level slab-lined *fireplace* 12" sq. x 10" d., half underlies W. wall 20" from SW. corner. Plastered S. wall extends 3' below floor, abuts and overlies another on floor at 39". Other walls on floor at 7½', razed at height of 5' 2", resemble OB stonework but are superior.
- 218 Masonry includes dressed laminate s.s.; plastered and sooted.
- Doorways: E. wall: 5' 9" from SE. corner, at floor level, 27" w. W. wall: (see E. door R. 217). Both blocked.
- Fireplace: 21" from E. wall, 22" from S., 13" dia., plastered and rimmed with adobe.
- Subfloor: Kiva A masonry extends below floor; W. wall, no foundation, built on waste abutting

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 218 kiva; E. wall at floor level on 16" h. foundation, debris of reconstruction below; S. wall plaster rounds to floor at depth of 27" overlying flag-paved "drain," 5½' l. x 5" d. x 9" w. Unplastered wall 15" th. continues from R. 150 and goes under W. side 2' 4" from SW. corner.
- 219 Floor 14" above that of R. 144.
 Doorways: E. wall: 7' 6" from NE. corner, at floor level, 31" w. x 25" across sill. W. wall: 7' from NW. corner, 6" above floor, adobe sill originally 26" w., reduced to 19" by secondary adobe jambs.
 Wall niche: W.: 26" from NW. corner, 16" above floor, 10" w. 10" h. x 9" d.
 Fireplace: NW. corner, 16" sq. x 6½" d., built on floor, same depth.
 Subfloor: S. and W. walls based on floor at 30"; also, masonry-lined NW. corner fireplace 38 x 17" x 10" d. and razed wall, 19" w., 2 courses h., 5½' from W. side and passing under N. and S. ends. Floor at 49" rounds to plaster on 6 razed walls, indef. masonry, their foundations on floor at 5' 7"; here, also, at 5' 7", paired walls 18" h., continue from W. Ct. and R. 144 across 219 and out under E. wall 5' from SE. corner.
- 220 Open room; walls of salvaged friable s.s. and plastered. N. resembles 2nd type masonry to 29" d.; possible S. foundation parallels N. side at 6' and extends under E. wall.
 Doorways: N. wall, 10" above floor (see S. door, R. 217). W. wall (see E. door, R. 219). E. door, possible.
 Wall niche: W. at NW. corner 10" above floor, 11" w. x 10" h. x 11" d., plastered inside.
 Subfloor: S. wall fallen 2' below floor level. Earlier floors at 5, 24, 46" and 6' 2". On 1st, NE. corner fireplace, 25" d. x 30" dia. at bottom, 36" at top, plastered. On floor at 24", masonry-lined and plastered fireplace 41" N.-S. x 34" w. x 50" d., filled with burned sand and s.s. fragments; E. and W. sides recessed 4"; N. end underlies room wall 4". Various walls, mostly thin and indeterminate, at different levels. 3rd type pair crossing W. Ct. and under 219 razed 20" inside 220 on floor at 6' 2".
- 221 Open room adjoining 220. Walls of salvaged friable s.s.; W. abuts N.; S. missing.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 221 Doorway: N. wall: 16" from NW. corner, 4" above floor, 25" w.; blocked.
- Fireplaces: 1) 22" from E. wall and 4' from N., 24 x 18" x 7" d.; 2) NW. corner 18 x 16" x 7½" d., its S. end a slab on edge; 3) slab-lined, against W. wall 2' from NW. corner, 23 x 19" x 13" d., its S. slab a troughed metate; 4) a central *firepit*, 3' 7" E.-W. x 28" x 31" d., masonry-lined, filled with burned sand and sparse charcoal.
- Subfloor: N., E. and W. foundations, av. 24" h., are partly razed house walls, unplastered but sooted, its floor at depth of 5' 2". Walls show alterations, possible occupancy after construction of Kiva B. *Ventilator* at floor level in S. wall 8" from SE. corner, 14" w. x 19" h. to stick lintels; connects with outside shaft, 13 x 10", finished inside.
- 222 Walls, mostly fallen, include larger than usual blocks of dressed friable s.s.
- Doorways: W. wall: at floor level 17' 1" from NW. corner, 25" w., blocked; S. wall, 3½' from SW. corner, sill 31" below floor, 28" w. x 4' 3" h. opened into R. 140, blocked.
- Subfloor: On floor at 3", 4 slab-paved basins each with single slab on edge at W. side. Under one, 2 hewn planks 3" and 7" w. x 20" l.; under another, part of a tabular O.B. metate. Under all, on floor at 22", a rude foundation, 17" w., that parallels W. side at 6' 5" and goes under N. and S. ends. Other sub-floor walls, mostly razed at 18", connect with floor at depth of 3½'.
- 223 Corner of former dwelling at SW. arc of Kiva B. Masonry includes larger than usual blocks of dressed friable s.s.
- Subfloor: S. and W. walls extend 3' 9" below floor level; plastered S. wall and unplastered exterior of Kiva B both smoke-stained. Sub-floor fill chiefly debris of demolition.
- 224 Small room, southeast corner Kiva B enclosure. 3rd type masonry, plastered.
- Fireplace: SE. corner, slab-lined, 30 x 23"; contained 5 s.s. firedogs.
- Bench: In corner back of fireplace, 12" sq. x 5" h.; on it a s.s. jar cover 7" dia.
- 225 4th type masonry, intermittent banding. Beams and ceiling poles pulled out or cut with steel axes.
- Doorways: N. wall: 4' 6" from NE. corner, 9" above floor, 27" w. x 4' 5" h., lintel of 8-2½" pine

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

225		poles, lower half rudely blocked. E. wall: 9' 6" from NE. corner, 12" above floor, 27" w. x 4' 4" h., formerly blocked. S. wall: 4' 7" from SW. corner, 10" above floor, 27" w. x 4' 6" h., lintel of 8-3" pine poles lashed together at ends with split willows; formerly blocked. W. wall: 7' 11" from SW. corner, 14" above floor, 27" w. x 4' 7" h. x 26" across sill, lintel of 7-3" pine poles.
	Ventilators:	E. wall: 1) 23" from NE. corner, 4' 10" above floor, 13" w. x 14½" h., lintel of 9 small pine poles; 2) flush with S. wall, 4' 10" above floor, 13" w. x 14" h.
	Subfloor:	Foundations av. 14" h.; 3 inset 2"; all 5" below floor. Foundation 26" w. x 19" h. parallels E. side at 6', underlies S. Test, NE. corner, 9' deep shows 3 silt layers, that at 38" sloping sharply S.
225 B	Doorways:	N. wall: 4' 8" from NE. corner, 22" above floor offset, 26" w. x 4' 2" h., blocked. E. wall: 9' 4" from NE. corner, 21" above offset, 27" w. x 4' 1" h. x 25" across sill; blocked. S. wall: 4' 10" from SE. corner, 28" w.; sill and lintel missing. W. wall: part of jamb remains. SE. corner: diagonal, 29" above floor offset, 23" w. x 4' 2" h. NE. corner: diagonal, 22" above offset, 22" w. x 26" h. x 3' 7" lengthwise across sill, lintel of 8 poles, secondary jambs inset 10" on N., 12" on S.
	Ventilators:	N. wall: 9' 2" from NE. corner, 32" above floor offset, ca 18" w. x 23" h. E. wall: 5' 3" from NE. corner, 3' 3" above offset, 18" w. x 23" h., 4 pine pole lintels with hewn plank at each side.
226		4th type masonry, intermittent banding. Ceiling offset at 8' 3" av. 3" w. on N., E. and W.; none on S.
	Doorways:	E. wall: (see W. door R. 225). W. wall, T-shaped door: 6' 6" h.; upper part 18" from NW. corner, 3' 9" w. x 3' 8" h.; lower part 29" from NW. corner, 23" w. x 34" h., sill 12" below floor; roughly blocked, 5 upright poles in middle blocking. S. wall: 6' 11" from SE. corner, 11" above floor, 27" w. x 4' 4" h. x 25" across sill, 6-3" pine lintels; formerly blocked.
	Subfloor:	Original floor 12" below.
226 B	Doorways:	E. wall: 7' from SE. corner, at floor level. S. wall: 7' 3" from SE. corner 21" above floor, 27" w. x 4' 9" h.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
226 B	Ventilators :	S. wall: 1) 5" from SW. corner, 5' 6" above floor, 13" w. x 14" h.; 2) 4" from SW. corner, 5' 6" above floor, 11" w. x 13" h.; both blocked. W. wall: 1) flush with S., 5' 6" above floor, 12" w. x 15" h., 10 lintel sticks; 2) probable vent in broken N. end.
227	Ceiling :	Masonry, 4th type banded. Plaster on all walls. Single E.-W. 10" pine beam; 40-3" poles, paired butt to tip and bound with yucca strips; split cedar and adobe mud.
	Doorways :	E. wall: 20" from NE. corner, 13" above floor, 28" w. x 4' h. x 25" across sill, 7-2½" lintel poles; lower 35" blocked. S. wall: 36" from W. corner, 39" above floor, 19" w. at top, 22" w. at sill x 33" h. x 25" across; inverted tabular metate sill, 21" w. x 2" th. extends 3½" into R. 173; new lintels reduced height to 28". W. wall: T-shaped door, upper part 7" from SW. corner, 3' 9" w. x 4' 3" h., 7 lintel poles 6' 8" above last floor; lower part 18" from SW. corner, 23" w., sill below floor. Projecting stone forms 9" w. x 5" step 14½" above floor. Repeatedly altered; finally blocked.
227 B	Doorways :	S. wall: 9' 7" from SW. corner, 28" w. x 3' 9" to broken top, 27" across sill. W. wall, T-shaped door; upper part flush with N., 3' 6" w. x 3' 9" h.; lower part 9" from N. wall, 23" w. x ca. 25" h.; blocked to leave upper door 18" x 20"; later blocked.
	Shelf :	Triangular, 32" x 18" x 21" above diag. door connecting 228B and 173B.
227-I	Doorways :	Ground floor room not evident before excavating. Room 227B covers both 227 and 227-I. E. wall: T-shaped door 1" above floor; upper part 18" from NE. corner, 3' 9" w. x 3' 9" h., 5-4" lintel poles; lower part 30" from NE. corner, 23" w. x 35" h., blocked with 1 stone protruding as 12" h. step, upper part with 5 upright posts in middle, blocked from R. 226 leaving recess 3' 9" w. x 16" d. S. wall: 3' 11" from SW. corner, 17" above floor, 24" w. x 4' 2" h. x 25" across sill; blocked. W. wall: blocked (see E. door R. 227).
	Subfloor :	Uneven surface at 2' covered by debris of occupancy containing both P. II and P. III potsherds.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 228 Hyde Exped's R. 73. Former dwelling, banded 4th type masonry, quartered with partitions of salvaged stone introduced under beams to provide base for rebuilt Kiva C ventilator. North quarters not cleared.
- Doorways: SE. quarter, E. wall: T-shaped, blocked (see W. door, R. 227). S. wall: 9' from SE. corner, 18" above floor, 27" w. x 4' 8" h., formerly blocked (see N. door R. 172).
- 228 B Covers quartered R. 228A. N. and W. walls rebuilt; N. overhangs that below by 16", abuts plaster on E. S. 2' of W. wall is banded 4th type masonry; remainder, of salvaged friable s.s.
- Doorways: E. wall: T-shaped door: upper part, 3' 7" w. x ca. 3' 6" h., successively reduced leaving *ventilator* in upper middle, later blocked; lower part, 3' 10" from SE. corner at floor level, 25" w. x 39" h. (see W. door, R. 227B). SE. corner, diagonal door 26" above floor, 28" w. x 31" h. x 5' lengthwise across sill; 11 pine lintel poles; 3 secondary lintels at W. end, blocked opposite. S. wall: 7' 11" from SE. corner, 26" above floor, 26" w. x 37" h. x 24" across sill, 6-2½" pine lintels; sill includes ½ tabular metate and slab fragments set in adobe. N. wall, T-shaped door; upper part 7' 11" from NE. corner, 46" w.; lower part 26" w. x 31" h., 24" above floor; blocked.
- Ventilators: NE. corner: 16" h., blocked and partly covered by later N. wall. S. wall: 1) 8" from SW. corner, 5' 1" above floor offset, 13" w. x 18" h.; 2) near SE. corner, 5' above floor, 12" w. x 14" h.
- Wall niches: S. wall: 1) 8" from W., 5' 1" above floor, 13" w. x 18" h.; 2) ca. 18" from SE. corner, 5' 3" above floor, 12" w. x 14" h., blocked.
- 228 C Doorway: Middle S. wall.
- 229 Identifiable as Hyde Exped. R. 24. Like 228, a former dwelling of 4th-type masonry quartered to support at 2nd story level new Kiva C ventilator shaft. Walls plastered; lower 3½' whitened. Rebuilt N. ¾ of E. wall not plastered.
- Doorway: S. wall: 4' 11" from SE. corner, 18" above floor, blocked by N.-S. partition.
- 229 B Like 228B covers quartered ground floor room. Walls of banded 4th type except E., rebuilt of salvaged stone abutting Kiva C ventilator shaft.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
229 B	Doorways :	N. wall, T-shaped: lower part, 5' 9" from NW. corner, 21" above floor offset, 22" w. x 30" h.; upper part, 3' 11" w., lintels missing; blocked. S. wall: 4' 10" from SE. corner, 19" above floor, 26" w.; same across sill.
230		Narrow terrace abutting W. side of Kiva C enclosure N. of R. 170. Plaster shows on S. and E. walls.
	Doorway :	S. wall, 4' from SE. corner, at floor level, 23" w.
	Subfloor :	E. foundation 26" h., has 8" w. offset 7" below floor level; adobe bank against base, 6" w. x 10" h. Original floor at offset level; above it, 3 floors overlying doubtful W. side. 26½' from S. end, subfloor wall 12" th., its N. and E. sides plastered and whitened, turns to abut Kiva C enclosure.
231		Angle of former dwelling, SW. corner Kiva C enclosure. S. and W. sides rebuilt with dressed friable s.s.; tie stones protrude from W. and kiva curve. Floor at 2nd story level, rounds to wall plaster; was broken through when kiva was rebuilt.
232		Masonry mostly of friable s.s., both dressed and unworked. May represent rebuilt angle of former dwelling. Fill, debris of reconstruction.
233		Small room, NE. corner Kiva C enclosure. E. wall, banded 4th type masonry; N., large dressed friable s.s. blocks; both sides plastered, E. plaster extending below floor level. Beam end, 10" dia., abuts N. plaster 19" above floor level extends under R. 237 and into 238.
	Subfloor :	E. wall plaster, including thin clay wash, rounds to floor 8' 1" below beam level. On that floor, dry masonry wall 33" l. x 36" h. buttresses kiva and E. wall.
234		Angle former dwelling SE. corner Kiva C enclosure. S. wall includes large dressed blocks of friable s.s. Both E. and S. plastered, several coats whitened. Stones protrude irregularly from kiva curve.
	Doorway :	Upper E. jamb, blocked T-door in S. wall 7' 1" from SE. corner (see N. T-shaped door, R. 228B).
	Fill :	Debris of demolition including cedarbark and wall adobe, 1 chunk with embedded cocklebur. Floor may overlies razed kiva under C.
235		At SW. corner Kiva D enclosure, once part of R. 227. W. and lower E. (continued)

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 235 from 227) of banded 4th type. N. and S. walls abut plastered W.; S. includes dressed friable s.s. and protruding tie-stones, extends over lower E. to join kiva curve. W. and S. wall offsets apparent at R. 227 ceiling level. 6" log from R. 236 pierces N. side 37" from NW. corner, is embedded in S. wall 8" from SW. corner.
- Fill: Mixed debris of demolition and occupancy including corn husks and stalks.
- 235 B E. end is 4½' solid masonry between kiva and S. wall.
- Ventilator: W. side 5' above floor offset, blocked from R. 228B to leave recess 11" w. x 15" h. x 23" d.; 13 small stick lintels.
- 236 Only S. ⅓ excavated. Floor to top S. wall, 16' 7". W. side had settled outward; cracks repaired but left unplastered. S. wall abuts plaster on W.; Kiva D curve, 22" thicker in lower 6', abuts S. and is tied to it by 6" dia. log brace.
- 237 Improvised room above and at NW. corner Kiva D enclosure. N. and W. walls only 2 courses thick; highest wall, on E. 19". Floor 33" above that in R. 233; clean sand below.
- 238 An apparent improvisation like 237 and at same level. N. side fallen to below floor.
- 239 At NE. corner Kiva D enclosure. E. side, banded 4th type masonry; 5" offset at 9' 8". W. side, floor to top, 19' 3". Lower W. and N. tied at corner, as former dwelling. N. wall and kiva curve rebuilt with salvaged stone; tie-blocks protrude from both. 20" w. offset on kiva curve at 8' 4" h., slab topped, suggests earlier kiva. 10" dia. log next W. wall at 5' 8" ties lower kiva curve. N. wall: 2 smaller logs in middle. 2-4" pole holes in N. wall at 10', 5 more at 14' but no holes opposite. Loose masonry buttress on building waste in SE. corner, 12' 2" above floor, ties kiva and E. wall.
- 240 Unexcavated.
- 241 Banded 4th type masonry; no plaster; corners tied. Uncertain floor covered by 2' debris of demolition; on this, 2 E.-W. beams and charred ceiling poles.
- Doorways: N. wall: 4' 10" from NE. corner, *ca.* 11" above floor, 27" w. x 4' 3" h. x 25" across sill; blocked. E. wall: 10' 7" from NE.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

241

Ventilators:

corner, 11" above floor 27" w. x 4' 4" h.; blocked. S. wall: (see N. door R. 225).
E. wall: 28" from NE. corner, 5' 3" above floor, 13" w. x 10" h., blocked from R. 178 leaving *recess* 9" d.

Subfloor:

Earlier floors or work surfaces at 15" and 26". N.-S. foundation av. 26" w. x 19" h., no identifying masonry, parallels E. side at 3½' and underlies end walls. On pavement at 6' 3" adobe wall 8" th. x 16" h., topped with stones, faced on N. side only and curving SE. Silt layer crossed wall top; blown sand banked against S. side.

241 B

Doorways:

N. wall: 4' 6" from NE. corner, 22" above floor offset, 26" w. x 3' 10" h. x 26" across sill. S. wall: 4' 8" from SE. corner, 28" w., blocked. W. wall: 8' 2" from NW. corner, 21" w. x 41" h. x 13" across; sill 7" below floor with steps leading down to Kiva D sub-floor passage.

Ventilators:

E. wall: 1) S. end, 5' 3" above floor offset, 17" h.; 2) probable companion at N. end.

242

Doorways:

N. wall: 5' from NE. corner, 2' 11" above floor, 26" w. x 4' 4" h.; reduced to 20" w. x 2' 8" h. by new sill at 4' 5" and secondary jambs inclined for R. 243 door slab; projecting stone on original sill served as *step*.

E. wall: 6' 3" from SE. corner, 17" above floor, 27" w. x 4' 5" h., blocked. S. wall: blocked and plastered (see N. door R. 241).

Ventilator:

E. wall: 28" from NE. corner, 5' 4" above floor, 14" sq., blocked.

Subfloor:

In SE. corner, foundation built on silt stratum 21" below floor; other strata to depth of 10½'. Under N. end, 2nd type kiva: walls 25" th., floor at 9½', bench razed. N.-S. foundation 33" w., no identifying masonry, built on kiva floor and fills its subfloor ventilation duct. R. 242 N. and W. walls built from kiva floor; E. foundation built on bench. Ventilator shaft partly underlies W. wall of room 11' 3" from NW. corner.

242 B

Banded 4th type masonry, larger blocks dressed as in 1st story. Floor offset av. 5" w. on all walls; ceiling poles, at 9' 7", grouped in 3s *ca.* 12" apart.

Doorways:

N. wall: 4' 6" from NW. corner, 2' above floor offset, 28" w. x 4' 2" h., lower 7" blocked. NE. corner: diagonal door 22" above floor offset, 24" w. at top, 26" w. at sill x 3' 3" h. NW. corner: diagonal door

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
242 B		25" above offset 27" w. x 38" h. E. wall: N. jamb 7' from SE. corner. S. wall: (see N. door R. 241B).
	Ventilators:	E. wall: 1) 34" from NE. corner, 5' above floor offset, 12" w. x 14" h.; 2) 12" from SE. corner.
242 C	Doorways:	Probable N. and S. doors as in 242B.
	Ventilator:	E. wall: 2' from NE. corner, 5' above floor, 12" sq.
243	Doorways:	In E. and S. walls successively reduced by new sills, lintels, and secondary jambs slanted outward for doorslabs. Masonry between main and secondary lintels. W. door, 8' 1" from NW. corner and 10" above floor, likewise reduced by secondary adobe jambs slanted for R. 244 door.
	Ventilators:	E. wall: 1) 29" from NE. corner 4' 5" above floor, vent to R. 181 blocked to leave plastered recess 13" sq. x 7" d.; 2) 6' 7" from NE. corner same height, 14" sq. W. wall: 1) 6" from NW. corner 4' 10" above floor, 13" w. x 15" h.; 2) 3" from SW. corner 4' 3" above floor, 12" w. x 14" h., blocked from 244 to leave recess 21" d.
	Subfloor:	N. end test shows 2nd type kiva, floor at 10' with buttresses 2' and 5' h. supporting R. 243 W. wall. Built on kiva floor, abutting its concave N. arc, and extending beyond N. and S. ends of 243 is friable s.s. foundation av. 3' w.
243 B	Doorways:	E. wall: ca. 4' 6" from SE. corner ca. 3' above floor offset, ca. 26" w. x 3' h. x 24" across sill. S. wall: blocked, (see N. door R. 242B). W. wall: 8' from SW. corner, 3' above offset, 26" w. at lintels, 28" w. at sill x 3' 5" h. x 27" across.
	Ventilators:	E. wall: 1) 2' from NE. corner, 5' above floor, 10" w. x 12" h.; 2) 5' from NE. corner, 5' above floor, 12" w. x 14" h.; 3) 6" from SE. corner, 5' 3" above floor, 11" sq. W. wall: 1) 6" from SW. corner, 5' 6" above floor, 10" w. x 12" h., blocked; 2) 4" from NW. corner, 5' above floor, 12" w. x 12" h., blocked.
243 C	Doorway:	E. wall: directly above E. door in R. 243B.
	Ventilator:	E. wall: N. half.
244		Banded 4th type masonry except W. which is mixed 3rd and 4th. N. and S. abut plastered W.
	Ceiling:	3 pairs E.-W. beams, split cedar and ceiling poles.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
244	Doorways:	E. wall: 9' from NE. corner, (see W. door, R. 243). W. wall: 5' 9" from SW. corner, 37" w., blocked and plastered; slab over lintels 12" above floor. N. wall: 7' from NE. corner, 16" above floor, 22" w. x 3' 4" h.; blocked.
	Ventilators:	E. wall: 1) 6" from SE. corner, 3' 9" above floor, 14" w. x 19" h., blocked; 2) 17" from NE. corner, 4' 6" above floor, 13" w. x 14" h., blocked.
	Subfloor:	Partly razed 4th type wall 18" w. x 20" h. on 15" h. foundation 31" from W. side goes under both N. and S.; associate floor rounds to 2nd coat W. wall plaster 31" below 244 floor. Original W. wall plaster rounds to floor at 4' 9"; other stonework to floor at 6' 9". Test ended on silt layer at 9' 10". E. side plaster ends at floor; foundation, 14" h. rests on subfloor 2nd type kiva masonry, 18" th., but continues to its floor at depth of 10'. Partly razed bench 26" w. x 22" h., ceiling-pole offset 6" d. 6' above.
244 B	Doorways:	N. wall: 7' from NE. corner, 28" above floor offset, 27" w. x 3' 8" h. x 24" across sill; 6-3" lintel poles 3" below smaller main lintel. E. wall: 8' 11" from NE. corner, 29" above floor offset, 28" w. x 3' 5" h. x 27" across sill; secondary lintel poles. SE. corner: diagonal door 26" above floor, 26" w. x 37" h.; secondary masonry jambs slanted for R. 244B doorslab; secondary lintels 3" below main lintel poles. W. wall: 11' 2" from NW. corner, 23" above floor, 24" w. at top, 28" w. at sill x 32" h. x 25" across.
	Ventilators:	W. wall: 1) 31" from NW. corner, 5' 9" above floor, 13" sq., blocked; 2) 6' 10" from SW. corner, 5' 9" above floor, 12" w. x 10" h., blocked. E. wall: 13" from NE. corner, 5' 2" above floor, 13" sq., blocked. All have pole lintels.
245	Doorways:	Frequently rebuilt dwelling adjoining R. 244; final masonry, chiefly banded 4th type. Continuing zigzag incised on several S. stones. E. wall: 5' 3" from NE. corner, 3' 2" w., lintel poles 4½" above floor, blocked; sill not cleared. S. wall: 2' 6" from SE. corner, 19" above floor at depth of 4' 4", 38" w. x 4' 3" h., blocked to leave <i>recess</i> , full width x 12" h. W. wall: 14" from SW. corner, 3' 11" above floor, 21" w. x 3' 3" h. secondary adobe jambs reduce width to 16" at lintel, 18"

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

245

- at sill. Within door, 15" from wall face, is masonry *step* to R. 246B, full width x 16" h. with 9" w. hewn plank tread. Set in floor below door is an 8" dia. pine post *step*, 24" h., formerly pilaster log, positioned after sub-floor chamber was filled and floored over.
- Wall pegs: 2 holes for 2" poles, E. wall 4' 4" above floor, 3' 11" and 8' 8" from NE. corner.
- Posts: 4 ceiling props: 1) 4" from N. wall, 4' 6" from NE. corner, 5" dia.; 2) 10" from S. wall, 4' 3" from SE. corner, 4" dia.; 3) 4' 8" from E. wall, 6' 7" from S., 9" dia.; 4) 29" from E. wall, 4' 6" from S., 8" dia.
- Sub-floor "Chamber": Across S. end 28" d.; N. side abuts E. wall 6' 1" from SE. corner and W. wall 7' 4" from SW. corner. In NW. corner of "chamber," a step 28" w. x 14" h. Test against S. wall of "chamber" revealed earlier floors at depths of 29", 3' 9" and 4' 4". Lintels of blocked S. door 4' 3" h., 10" below 245 floor or 6" above floor of "chamber," shows former dwelling where R. 239 now stands. "Chamber" filled with debris of demolition and floored over; post step to intermural W. door followed flooring.

245 B

- Doorways: E. wall: 5' 2" from NE. corner, 29" above floor offset, 22" w. at top, 25" w. at sill x 31" h. x 26" across. W. wall: 6' 2" from NW. corner, 26" above floor, 20" w. at top, 22" w. at sill x 37" h.
- Wall niche: Below E. door, 19" above floor, 24" w. x 21" h. x 2" d.
- Shelf: Along N. wall: 6 small pole holes 5' 2" above floor, 4' 3" w.

246

- Masonry, mixed 2nd and 3rd types; reconstruction obvious; some plaster remains.
- Doorways: N. wall: 3' 6" from NE. corner, at floor, 28" w. x 3' 9" h.; 2 secondary lintels 6" below main lintels support masonry fill; blocked. E. wall: 6' 8" from NE. corner, 28" w. x 3' 8" h., neatly blocked before last floor was laid 7" above sill level.
- Wall pegs: Four-2" dia. pole holes, W. wall 9' 8" above floor.
- Subfloor: Earlier floors at depths of 12" and 20"; latter covers layered stones, as in 248.

246 B

- Doorways: E. wall: 1) 5' 11" from SE. corner, 26" above floor, 28" w. x 3' 7" h. x 24" across sill; reduced to 22" w. by secondary masonry jambs slanted for R. 246B doorslab; 2) 19" from SE. corner, at floor level, 20" w. x

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

246 B

28" h., stepped-down lintels and one step to R. 245; secondary jambs for R. 246B door-slab; 3) 22" from SE. corner, 30" above floor, 20" w. x 34" h., blocked. W. wall: 5' 11" from SW. corner, 3' 5" above floor, 28" w., hewn planks for sill. N. wall: 3' 10" from NE. corner, 17" above floor, 25" w. x 35" h., blocked.

Wall niches:

W. wall: 1) 32" from SW. corner, 26" above floor, 18" w. x 10" h. x 14" d.; 2) 5' 11" from SW. corner, 26" above floor.

Shelf:

Paired pole holes in E. and W. walls, 5" and 14" from SW. corner, 4' 2" above floor.

247

Masonry shows reconstruction: W. wall, predominantly 2nd type: E., 4th; N., a rough partition under ceiling beam but 16" N. of corresponding wall in R. 247B.

Doorways:

S. wall: 4' 4" from SW. corner, hewn plank sill; blocked above floor at depth of 21". W. wall: flush with N., 27" above floor, 25" w. x 28" h., blocked from R. 251 leaving 14" d. *recess*; this door appears to have been cut after completion of room.

Post:

8" dia., post under N. beam, 4' from N. wall; 2' 7" from E.

Subfloor:

N. wall built on 12" layer of dried wall adobe extending out 8'; earlier floor at 5' 7". Test against middle S. wall shows earlier floors at 21 and 44"; fill between, debris of demolition. Upper floor crossed lower half of blocked and plastered door 25" w. x 4' 7" h., with hewn plank sill. 1923 test showed sub-floor foundation 23" w. x 3-6" th. continuing under N. end 16" from NE. corner but razed 5' to S.

247 B

Excavation disclosed two 2nd story rooms, 247B north and 247B south, separated by wall built on ceiling beam.

247 BN

Doorways:

E. wall: 37" from SE. corner, 32" above floor, 28" w. x 3' 7" h. reduced to 27" h. by new sill. W. wall: 7' 9" from NW. corner, 28" above floor, 21" w. x 3' 6" h.

Ventilator:

W. wall: 13" from NW. corner, at floor level, 14" sq. blocked.

247 BS

Ventilator:

W. wall: 26" from SW. corner, at floor level, 14" sq. blocked.

Shelf:

At S. end: 4 pole holes in side walls, 35" w., 4' 4" above floor offset.

248

With 249 part of former dwelling divided by later partition. Masonry suggests 2nd type but evidences reconstruction.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
248	Doorway :	S. wall: 3' 7" from SE. corner, 18" above floor, 26" w. x 3' 10" h., blocked.
248 B	Doorways :	N. wall: (see S. door R. 249B). S. wall: 4' from SW. corner, 2' above floor, 23" w. x 21" h., blocked to leave <i>recess</i> 19" w. x 13" d.
	Ventilator :	E. wall: 2' from SE. corner, at floor level, ca. 14" sq., blocked.
249		With 248 part of former 1st story dwelling but divided vertically into 249A ₁ , lower half, and 249A ₂ .
249 A ₁	Ceiling :	4-4" E.-W. beams seated in 2" d. made holes 7' above floor; 5" w. offset, upper S. wall, as ceiling pole seat; layered reeds and adobe above poles. <i>Hatchway</i> , SW. corner, adobe rim (hewn plank 5" w. x 26" l. and rounded adobe found on floor beneath).
	Doorways :	N. wall: 3' 8" from NE. corner, 35" above floor, 27" w. x 31" h., cedar bark on lintel poles; blocked leaving plastered <i>recess</i> 27" w. x 31" h. x 12" d. W. wall: 17" from SW. corner, 19" above floor, 15" w. x 3' 7" h., blocked forming plastered <i>recess</i> 11" d.
	Wall niche :	N. wall: flush with E., 4' 3" above floor, 22" w. x 12" h.
	Macaw perch :	Against E. wall: 3' 8" above floor, 6' 10" w. x 3' 4" d., on 4-4" N.-S. poles, adobe surfaced.
249A ₂	Ceiling :	Three 10" E.-W. beams overlain by ceiling poles and split cedar, the ceiling of R. 249 before its vertical division.
	Ventilator :	W. wall: 4' 10" above floor, 11" w. x 9" h., sloping upward and outward to floor of Kiva E court. Second, possible W. ventilator: 19" above floor, 21" w. x 18" h., lintel of hewn boards with 2 sticks, 1 above the other, under inner edge of front plank; N. jamb rounded by adobe 4" th. x 12" w., reinforced by willow slanting back to 2 under-lintel sticks.
	Wall niche :	W. wall: flush with S., 3' 6" above floor, 15½" w. x 25" h.
	Shelf :	Indicated by hewn plank, 9" w., embedded in W. wall at NW. corner, 23" above floor.
249 B		Overlies 249A ₂ and part of 248. S. wall built on log above floor level; its decay caused partial wall collapse.
	Doorways :	E. wall: 10" from SE. corner, 24" above floor, 27" w. x ca. 3' 4" h. blocked from R. 247B. S. wall: 4' 2" from SW. corner, 22" w. W. wall, former T-shaped door; lower part 17" from SW. corner, 6" above

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
249 B		floor, 25" w. x 33" h.; upper part 3' 10" w., blocked to width of lower part, then completely closed.
	Ventilators :	E. wall, at floor level, both blocked: 1) below E. door, <i>ca.</i> 11" sq.; 2) 12" from NE. corner, 14" sq.
250		Passageway under S. end of R. 252B connecting Rs. 251 and 256.
	Doorways :	E. wall: 5" from SE. corner, at floor level, 27" w. x 27" h. x 24" across sill; secondary masonry jambs 2" th. slant up and out. W. wall: 2" from NW. corner at floor level, 19" w. x 24" h. x 19" across sill; S. jamb is pine post 10½" dia. supporting a hewn plank 19" l. and 6-3" dia. lintel poles.
251		Much altered masonry; smoke-stained plaster all sides.
	Ceiling :	Ceiling poles, at 6' 2" had sagged 2' in middle; split cedar and cedarbark above poles sooted but unburned.
	Doorways :	N. wall: 5' 10" from NE. corner, 26" above floor, 22" w. x 25" h. x 17" across sill; plank 6" w. x ½" th., serves as front lintel; secondary jambs. E. wall: 1) 36" from SE. corner, 21" above floor, 22" w. at top, 25" w. at sill x 27" h. (see W. entrance R. 250); 2) flush with SE. corner, blocked (W. door R. 247). S. wall blocked (see N. door R. 249A). W. wall: 12" from SW. corner, 16" above floor, 28" w. x 5' h., 5 lintel poles at front stepped sharply upward to hewn plank 6' 3" above sill and more poles same level.
	Ventilators :	W. wall, 21" from NW. corner, 5' 2" above floor, 30" w. x 17" h., blocked to form <i>recess</i> 9" d. Sill slopes upward and out to Kiva F terrace. E. wall: 4' 3" from NE. corner, 3' 6" above floor, 16" sq., pole lintels.
	Subfloor :	Earlier floors at depths of 6' 3" and 6' 9" are those of rooms abandoned and built upon. Masonry of lower walls is more typical than that above but remains unplastered. Test at N. end shows base of E. wall at 6' 8"; N. wall masonry continues to associate floor at 7'; upper N. overhangs 2nd type lower by 8". Masonry, mixed; W. wall favors 2nd type, E. wall, 4th.
252		
	Doorways :	E. wall: 5' 6" from NE. corner, 13" above floor, 25" w. at top, 27" w. at sill x 38" h. W. wall: 4' 2" from NW. corner, 26" above

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
252		floor, 16" w. x 36" h., partially blocked from R. 251 leaving <i>ventilator</i> 16" sq.
	Wall peg:	S. wall: 7" from SE. corner, 34½" above floor, 3" dia. hole.
	Subfloor:	Earlier floors at depths of 13", 31", 3' 11" and 5' 2" evidence reconstruction. <i>Door</i> in N. wall 37" from NE. corner, and 20" above floor at 5' 2", 24" w. at top and 28" w. at sill x 5' 9" h.; blocked. In blocking stonework, 23" above sill, hewn plank 8" w. x 2" th. stands endwise next E. jamb; on its W. side, 13" higher, a 2nd plank protrudes 5½".
252 B		Overlies 252, 250, and 17" of R. 247.
	Doorways:	W. wall: 4' 1" from NW. corner, 20" w. sill 8" below floor level, jambs continue past top of broken wall, 32" above sill.
	Ventilators:	W. wall: 1) 8' 7" from SW. corner, 7" above floor, 14" sq.; 2) 29" from SW. corner, at floor level, 14" h. x 15" w. Both blocked.
253		Partially razed small room, abutting 4th type exterior of R. 248, middle E. side of Kiva E terrace.
	Doorway:	SE. wall: 24" from E. corner, 17" above floor, 19" w.; masonry <i>step</i> 11" w. x 21" l. x 5" h.
	Wall niche:	NW. wall: 5" from N. corner, 12" above floor, 7" w. in front, 12" w. at rear x 8½" d.
	Fireplace:	27" from SE. wall, 3' 2" from NE., 22" dia. x 6" d.
	Subfloor:	Earlier floor at 4' 10" covered by chunks of wall adobe. Plaster on E. wall, smoke-stained; has incised figures. Ventilator of R. 249A ₂ opens at terrace floor 22" from NE. corner of Kiva E enclosure. Sill of blocked T-door, on terrace floor 3' 7" from NE. corner.
254		Open area surrounding Kiva E ventilator shaft. E. side 11' 3" from SE. corner Kiva E enclosure; its S. half is wattlework.
255		Small subterranean room SE. corner Kiva E square, roof at terrace level. S. wall abuts E.; is overhung by Kiva C enclosure, 9" at E. end, 12" at W., the overhang supported on 2 logs, split cedar above. Cedar ceiling splints from R. 246 show in E. wall 4' 2" above floor; a 5½" beam hole, 29" above floor, 7" from NE. corner.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

255	Ceiling :	Single E.-W. beam in middle; ceiling poles and split cedar; 3 hewn planks in ceiling, SE. corner.
	Hatchway :	NE. corner, 15" x 20" N.-S.; hewn planks rim S. and W. sides, adobe on E., 4" masonry on S. plank.
	Wall niches :	N. wall: 6" from NE. corner, 3' 10" above floor, 14" x 6" h. x 5" d., plastered, hewn plank lintel. S. wall: 27" from SE. corner, 28" above floor, 6" x 7" h. outside, 13" w. x 11" h. x 11½" d. inside; floor 4" below sill, a mano 4" w.; slab lintel on split cedar.
	Wall pegs :	S. wall, 4' 3" above floor: 1) 24" from SE. corner broken off flush; 2) 10½" from SW. corner protrudes 15".
	Fill :	Debris of occupancy dumped through hatchway; includes part of macaw skeleton and sherds matching fragments from R. 246.
	Subfloor :	Partly razed wall parallels S. side at 3' 2", plaster rounds to that on E. wall and floor at 4½'.
256	Doorways :	NW. wall: 5' 7" from W. corner, 14" above floor, 27" w. x 3' 5" h., later reduced to leave under-lintel vent. 20" h. NE. wall: 7' from E. corner, 13" above floor, 27" w. x 3' 10" h., sill later raised to 25". SE. wall: 6' 9" from E. corner, 3' 10" above floor, reduced to <i>ventilator</i> 28" w. x 20" h. SW. wall: (entrance to R. 250) 13" from W. corner, 25" above floor, 24" w. x 29" h.; masonry <i>step</i> below, 15" w. x 18" l. x 8" h., 18" from NW. wall.
	Ventilators :	NE. wall: 1) flush with SE., 5' 3" above floor, 13" w. x 14" h.; 2) 31" from N. corner, 5' 3" above floor, 14" sq.; both blocked.
	Shelf :	N. corner: 5' 8" above floor, masonry 21" w. x 4' 2" h. enclosing diagonal door between Rs. 257 and 258.
	Partition :	Wattle wall, horizontal willows supported by 9 posts and plastered on N. side only, abuts NE. wall 11' from N. corner and SW. wall 4' 5" from W. corner, preserving passageway between Rs. 250 and 257.
	Subfloor :	Foundation 18" w. bearing 4th type masonry goes under E. wall 11' 8" from NE. corner, razed 10' to W. [One of posts for wattled wall pierced this foundation.] Test in SW. corner revealed earlier floors at 24" and 3' 10"; W. wall plaster rounds to latter but its 4th type masonry continues 16". On floor at 24", wall 17" w. abuts W. side 6' 2" from

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
256		SW. corner, extends E. $2\frac{1}{2}'$, thence S. to tie with rude stonework under S. wall.
256 B	Doorways:	NW. wall: $7' 8''$ from W. corner, $12''$ above floor, $2' 3''$ w., blocked. NE. wall: $7' 5''$ from E. corner, $19''$ above floor, $28''$ w., blocked. SE. wall: $7'$ from S. corner, $30''$ above floor, $28''$ w. x $3' 5''$ h. x $25''$ across sill. SW. wall: $3' 4''$ from S. corner, $18''$ above floor, $25''$ w. x $3' 7''$ h., secondary masonry jamb on S. side $2\frac{1}{2}''$ w.
	Ventilator:	NE. wall: near S. end, vent broken with collapse of wall was heedlessly closed during 1922 repairs.
257	Doorways:	NE. wall: 1) $8''$ from N. corner, $15''$ above floor, <i>ca.</i> $26''$ w. x $32''$ h., blocked and plastered; 2) $6''$ from E. corner, $4''$ above floor, $27''$ w. x $24''$ h. x $26''$ across sill, fitted with secondary jambs inclined for R. 257 doorslab. SW. wall: $8'$ from S. corner, blocked (see NE. door R. 256). W. corner: $22''$ above floor diagonal door $24''$ w. x $36''$ h., hewn plank sill, crudely blocked from R. 258.
	Ventilators:	NE. wall: 1) $6' 5''$ from N. corner, $4' 9''$ above floor, opened into R. 182; 2) $7'$ from E. corner, $4' 9''$ above floor, opened into R. 181; both $13\frac{1}{2}''$ w. x $14''$ h., both blocked. SW. wall: 1) $8''$ from W. corner, $5' 3''$ above floor, $13''$ w. x $14''$ h.; 2) $11''$ from S. corner, $4' 11''$ above floor, $13''$ w. x $15''$ h., both blocked.
	Shelf:	Over W. corner door, $4' 10''$ above floor, triangular, $24''$ w. in front.
	Partition:	Unplastered wattle wall supported by 13 posts, $2-3''$ dia.; abuts NE. wall $11' 7''$ from E. corner and NW. wall $11' 4''$ from S. corner. Imprints of horizontal willows; blown sand packed behind.
	Subfloor:	Test at NW. end: No visible foundation under NW. and SW. walls except $2''$ layer of mud with occasional small stones at depth of $12''$. Foundations av. $24''$ w., underlie all 4 walls; NW.-SE. foundation overlies one $18''$ w. bearing 4th type masonry that goes under NE. wall $4'$ from E. corner and under SW. wall $6' 7''$ from S. corner.
257 B	Doorways:	NW. wall: $4' 7''$ from W. corner, $20''$ above floor offset, $23''$ w. at top, $21''$ w. at sill x $3' 5''$ h.; $2''$ secondary jambs. NE. wall: 1) $10''$ from SE. corner, $28''$ w., blocked; 2) $8''$ from NE. corner, $15''$ above floor,

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
257 B		28" w. SW. wall: blocked (see NE. door R. 256B).
	Ventilators:	NE. wall: 1) 7' 3" from E. corner, 4' 2" above floor, 14" w. x 10" h., closed from R. 181 leaving 10" d. <i>recess</i> ; 2) 7' from N. corner, 14" sq., blocked. SW. wall: 20" from S. corner, 4' 10" above floor, 14" w. x 10" h., blocked from R. 256B.
258		Banded 4th type masonry; all walls plastered; N. and S. abut plaster on W. side.
	Doorways:	NW. wall: 34" from N. corner, 18" above floor, 28" w. x 4' 3" h., blocked. NE. wall: 5' 8" from E. corner <i>ca.</i> 14" above floor, 25" w. x 4' 3" h., blocked and plastered over; below sill, stone protrudes 8" to provide 4 x 6" <i>step</i> . SW. wall: 16" from W. corner, 15" above floor, 18" w. at top, 20" w. at sill x 38" h. E. corner: diagonal door, 15" above floor, blocked on sill to leave 18" h. recess under lintels (see W. corner door, R. 257).
	Ventilators:	NE. wall: 1) flush with NW., 5' 6" above floor, 12" w. x 13" h. opens into R. 260; 2) 4' 9" from N. corner, 5' 6" above floor, 12" w. x 14" h. opens into R. 259; 3) a second 259 vent had been closed upon construction of E. corner diagonal door to R. 257. SW. wall: 1) 6' 5" from S. corner, 5' 2" above floor, 17" sq., blocked; 2) 11' 1" from S. corner, 5' 6" above floor, 17" w.
	Shelf:	Triangular, above E. corner door.
	Subfloor:	SW. wall is 4th type masonry to its foundation at depth of 5' 2"; in S. corner, top of SE. foundation is 5' above that of SW. wall; floor of 258 is 2' 8" above that of R. 263. Rude foundation 24" w., goes under NW. wall 3' 9" from W. corner and under NE. wall 3' 6" from E. corner.
259		Banded 4th type masonry; all walls plastered, corners tied; doors blocked and plastered over thus necessitating a <i>hatchway</i> . Wall plaster burned to sand accumulation within a few inches of floor.
	Doorways:	NE. wall: 33" from N. corner, 15" above floor, 26" w. x 3' 8" h. SW. wall: 7' 10" from W. corner, 20" above floor, 26" w. x 4' 1" h. Both blocked and plastered over.
	Ventilators:	NE. wall: 4' 10" from E. corner, 5' 4" above floor, 12" sq., blocked. SW. wall: 1) 12" from W. corner, 5' 9" above floor, 12" sq., blocked; 2) 8½" from S. corner, 5' 3" above

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
259		floor, 13" sq., blocked by diagonal door between Rs. 257 and 258.
	Shelf:	Triangular, 15" w. x 9" d., S. corner above masonry enclosing diagonal door between Rs. 257 and 258.
	Subfloor:	Foundations, 24-26" w., no identifying masonry, underlie all 4 walls at diverse angles.
259 B	Doorways:	Evident in all 4 walls, that to R. 182B being 27½" across sill.
260	Doorways:	NW. wall: 4' 9" from W. corner, 20" above floor, 21" w. x 3' 9" h.; secondary masonry jambs 27" h. to support R. 261 doorslab. NE. wall: 7' 3" from N. corner, 16" above floor, 27" w. x 3' 7" h., blocked. SW. wall: 6' 5" from W. corner, 17" above floor, 27" w. x 3' 10" h., lower 2' 9" blocked.
	Ventilators:	NE. wall: 1) 17" from N. corner, 4' 11" above floor, 12" sq.; 2) 42" from E. corner, 4' 7" above floor, 13" w. x 11" h. SW. wall: 1) 8" from S. corner, 5' 1" above floor; 2) 10" from W. corner, 5' 4" above floor, both 13" w. x 12" h. All 4 blocked.
	Subfloor:	5 underfloor foundations on floor at depth of 30" abutted by R. 260 foundations offset 15" at NW. and 12" at SE.
260 B	Doorways:	NW. wall: ca. 5' from W. corner, ca. 21" w. x 4' h. NE. wall: ca. 7' from N. corner, ca. 27" w. x 4' h. SE. wall: ca. 4' 2" from E. corner, ca. 30" w. SW. wall: ca. 6' 5" from W. corner, ca. 27" w. x 4' h., blocked.
261		Walls of banded 4th type masonry overlying units of NE. Foundation Complex. Built-in triangular block, NW. end, supported 3 NW.-SE. ceiling poles.
	Doorways:	NE. wall: 1) 1" from N. corner, 25" above floor, 28" w. x 37" to 8-2" lintel poles x 27" across sill to R. 186; 2) 5' 8" from E. corner, 20" above floor 27" w. x 41" to 7-3" lintels x 26" across sill; 2 secondary lintels, masonry above, and secondary jambs sloping toward R. 185 reduce door to 21" w. x 36" h. SE. wall: 4' 8" from E. corner, 18" above floor, 27" w. x 44" to 7-3" poles x 26" across sill; secondary jambs supported slab blocking entrance to R. 260.
	Ventilators:	NE. wall: 1) 6' 9" from N. corner, 4' 6" above floor, 13" w. x 10" h. to 2" lintel poles, blocked; 2) 7' 10" from N. corner, 6' 5" above floor, 11" sq.; 3) 4" from E. corner, 3' 10" above floor, 11" h. to lintels, partly covered by abutting SE. wall.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 261 Subfloor: 4 units of abandoned NE. Foundation Complex underlie floor 2 abutting plastered external masonry of earlier Rs. 265-267. NW. and SW. walls of R. 261 overlie Complex units and likewise abut older W. wall, 46" above its foundation at NW. end and 41" at SW. corner.
- 261 B Floor covered part of lower NW. corner block.
- Doorways: Evident in middle NE., SE. and SW. walls.
- Ventilators: NE., 1) indicated above door into R. 186B; 2) about 12" sq., opened into R. 185B.
- 262 Masonry evidences repeated reconstruction; all sides plastered; cedar splint 14" above floor in SE. corner ties S. and W. Walls; floor is 4½' above that in R. 263.
- Doorways: N. wall: 3' 10" from NW. corner, lintel, 7" above floor, identifies door 21" w. x 43" h., blocked, with sill 30" above earlier floor. S. wall: 22" from SW. corner, 23" above floor, 22" w. x 25" h.; hewn lintel boards and secondary jambs for R. 262 doorslab. W. wall: 12" from NW. corner, 4' 4" above floor, 27" w. x 29" across sill, opened into outside vestibule 4' 7" E.-W. x 29" w.; below door, *step* with 14" tread 19" w. x 13" h.
- Subfloor: Earlier floor at depth of 5' 1"; work surface at av. 5' 9"; E. and W. foundations at 6' 5". Lower walls of mixed 2d and 3rd type masonry; doors in lower N. and W. blocked and plastered over. At 5' 9" solid masonry *ca.* 4' h. crosses room, abuts E. plaster 2' 8" from SE. corner; upper 22" unplastered; in front, 3' above floor, *step* 26" w. x 20" d. On floor at 5' 1", foundation 18" w. x 10" h. abuts plastered W. wall 6' 9" from SW. corner. On floor at 7' 5" wall 20" w., razed at 8", plastered on E. side only and painted pink, goes under N. end 27" from NE. corner.
- 263 Masonry a mixture of 2nd and 3rd types and plastered. Reconstruction evident. Floor is 39" below that of R. 274; 32" below that of 258, 41" below that of 252, and 4½' below that of R. 262.
- Doorways: N. wall: 3' 3" from NE. corner, 10" above floor, 26" w. x 34" h., lower 26" blocked. S. wall: 37" from SE. corner, original sill 4" below floor level, blocked from R. 252 to leave opening 18" above floor, 27" w. x 23" h.; later completely closed with hewn planks among blocking stones.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
263	Ventilators:	E. wall: 1) 7" from NE. corner, 8' 7" above floor, 16" sq., blocked; 2) 6" from SE. corner, 8' 5" above floor, 17" w., blocked.
	Ceiling prop:	8" dia., 3' from E. wall, 5' 3" from S. set in dug hole 4' 3" d., later cut off 8" below floor and hole filled in.
	Subfloor:	Test pit 7' d. shows mixed debris of demolition and occupation. Early floors at 17" and 51". On latter, 33" from SE. corner, foundation 28" w. x 22" h.; at N. end, N.-S. foundation 30" w. x 18" h., 3½' from NE. corner; another goes under E. wall; N. end foundation built upon this latter.
264		Reconstruction evident thruout. W. wall includes dressed friable and laminate s.s., with 2nd type chinking; middle is slightly convex. All plastered.
	Doorways:	N. wall: 3' 10" from NE. corner, 15" above floor, 25" w. x 35" h. x 20" across sill; a few blocking stones placed from R. 266. E. wall: 8' from NE. corner, 28" above floor, 23" w. x 27" h. S. wall: 3' 7" from SE. corner, 3" above floor, 25" w. x 3' 8" h., blocked.
	Ventilator:	W. wall: 4' from SW. corner, <i>ca.</i> 6' above floor, S. jamb only, blocked with 2nd type masonry.
	Shelves:	Pole holes in E. and W. walls <i>ca.</i> 4' 6" above floor indicate N. shelf 7' w.; S. shelf 5' w.
	Subfloor:	On earlier floor at depth of 7" plastered masonry <i>step</i> , 12" w. x 18" N.-S., under E. door, 8' 1" from NE. corner. Foundation 20" w. goes under N. wall 5' 4" from NW. corner, under S. wall 5' 8" from SW. corner.
265		Masonry predominantly 3rd type. All walls plastered.
	Doorways:	N. wall: 4' 2" from NW. corner, 13" above floor, 29" w. x 3' 4" h., blocked. S. wall: 4' 4" from SW. corner, 7" above floor, 27" w x 3' 5" h., blocked.
	Ventilators:	E. wall: 7" from SE. corner, 8' 9" above floor, 16" sq., blocked.
	Ceiling props:	Two post holes: 1) 5' 4" from NW. corner, 12" from W. wall, 5" dia; 2) 8' 11" from NW. corner, 3" from W. wall, 6" dia.
	Subfloor:	Tests show W. foundation, 21" h., at depth of 12"; SE. corner foundation 16" below floor; work surface at 6". Subfloor foundation 20" w. x 20" h. on apparent floor at depth of 6' goes under N. end 3½' from NW. corner, under S. end 4' from SW. corner.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room 266	Doorways:	Mixed masonry; reconstruction evident; W. wall and W. half of N. are 2nd type; others probably 3rd with flavor of 2nd. W. side, slightly convex with masonry change 13½' from SW. corner; longitudinal offset, 12" w. at N. end, is 5' 8" above floor. Blown sand 4-12" d. on floor; burned ceiling above. S. wall: 3' 8" from SW. corner, 26" above floor, 27" w. x 34" h. x 18" across sill; lower 10" blocked. W. wall: 6' from SW. corner, 4' above floor, 16" w. x 24" h. x 24" across sill.
	Wall niche:	W. wall: oval opening 4' 11" from NW. corner, 3' 10" above floor, 6" w. x 2" h. x 4½" d.
	Subfloor:	Earlier floor at 12". Dug into it, 5 storage cists av. 3½' dia. x 4½' d. In floor of each, oval to rectangular basin av. 2" d. N.-S. foundation 21" w. x 3' 5" h. underlies N. wall 5' 1" from NW. corner; S. wall 5' 4" from SW. corner.
267	Doorways:	NE. unit of 14-room E.-side rectangular house group. Lower N. wall suggests 2d type masonry; E. and W., 3rd type. Reconstruction evident. Latest floor <i>ca.</i> 22" below that of R. 261 and <i>ca.</i> 4½' below that of R. 186. N. wall: 3' from NE. corner, sill 2" below floor, 29" w. x 33" h.; later sills 3" and 9" above floor; secondary masonry jambs for 267 doorslab reduced width to 21". S. wall: 38" from SE. corner, sill 11" below floor, 29" w. x 3' 5" h., later sill 2" above floor; blocked from R. 265 leaving <i>recess</i> 7" d.
	Shelf:	N. end, pole seats in side walls 4' 9" above floor indicate shelf 5' w.
	Beam props:	1) Against W. wall 5' 9" from NW. corner, post hole 5" dia. x 26" d.; 2) 5' 2" from W. wall, 5' from N., hole 8" dia. x 29" d.
	Subfloor:	Earlier floor, partly whitened, at 26". N. foundation, 30" h., based 35" below earlier floor or approximately 4½' below R. 186 floor. N.-S. foundation 27" w. x 17" h., no identifying masonry, abuts N. wall 4' 8" from NE. corner and S. wall 4' 4" from SE. corner.
267 B	Doorway:	Middle W. wall: probable door.
268	Ventilators:	W. wall: 3 at floor level, all blocked. Masonry mixed, reconstruction indicated. N. and W. walls chiefly dressed friable s.s.; E. and S., banded laminate in 4th type. Re-

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
268		built end of plastered wall, 15" th., protrudes 19" from N. wall 9' 2" from NE. corner; in it 30" above floor, oval <i>recess</i> 5" w. x 3" h. x 5" d. Probable continuation, 14" w. x 27" N.-S., stands 3' 6" from S. side and 10½' from E. corner. In W. wall, 3' 7" from SW. corner, vertical channel 4" w. x 7" d. for hewn timber ceiling high.
	Doorways:	N. wall: 14" from NW. corner, 2' 6" above floor, 2' w., door with 2 <i>steps</i> to Kiva H court level: 1) 19" from wall face 9" h., 10" tread; 2) 3' 5" from wall face 17" h. E. wall: flush with S., 25" above floor, 24" w. x 37" h., blocked. S. wall: 1) 8' 1" from SE. corner, 1" above floor, 25" w. x 20" h. x 25" across sill; 2) 7' 11" from SW. corner, 19" above floor, 27" w. x 3' 4" h.; secondary jambs for 268 doorslab reduced width to 19", lower 13" blocked.
	Wall niche:	W. wall: 2' 6" from NW. corner, 3' 1" above floor, 11" w. x 9" h. x 8" d., plastered.
	Fireplace	Oval, 18 x 13 x 8" d. 13" from N. wall, 7' 3" from NW. corner, unlined. Back of it, a slab embedded flush with floor; nothing beneath.
269		Small room SW. corner, Kiva I enclosure.
	Doorway:	W. wall: 23" from SW. corner, 25" above floor. 19" w.; secondary adobe lintels supported doorslab placed from Kiva 162 roof level.
270		Former house walls NW. corner Kiva I enclosure; 3rd type masonry. W. side, of salvaged s.s., abuts unsmoked plaster on N.
271		Former house walls S. end of Kiva J enclosure. E. and S. walls plastered, unsmoked, have 3" w. white band 32" above floor. Kiva J ventilator shaft rises 3' 5" from S. wall and 8' from E.
272		Small room, generally 2nd type masonry. W. wall abuts N. and S. Fragments of P. III coiled pot and Hachure II. B/W jar fragments used as chinking, S. wall.
	Doorway:	W. wall: 29" from NW. corner, 12" above floor, 19" w. at top, 24" w. at sill x 3' 4" h. x 19" across, lower 15" roughly blocked.
	Subfloor:	E.-end test revealed 2nd type kiva wall 18" thick; floor at 9' 8"; bench 11½" w. x 33" h.; 1 plastered pilaster, 11½" x 16" h., corners rounded, no visible pilaster log.
273	Doorways:	N. wall: 5" from NW. corner, 15" above floor, 27" w. x 5' 4" h., leads to surface SW.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
273		of Kiva J by 7 steps, av. 11" d. x 12" h. W. wall: 26" from NW. corner, 14" above floor, 25" w. x 3' 4" h. x 22" across sill.
	Subfloor:	E-end test showed 2nd type subfloor kiva from R. 272, wall 18" th., razed to within 2' of bench; floor at 8' 5".
274		Triangular room; banded 4th type masonry. Built-in N. section, abuts W.; walls plastered. In W. side, 2-2" dia. tie poles end flush with wall face.
274	Doorways:	NE. wall: 4' 6" from E. corner, 16" above floor, 27" w. x 3' 9" h., 7-3" lintel poles, lower 2' 6" blocked. SE. wall: 26" from E. corner, 15" above floor, 28" w. x 4' 2" h., roughly blocked.
	Subfloor:	Earlier floor at depth of 3' 8"; on floor at 22" large-block foundation abuts W. side 4' 2" from SW. corner, goes under E. side 25" from SE. corner.
274 B	Doorways:	SE. wall: (see NW. door R. 258B). NE. wall: (see SW. door R. 260B).
275		Vestibule outside R. 249A ₂ . NE. and SE., banded 3rd type, former house walls.
	Doorways:	NE. wall, 22" from N. corner, originally 31" w. with sill 6" below floor, reduced to 21" w. x 22" h. by secondary jamb, N. side only, inclined for doorslab from R. 249A ₂ . 2 hewn planks 1" x 7" formed lintels. NW. wall, 12" from SW. corner, 5" above floor, 26" w. leads to Kiva F roof level by 2 steps. A 3" dia. post stands against S. jamb of 2nd step 27" from wall face.
	Fireplaces:	1) In S. corner, 18" x 14" x 5" d.; 2) in NW. corner, 17" x 12" x 6" d.
	Subfloor:	Earlier floor at 10"; on it, in NW. corner, an old fireplace. Plaster on NE. and SW. walls extends below floor.
276		Angle of former dwelling, NE. corner, Kiva F enclosure, wall plaster remains. In N. corner, a 10" dia., beam introduced to tie with kiva stonework; 8' 2" from N. corner 3 superposed stones tie kiva curve to NE. wall.
277		Angle of former dwelling W. corner of Kiva F enclosure. N. jamb of former door in SW. wall.
278 B		Angle of former dwelling. SW. corner Kiva G enclosure; filled to ceiling level and remodeled above. Lower masonry, 3rd type unplastered; plastered 4th type above. Abutting SW. side 30" from S. corner, 4-course

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 278 B foundation 22" w. braced kiva stonework; small-pole braces at E. end.
- 279 Angle of former dwelling, 2nd type masonry, preempted by Kiva G and remodeled for limited use. NW. wall partly razed; in it, 3½' above floor, 11" from N. corner, former door 15" w. x 27" h. At varied heights, 9 logs 3-11" dia., tied NE. and SE. walls to kiva stonework at 7½'; 3 pole ends, split cedar and adobe above, mark former 1st story ceiling.
- 279 B Floor, overlying razed 279 NW. wall, broken thru apparently when Kiva G was remodeled. Banded 4th type masonry. Cross-corner log on floor tied NE. and SE. walls. Outside NW. wall, 16" th. and built upon 1st story fill, is R. 262 vestibule.
- 280 Narrow, N.-S. room, at 2nd story level, SE. corner Kiva K. NE. side of 2nd type masonry; S. end replaced by 3rd and plastered. SE. wall, of salvaged stone, abuts NE.; SW. side, crude, irregular, and unplastered. At 5' d. width decreases from 30" to 21". Decayed poles at surface mark 1st story ceiling.
- 281 Narrow room S. of Kiva K.; W. of R. 280. Floor at depth of 6'; NE. and SE. walls, plastered and whitewashed, probably mark angle of former dwelling. SW. side, 22" th. at S. end, is 14" th. abutting Kiva K stonework.
- 282 W. of R. 281, SW. of Kiva K.; opens into 166. Masonry, chiefly large blocks friable s.s., probably 2nd type; E. side abuts plastered S.; N. abuts E. and W.
- Doorways: N. wall: 15" from NW. corner, 26" w., leads to Kiva K roof level by 3 steps: 1) 6" within door, 14" h. x 9" d.; 2) 13" h. x 7" d.; 3) 8" h.; on floor in front, landing step 2" h. x 24" w. with 14" tread. W. wall: 14" from NW. corner, 22" w. sill at earlier floor level, blocked.
- Fireplace: Against W. wall, 14" from SW. corner, 16" w. x 29" N.-S. x 2" d.
- Subfloor: Earlier floor, at depth of 13", is 1" above R. 167 floor; 2" below that of R. 166. On it, against W. wall and 8" from SW. corner, slab-lined fireplace, 31" N.-S. x 22" x 8" d. with 5 sandstone firedogs. *Jar-shaped cist*, 20" dia. at top x 28" dia. at bottom x 29" d., in floor 24" fr. E. wall, 29" from N. 1-course foundation, 2" w., abuts W. wall 4' 9" from

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 282 NW. corner, goes under E. 3' 9" from NE. corner; 2nd foundation, 9" h. x 21" w., under solid triangle at SW. corner, was razed 4½' to E.
- 283 Narrow room W. of Kiva K. Masonry, chiefly dressed friable s.s. but typeless, overlies razed sub-court 2nd type walls.
- 284 Improvised room SE. of Kiva 161 above R. 168. Masonry mixed; S. is 4th type, plastered; E. and W. abut S., replastered and whitewashed. W. built on fill, encloses *steps* from R. 168 to roof level of Kiva 161. Floor is 3' above bench in Kiva 161.
- 285 Small room SW. corner Kiva 161, above R. 160. S. wall is 4th type; others, 3rd. E. and W. abut plaster on S. All plastered.
- Doorways: S. wall, T-shaped door: upper portion flush with E. wall, 29" w. x 36" h.; lower portion 6" from SE. corner at floor level, 18" w. x 24" h.; blocked. W. wall: 30" from NW. corner, 22" above floor, 22" w.
- Fireplace: Against N. wall, 31" from NW. corner, 15" w. x 18" N.-S. x 10" d., slab-lined; E. slab is a metate.
- 286 Open workspace, SE. corner East Court. Latest surface at top of 12" h. E. wall foundation, 3' 4" above approximate floor level, R. 159.
- Doorways: N. wall: 31" from NE. corner, 22" above court surface, originally 26" w., reduced to 13" by secondary jambs, plastered and slanted for doorslab placed from R. 287. E. wall: in W. end of R. 285, 22" from SE. corner, 21" above surface, 23" w. S. wall: 1) flush with SE. corner, 27" w., opened obliquely into R. 189, outside step-like sill; 2) 4' 7" from R. 285 and 26" above surface, 27" w.; its sill a s.s. slab with 5" w. hewn plank on each side.
- Post: 5" dia., 4½" from E. side, 4' 8" from S.
- Fireplace: Slab-lined, 6' from E. side, 2' 5" from S., 21" x 26" E.-W.
- Subcourt kiva: Masonry of friable s.s., irregular chinking; does not conform to P.B. types; inner E. arc directly under E. side of area; inner N. arc, 3" outside R. 287. Depth, 9½'; floor dia., 13'; bench 10" w. x 36" h.; above-bench S. recess 5' 2" w. x 6" d.; walls plastered full height. Roof on single E.-W. beam, 8" dia.; N.-S. poles 2"-5" dia. E. end of beam on 2 posts (JP B. 97 and 98) 1 of them, 5" dia., partly

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

286

Kiva 2-E:

embedded in bench front. Central *fireplace* 24" dia. x 11" d.; 8" w. masonry rim, 4" h. *Subfloor vent.*, 14" w. x 20" x 27" d.; masonry-lined duct turns SW at 45° angle. Kiva partly razed upon construction of Kiva 2-E. SW. of R. 286 undercourt kiva and similar. Only S. half excavated. Masonry, dressed friable s.s., unlike PB types. Floor dia., av. 14'; depth, av. 7' 7". Bench av. 13" w. x 34" h. S. bench recess, 49" w. in front, 45" at rear x 5" d. on W., 10" d. on E.; above-bench wall recess 49" w. in front, 52" w. at rear x 4' 9" h., repeatedly plastered full height. *Roof*, single E.-W. beam seated 4' 9" above bench with 6" sq. ceiling-pole offset above. *Fireplace*, 5' 8" in front of bench recess, 19" dia. x 10" d. Subfloor vent duct 18" w. x 5' 2" l. reduced to 3' 9" l. and N. end floored over; duct turns SW. at right angle under rear of bench recess. Between fireplace and closed vent, masonry screen 6" h. *Bench niches*: 1) 15" E. of S. recess, 13" above floor, 12" sq. opening to 13 x 12 x 28" l. repository, masonry-lined, unplastered; 2) 22" NE. of 1st niche, 27" above floor, 8" w. x 4" h. x 16" l.; 3) W. of S. recess, demolished. *Finds* in fill included more fragments of Mesa Verde, proto-MV, and Kayenta polychrome pottery than in other East Court excavations.

287

Doorways:

Late dwelling, E. side East Court. N. and S. walls, on last court surface, abut E. Masonry of dressed friable s.s., sparse chinking; plastered and smoke-stained; not 2nd type.

Wall niche:

N. wall: 2' 4" from NE. corner, 21" above floor, 26" w. x 23" across sill. S. wall: 2' 9" from SE. corner, 20" above floor, 25" w., reduced to 15" w. by plastered secondary jambs for R. 286 doorslab.

Fireplace:

E. wall: 35" from SE. corner, 31" above floor, 6" w. x 3" h. x 3" d. SE. corner, 19" x 21" x 6" d., 3 stone fire-dogs.

Stone slab:

Against N. wall, 33" from NE. corner, 3" h. x 15" l. set on edge.

Burial:

In ashy fill, SE. corner, *ca.* 4' above floor. child burial (Field No. 923).

288

Doorway:

S. wall: 29" from SE. corner, 20" above floor, 26" w. and 23" across sill.

289

Like 287-288, a late room built upon last East Court surface. Masonry, lightly plas-

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- tered, of dressed friable s.s. with minimum chinking; not our 2nd type. N. and S. walls abut E.; vertical union 7' 4" from NE. corner suggests former wall end.
- Doorway : E. wall: 2' 9" from NE. corner, 19" above floor, 22" w. at top, 26" w. at sill x 35" h. x 24" across sill, secondary lintels 3" below. Lower 17" blocked from R. 163.
- 290 One of 2 dwellings partly overhanging N. arc of Kiva L. Masonry, of salvaged stone, is 3rd type, repeatedly plastered. S. wall built upon paired beams.
- Doorways : NE. wall: 1) NW. jamb 9" from E. corner, 3' 5" above floor, blocked by SE. wall; 2) N. end NE. wall, 19" above floor, 3' 9" h., blocked by abutting NW. wall. SW. wall T-shaped door: upper part *ca.* 5' from S. corner, 30" w., lower part at floor level 19" w. x 20" h., possibly blocked.
- Wall niche : NE. wall: 5' 5" from N. corner, 2' 8" above floor, stones removed to form recess 13" w. x 7" h. x 14" d., plastered.
- Fireplace : Next NE. wall *ca.* 5½' from N. corner, oval, 25" x 14" x 9" d. Contained infant burial (U.S.N.M. No. 327133), face down, head to W. Open hearth above burial.
- Workslab : Shaped s.s. slab 12½" NW.-SE. x 10½" w. x 6" th., worn on top, embedded in floor 3½' from NE. wall, 4' from NW.
- Subfloor : Concave face of Kiva L wall, 20" th., goes under NW. end 5½' from N. corner with 13" w. outside offset for ceiling poles. Under SE. end, apparently Old Bonitian house, associate floor at 7' 2", walls 11" th. plastered on inside only and sooted. Vent shaft, apparently of former Kiva 76, underlies E. corner.
- 291 Like 290 a Late Bonitian house abutting an earlier 3rd type wall perhaps built to enclose former Kiva 76. E. half of SW. side, on paired logs, overhangs Kiva L.
- Doorways : NE. wall: 1) 4' 11" from N. corner, 28" w. x 49" h., hewn plank sill 5" above floor, blocked; 2) T-shaped: upper part 16" from E. corner, 38" w. blocked and plastered over; lintels of hewn cedar planks 33" above floor, front lintel 42" l. x 5½" w. x 1½" th., propped by 2" post; blocked to leave *recess*, 10" w. x 11" h. x 16" d. 22" above floor. SW. wall, T-shaped door: lower part, 22" w., 7' 9" from W. corner at floor level, blocked.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room	
289	Mealing Bins: 5 at NW. end, 2 against NE. wall, 3 opposite, av. ca. 18 x 15" x 4" d., 4 slab-paved; all demolished. Posts: 6 holes, 3-4" dia., diversely placed, identify former ceiling props. Fireplace: 18" from NE. wall, 7' from NW., 30" dia. x 3" d., adobe rim. On N. side, ash-filled basin 10" dia. x 3½" d. Potrest (?): E. corner, semi-globular basin in floor, 4" dia. x 3" d. Workslab: Fine-grained s.s., 11½ x 9½ x 1½" (Field No. 1064), worn on top, embedded in floor, E. corner. Subfloor: Room 291 floor, 7" above that of 290; NW. end built upon paired logs laid across partly razed NW.-SE. wall, 24" w., 3rd type masonry, plastered and smoke-stained both sides, razed ca. 6' from NW. end and 15" from SW. side apparently when Kiva L was built. In that earlier wall a neatly blocked door, 36" w. with sill 4' 9" below R. 291 floor (test pit ended 3' deeper without exposing associate floor). Other underfloor walls: 1) 1st type O.B., 6" th., plastered and sooted on 1 side only, an apparent continuation of that under R. 316, emerges 6' 8" from W. corner, extends NE. 40" and likewise was razed; 2) an adobe wall on floor at depth of 14" retained earth fill at NW. half and sheltered slab-lined fireplace 28" NE.-SW. x 21" w. x 12" d.; 3) underlying E. corner, masonry-lined passageway 22" w. x 5' d., filled to depth of 38" with village waste and blocked 10" from its SW. end by a s.s. slab on edge, mud-cemented to sides.
292	A triangle of L.B. masonry abutting the NE. side of 3rd type Room 99 and the plastered 2nd type exterior of R. 266; overlain by R. 99B. A dividing wall, 27" th., was partly razed; reconstruction is evident. Floor is approximately 3½' above those in Rs. 70 and 266; a R. 293 beam, 5½" dia., appears at R. 99 ceiling level.
293	3rd type masonry with some 2nd type; 4th type repairs in lower SE. wall. Built-in E. corner, wedge 17" w., walls plastered. Ceiling: 3 pairs transverse beams, av. 5" dia. Doorways: NE. wall: 5' 8" from N. corner, 21" above floor, 31" w., blocked to leave on sill <i>recess</i> 31" w. x 15" h. x 18" d. SE. wall: 6" from E. corner, originally 29" w., sill below floor;

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room
293

reduced to 21" w. x 26" h. by new sill at floor level and secondary jambs to support doorslab from R. 267; further reduced to 12" w. x 20" h. by new sill 6" h., plastered and rounded in front and by later pair of secondary jambs, that on W. being 2 adobe-covered sticks 1½" dia., slanted outward from R. 267.

Ventilators: NE. wall: 7" from N. corner, 6' 1" above floor, 13" w. x 12" h., blocked. SW. wall: 7" from W. corner, 6' 4" above floor, blocked from outside to form plastered *recess* 11" w. x 10" h. x 9" d.

Shelf: Against built-in E. block 4' 3" above floor, 3 poles embedded in NE. and SE. walls, 23" w. In SW. wall, 3' 10" above floor, 2 3" dia. holes, edges rounded with adobe; 1 hole, NW. wall, same level.

Subfloor: Earlier floor at 5"; NE. foundation, 20" h. at depth of 22"; SE. wall (exterior of R. 267) has 12" h. foundation at 37", a difference of 15". SW. wall, contemp. with NE. abuts 267 exterior 23" above its foundation, stones being removed to effect union. Thus E. side of 293 is 8" lower than W. A possible precursor, 27" w. x 19" h. of NE. foundation and at same level (22") abuts lower SE. masonry 8' from E. end, extends to and under NW. wall 4' 10" from N. corner. Tightly packed debris of demolition, both sides old foundation leaves "trench."

293 B Doorway: NE. wall: 5" from E. corner, 14" above floor, 28" w., plank sill, blocked.

294 Of 3rd type construction reflecting 2nd type. Walls plastered and smoke-stained; lower NE. had settled outward.

Doorways: NE. wall: 7' 1" from N. corner, at floor level, 37" w. x 3' 8" h., N. jamb extends down 4" to earlier floor, blocked. SW. wall: 6' 7" from W. corner, 17" above floor, 27" w. x 36" h., reduced to 21" w. by masonry secondary jambs placed to support doorslab from R. 99.

Ventilators: NE. wall: 1) 15" from N. corner, 6' 3" above floor, 11" w. x 12" h.; 2) 4" from E. corner, 6' 9" above floor, 12" w. x 14" h.; both blocked. SW. wall: 7" from W. corner, 6' 8" above floor, 13" w. x 15" h.

Shelves: At NW. end: in side walls 9 small pole holes 4' 3" above floor evidence shelf 49" d. At SE. end: 11 similar holes 4' 7" above floor.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
294	Storage Cist:	N. corner: 13" from NE. and NW. walls, 26" dia. x 19" d., unplastered.
	Subfloor:	Earlier floor at 4". NW. and SE. foundations cross "trench" 28" w. x 29" d. left by completely razed wall.
295		Of 3rd type masonry, 4th room E. of 297 in Late Bonitians' 2nd addition.
	Ceiling:	Beams and ceiling poles, all walls, cut by saw or steel ax.
	Doorways:	NE. wall: 6' 4" from N. corner, 3' 8" w. x 4' h., blocked. SW. wall: 7' 4" from S. corner, 2' 4" w.
	Ventilators:	NE. wall: 1) 7" from N. corner, 14" sq.; 2) 17" from E. corner; both <i>ca.</i> 6' above floor. SW. wall: 1) 16" from E. corner, 14" sq.; 2) W. end, inadvertently closed during 1923 repairs.
	Subfloor:	Foundation 22" w. without masonry underlies NW. end 1" from N. corner and is crossed by SE. foundation 14" from E. corner. This unidentified foundation, in line with those under Rs. 293-294 probably marks former position of 2nd type masonry wall continuing E. and SE. from R. 297 (fig. 4).
295 B	Doorways:	Probable doors in now shattered NW., SE., and SW. walls.
Unnumbered room NE. of 295:		SW. wall of 3rd type masonry; others of 4th type. NW. and SE. ends abut plaster on SW. side. 3rd story masonry survives; no wall openings. Ground floor room unexcavated.
296		A 3-story OB dwelling in outside row of original pueblo. First story floor ill-defined, covered by 12" layer of cedar chips; most artifacts recovered above this layer.
	Ceiling:	Pine, cottonwood, and pinyon poles crushed vertically against side walls by stonework fallen from above. Two dated timbers, Nos. 68 and 69.
	Doorway:	SW. wall: 7' from W. corner, <i>ca.</i> 4' above floor, 27" w. x 24" h.; lintels hewn boards; ill-defined sill suggests partial blocking; 2 protruding wall stones as probable <i>steps</i> .
	Subfloor:	Under floor, W. corner, same massive s.s. noted in R. 298—former cliff-fall.
296 B		W. corner masonry still stands 4½' above floor level; shows better plastering, more finger prints, than in 1st story.
297 B		2nd type L.B. room in outside row abutting OB 298. First story not excavated; 2nd story floor not cleared. R. 297B and that next on

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
297 B		E. show 2nd type masonry; room next beyond, 3rd type.
	Doorways:	N. wall: 6' 11" from NW. corner, 19" above floor, 23" w. x 36" h., blocked from outside leaving 8" h. recess under lintels. E. wall: 20" from NE. corner, N. jamb only. W. wall: 21" from NW. corner, 21" above floor, 22" w. x 32" h.
297 C		4th type masonry is part of final L.B. addition. Floor level is higher than that of R. 299C, adjoining.
298		A 3-story room external row of O.B.; masonry, 1st type thickly plastered. N. 4½' of NW. wall abuts R. 13 with 8" jog. Ill-defined floor covered by 12-14" of cedar chips and vegetal leavings. Upon this, 10 bowls and other objects fallen from 2nd story; above, transverse poles, cedar splints, unpeeled willows. Fire had burned 1st and 2nd stories.
	Doorway:	Middle S. wall; split cedar lintels; jambs broken.
	Subfloor:	Massive blocks of friable s.s., northward slope, 12" or more under floor and SW. wall represent old cliff-fall. On either side, clean sand.
298 B	Doorways:	S. wall: 2 indicated, both with plastered jambs and downward sloping sills.
	Shelf:	W. end, 3' 9" above floor level, 5 poles in N. wall, apparently post-construction.
299		L.B. room, outer N. row, 2nd type masonry. Wire hangs from nails in beams.
	Ceiling:	23 N.-S. pine beams 3-5" dia.; above, peeled willows, butts squared (134 counted), bound to beams by yucca thongs over unpeeled split willows, flat side down; cedarbark above.
	Doorways:	N. wall: 6' 4" from NE. corner, 21" above floor, 25" w. x 3' 9" h. x 26" across sill, formerly blocked. E. wall: 23" from NE. corner, 23" above floor, 23" w. x 32" h. S. wall: 5' 2" from SW. corner, 28" above floor, 19" w. x 3' 4" h. x 18" across sill. W. wall: 25" from SW. corner, 21" above floor, 21" w. x 35" h., probably blocked.
	Shelves:	1) Pole holes av. 37" from W. end 5' 2" above floor mark clothes pole; 3 holes in middle W. wall evidence cross-pole shelf; 2) other holes, same height, mark E.-end clothes pole; single hole above E. door.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
299 B		Superior 2nd type masonry; walls plastered but not smoke-stained; adobe floor rounds to wall plaster. Ceiling beams <i>ca.</i> 2' lower than in R. 297 B, next on E.
	Doorways:	N. wall: 5' 10" from NW. corner, 19" above floor, 27" w. x 35" h., lower 12" blocked from outside to form <i>recess</i> 27" w. x 23" h. x 11" d. E. wall: 19" from NE. corner, 21" above floor, 22" w. x 33" h. x 18" across sill, lower 4" blocked. S. wall: 5' 2" from SE. corner, 18" above floor, 25" w. x 34" h. x 18" across sill reduced to 21" w. x 30" h. by secondary jambs and lintels to support door-slab placed from R. 300B. W. wall: 22" from NW. corner, 19" above floor, 25" w. x 34" h. x 18" across sill, reduced to 21" h. by blocking on sill.
	Ventilators:	N. wall: 1) 18" from NE. corner, 4' 10" above floor, 10" w. x 9" h., closed from outside leaving plastered <i>recess</i> 20" d.; 2) 18" from NW. corner, 4' 9" above floor, 11" sq., blocked. S. wall: 1) 17" from SE. corner, 4' 8" above floor, 11" w. x 8" h., blocked to form plastered <i>recess</i> ; 2) 18" from SW. corner, 4' 10" above floor, blocked from R. 300B to form <i>recess</i> 10" w. x 10" h. x 11" d.
	Wall pegs:	1) In S. wall, 50" from SW. corner, 6" l.; 2) in N. wall, below W. side of NE. vent.
299 C	Doorway:	N. wall: 5' 7" from NW. corner, 11" above floor offset, 25" w., formerly blocked.
300		Previously opened L.B. storeroom of R. 299, abuts plastered exterior of R. 13. Wire hangs from nails in beams; walls heavily smoked. Identified as Wetherill smoke-house; recent E.-end stonework built on debris fill to N. door sill level. R. 13B beams protrude thru S. wall just under R. 300A beams.
	Ceiling:	17 selected pine poles covered by split red cedar, cedarbark and adobe mud. Next to last pole removed to provide E.-end <i>hatchway</i> 18" N.-S. x 17", lined at ends by 3 small sticks, masonry at sides. Later closed from 300B by shaped s.s. slab.
	Doorway:	N. wall: 4' 9" from NE. corner, 19" w. at top, 24" w. at sill x 37" h. x 18" across. 2nd story storeroom connected with L.B. 299B and O.B. R. 13C. Floor rounds to wall plaster.
300 B	Doorways:	N. wall: 4' 11" from NW. corner, 23" above floor, 25" w. x 33" h., reduced to 19" w. x

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

300 B

29" h. by new sill, secondary lintel and jambs slanted outward for R. 300B doorslab. S. wall: 4' 8" from SW. corner, 10" above floor, 24" w. x 29" h. x 27" across sill, reduced to 19" w. by secondary jambs for door-slab placed from Room 13C. N. side of S. sill is hewn board 7" w. x $\frac{3}{4}$ " th.

Ventilators:

N. wall: 1) 18" from NW. corner, 5' 1" above floor, 10" w. x 9" h.; 2) 13" from NE. corner, 4' 10" above floor, 11" w. x 9" h.; both blocked and plastered over.

Workslab (?) :

Embedded N.-S. in floor, 6" from E. wall, closed end 8" from N., tabular metate 26" l. x 22 $\frac{1}{2}$ " w.

301

Unexcavated.

Doorways:

N. wall: 25" w., formerly blocked; now fitted with 4" pine log frame and planking.

301 B

Doorways:

E. wall: 23" from SE. corner, 18" above floor, 25" w. x 33" h. x 16" across sill, 5 pole lintels, lower 11" blocked. S. wall: 4' 4" from SE. corner, 15" above floor, 24" w. x 19" across sill. W. wall: 24" from NW. corner, 21" above floor, 25" w. x 32" h. x 18" across sill, formerly blocked. N. wall: 44" from NW. corner, 23" above floor, blocked; lintel poles extended to form sill of E. ventilator.

Ventilators:

N. wall: 1) 17" from NW. corner, 5' above floor, 11" sq., blocked to leave *recess*; 2) 21" from NE. corner, 4' 10" above floor, 18" w. x 11" h.

301 C

Doorway:

N. wall: 4' 6" from NE. corner, 23" w. x 33" h., blocked.

302

Unexcavated.

302 B

Doorway:

N. wall: 4' 7" from NE. corner, 24" above floor, 24" w. x 19" across sill.

303

Unexcavated.

303 B

Doorway:

N. wall: 5' 3" from NW. corner, 20 $\frac{1}{2}$ " above floor, W. jamb only.

304

2nd type L.B. storeroom connected with 209; abuts exterior of O.B. R. 10. Ceiling poles from latter protrude thru S. wall on top 304 floor.

Ceiling:

3 N.-S. poles remain at E. end, overlain with split cedar, cedarbark and adobe floor of 304B.

Doorway:

N. wall: 5' 7" from NE. corner, 13" above floor, 17" w. at top 21" w. at sill, x 34" h. x 18" across sill, lintel of 5-3" poles.

Subfloor:

N. foundation, 2' 7" h., with 7" offset 23" below door sill. Base of 1st type S. wall 5' 5" below N. foundation offset.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 305 2nd type L.B. masonry abuts irregular exterior of R. 9, formerly in outer row of O.B. village. Too small for storage; no wall openings.
- 306 O.B. room; walls thickly plastered, lightly smoke-stained. E. side a partition abutting plaster on N. and S. Slabs on edge at base of walls.
- Doorways: N. wall: 26" from NW. corner, 30" above floor, 28" w. x 28" h. S. wall: 4' from SW. corner, 28" above floor, 28" w. x 23" h., partially blocked; stone embedded in floor provides *step*, 11" w. x 7" h. x 4" th. W. wall: 8" from SW. corner, 17" above floor, 20" w. at top, 25" w. at still x 33" h.; blocked to leave *ventilator* 37" above floor, 14" w. x 13" h.
- Posts: Embedded in S. wall: 4" from SW. corner, 3" dia., broken off 2' above R. 306B floor. Two beam props, 4" dia., stood against middle W. wall and in NW. corner.; latter braced by stones on edge. Close in SE. corner, 4" post hole extends 3' below floor.
- Holes in Floor: Irregular and unlined: 1) Against S. wall 34" from SW. corner, 9" w. x 14" x 5" d., contained infant burial, decayed sticks above; 2) 18" from N. and 25" from E. wall, 6½" dia. x 4" d., contained 2 macaw skeletons, covered by ½ mano; 3) 14" from W. wall, 28" from N., 10" dia. x 4" d., held single macaw skeleton covered by stone fragments; 4) NE. corner 15" dia. x 28" d.; 5) SW. corner, oval, 30" along W. wall x 20" w., no floor found in 4' d. pit; 6) against E. wall 44" from SE. corner, 13" w. x 17", cleared to 27" d.
- 307 An O.B. dwelling perhaps originally 1 with 306 and 307-I.
- Doorways: N. wall: 3' 5" from NE. corner, 25" above floor, 20" w. x 31" h., blocked and plastered over. S. wall: 37" from SE. corner, 27" above floor, 24" w. x 30" h., formerly blocked. E. wall: 3' 8" from NE. corner, 37" above floor, 38" w. x 27" h., later reduced to 17" w.; later completely blocked from R. 83.
- Ventilators: N. wall: 11' 8" from NE. corner, 4' above floor, 15" w. x 11" h., blocked. S. wall: flush with W., 29" above floor, 14" w. x 13" h., blocked from R. 309.
- Beam props: Along N. wall: 3 posts at 13", 6' and 12½' from NE. corner av. 5" dia. Along S. wall: 4 posts at 6", 15", 7' 10" and 12' 10" from SE.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
307		corner; 2 in SE. corner half enclosed by masonry 24" w. x 16" h. x 7" th.
	Subfloor:	Earlier floor at 7"; in it 7 slab-lined bins av. 13" w. x 23" x 9½" d. Under SE. corner, arc of O.B. kiva, wall 9" thick slopes outward <i>ca.</i> 7°; bench 5' 7" below R. 307 floor.
307 B	Doorways:	N. wall: E. half, blocked. Middle E. wall: 21" w. blocked. S. wall: 1) middle, blocked and plastered; 2) <i>ca.</i> 15" from SE. corner.
307-I	Ceiling (?):	Poles embedded in side walls, 5' 5" above floor on W. and 5' on E. may be former ceiling beams. W. wall, a partition, built against 2 N.-S. beams of original room.
	Doorway:	S. wall: 18" from SW. corner, 29" above floor, <i>ca.</i> 16" w. x 24" h., blocked.
308		E. and S. walls of 2nd type L.B. masonry abutting O.B. stonework of Rs. 19 and 306.
	Ceiling:	4 pine beams 8" dia., ends squared, extend S. 7' 2" at height of 4' 3", 2 to rest upon posts and 2, paired at E. end, upon masonry pillar against E. wall 5' 10" from NE. corner.
	Doorways:	N. wall: 28" from NE. corner, 22" above floor, 28" sq., partly blocked. E. wall: 4' 4" from NE. corner, 16" above floor, 37" h., blocked and partially hidden by masonry pillar; repairs above and at N. are O.B. repairs. S. wall: 27" from SE. corner, 14" above floor, former door 30" w. at sill, narrower at top, plastered jambs continuing 7' 5" above floor to present top of broken wall, successively reduced to a possible <i>ventilator</i> , 19" w. x 25" h. and the lower 11" finally blocked. W. wall: 1) 15" from SW. corner, 14" above floor, 28" w. x 23" h.; 2) ancient repairs in N. half conceal blocked door to R. 41.
	Floor basin:	14" from S. wall, 6' 3" from E., adobe-rimmed, slab-floored 12" dia. x 2½" d.
	Fireplace (?):	Against E. wall, 20" from NE. corner, 14" dia. x 14" d.
	Subfloor:	Earlier floor at depth of 7"; on it, 22" from E. wall and 18" from S. unrimmed <i>fireplace</i> , 14" dia. at top, 8" dia. at bottom x 18" d.
308 B	Doorways:	N. wall: 1) 4" from NE. corner, 20½" w. blocked; 2) 48" from NE. corner, 26" w., blocked. E. wall: 4' 3" from NE. corner, plastered jambs of blocked door, 18" w.
309		L.B. cult room of 2nd type masonry built against O.B. Rs. 307 and 307-I. Recessed in W. wall, 23" from SW. corner, upright post 3" dia.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

309	Doorways:	N. wall: 1) 4' 2" from NW. corner, 15" above floor, 17" w., blocked; 2) 11' from NW. corner, 4' 5" above floor, plastered, W. jamb only; 3) 14" from NE. corner, 4' 8" above floor, blocked; 4) 27" from NE. corner, 6" above floor, 25" w. x 16" h., blocked from R. 307. W. wall: 1) 4' 7" from SW. corner, sill 8" below floor level, 22" w. x 35" h., blocked from R. 308 and plastered over; 2) directly above latter, sill 4' h., door 27" w. to R. 308B(?) reduced to 18" w. by new N. jamb, later blocked.
	Wall openings:	S. wall: 1) 4' 5" from SW. corner, at floor level, 19" w. x 12" h., reduced by raised adobe sill and board fragment to 15" x 10", later blocked and plastered over; 2) 5' 10" from SW. corner, 29" above floor, 32" w. x 13" h. to lintel poles.
	Ventilator:	S. wall: 34" from SW. corner, at floor level, 11" w. x 12" h., connects with vertical shaft outside.
	Wall pegs:	E. wall: 16" above bench, antler prong and 3 sticks in a row protrude av. 5".
	Bench:	Along E. wall: 9" w. x 7" h.; built on floor at 27". On bench, SE. corner plastered masonry forms shelf(?) 9" w. x 23" x 19" h. In NE. corner a triangular block of masonry forms shelf(?) 17" w. x 30" h.
	Fireplace:	Mid-floor, 8' 2" from SW. corner, 6' from S. wall, 39" dia. at top, 22" dia. at bottom x 22" d., unrimmed, upper 10" plastered.
	Deflector:	SW. of fireplace, plastered masonry 37" l. x 12" w. x 22" h., its N. end 6' from SW. corner, 4' from W. wall.
	Vault (?) :	Against S. wall: 3' 5" from SE. corner, 33" w. x 5' 10" E.-W. x 3' 8" d., plastered masonry walls rise to 4" w. offset, N. side, 9" below room floor; in middle of offset imprint of 1½" dia. pole which may have crossed vault to support some kind of covering. An antler prong protruded from middle N. side, below offset.
	Depositories:	1) In floor S. of fireplace, 12" dia. at top, 8" dia. at bottom x 8" d., adobe-lined. 2) Against E. bench S. of NE. enclosure, 29" d.; 3) outside NE. enclosure, 27" from N. wall, slab-lined 8" d.
	SE. Enclosure:	In SE. corner; 30" against E. bench, 33" against S. wall x 9" d.; third side concave and plastered with 7" w. rim 2" below room floor.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 309 NE. Enclosure: Masonry of varied height and thickness abuts N. wall 4' 8" from NE. corner, curves S. and E. to abut bench and E. wall 3' 3" from NE. corner. Floor 6" higher than room floor, enclosure once ceiled with thin pine boards.
- SW. Enclosure: Crude masonry wall extends from N. end of deflector to W. wall 6' 9" from SW. corner. Floor within this enclosure 2" higher than that outside; on it lay skeletons of an infant and macaw. In SW. corner masonry-lined pit 34" on W. x 27" x 29" d.; in its concave side, an open niche 6" w. x 8" h. x 7" d., sill 8" above pit floor.
- NW. Enclosure: Plastered masonry 3' 7" x 8" x 24" h. abuts W. wall 3' 8" from NW. corner, extending NE. and ending 2' 9" from NW. corner.
- Subfloor: Tests revealed earlier floors at depths of 19", 27" and 36", each with bins and enclosures.
- 310 Presumed open workspace fronting O.B. Room 19 and L.B. 308-309. Ventilator shaft from latter abuts plastered N. side 14' 3" from NW. corner. On surface, 9 metates—both tabular and L.B. types—and 6 large s.s. slabs, all lying flat. One metate, *ca.* 6' from W. wall and 8' from N., embedded in adobe mud and rimmed by masonry; below it, 2 layered slabs each embedded in mud; beneath the lower, a masonry-lined repository, 5½" sq., and empty. 3 similar repositories lay against N. wall between 309 vent shaft and NW. corner, each with slab cover; also, 2 shallow depressions, each with shells, beads, and flint chips.
- Subfloor: NW. corner test shows 9 earlier surfaces, each whitened; lowest rounds up to plaster on N., W., and lower E. wall, razed when Kiva N. was built. In lower E. wall, former door 16" from NE. corner, and 6" above floor.
- 311 Remnant of L.B. room much altered. N., W., and S. sides of 3rd type masonry, plastered; E., 8" th., built from outside in line with 2nd type wall of R. 312.
- Doorway: N. wall, 22" from NW. corner, 2' 10" w. x *ca.* 3' h., W. jamb partly lost in rude blocking.
- Subfloor: Partly razed 2nd type wall, whitened, underlies W. side and connects with like masonry at NE. corner Kiva N.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

312

- Remnant of much altered L.B. house. Masonry is 3rd type built upon razed 2nd type walls and leveled.
- Fireplace: Slab-lined, 5' 10" from N. wall, 22" from W., 17" N.-S. x 19" x 6" d., concealed by later floor, 7" above.
- "Platform": Abuts E. wall 26" from NE. corner, 26" N.-S. x 23" x 6" h. In middle front, 5½ x 7" opening to slab-lined and covered repository 12" E.-W. x 23" x 17" d., inner E. side plastered and whitened.
- Vault (?): SW. corner, N. 3' 7", E., 2' 9"; S., 3' 6", W., 3' 1" x 30" d. Sides plastered and whitened.
- Depositories: 1) NW. corner, 12" sq. x 10" d., masonry-lined and plastered; rimmed on E.; 2) NE. corner, masonry-lined, 17 x 14 x 7" d.; in floor, 5" sq. hole filled with s.s. chips.

313

- An open area S. of R. 312, between Kivas M and P. N. side, 4' 2" h. to floor level of R. 312, is 2nd type masonry its upper 10" being a later replacement. On W. side, Kiva N. vent. shaft shows a door-like end, plastered and whitened. On floor, a rude masonry wall 10" h. extends from NE. corner, 8' SW. thence concavely S. 7'.
- Subfloor: Tests show varied stonework at various depths. At NE. corner, wall fragment of mixed masonry 12-14" w., stands upon indefinite floor at depth of 7' 3" and extends irregularly W., S., and E. Another floor, 3" lower. About 7' from NE. corner of area, a 27" dia. shaft, razed 3' 8" below surface, connects at depth of 7' 10" with slab-paved tunnel 26" w. x 25" h., roofed with transverse sticks and s.s. slabs, and extending N. beneath R. 312. On floor at 7' 3" 2nd type masonry occurs repeatedly. Between Kivas M and O the partly razed wall and foundation of an unnamed kiva, apparently 3rd type. W. of Kiva N vent shaft, sand fill to depth of 10' (3' 8" below Kiva N floor). Log whose cut end appeared 25" above W. end of Kiva N bench recess extends through kiva stonework and 5' 3" outside. An incomplete test SW. of Kiva N vent shaft disclosed a partly razed convex adobe wall, 2' 10" h., at depth of 2½', its broken top overlain by exterior stonework of Kiva N.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

314

- A 3d type L.B. house E. of Kiva M.; W. corner overhung latter. NW. corner indicated by 2 projecting wall stones.
- Doorways: NE. wall: 1) *ca.* 4' from E. corner, *ca.* 12" w. x 20" h., blocked; 2) *ca.* 9' 6" from E. corner, *ca.* 15" w. x 28" h., blocked.
- Wall niches: SW. wall: 5" from S. corner, sill 2" below floor, 11" w. x 17" h. NE. wall: 1) 4' 8" from E. corner, 12" w. x 6" h.; 2) 8' 2" from E. corner, 13" w. x 5" h., both 9" above floor.
- Fireplace: 35" from NE. wall, 7" from SE., *ca.* 26" dia., unrimmed.
- Outside fire pit: 27" outside R. 314, between Kiva M and R. 315. Slab-lined firepit 31" NE.-SW. x 21" w. x 27" d., surrounded by slab pavement. E. of pit, abutting 314 wall, masonry-lined repository 10" x 11" x 9" d.
- Subfloor: Fill, constructional debris and blown sand. S. corner test shows R. 314 SE. and SW. foundations built on O.B. floor at depth of 8' 2". That floor, with 3 O.B. walls, is 4" below that of R. 315 alcove. At height of 6' 9" a 10½" dia. beam parallels SE. side of 314 at dist. of 23". Two poles protrude from upper SE. foundation; above poles and beam, a layer of cedar splints. Under 314 floor 2 foundations av. 12 x 17", no identifying masonry, cross NE.-SW. A subfloor repository, 26" NE.-SW. x 16" x 10" d., rude masonry, partly razed, floored with slabs, abuts NE. wall 7' 5" from E. corner.

315

- Possible O.B. cult room, subterranean, NE. corner, East Court. SE., SW., and NW. walls are 1st type stonework; E. half of NE. wall abuts O.B. stonework at either end as foundation for 3rd type masonry fronting Kiva 75. NW. side, later, abuts plastered SW. and NE. walls. Alterations and repairs evident thruout.
- Ceiling: 2 NW.-SE. beams 7' above floor; transverse ceiling poles in NE. and SW. walls.
- Doorway: Lower N. half, SE. wall, partly hidden by repairs, blocked and plastered over.
- Fireplace: 4' 5" from SE. wall, 2' 8" from SW., 21" NE.-SW. x 19" x 8" d., slab-lined.
- Wall opening: SW. side, 2' 5" from S. corner, 4' 4" above floor, 4' 8" w. x 20" h. x 26" d., split cedar lintels; sill extends 14" to abut convex wall of Kiva O with no trace of lintels above.
- Subfloor: Earlier floor at 6". In it, underlying NE. wall 28" from E. corner, masonry-lined fire-

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

315

place 12" d. Subfloor masonry-lined ventilator duct, 26" w. x 29" d., originally 7' 1., but reduced to 22" by 10" th. masonry partition, underlies S. corner, connects with outside shaft, 12 x 15".

NW. Alcove:

Separated from main room by unplastered wall 12" th. abutting SW. side 7' 9" from S. corner, and NE. side 9' 6" from E. corner; in it, 32" from NE. end, *door* 15" w., its S. jamb a 5" post (possible beam prop). Floor of alcove 4" above both floor of main room and that of O.B. house under R. 314. At NW. end 3 transverse poles 4' 9" above floor evidence *shelf* 22" w. *Ventilator* in SW. wall, 3' 4" from W. corner and 1" above floor, 13" w. x 16" h.

Subfloor in Alcove:

Fireplace, slab-lined, 25" w. x 12" d. on floor at depth of 10" underlies W. half of NE. wall 2' from N. corner. On same floor (at 10" d.), masonry-lined *subfloor ventilator duct* 19" NW.-SE. x 17" x 21" d., filled and floored over; probably connects with outside ventilator shaft, 16" NE.-SW. x 14".

316

With R. 315, possible O.B. cult room remodeled when 3rd type NE. wall was built on floor to support S. side of R. 291 and Kiva 75 enclosure. NW. wall is 1st type and abuts plastered W. half of SW. wall, also 1st type. A *mano* 10" l. was embedded in the N. corner, its edge 1½" above floor.

Doorways:

SW. wall: 1) flush with SE. wall, at floor level, 24" w. x 27" h., blocked and plastered over; 2) 9' 6" from W. corner, at floor level, originally 24" h. x 15" w. at top and 26" w. at sill; blocked leaving *ventilator* 10" w. x 13" h., its W. jamb an upright slab. NW. wall: 6" from N. corner, 17" above floor, 22" w. x 19" h., blocked and plastered over.

Fireplaces:

1) 7" from NE. corner, 6' 2" from NW., 28" NW.-SE. x 18" x 8" d., slab-lined, corners rounded, 3 stone firedogs in row NE. half; 2) 24" from NE. corner, 4' 7" from NW., 25" dia. x 8" d., slab-lined, reduced one half by masonry on W. side, later abandoned and floored over.

Subfloor Ventilator:

Duct 15" w. x 24" d., masonry-lined, underlies SW. wall, 9' 5" from W. corner, connects with outside shaft.

Subfloor Passage:

Masonry lined 22" w. x 26" d., finished on inside only, passes under E. corner of room and, 7" beyond, turns sharply to right.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
316		Roofed at angle by 3-2" poles spread fan-wise from middle SE. edge.
317		O.B. storeroom to R. 323; outer row, W. side. Walls plastered; floor 21" below that of L.B. R. 114 adjoining. 3rd story indicated.
	Ceiling :	NW.-SE. ceiling poles at 7' 10"; split cedar and cedarbark bound to poles by cedar strips and yucca thongs; thin adobe floor above cedar shakes.
	Doorway :	SE. wall: 7' 6" from E. corner, 3' 6" above floor, 25" w. x 35" h., secondary lintel 5" below, wooden jamb on E. side, blocked; post <i>step</i> below door.
	Ventilators :	SE. wall: 1) 3" from E. corner, 11" sq.; 2) 5' 5" from E. corner, 8" w. x 9" h.; both 5' 10" above floor and blocked. NW. wall: 1) 9" from N. corner, 5' 6" above floor, 15" w. x 12" h.; 2) 6' 2" from N. corner, 5' 8" above floor; 3) 10' 7" from N. corner, 5' 8" above floor. All 3 had stick lintels and slab sill; all blocked, last 2 leaving <i>recesses</i> . Slabs on edge in SE. wall foundation; 6" layer of shale 14" below floor.
317 B	Ventilators :	NW. wall: 4, av. 13" sq., at 8", 4' 7", 10' 4" and 15' 7" from W. corner; 32" lower, 3 more, av. 12" sq. at 35", 8' 1" and 12' from W. corner. All 7 blocked.
318		With R. 317, storeroom of O.B. dwelling 323. Walls plastered, not smoke stained. 3rd story indicated.
	Doorway :	SE. wall: 7' 9" from S. corner, 4' 10" above floor, 24" w. x 27" h.
318 B	Ventilators :	NW. wall: 1) 5" from N. corner, 11" w. x 12" h.; 2) 6" from W. corner, 12" w. x 13" h.; both blocked.
319		One of 2 storerooms with O.B. dwelling R. 325. 3rd story indicated.
	Ceiling :	25 E.-W. poles 8' 6" above floor.
	Doorway :	E. wall: evidenced by decayed post step, 24" h., standing close to wall, 7' 7" from NE. corner.
	Subfloor :	NW. corner test shows foundation with 6" offset 16" below floor; clean sand at 20".
319 B	Doorway :	S. wall: 3' 4" from SW. corner, 22" w. x 37" h.
320		One of 2 storerooms entered from O.B. dwelling 326. Walls plastered; smoke-stained around door; flagstone floor. 3rd story indicated. On or near floor, 10 skeletons: 2 juveniles and 8 adult females, all but 2 dis-articulated.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
320	Ceiling:	E.-W. pine poles, 3"-4" dia., 7' 11" above floor, overlain with greasewood and other brush, then adobe of second story floor.
	Doorway:	E. wall: 6' 11" from NE. corner, 35" above floor, 25" w. x 30" h.; single secondary pole at 27" secondary adobe jambs slanted outward for doorslab from R. 326; below door broken L.B. metate on end forms <i>step</i> 15" h.
	Ventilators:	E. wall: 1) 9" from NE. corner, 4' above floor, <i>ca.</i> 12" sq.; 2) 19" from SE. corner, 4' 4" above floor, 13" w. x 10" h. W. wall: 2 opposite above. All 4 blocked.
	Shelf:	Two poles, 5" apart and embedded in blocked S. vents form open shelf 55" above floor.
320 B	Doorway:	E. wall: 6' 9" from SE. corner, 29" above floor.
	Ventilators:	W. wall: 1) 28" from SW. corner; 2) 30" from NW. corner; both 3' 10" above floor, both blocked. E. wall: 34" from SE. corner, 4' above floor, 15" w.
321	Doorway:	Angle of former dwelling NW. corner, Kiva Z enclosure. W. side, 1st type stonework of R. 323 with 3rd type repairs. Convex exterior of 4th type Kiva Z begins 26" above floor level, abuts NE. and NW. sides; is tied to NE. by a 3" pole 44" above floor. NW. wall, T-shaped: lower section 26" from N. corner, 22" above floor, 22" w. x 34" h.; upper part 19" from N. corner; third-type masonry repairs; blocked.
322	Doorway:	SW. corner, Kiva Z enclosure. S. side resembles 3rd type masonry built with salvaged 2nd type material. W. side, exterior of 1st type R. 323, had settled forward; was repaired before construction of Kiva Z. Tie-stones project irregularly from kiva curve. W. side thickly plastered; S. side, 1 coat only. W. wall: 7' 8" from SW. corner, 4' 10" above floor, 22" w., blocked.
	Wall decoration:	Upper S. wall, 4 aligned blocks of friable s.s., dressed on face, incised with continuing zig-zag, plastered over.
	Masonry "box":	Partly underlying W. wall 24" from SW. corner, finished on inside only and av. 33 x 24 x 21" d.; floor 5" below that of room; divided by 5" th. masonry partition; both parts filled with sand and adobe from razed walls; covered with poles av. 3' 6" l., ends square-cut.
	Shelf (?):	Pole holes in W. wall 3' above floor suggest possible shelf.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
322	Subfloor:	Partly razed 2nd type kiva, plastered inside, abuts W. wall and underlies Kiva Z stonework. Test pit abandoned at depth of $3\frac{1}{2}'$.
323	Ceiling:	O.B. dwelling with 2 storerooms, 317-318. All walls 1st type stonework plastered and smoke-stained. Floor, sandy and ill-defined. NW.-SE. beams, NE.-SW. ceiling poles, layers of chico brush, cedarbark, and adobe. 7 pine posts as beam props on slabs at or just below floor; packed at butt end with shale chips and slab fragments in adobe cone, 6-8" h.
	Doorways:	Middle NE. wall: <i>ca.</i> 4' 6" above floor. SE. wall: 1) 7' 8" from E. corner, 6' 2" above floor, 23" w. x 32" h., pine lintel poles, hewn pine board sill, blocked; below S. jamb, 6" from wall 7" dia. hole for post <i>step</i> ; 2) 13' 10" from S. corner, 38" above floor, 25" w. x 31" h., blocked by Kiva Z; post <i>step</i> beneath; 3) T-shaped door, lower part 23" from E. corner, blocked. (This door with 4th type repairs, collapsed during excavation of 323. Its plank sill, U.S. N.M. No. 335275, was saved.) SW. wall: 6' 9" from S. corner, 3' 6" above floor, 24" w. x 27" h. NW. wall: 1) 8' from W. corner, 3' 8" above floor, 25" w. x 31" h.; 2) 8' 3" from N. corner, 35" above floor, 21" w. x 33" h., blocked.
	Fireplace:	8' 8" from S. corner, 6' 4" from SE. wall, 13" w. x 15" x 12" d., slab-lined, E. slab a discarded metate.
324	Subfloor:	Test at midfloor shows clean sand at $4\frac{1}{2}'$. L.B. dwelling at 2nd story level; its floor 10' above that of O.B. room 325 and $3\frac{1}{2}'$ above floor of 4th type Kiva Z, adjoining on N. W. wall of 1st type stonework; others, 3rd type built with salvaged 2nd type materials. S. side rests on beam atop R. 327 N. wall. All walls plastered; butt of R. 325 ceiling beam protrudes thru W. wall 2' 7" from NW. corner.
	Doorways:	E. wall, T-shaped; lower part 28" from NE. corner original sill 10" below floor, 22" w. x 3' 4" h., lower 11" blocked to leave low <i>ventilator</i> ; upper part 16" from NE. corner, 36" w., blocked and plastered over. S. wall: 1) 29" from SW. corner, 10" above floor, 19" w., blocked; 2) 29" from SE. corner, 10" above floor, 17" w.
	Fireplace:	Against S. wall, 4' 10" from SE. corner, 23" E.-W. x 20" x 12" d., masonry-lined; 2 stone firedogs.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
324	Subfloor:	Earlier floors at 7" and 3' 6". On latter, N. and E. foundations within walls of a 2nd type kiva; on former, a mid-room N.-S. foundation 7" w., no identifying masonry. Plastered face of 2nd type kiva, floor at depth of 10' 4", underlies E. and N. walls of R. 324. Kiva bench, 18" w. x 23" h., has 6 coats of plaster on face; only 1, above. Neither pilaster nor S. bench recess exposed in our 4½' w. excavation.
325	Ceiling:	O.B. dwelling with 2 storerooms at rear. Walls plastered. NE. corner floor 10' below that of R. 324, next on E. 7 beam props along E. side. My field notes, possibly incomplete, report 5 posts set in holes lined with slab fragments and packed with shale; 3 in basal cones of adobe; 1 standing on a base slab and 2 on the room floor.
	Doorways:	N. wall: 4' 8" from NW. corner, 4' 3" above floor, 21" w. x 26" h. x 20" across sill, vertically concave jambs; below, 2 post <i>steps</i> , 1) next wall, 9" dia. x 33" h.; 2) in front of first, 5" dia. x 18" h. E. wall: 1) flush with N., 16" above floor, 16" w. x 22" h., blocked from R. 324 side leaving <i>recess</i> 19" d.; at rear jambs a digging-stick fragment and a juniper shake stood to hold back debris of demolition; 2) 11' from SE. corner, 32" above floor, 22" w. at top, 28" w. at sill x 3' 7" h.; below it half a log on stones formed a <i>step</i> 3' 5" l. x 9" w. x 9" h. W. wall: 1) 6' 10" from SW. corner, 3' 5" above floor, 23" w. x 24" h.; below it, a post <i>step</i> set in floor; 2) 6' 4" from NW. corner, 4' 9" above floor, 23" w. x ca. 31" h.; below it a 30" section of 8" log leaned against wall as a <i>step</i> ; a 4" x 2" h. x 1½" d. recess in wall 35" above floor provided a 2nd step.
326	Ceiling:	O.B. dwelling, 2 storerooms at rear; with Rs. 320 and 330, formed SW. end of original crescentic P. II village. Finally used as dump and tomb for 11 burials: 1 infant, 1 male, 9 females. 6 beam props indicated by posts or postholes, av. 6½" dia., along E. side; each basally wedged by slab fragments, packed with shale chips, and enclosed by adobe cone. E. wall: 1) 3' 7" from NE. corner, 34" above floor, 24" w. x 31" h., blocked; 2) 12' 11" from NE. corner, 36" above floor, 26" w. x 38" h., secondary lintels 5" lower. W. wall:

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

326		1) 4' 8" from NW. corner, 3' 2" above floor, 28" w. x 29" h.; 2) 7' from SW. corner, 3' 5" above floor, 24" w. x 26" h. (see E. door R. 320).
	Ventilators:	W. wall: 1) 22" from SW. corner, 4' 6" above floor, 13" w. x 9" h., blocked from R. 320; 2) 13' 10" from SW. corner, blocked from R. 326.
	Subfloor:	Test in NW. corner shows N. foundation, 35" h., and W. foundation 39" h. both built on clean sand.
326 B		In SE. corner, masonry stands 8' 4" above approximate floor level with no trace of ceiling timbers.
	Doorways:	W. wall: 1) 5' from NW. corner, 23" w. x 38" h., blocked; 2) ca. 7' from SW. corner (see E. door R. 320B).
	Ventilators:	W. wall: 1) 6" and 2) 10' 2" from NW. corner; both 12" w. x 15" h., both blocked.
	Wall niches:	S. wall T-shaped: 1) 35" from SW. corner, 37" above floor offset 6" w. at top, 3" w. at sill x 6" h. x 5" d.; 2) 31" from SE. corner, 36" above floor, 7" w. at top, 3" w. at sill x 5" h. x 7" d.
327		A court-side O.B. room remodeled and refurbished by L.B. architects. W. side, 1st type stonework, heavily plastered; N. side, indefinite masonry; S. consists of 2" dia. posts 4-5" apart, mud between, forming 7" th. wall that abuts W. side, curves S. at E. end. Two 8" R. 325 beams protrude through W. wall 51" above floor.
	Ceiling:	Single beam W. end in blocked R. 325 ventilator; E. end on 6" post 4' 9" from NE. corner, 5' from SE. N.-S. pine poles of uniform dia. and chico brush. Split cedar patch in NE. corner; hatchway in SE.
	Doorways:	W. wall: 17" from SW. corner, blocked 325 door 24" w., lintels 28" above floor, sill 15" below. E. wall: 4' from NE. corner, 25" w. at floor, 19" w. at lintels x 37" h., blocked; jambs, rounded with mud, oriented NE.-SW.; against N. jamb, a 2½" post inclined outward.
	Ventilator:	W. wall: 5' 2" from NW. corner, 3' 11" above floor, 13" w. at top 17" w. at sill x 16" h., blocked from R. 325.
	Bench:	SE. corner, under hatchway, masonry, 25" N.-S. x 7" w. at N., 16" w. at S. x 28" h.
	Subfloor:	Original floor at depth of 30", 15" below sill of blocked SW. door to R. 325. On same

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

327

floor blocked E. door, *ca.* 4' 4" h.; in front of it a post *step*, 11" dia. x 14" h., sill height, with 6" h. 2nd *step*, stone, in front. On original floor, masonry-lined bins in NW., SW. and SE. corners av. 10" d. E.-end beam prop set in original floor.

327 B

L.B. room at 2nd story level, slightly larger than 327A. W. wall is O.B. 1st type; others are 2nd type with 3rd type repairs in N. and E. S. wall built on 2nd type N. wall of R. 328 rather than on post-and-mud S. wall of 327A.

Doorways:

N. wall: 2 doors to R. 324, one blocked; 1 open (see S. door, R. 324).

Hatchway:

SE. corner, 20" from S. wall, 28" from E. 14" w. x 28". Two end pieces lay upon ceiling poles; side poles upon end pieces.

328

A possible O.B. cult room with L.B. revisions. Original E. wall, now only 39" h., of 2" dia. posts set 6-12" apart, packed between with mud and plastered over; beginning 6' 8" from SE. corner it curves W. as S. wall of R. 327. N. wall, abutting plastered post-and-mud E. side, is foundation for 2d type, 2nd story wall. 1st type S. side abuts E. and W.

Ceiling:

Original represented by two 6" beam props: 1) 7' h. with potrest on top, partly embedded in N. masonry 9' from NW. corner, supports beam that dips to 6' 5" at E. end; wall curves forward at top to come under beam; 2) 7' 11" from SW. corner and 20" from S. wall, joined to latter by jacal *screen* of six 1" dia. posts both sides plastered with mud to 4" th. Later beams indicated by 2 E. wall seatings 7' 3" above floor and 12" S. of original beams.

Doorway:

S. wall: 27" from SE. corner, 20" above floor, 14" w. x 17" h. x 11" across sill, opens into built-in closet, NE. corner of R. 329.

Ventilators:

E. wall: 1) 3' from SE. corner, at floor level, 8" w. x 10" h., stick lintels, rounded adobe jambs; beneath it, 2) *subfloor duct*, 13" w. x 18" d. x 4' l., roofed with cross sticks and slabs to W.-end vent 8" x 13"; blocked 3' 10" from W. end by masonry under E. wall.

Deflector (?):

Broken metate, trough to W. set in floor at NW. corner of subfloor duct forms screen 20" w. x 21" h.

Fireplace:

In mid-floor, 7' 2" from SE. corner, 4' 3" from S. wall, originally 25" dia. x 17" d.,

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 328 rimmed with clay; reduced to 17" w. x 18" E.-W. by slabs thru middle and on S. On NE. rim a clay-lined ash *basin* 14" dia. x 2" d.
- Ventilator shaft: Rises to last West Court surface 3' outside of 328, 8" w. x 12" E.-W.
- Subfloor: 1st type W. wall foundation built on clean sand 20" below floor. Posts in E. wall stand on 8" h. adobe foundation *ca.* 2" below floor. 2nd type N. wall stonework rests upon room floor.
- 329 An improvised O.B. room built in front of R. 326 and *ca.* 12-15" higher. N. half of E. side, continuing from Rs. 327-328, consists of posts with 1st type stonework between, rather than mud alone. N. and S. walls abut plaster on W. side; N. abuts E. side; latter abuts plaster on S. All walls plastered and sooted. Beam ends show in 1st type W. wall at height of 6' 7". In debris above floor, skeletons of 1 male, 6 children, and 17 adult females, all disturbed post-burial.
- Ceiling: Pole seatings in N. wall at height of 6½'; none in S. wall. A 7" dia. post 8" from S. wall and 30" from SE. corner apparently replaced one 10" to E. its position marked by slab fragments on edge and shale packing. 3 smaller posts stood in dug holes, braced by slab fragments, shale packing and basal cones.
- 329 Doorways: W. wall: 1) 3" from SW. corner, 27" above floor, 23" w. x 37" h. (secondary lintel 7" lower), partially blocked; 2) previously blocked and partly hidden by N. wall.
- Ventilator: E. wall: 23" from SE. corner, 5" above floor, 15" w. x 12" h.; reduced to 8" w. x 11" h. by secondary jambs sloped outward for doorslab.
- Fireplace: 6' 3" from SE. corner, 4' 6" from S. wall, 19" dia. x 6" d., slab-lined and plastered.
- "Closet": Beam post wedged with slabs and packed with shale stands 35" from E. wall to form SW. corner of "closet" 4' E.-W. x 3' 6", enclosing NE. corner of 329. Its plastered walls, 7" th. x 26" h. were later increased above burial zone by 20" additional masonry 15" th. Closet had been ceiled 39" above floor; N. wall opening to R. 328, 14" w. x 17" h., 22" above floor.
- 330 With 320 and 326, R. 330 formed a S. end to the W. arm of crescentic Old Bonito. Its

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

330

4 walls are 1st type stonework thickly plastered with rounded corners. Its sandy floor is 8' 1" below SE. corner ceiling poles and 6' 5" below roof level of Kiva X, the approximate last West Court level of occupancy. In debris on floor, 23 burials: 6 children, 4 females, 13 males—most of them disturbed before collapse of the ceiling.

Ceiling:

Over E.-W. beams, N.-S. ceiling poles covered with chico brush and adobe; over latter cedarbark and 2nd adobe layer.

Ventilator (?) :

Middle E. wall: at floor level, 17" w. x 15" h., blocked from outside.

Fireplace:

3' 4" from N. wall, 4' 10" from E., 31" E.-W. x 27" w. x 14" d., slab-lined, 4" adobe rim.

Burial Vault (?) :

On floor, NW. corner: inside, 50" E.-W. x 25" w. x 6" d.; ceiled with poles and adobe; within, skeleton of child under 6 yrs. (Field No. 1940). Buried upon a reed mat above the vault roof, the skeleton of a male about 20.

Subfloor:

Male skeletons Nos. 1948 and 1950 were buried in underfloor graves. Subfloor tests show W. foundation varying in height from 15" at N. end to 37" at S.; clean sand 36-56" below floor; in SE. corner, 22" h. foundation; clean sand at 4'; 6" lower, a thin lens of gravel.

331

With 332, a small late room between Kivas U and X. Its N. wall, exterior of R. 330, is 1st type; others are mixed 2nd and 3rd.

Doorway:

E. wall: 34" from NE. corner, 7" above floor, 25" w., blocked.

Ventilator (?) :

S. wall: 25" from SW. corner, 13" above floor, 15" w. x 17" h.

Fireplaces:

1) SW. corner, 16" dia. x 11" d., unrimmed;
2) NE. corner, hole in floor, 13" w. x 22" N.-S. used as fireplace.

Subfloor:

Under floor, debris of occupancy and demolition to undetermined depth. In lower 1st type N. wall a "mosaic" of small laminate chips. A 2nd type wall underlies W. side 4' 3" from NW. corner and ties with one under E. side.

332

Doorway:

E. wall, T-shaped: lower part 10" from SE. corner, 15" above floor, 18" w. x 18" h.; upper part, 30" w., including 6" secondary jambs, blocked.

Ventilator:

N. wall: (see S. ventilator, R. 331).

Subfloor:

Earlier floor at 11". A wall of good 2nd type masonry goes under N. side 4' 10" from NW. corner and ties with S. side 4' 7" from SW.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
332 A		corner an apparent continuation of that under E. side, R. 331.
332 B		A possible 2nd story is suggested by a blocked and plastered S. door, 22" w. 19" from SW. corner, and 4' 11" above floor of 1st story room 332A.
333		Arbitrarily chosen southwest room of superior 3rd type masonry. Walls formerly plastered; fire stains near floor.
	Doorways:	E. wall: 7' 2" from NE. corner, 22" above floor, 26" w. x 30" h., partly blocked. W. wall: 8' from NW. corner, 6" above floor, 21" w. at top, 26" w. at sill x 3' 5" h., partly blocked.
	Bench:	SE. corner: 35" w. x 4' 4" N.-S. x 14" h.; plastered masonry.
	Subfloor:	Test trench reveals subfloor foundation, av. 20" w. x 20" h., goes under N. wall 4" from NW. corner and under S. wall 8' 2" from SW. corner; 3 others underlie room walls. Base of E. wall lies 14" below floor; of W. wall, 17" below.
334		Another 3rd type masonry room. Walls plastered and smoke-stained; corners tied.
	Doorways:	E. wall, T-shaped: upper part 6' 3" from NE. corner 3' 9" w. x 4' 7" h.; lower section 12" above floor, 26" w. x 33" h.; blocked. Door thus 7' 4" h.; lintels 8' 4" above floor. W. wall: 7' 5" from NW. corner, 13" above floor, 26" w. x 5' 10" h., blocked.
	Subfloor:	Earlier floor or work surface at 12". On it, a 2-course foundation 22" w. goes under N. wall 2' from NW. corner and under S. wall 8' 8" from SW. corner.
335		A L.B. room of superb 3rd type masonry—dressed friable s.s. of uniform thickness separated by 4-7 courses of selected laminate blocks. In the NW. corner, walls now stand 9½' without seatings for beams or ceiling poles.
	Doorways:	E. wall: 7' 8" from NE. corner, 10" above floor, 24" w. x 4' 5" h., blocked. W. wall: 7' 10" from NW. corner, 13" above floor, 24" w. x ca. 3' 9" h., lower 9" blocked.
	Loft (?):	Built-in ceiling evidenced by 4 post-construction beam seatings cut in E. and W. walls 5' 4" above floor with ceiling poles in S. wall only. Loft doors: E. wall, 19" from SE. corner, 7' 8" above R. 335 floor; W. wall, 12" from SW. corner, 6' 10" above floor, 27" w.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room		
335	Subfloor :	Base of N. wall masonry lies 13" below floor; of S. wall, 8" below. A subfloor foundation 19" w. goes under N. side 12½' from NE. corner and under S. side 4' 7" from SE. corner. A 2nd foundation 18" w., joins 1st and goes under W. wall 5' 11" from NW. corner. No identifying masonry on either.
336	Doorways :	Remodeled room of 3rd type masonry S. of R. 23 and E. of 106. E. side abuts N.; all walls plastered and smoke-stained. E. wall, T-shaped door: lower part 7' from NE. corner, <i>ca.</i> 17" above floor, 29" h.; upper part 6' 3" from NE. corner; jambs continued 7' 2" to broken wall top; blocked from 336. W. wall: 6' 5" from NW. corner, 4" above floor, 25" w., blocked.
	Fireplace :	Oval, masonry-lined: 4½' from S. wall, 6' from W. 22" w. x 29" E.-W. x 9" d., adobe rim, 5" w.
	Bin :	NE. corner: triangular, built-in wall 16" th. abuts N. and E.; inside, N., 3' 7"; E., 3' 9" x 23" d.
	Razed kiva :	On 1-inch layer of shale spread on earlier floor at depth of 9": 11' 8" dia., walls av. 12" th. razed to last 2 courses; S. recess, 6' w. x 34" d.; on recess floor found jet carving of frog (U.S.N.M. No. 335603); <i>fireplace</i> , masonry-lined, 29" E.-W. x 27", 7' 8" from rear of recess; <i>ventilator</i> , 20" w. x 13", at N. end of <i>sub-floor duct</i> 20" x 40" d., 4' 7" from rear of recess, roofed at height of 3'; <i>masonry deflector</i> , 28" E.-W. x 15" x 4" h. stands 5" N. of vent; <i>repository</i> , masonry-lined, 15" sq. x 9" d., abuts N. side of deflector; <i>ventilator shaft</i> , 17" E.-W. x 12" inside, rises in unnumbered room area next S. of 336.
	Subfloor :	In NW. corner, razed kiva wall rises slightly in crossing an older wall, apparently 3rd type, that overlies a 2nd type wall, 21" th., which in turn, underlies N. end of R. 336 16" from its NW. corner and was razed 6½' to S. upon construction of sub-floor ventilator duct. A companion 2nd type wall, 25" th. and razed 3' above its associate floor at depth of 4' 7" goes under W. side of 336 12' from its NW. corner but its 2nd type masonry continues another 17", to 6' d.
337		3d type masonry although half the friable s.s. blocks are squarish and not face-dressed.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- 337 Doorway: E. wall: 3' 8" from NE. corner, 2' 10" above floor, 26" w. x 3' 8" h. x 26" across sill.
Subfloor: E. and W. foundations built on surface at depth of 7"; stratified sand beneath.
- 338 Ceiling: Split cedar strips lay pressed against N. wall.
Doorways: N. wall: 5' 6" from NW. corner, 2' 7" above floor, 2' 3" w. x 3' 8" h. W. wall: 4' 5" from NW. corner, 2' 9" above floor 26" w. x 3' 8" h. x 26" across sill.
Subfloor: S. foundation 12" h. and offset 9", built in trench cut through earlier surface supporting E. and W. foundations.
- 339 Doorway: N. wall: 5' 11" from NW. corner, 14" above floor, 27" w. x 36" h.
Subfloor: Hard, uneven silt surface at depth of 7" E. end, 15" at W.; beneath it 2' of constructional debris; stratified sand below.
- 340 Ceiling: Split cedar strips lay pressed against N. and S. walls.
Doorway: E. wall: 3' 7" from NE. corner, 9" above floor, originally 26" w., reduced to 17" w. by secondary masonry jambs slanted for R. 341 doorslab; secondary sill 21" above floor.
Subfloor: N. wall built upon partly razed 3rd type kiva whose plastered masonry underlies N. wall 11' 2" from NE. corner and E. side 6' 4" from same corner. Kiva fill, debris of demolition.
- 341 Doorways: E. wall: 3' 7" from NE. corner, hewn plank sill 4" above floor, 23" w. x 23" across, blocked and plastered over. W. wall: 3' 8" from NW. corner, at floor level, 26" w. x 3' 10" h. x 25" across sill; lower 22" blocked new sill slab laid above; secondary jambs set back 11" at sill slant outward for 341 door-slab, reducing width to 18".
Subfloor: W. wall overhangs its foundation 10"; rests directly upon 3rd type kiva masonry, 25" th., plastered and lightly whitened, with 12" sq. offset at top for roofing poles. Most of kiva masonry razed within 5' of 22" w. bench at depth of 8' 5"; pilaster logs had been removed.
- 342 Doorways: E. wall: 3' 2" from NE. corner, 7" above floor, 22" w. x 3' 4" h., dressed 1" th. pine board as sill, blocked from R. 343 to form 9" d. recess. W. wall: 3' 6" from NW.

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EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room
342 corner, 23" above floor, blocked (see E. door R. 341).
Subfloor: Earlier floors at 18" and 24"; under latter, subfloor wall, 20" w. x 19" h., abuts N. foundation 4' 8" from NE. corner and underlies S. wall 3' 8" from SE. corner.

343 Remodeled 3rd type room, walls plastered and whitened. Secondary N. wall, finished on outside but unplastered, abuts previously blocked and plastered E. and W. doors on floor 35" above original, reducing room width to 5' 4" on E. and 5' 11" on W. and enclosing 16" sq. vent shaft for Kiva 130 and 3 larger sand-filled compartments.
Doorways: In original N. wall: 4' 8" from NW. corner, 24" w., blocked from outside before construction of Kiva 130. E. wall: blocked, abutted by secondary N. wall. W. wall: at floor level, 19" w. x 28" h.; N. jamb abutted by secondary N. wall; blocked and plastered over.
Subfloor: Original floor at depth of 35", same level as that in R. 344. On it, in mid-floor, former *fireplace*, filled and floored over. Sill slab of blocked W. door, 20" above original floor. Under latter, foundation 20" w. underlies N. wall 6½' from NW. corner; a 2nd, 23" w., abuts W. foundation, 6½' from NW. corner and E. foundation 7' 3" from NE. corner.

344 3rd type room abutted by Kiva 130 enclosure. E. and W. walls abut plaster on N. and S. S. wall had collapsed outward.
Doorways: N. wall: 1) 6' 4" from NW. corner 32" above floor, 23" w., jambs extend 3' 8" to broken wall top, blocked; 2) T-shaped door: lower part, 23" w., 1" from NE. corner; jambs extend below floor level; upper part 6" w.; W. offset 23" above floor, filled with masonry; abutting E. wall covers filled E. offset. Door later blocked from outside leaving 24" w. x 10" d. *recess*. Original and later jambs plastered. W. wall: 33" from NW. corner, 26" above floor, 21" w. x 32" h., blocked from R. 343 to leave 12" d. *recess*.
Subfloor: No foundations disclosed.

345 Possible external room, S. of Rs. 156-157. Masonry indefinite, 4th type indicated. E. wall, 10" th., without foundation, stands buttress-like 29" h. above foundation of southward-leaning N. wall. Silt pavement dips to pass 5" under N. foundation.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

346

Like 345, a possible late room suggested by buttress-like W. partition and uncertain S. wall 13" w. x 11" h. at outer SW. corner R. 159 but reduced to a single course 20' to the W. Room floor lies 8" below N. foundation offset; another silt layer 8" lower.

347

An open terrace fronting LB. R. 324 at 2nd story level and overlying remnants of earlier buildings. Against W. wall 29" from NW. corner is *masonry step* to R. 324 door, 21" w. x 27" E.-W. x 5" h. N. foundation, 8" h., abuts W. wall on same level as step; above foundation, N. wall (exterior of Kiva Z enclosure) had been plastered and whitened.

Subfloor:

Partly razed 2nd type kiva noted subfloor in R. 324 underlies NW. corner of 347; also, 2 fragments of plastered 2nd type masonry, their associate floor at depth of 24" broken thru *ca.* 6' from NW. corner. Embedded in this floor directly below the Kiva Z enclosure at the break-off point are 2 posts 3" dia.; a 3rd post, 10" dia., stands several feet to the S., at the W. jamb of the R. 348 N. door. Beyond the broken 2nd floor, portions of 3 successive kivas were encountered beneath the SE. corner of Kiva Z enclosure: 1) a 1st type OB kiva; 2) one of 2nd type masonry; 3) 3rd type Kiva 67.

Subfloor OB Kiva:

Of the OB kiva, we exposed a 7' arc to bench level at 9' 3". Stonework typical, 12" th., slopes outward *ca.* 13 degrees, razed av. of 4' 10" above bench. Bench 36" w., front edge rounded and 2-3" higher; on bench, plastered masonry pilaster 8" w. x 6" h. x 36" l.; resting lengthwise directly upon pilaster, exposed 5" dia. log its distal end embedded in kiva stonework, forward end seated upon 4" dia. post embedded in bench masonry 29" from rear. A N.-S. log close against the concave W. arc of this partly razed OB kiva and 2 others, above and at right angles, helped support masonry of Kiva Z enclosure.

Later kiva remnants:

Overlying OB kiva bench 9' 3" below R. 347 terrace, 15' 3" from its NW. corner and 28" from outer SE. corner of Kiva Z square, is convex exterior of partly razed 2nd type kiva masonry 20" th. We exposed a 6½' section only, our trench ending 12' 9" from the NW. corner of R. 347 and 9' from the SE. corner of Kiva Z enclosure. Built upon this partly razed 2nd type stonework is the previously

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

347

excavated 3rd type masonry structure readily identified as Kiva 67. Of this latter, we bared an upper arc only, 23' 4" l., extending from a point 18' from NW. corner of R. 347 and 6' from outer SE. corner of Kiva Z square to our trench end, 35½' and 29' 4", respectively, from same 2 points.

348

A semi-subterranean room built of salvaged stone and fronting R. 327. Masonry, heavily plastered and sooted, is typeless but undoubtedly quite late. In NW. corner, walls now stand 50" h., to R. 347 terrace level, and 3rd type masonry of R. 324 rises 38" higher; in SE. corner, walls stand 37" h. In W. wall, 3" posts embedded vertically 5" and 5½' from NW. corner, their butts 4' 3" above floor or at R. 347 terrace level. Below posts, large blocks dressed friable s.s. suggest effort to buttress weakened E. masonry of R. 327.

Doorways:

N. wall: 7" from NE. corner, 28" above floor, 37" w.; jambs plastered; 10" dia. post stands outside W. jamb. W. wall: 20" from SW. corner, sill below floor, lintels 31" above, 26" w., blocked.

Ventilators:

W. wall: 6" from NW. corner, 9" above floor, 7" w. x 10" h.; S. jamb flush with 5" dia. *post* embedded in wall. S. wall: 1) 4' 3" from SW. corner, 5" above floor, 10" w. x 13" h., connects with ventilator shaft in R. 349; 2) flush with E. wall, at floor level, 9" w. x 11" h.; 3) *sub-floor vent*, opens into masonry-lined duct 15" N.-S. x 10" w., underlying S. wall 17" from SE. corner. Duct covered by s.s. slab 12" w. x 14" x 1" th.

Wall niche:

S. wall: 2" from SW. corner, 28" above floor, 9" w. x 3" h. x 6" d., plastered.

Wall Decoration:

1) Cross-hatched figures scratched in plaster, upper E. and S. sides; 2) a T-shaped figure, 2" w. x 1¾" h., S. wall, next to last plaster coat; 3) outline of left hand, W. wall, next to last plaster coat. Last layer whitened.

Fireplaces:

1) Against S. wall 3' 11" from SW. corner, 10" w. x 16" E.-W. x 11" d., slab-lined, 3 sandstone fire dogs; 2) 2' 6" from S. wall, 17" from E., 18" dia. x 6" d., plastered, unrimmed.

Bench:

Against E. wall N. end: 14" w. x 5' 2" l. x 2' 10" h.

Subfloor:

Earlier floor at depth of 24", S. wall built on overlying fill. On lower floor, half under S. wall 2' from SW. corner, slab-lined *fireplace*

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

- ca.* 2' dia. *W. door*, 20" from SW. corner, 17" above original floor, above-sill height, 3' 7", blocked; unplastered below upper floor.
- Ventilators*: 1) *W. wall* 19" from NW. corner at floor, 8" sq.; 2) 10" above latter, 2nd vent, 8" w. x 9" h.; both concealed by upper floor, here 30" above original; 3) vent in SE. corner connects, both above and below upper floor, with shaft in NW. corner R. 349. *Subfloor wall*, 8" th., immediately underlies N. side 21" from NE. corner.
- 349 Originally 1 with R. 348 and separated from it by rude stonework, 10" th. stones protruding irregularly. Floor is 2' lower than that of R. 348. In NW. corner, walls stand 6' h. to last R. 347 level. Lower 3½' of *W. wall* is rough and smoke-stained; upper part, of plastered 2nd type masonry.
- Ventilators*: *S. wall*: 39" from SW. corner, 15" w., lintels 22" above floor, sill not evident. *E. side*: 5"-th. wall parallels *E. side* at 9", space between roofed with slabs 4' 5" above floor, connects 9 x 11" vent at floor, SE. corner of R. 348 with 9" sq. shaft in SE. corner of 349.
- Ventilator shaft*: NW. corner, conical pile of friable s.s. *ca.* 40" dia. x 5' 9" h., shields 10" dia. shaft connecting with 10 x 13" vent 5" above floor 4' 3" from SW. corner of 348.
- 350 Subterranean room, *W. Court*; floor lies 5½' below last utilized surface; Kiva 2-D adjoins on *E.* Masonry, typeless, of salvaged materials, chiefly dressed friable s.s.; walls, built from inside, plastered and sooted.
- Fireplace*: Against *E. wall* 40" from SE. corner, 14" x 22" N.-S. x 7" d.; unrimmed.
- Wall Decoration*: *S. wall*: carelessly incised in plaster, 2 human hands; *W. side*, 1 human foot and misc. lines scratched in plaster.
- Ventilator*: Unfinished stonework, 23" w. at floor, abuts plastered NE. corner; shaft, *ca.* 8" dia., faced on inside, rose to *Court* level.
- 351 Adjoins 350 as possible subterranean cult room S. end *W. Court*; wall between, 14" th. Masonry nondescript, built up from inside, walls repeatedly plastered and sooted.
- Fireplace*: Slab-lined, unrimmed, against *E. wall* 38" from SE. corner, 15" w. x 19" N.-S. x 3" d.
- Wall decoration*: Painted on *S. plaster*, 37" from SW. corner, white rectangle with 7 serrations on upper edge, tips 32" above floor.

(Continued)

EXCAVATION NOTES, PUEBLO BONITO—*continued*

Room

351

Ventilator:

Abutting NE. corner, masonry 20" w. x 16" th.; vent in front, 4" above floor, 10" w. x 11" h. to small-stick lintels, fitted with 10 x 16" s.s. slab broadly notched at ends. Built against exterior NE. corner oval vent shaft enclosed by rough stonework 32" N.-S. x 14" w. at S. and 24" at N.

APPENDIX C

A PARTIAL LIST OF WALL REPAIRS MADE BY THE PUEBLO BONITO EXPEDITIONS ¹

- 14a Rebuilt E. end as N. wall buttress, 10' h. x 4' w.
- 14C Repairs, north offset, 1' h. x *ca.* 4' long.
- 60B SE. wall repaired, 1926.
- 76 SE. arc, rebuilt 5' h. x 7' w.
- SW. door, blocking replaced, 1927.
- N of 86C 3rd story ceiling offset, repairs above and below; beams replaced.
- 87 N. wall below offset, 3' repaired; beam replaced.
- B N. wall, floor offset to door repaired, sill replaced.
- 88 S. wall, 4' h. x 3' patch, W. half; N. door, lintels replaced; NW. ventilator inadvertently closed, 1926.
- 89B N. side, repairs E. of door; beam end replaced.
- 2nd N. of 89: N. wall, beam holes repaired; beam end replaced.
- 91 Piled loose stones against leaning SW. wall as temporary buttress, 1924.
- 98B N. wall: 2 new door lintels; repairs above door to ceiling offset; E. of door, 3' h. x 6' patch.
- 98C N. wall: above floor offset, 3' patch to NW. corner; beam replaced. W. wall, 4' h. x 3' w. patch.
- 138 N. wall E. of door, 3' h. repairs. W. wall, 2' h. repairs, full length.
- 142 E. wall repaired; outside SE. corner, repaired masonry under large slab, 1923.
- 143-4 External W. wall repairs (see W. Court).
- 148 Repaired "altar."
- 153-4 S. wall, rebuilt 2' h.
- 158 Repaired N. and W. walls, 1927.
- 168 W. door repaired, new lintels, 1925.
- 172 N. wall, 5' h. x 3' patch, W. half.
- B Repairs N. door, NW. corner.
- C Repairs along N. floor offset and below door.
- 173 W. wall: repairs, *ca.* 4' long, at ceiling pole level.
- B NW. diagonal door: replaced 2 lintels; repairs above to ceiling offset.
- 174 N wall: repairs around beam end. E. wall; over door, 2' sq. patch.
- B Repairs NE. corner, above floor offset.
- 175B Repaired N. door jambs and 18" above to NW. corner; new lintels; W. wall: N. end offset repaired.
- 177B 3 large patches W. side at and above floor offset; wall top repaired.
- 179B 2' sq. patch at floor offset NW. corner. W. side: patch 5' h. x 3' in N. half; offset repaired to N. wall.
- 180 W. wall: 2' h. x 3' patch upper south.

¹ Beginning in 1921 representatives of the National Geographic Society undertook voluntarily to repair wall damage at Pueblo Bonito previously caused by extraction of timbers or otherwise. Some of that damage pre-dates Mindeleff's 1887 photographs but most of it apparently occurred during the decade 1896-1906. The following list, by no means complete, was begun in 1926 by Henry B. Roberts from personal observation and has since been expanded by others from field records of the Expeditions. As a matter of fact, repairs in some degree were required in nearly every room, the annual cost exceeding \$2,000.

Known repairs by the National Park Service, 1925-1927, follow on page 341.

- 180B NW. end: 3' h. x 4' patch in middle; 2' patch along offset. W. side: repairs over diagonal doorway, SW. corner; 2 new lintel poles; offset repaired to NW. corner, ventilator repaired and 5' h. x 3' patch above.
- C Repaired W. door jambs; new sill; 1' sq. patch in N. half of wall.
- 183 N: middle of ceiling offset repaired; W: N. half of offset.
- B Repaired N. door and for 9" above; new jambs, sill and lintels. W. door: both jambs repaired; new sill installed.
- 184 SE. end: repairs around ceiling poles; SW. side, above blocked door to offset.
- B NE side: door jambs repaired and 15" above; new lintels; SW. side, 6' w. repairs to wall top, including new door lintels.
- 185 NW. end: repairs 1' below entire offset; SW. side, repaired beam hole and ventilator.
- 186 Southwest wall, beam holes repaired.
- 187B Northeast: Beam replaced; 2' square patch.
Northwest: wall rebuilt to below 187C doorway to buttress NE wall; N. jamb repaired; replaced lintels.
- C Northwest: door repaired.
Northeast: W. ventilator repaired.
- 188 Outside NE. wall: 2 patches 1½' w. x 3' h.; 2' w. x 3' h.
- B Northeast: Repaired around beam holes and along ceiling offset.
Southeast: Wall rebuilt to door in 188C as N. wall buttress.
Northwest: Rebuilt above door to wall top, 10' h. as N. wall buttress.
- C Northeast: Patched floor offset, 3' l. x 1' h.
- 189 Outside NE. wall: Repairs above ventilators, 3' h.
- B Northeast: Beam holes repaired.
Southeast: Rebuilt above doorway to wall top, 4' w. x 12' h. as N. wall buttress.
- C Northeast: floor offset repaired.
- D Northeast: Patched floor offset, 5' l. x 3' h.
- 209 East end repairs.
- 225 E. and W.: Repaired beam seatings.
- B Repaired about all doors; replaced lintels, N. and E.; sill, S. door; repaired ventilators.
- 226 N.: Repairs at ceiling level, 2' h. x 4' l., upper 4' rebuilt, 1921.
- B S.: Repairs about door and above to wall top; E. and W. repaired to buttress S. wall.
- 227 N.: Repaired and replastered large vandal-torn hole, east end, 1926.
- 227-I N.: Repairs at ceiling level.
- 228 N., E., and S. walls: Repaired (1921) holes caused by removal of beams and ceiling poles.
- B Repaired (1921) and partly rebuilt E. and W. walls; E. repairs inadvertently blocked ventilator in T-shaped door. S. wall: Repaired beam holes and ventilator.
- C Repaired S. door and surrounding masonry.
- 229B Upper E. wall partly rebuilt (1921) to buttress 229C south wall.
- 235 S.: Repaired large hole broken through from 227. Room refilled on account drainage.
- 241B Repaired N. door jambs and 2' above to wall top; new lintels. W. door: New lintels and 6' h. repairs, 8' w. at top.
- 242 W.: Small patch at beam level.
- B 2' x 4' h. patch in middle E. wall. NE. diagonal door: New lintels and 4' above to ceiling offset. W. side: Upper courses relaid to provide drainage.

- C E. side: From floor offset, repairs 2' w. x 6' h.
 243 Repaired E.-W. beam seatings, 1921.
- B 2' h. repairs at N. ceiling level. E. side: 6 sq. ft. patch in middle; above S. ventilator, new lintels and 15 sq. ft. patch above into 243C. W. side: New lintels and N. jamb of door; repairs at beam level.
- C Repairs, W. side: middle and S. half.
- 244B Minor repairs (1921) SE. diagonal and 3 other doors; above E. door, 6' patch into 244C; W. door, new lintels.
- 245B E. door: Repairs and new lintels, 1921.
- 247B-S N. wall, on rotted beam, removed 1921 and position indicated.
- B-N N. and S. walls, built on rotted 247A beams, removed 1921; positions indicated by stones protruding from side walls. East door repaired, lintels replaced.
- 248B N. wall: Built on beam, position marked by stones protruding from side walls, 1921.
- 249B S. wall removed, N. wall repaired 1921.
- 251 East: 2 new beams placed. W. side: door repaired, lintels replaced.
- B S. wall: upper 5' rebuilt. W. wall: S. half, 1' h., rebuilt.
- 252 East: Repairs at beam level.
- B East: 3' x 4' patch in middle; upper 3' new. S. wall: Collapsed; position indicated as in 247B-N.
- 256 East door: Burned lintels replaced; wall above repaired.
- B W. door restored, 1922; rebuilt step below.
- 257 E. door: new lintels placed; wall above repaired 1922; NW. diagonal door, new lintels.
- B N. and E. doors and masonry above repaired, new lintels placed. Ventilator from 181B and surroundings repaired; ventilator from 256B unwittingly closed during 1922 repairs.
- 259B North door repaired, new lintels, jambs, and sill.
- 260 N.: Repairs at ceiling level; 1' x 2' h. patch; E. door repaired, new lintels placed, masonry below repaired to floor offset; 4' square patch above.
- B SE. door repaired, new lintels placed. S. door: new lintels and 6' patch above.
- 261 N. door: new lintels; repairs above and for 3' on W. side.
- B E. wall partly rebuilt, 1922, to brace insecure W. corner of 184. S. door: Both jambs repaired, new lintels placed, wall above repaired entire length.
- C S. end: 4' w. x 3' h. patch.
- 265 N.: Repairs entire length at ceiling level, ceiling poles replaced. E.: offset and 1' below repaired entire length; ventilators repaired; 3' x 5' h. patch at N. ventilator. W. wall: offset and beam seatings repaired.
- B E. door: From floor offset to sill repaired; also both jambs and masonry on either side.
- 268 E. door: N. jamb rebuilt, new lintels placed, masonry on either side repaired.
- 273 N. door: replaced lintels, repaired masonry above, 1922.
- 295 SW. wall: E. end, repaired (1923) hole broken through W. end. Inadvertently closed ventilator.
- 296B N. wall: Patch 2' x 4' h. at ceiling offset, W. half.
- C N. wall: 2 beam holes repaired, 1 beam reset; patch, NE. corner at ceiling level.
- 297C N. wall: 1 beam reset; repairs *ca.* 2' below ceiling offset; NE. corner, repairs above and below offset.
- 299B W. end: Upper part rebuilt to buttress N. wall (1923).
- C W. end: Upward extension as in 299B.

- 301B N. wall: 1922 repairs failed to reproduce second-type masonry. Beam reset; ventilator repaired and new lintels placed. E. and W. ends rebuilt 3' w. from floor offset to buttress N. wall.
- C N.: Repairs at ceiling level.
- 306B N. door: new lintels and jambs. E. and W. sides, wall repairs. S. side: 9 sq. ft. patch lower E. half.
- West Court. SE. corner Gateway: Repaired cross-wall, 2' high. E. side of Court: Rebuilt lower 18"-24" from Gateway to inter-Court passageway N. of 35a; on N. side of passageway, repairs 7' long x 5' h.
- Outside North wall: Repaired all vandal-torn holes, R. 14b to R. 187.
- Kivas
- A Repaired upper 2-3' of wall, replacing 3 charred ceiling(?) poles in original position, W. wall. Repaired both sides stairway to R. 148, replacing decayed sticks at step level.
- B Repaired and raised wall 2½ to 3½ ft.
- D In 1921 raised N. and W. walls 3' to approximately original height to control drainage. Where pilaster logs had burned, filled holes with stonework. Filled subfloor vault with sand and broken rock as drainage aid.
- E Rebuilt upper 3' of wall; upper 6-15" of each pilaster rebuilt.
- F Rebuilt upper wall, 12-18" on N. and E.; 2-3', S. and W. sides.
- G Approximately upper 1' repaired.
- H Approximately upper 3' rebuilt.
- I From 2½ to 3½' of upper wall repaired.
- J Approximately 2' of upper wall rebuilt.
- K Upper 3' of S. wall rebuilt; remaining wall raised about 2'.
- L Upper 1' of S. quarter rebuilt. At top of W. quarter, 1 x 4' patch.
- M Upper 3' of wall rebuilt.
- N Upper 2' of E. side rebuilt; at S., upper 1' rebuilt.
- O Upper 3' of N. wall rebuilt.
- Q Upper 2-4' of wall repaired or rebuilt; 6' at NW.
- W Upper 6" of wall repaired; also pilasters.
- 67 E. face of enclosed wall repaired.
- 161 Approximately 2' of upper wall rebuilt, three-fourths of circumference.

KNOWN NATIONAL PARK SERVICE REPAIRS AT PUEBLO BONITO, 1925-1927

- | Room | Nature of repairs. |
|--------|---|
| 3b | Repaired (1926) holes broken through NW. ceiling, NE. and NW. walls. |
| 3d | Repaired (1926) platform at NW. end; holes broken through floor and NE. wall from R. 58. |
| 58 | Repaired (1926) hole through SW. wall to R. 3d (Pepper, 1920, pp. 220, 329). |
| 92 | (2nd story of R. 97 or 3a) T-shaped door, NW. wall, 1926. |
| 110 | See Rooms 3b, 3d, 58 above. |
| 158 | Repairs to N. and W. walls, 1927. |
| 168 | Repaired W. door, replaced lintels, 1925. |
| 169 | SW. door: lintels and masonry above replaced, 1927; 3 NW. doors rebuilt. |
| 185B | SW. door repaired, 1927. |
| 227B | Concrete floor placed, 1925, to protect ceiling of 227A. |
| Kiva D | Walls and surrounding rooms covered with concrete, April-May 1925, as experiment in drainage control. |

INDEX*

- "Ackerly House" (*see* Wetherill dwelling), 40
 Acoma, 52, 53
 Adams, Richard N., 21
 Addition, Second-type, 78-124
 Addition, Third-type, 125-142
 Addition, Fourth-type, 154-176
 Agriculture, 2, 3, 8, 16, 56
 Agriculture and alluviation, 223-233
 Alkali, black, 16, 56, 230, 231, 233
 Alkali Ridge, southeastern Utah, 44, 45, 47
 Alluvium (*see* Valley fill)
 "Altar" in Room 148, 201
 American Philosophical Society, v
 American Museum of Natural History, iv, 5, 7, 17, 212, 213
 Amsden, Munroe, iv, v, 10, 11, 12, 13, 14, 15, 16, 48, 49, 66, 101, 130, 133, 140, 211, 213, 215
 Anderson, R. P., v, 3, 223
 Antechamber (*see* Great Kiva Q), 209
 Antiquities Act of 1906, 5, 8, 23
 Apache Indians, 32
 Arroyo, historic, 1, 3, 19, 223, 232
 Arroyo, prehistoric, v, 2, 19-20, 56, 218, 219, 220, 224-225, 228, 233
 "Arroyo House," 21
 Axes, stone, 26, 27, 58, 211
 Aztec Ruin, 17, 39, 42, 54, 55

 Balcony, lack of, 34
 Ban, Cecil (cook), v
 Bannister, Bryant, 35, 40, 50
 Bc50-51 (small-house site), 48, 49
 Beans, 3, 30, 63, 95, 197, 223
 Black House, 50
 Blom, Frans, v
 Bourke, John G., 27

 Braced-up Cliff, 29, 79, 123, 141, 143, 154, 156, 225
 pre-1877 rockfall, 57, 67, 70, 124, 144
 Brand, Donald D., 48
 Breazeale, J. F., 230-231
 Brew, John O., 41, 44, 45, 47, 48
 Bryan, Kirk, geological studies in Chaco Canyon, iii, iv, 3, 19, 20, 21, 33, 51, 149, 219, 220, 223-233
 Bunchgrass, 187, 192, 196, 226
 Bureau of American Ethnology, 4, 21

 Calahan, Dolores (secretary), v
 Casa Rinconada, 3
 Cedar, 82, 84, 87, 163
 Cedarbark, 32, 59, 60, 62, 79, 80, 83, 87, 121, 163
 Cedar splints, 74, 79, 87, 89, 121, 161, 162
 Chaco Canyon, 1, 3, 5, 8, 16, 18, 202, 223
 cliff stairways, 141, 142
 climate, 3, 17, 19, 224, 233
 discovery and exploration, 4-5
 floodwaters, 1, 20, 56, 150, 226-229, 232
 floodwater channel, 129, 130, 133, 140, 150, 172, 219
 forests, 3, 8, 16-18, 20, 30, 40, 51, 56, 180, 233
 peoples of, 1, 3, 19, 21, 22, 51, 53, 187
 rainfall, 3, 18, 19, 56, 223
 ruins of, iv, 1, 3, 4, 20-21, 28, 48-52 (*see also* ruins listed on page 50)
 Test Pit No.3, 16, 219, 224, 228, 230, 231
 topographic map, v, 3
 small-house sites, iv, 10, 48, 49
 vegetation, 2, 3, 19, 57, 224

* This Index is not exhaustive in every particular.

- Chaco Canyon—*Continued*.
water resources, 3, 56, 224, 230, 233
Chaco Culture, iv, 8, 41, 53, 56
Chaco influence, 42, 52, 55
Chaco-like remains, 41-43, 52-53, 55
Chaco Canyon National Monument, iv, 1
Chetro Kettle Ruin, 5, 25, 34, 48, 50, 142
Chico brush, 74, 211, 226
Chimney Rock Ruin, near Pagosa Springs, Colo., 54, 55
Cliff House sandstone, 1, 25, 202, 223
Collins, Henry B. Jr., v
Conant, Kenneth J., v
Continental Divide, 1, 52
Corn, 30, 63, 95, 108, 223
Cottonwood, 3, 26, 39, 48, 57, 58, 224, 232
Coville, Frederick V., iv
Crownpoint Indian Agency, 3
Cummings, Byron, 65

Darton, N. H., 233
Debris of occupation, 10, 11, 14, 129, 165, 174, 189, 207, 215
of construction, 11, 85, 100, 128, 203, 225
Dendrochronology, science of, 35, 138
(*see also* Douglass, A. E.; Tree-ring dating, Pueblo Bonito)
Department of the Interior, iv, 10, 49
Dodge, Richard E., 7, 229
Door hasp, 65
Douglass, A. E., tree-ring research at Pueblo Bonito, iii, iv, 17-19, 35, 39, 50, 51, 162, 169, 224
Droughts, 19, 56, 224-226
Duck, redhead, 192
Dutton, Bertha P., 48

East Court, 34, 67, 68, 70, 93, 113, 114, 118, 119, 120, 122, 137, 140, 175
East Mound Trench 10, 220-222, 227, 228
East Refuse Mound, 10, 190, 214, 217, 219, 226, 227

Escavada Wash, 33
Excavation notes, 264-337

Fajada Butte (Mesa Fachada), 4
"Far East" Trench, 150
Farmington, N. Mex., 33
Firedogs, sandstone, 31, 74, 93, 190
Floodwater farming (*see* Agriculture and alluviation)
Fort Defiance, 18, 53
Fort Wingate, 5
Foundation Complex, Northeast, 143-153, 155, 157, 159

Gallup, N. Mex., 53
Gila Pueblo, tree-ring dates at Pueblo Bonito, 40, 95
Gladwin, Harold S., iv, 53
Golden eagle, 84
Grass seed, 3, 30, 63
Gregory, Herbert E., 233
Grosvenor, Melville Bell, v

"Half House," 21
Hammond, J. F., 82
Hammond L. C., v
Havens, O. C., v
Hawley, Florence, 51
Henderson, Junius, 233
Hewett, Edgar L., 9, 233
Hillside Ruin, 146-149, 151, 225
Hitchcock, A. S., 187
Hodge, F. W., 52, 53
Holsinger, S. J., 32, 40
Hopi villages, 19, 24, 27, 39, 52, 60
"Hotel," Hyde Expedition, 6
Hungo Pavie, 50, 51, 142
Huntington, Ellsworth, 3, 19, 233
Hyde, B. Talbot B., 5, 7
Hyde, Frederick E., Jr., 5
Hyde Exploring Expeditions, iv, 5, 6-8, 9, 23, 32, 45, 66, 80, 81, 88, 165, 198, 212, 214
unpublished prints, 66, 87, 90, 95, 166, 169

Jackson, Martin L., 24
Jackson, W. H., 4, 5, 16, 20, 23, 28, 34, 57, 85, 141, 142, 146, 149, 154, 224, 226
Juniper, 26, 224 (*see also* cedar)

- Kayenta country, 28, 65, 162
 Kern, R. H., 81
 Ketchipauan, one of the Seven Cities of Cibola, 52
 Kiatuthlanna (Village of the Great Kivas), 53
 Kidder, A. V., 10, 11, 14, 41, 47, 49, 51, 55, 233
 Kinbiniyol Valley, 49, 229
 Kinklizhin, 50
 Kivas, 177-211
 bowl-shaped, 44, 45, 46, 54, 67, 68, 70, 191, 193
 Chaco-type, 43, 44, 46, 54, 111, 177, 180, 183, 186, 196
 Chaco-like, 52, 53, 55
 cribwork, 39, 139, 180, 187, 191, 196
 deflector, 49, 54, 76, 95, 97, 180, 197, 203, 209
 fireplaces, 48, 112, 177, 180, 186, 188, 190, 191, 196, 203, 208
 Great Kiva A, 14, 135, 137, 173, 198-207
 Great Kiva Q, 64, 131, 132, 175, 198, 207-211
 Great Kiva under West Court, 11, 123, 129, 130, 132, 133, 137, 141, 198, 211, 216
 "keyhole," 48, 189
 Mesa Verde-type, 43, 44, 46, 47, 54, 183
 niches, 112, 181, 183, 188, 189, 191, 192, 196, 199
 non-Chaco, 183-184, 190, 196
 pilasters, origin of, 46
 pilaster construction, 43, 181, 186, 190, 191
 pilaster offerings, 133, 156, 181, 182, 186, 189, 192, 196
 possible cult rooms, 73, 74, 76, 95, 97, 196
 pre-Zuñi near Hawikuh, 52, 53
 razed, 94, 111, 116, 127, 137, 183, 184, 188, 203
 remodeled, 183, 194, 196
 repositories, subfloor, 137, 138, 184, 192, 207, 209
 roof-pole offset, 190, 191
 sipapu, lack of at Pueblo Bonito, 43, 209
 subfloor ventilator, origin of, 46, 54
 "wainscoting," 44, 112, 181, 187, 191, 192, 196
 Kluckhohn, Clyde, 48
 Laboratory of Anthropology, 15
 Ladder, 3-pole, 209
 Lancaster, J. A., and Pinkley, Jean M., 44, 45, 47
 La Plata River Valley, 42, 43, 47
 Largo-Gallina area, 34
 Leyit Kin (small-house site), 48
 Linsley, A. H. (cook), v
 Little Colorado-Puerco drainage, 53
 Lowry Ruin, 15, 41, 42, 46, 47, 54
 Macaws, 84, 97, 99, 107
 MacEwen, Harold E., v
 Maize, 3, 30 (*see also* corn)
 Mancos, Colorado, 5
 Mancos Phase, 47
 Manuelito Wash, 53
 Martin, George B., v
 Martin, Jack, 7, 33, 40, 83
 Martin, Paul S., 15, 41, 46, 53
 Masonry, Chaco-like, 41, 55
 non-Chaco, 41, 66, 190
 double-coursed, 41, 44, 45, 78
 single-coursed, 41, 44, 45, 54, 58, 60
 McElmo Canyon, 42, 55
 McElmo Phase, 47
 McFarlane, Robert (cook), v
 McKinney, Lewis T., 156
 McLellan, George M. (cook), v
 McNaughton, J. B. (cook), v
 McNitt, Frank, iv, 6, 149
 Menefee formation, 202
 Merchants, 4
 Mesa Verde National Park, 15, 19, 43, 44, 47, 54
 Mesa Verde country, 43, 48, 53, 65
 Mesa Verde-like culture, 42, 48
 "Mesa Verde House," 49
 "Middle" Trench, 227

- Mindeleff, Victor, 4, 5, 23, 24, 27, 28,
29, 34, 81, 87, 91, 109, 154, 155
Mockingbird Canyon, 18, 33
Montezuma Valley, 55
Morris, Earl H., 24, 41, 42, 43, 46, 47,
54, 55, 207
Museum of New Mexico, 201
National Geographic Society, iii, iv, v,
8, 9, 23, 38, 40, 51, 55, 80, 103,
179, 196, 198, 210
Committee on Research, iv, v, 8,
23
Beam Expeditions, 17, 39, 51
Chaco Canyon Reconnaissance, iv,
7, 18, 22, 33, 87, 214, 224
Pueblo Bonito Expeditions, iii,
iv, v, 8-22, 24, 38, 40, 41, 49, 50,
152, 202, 223
National Park Service, 3, 90, 232
Navaho Indians in Chaco Canyon, 1,
3, 5, 6, 16, 18, 19, 23, 56, 141, 224,
226, 230, 232
Nelson, N. C., 7, 52, 212, 214, 215, 221
Northeast Foundation Complex, 143-
153, 176, 225, 226
O'Bryan, Deric, 21, 40, 47, 53, 54, 95
"Old dark room," 80, 87
Old Wello, Navaho Indian, 18
Oraibe, 19, 35
Pagosa-Piedra region, Colorado, 10,
44
Palmer, S. L., 5, 23
Parrot, thick-billed, 97
Pecos classification, 12
Peñasco Blanco Ruin, 18, 49, 50, 229
Pepper, George H., 6-9, 29-32, 57, 61-
72, 77, 78, 80-82, 86, 87, 90, 91, 95,
96, 99-102, 104, 131, 212
Pine, 3, 18, 23, 26, 39, 58, 59, 224, 233
Pinkley, Frank, 24
Pinkley, Jean M., and Lancaster J. A.,
44, 45, 47
Pinyon, 26, 39, 48, 58
Pinyon nuts, 30, 108
Pit-houses, BM. III-P.I, 21, 22, 30, 44,
45, 49, 53, 54, 57, 77, 129, 132, 187,
225
Planks (*see* Boards, Late Bonitian)
Plateau Province, 19, 32
Pottery of Pueblo Bonito,
Black-on-red, 9, 11, 14
Black-on-white, 9, 11, 16, 64
Chaco, 41, 42, 52
Chaco-like, 15, 16, 41, 42, 43, 47,
53, 55
"Chaco-San Juan," 13, 14, 15, 41,
50, 64, 67, 135, 211, 216
non-Chaco, 41, 42, 47
Chaves Pass Polychrome, 14
Corrugated-coil, 9, 11, 13, 14, 30,
41, 50, 64, 67, 93, 97, 130, 159,
211, 213, 215
Design elements, 12 (table), 48
"Early," 11, 50, 101, 213, 215
Houck Polychrome, 14
Kayenta Polychrome, 14, 189
"Late," 11, 32, 50, 213, 216
Little Colorado Polychrome, 203
Mancos Black-on-white, 15, 41, 46,
47, 48, 211
McElmo Black-on-white, 14, 41,
46, 47, 48, 50, 64, 67, 135, 189,
196, 203
Mesa Verde, 10, 13, 14, 41, 47, 48,
49, 55, 65, 66, 135, 173, 189
Mesa Verde-like, 42, 48, 66, 131,
215
Mesa Verde, proto-, 10, 14, 16,
147, 173, 196, 203, 213
Mimbres, 14
Navaho or Apache, 14, 34
Pigment, 11, 13, 14, 15, 16, 47, 48,
55, 216
pre-Pueblo, 9, 211, 215
Plain-banded, 9, 11, 13, 30, 213
Polished-black-interior, 10, 11, 13
potsherds as wall chinking, 48
sherd analysis, 12, 14
Solid, 213, 216
Straight-line Hachure, 9, 13, 14,
16, 41, 49, 64, 67, 129, 159, 213,
216, 222
techniques, 13, 16
temper, 11, 12, 13, 14, 15, 16, 47
"Transitional," 12, 14, 15, 50, 101,
130, 213
Tularosa-coil, 14

- Pueblo Alto, 49, 50, 141, 142, 150
 Pueblo del Arroyo, 4, 6, 20, 30, 34, 40, 48, 50, 140, 150, 196, 224, 226
 Pueblo Bonito, v, 1, 3, 4, 8, 15, 22-40
 conflagrations, 32, 34, 186
 constructional timbers, 1, 3, 8, 18, 23, 26, 35, 38-40, 66, 74, 87, 163, 166, 187
 constructional timbers, reuse of, 39, 51, 163, 189
 constructional offerings, 156
 Cross-section A-A', 136, 137, 139, 204
 Cross-section B-B', 131, 133, 134
 Cross-section C-C', 136, 139, 140, 141, 154
 dating of, iv, 17, 35-40, 51, 163, 166, 169, 174
 defensive measures, 33-35
 dual occupancy, 22, 24, 41, 45, 52, 54, 56
 East Court, 70, 93, 113, 114, 116, 118, 119, 120, 123, 137, 140
 elevation of, 3
 flagstone floors, 31, 137, 172, 175, 176
 fireplaces, 31, 59, 62, 79, 95, 123, 124, 127, 129, 148, 218
 "foreign" rooms, 65-66
 groundplan, iv, 7, 8, 26
 kivas, 177-211
 rise and fall, 41-56, 223
 room dimensions, 241-263
 steps, intramural, 27, 109, 120, 128, 130, 138, 171, 174, 199, 200
 Pueblo Bonito: Old Bonito, a P.II village, 8, 16, 22, 24, 41, 45, 54, 57-77, 78, 194
 beam ends, conical, 26, 58
 burial rooms, 34, 35, 45, 52, 58, 63, 64, 65
 ceilings, 26, 58, 59, 75, 84, 87
 ceiling props, 39, 58, 59, 75
 doors, 27, 59, 60, 63, 75
 fireplaces, 31, 59, 63, 73, 76, 95
 foodstuffs, 30, 45, 51, 63, 95, 197
 ground plan, iv, 57
 hatchways, 27, 58, 60, 63, 74, 75, 96, 197
 houses, posts as steps, 59, 60, 66, 75
 household waste, 10, 11, 13, 14, 41, 45, 48, 57, 61, 78
 kivas, 54, 57, 61, 67-70, 118, 192, 193, 194
 masonry, 24, 26, 45, 57, 58, 60, 67, 69, 72, 73, 80, 84, 86, 88, 136, 194
 occupants, 8, 16, 22, 26, 45, 52
 outside rear wall, 24, 27, 33, 34, 56, 58, 78, 84, 88, 131
 post-and-mud walls, 45, 60, 61, 62, 64, 65, 66, 75, 94, 162
 pottery of, 14, 16
 rooms replaced, 66, 70-77, 79, 100, 101, 125, 128, 173, 194
 storage, 20, 30, 57, 58, 59, 61
 studwork, wall "mosaic," 57, 88, 96
 tree-ring dates, 38, 39, 45, 51
 ventilators, 28, 29
 Pueblo Bonito: Late Bonito, a P.III village, 8, 15, 19, 41, 54, 55, 57, 97, 125
 abandonment of, 35, 45, 52, 56, 161
 adult burials, lack of, 45
 architects, 66, 77, 84, 85, 86, 87, 92, 93, 95, 125, 128, 136, 143, 151, 164, 167, 194
 boards (planks, hand-hewn), 27, 59, 82, 83, 107, 181, 183, 187
 ceilings, 26, 79, 81, 82, 83, 95, 161, 162, 163
 doors, 27, 33, 79, 85, 88, 89, 102, 163-165, 170, 171
 diagonal, 28, 164, 165, 166
 T-shaped, 28, 62, 113, 127, 165, 168, 174
 intermural, 109
 entranceway, 34, 134, 202, 207, 208
 fireplaces, 31, 72, 73, 74, 93, 98, 113, 120, 122, 131, 174
 "fire pits," 31, 120, 148, 174
 hatchways, 27, 75, 81, 83, 96, 107, 164, 197
 houses, 26
 infant burial, 97
 masonry, 24-26, 45, 61, 78, 85-90, 92-94, 121, 125, 138, 145, 151, 162, 172, 225

Pueblo Bonito—*Continued.*

- masonry steps, 114, 138, 168, 169, 171, 174, 184, 200, 217
- milling room, 30
- Northeast Foundation Complex, 141, 143-153
- outer north wall, 85-87, 155-157
- reconstruction, 72, 77-79, 86, 89-91, 94-96, 99, 100, 107, 127, 135, 136, 160, 166, 169-173
- repositories, subcourt, 114, 123, 172
- Room 14b, 6, 23, 40, 81, 82, 85
- storage, 29-30, 79-81, 83, 88, 101, 103, 104, 131, 139, 159
- tree-ring dates, 38, 39, 45, 51-52
- walls built on beams, 26, 63, 94, 95, 96, 110, 139, 174, 193, 210
- wall disks, sandstone, 90-91
- walls, undercourt, 93, 114-116, 118, 119, 120-123
- wattlework, 61, 114, 162, 183, 203, 209, 228
- ventilators, 28-29
- Pueblo Pintado, 4, 28, 50, 51, 52
- Pumpkins, 3, 223
- Putnam, F. W., 5, 6, 7
- Reed, Erik K., 15, 47, 52
- "Relic hunting," 5, 8
- Rincon del Camino, 3, 33
- Rio Colorado, 42
- Rio Grande, 52, 175
- Rio San Juan, 1, 42, 66
- "Roads," prehistoric, 141, 142
- Robbins, Wilfred W., 233
- Roberts, Frank H. H., Jr., 41, 44, 46, 53, 54, 55
 - research at Pueblo Bonito, iii, iv, v, 10, 11, 12, 13, 14, 15, 16, 21, 48, 49, 50, 66, 101, 130, 133, 140, 211, 213, 215, 222
- Roberts, Henry B., v, 241-263
- Roosevelt, Theodore, 1
- Ruppert, Karl, v, 167
- Rushes (reeds), 3, 18, 19, 26, 58, 107, 183, 233
- Sand, wind-blown, 24, 32-33, 40, 56, 60, 84, 89, 127, 130, 139, 168, 193, 222
- Sand bunch-grass, 187
- San Juan area, 15, 35, 41, 55, 63, 68, 131, 184, 187, 213
- School of American Research, 7
- Scofield, Carl L., 230, 231
- Sedimentation (*see* Valley fill)
- Seltzer, Carl C. (on Zuñi and Chaco skulls), 53
- Shabik'eshchee, a Late Basket Maker village, 21
- Shale, 67, 91, 114, 118, 123, 129, 147, 191, 192, 193, 194, 201, 202, 203, 208, 209
- Sheepherders, Mexican, 18, 23
- Shepard, Anna O., 12, 55
- Shrines, 115, 123, 175-176
- Silt layers, 10, 20, 77, 138, 139, 143, 149, 150, 154, 159, 203, 225, 226
- Simpson, James H., 4, 6, 23, 81, 146
- Skeletal remains from Pueblo Bonito, iv
- Smiley, Terah R., 35, 39, 50, 54
- Smithsonian Institution, vi, 4
- Soil analyses, 10, 16, 230-231
- Soldiers, 4, 5, 23
- Solomon's Ruin, 42, 54
- South Refuse Mounds, 79, 123, 129, 141, 212-222, 229
- Stewart, T. Dale, iv
- Stone axes, 26, 27
- Stratigraphy, 9-16, 66, 130, 133, 211, 215 (*see also* South South Refuse Mounds; West Court Trench)
- Stratigraphy at Peñasco Blanco, 49, 50
- Stratigraphy at Pueblo Alto, 49
- Symposia at Pueblo Bonito, 16, 52, 233
- Table of room dimensions, 241-263
- "Talus House," 124
- "Tanner's Garage," 40
- The Gap, 48, 141, 142
- Tie poles, constructional, 26, 87, 155, 156, 191
- Tree-ring calendar (*see* Pueblo Bonito dating)
- Tsin Kletzin, 3, 142
- United States Army Engineers, 4
- United States Geographic Board, 4
- United States Geological Survey, 19

- United States National Museum, iv, 152
 Una Vida Ruin, 4, 50, 51
 University of Arizona, 17, 35
 University of New Mexico, 48
 Ute Indians, 32

 Valley fill, iv, 1, 4, 10, 19, 20, 51, 56, 223
 Vandalism, 4, 5, 23, 34, 83, 85, 155, 156
 Ventilators, 28, 29, 54
 Village of the Great Kivas, 46, 53
 Vivian, Gordon, 40, 202, 209, 210

 Wall decoration, 70, 129, 135, 207
 Wall repairs, Pueblo Bonito Expeditions, 23, 338-341
 National Park Service, 23, 24, 40, 62, 163, 170, 209, 341
 Walsh, Oscar B., v
 Washington, John M., 4
 Water analyses, 10, 16

 Weje-gi Ruin, 50, 51, 52
 West Refuse Mound, 9-10, 128, 129, 139, 212-216, 218-220, 227, 228
 West Court Trench, 11, 22, 48, 66, 69, 77, 128, 129, 132, 133, 211, 215, 216
 Wetherill, John, 229
 Wetherill, Richard, 5, 6, 8, 23, 40, 81, 84, 90, 229
 rooms rebuilt by, 7, 12, 23, 40, 90
 dwelling of, 40, 149
 White Canyon, 65
 Whitewash, 66, 70, 99, 165, 171, 191, 192, 193
 Whitewater, Ariz., 46, 53, 54
 Whitmore, Jeraldine M., v
 Willows, 3, 18, 19, 57, 79, 80, 81, 82, 83, 84, 87, 131, 162, 187, 224, 232
 Wirito's Rincon, 18, 48
 Wissler, Clark, 212

 Zuñi Indians at Pueblo Bonito, 22, 98, 135, 145, 175, 208, 209
 Zuñi country, 46, 52, 109
 Zuñi homes, 27, 52, 60

