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REPORTS OF THE CHACO CENTER
Number Six

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THE ARCHITECTURE AND DENDROCHRONOLOGY OF CHETRO KETL

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CHETRO KETL


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REPORTS OF THE CHACO CENTER
Number Six

THE ARCHITECTURE AND DENDROCHRONOLOGY OF

CHETRO KETL

Chaco Canyon, New Mexico

Edited by
STEPHEN H. LEKSON

With contributions by
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Foreword by
FLORENCE HAWLEY ELLIS

DIVISION OF CULTURAL RESEARCH

National Park Service
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1. LYONS, THOMAS R., ED.
   1976 Remote Sensing Experiments in Cultural Resource Studies: Non-destructive Methods of Archeological Exploration, Survey and Analysis. Report of the Chaco Center, No. 1. National Park Service and the University of New Mexico, Albuquerque.

2. LYONS, THOMAS R., AND R. K. HITCHCOCK, EDS.
   1977 Aerial Remote Sensing Techniques in Archeology. Reports of the Chaco Center, No. 2, National Park Service and the University of New Mexico, Albuquerque.

3. POWERS, ROBERT P., WILLIAM B. GILLESPIE, AND STEPHEN H. LEKSON
   1983 The Outlier Survey: A Regional View of Settlement in the San Juan Basin. Reports of the Chaco Center, No. 3. Division of Cultural Research, National Park Service, Albuquerque.

4. BRUGGE, DAVID M.
   1979 A History of the Chaco Navajos. Reports of the Chaco Center, No. 4. Division of Chaco Research, National Park Service, Albuquerque.

5. WINDES, THOMAS C.
   1978 Stone Circles of Chaco Canyon, Northwestern New Mexico. Reports of the Chaco Center, No. 5. Division of Chaco Research, National Park Service, Albuquerque.

6. LEKSON, STEPHEN H., ED.
   1983 The Architecture and Dendrochronology of Chetro Ketl, Chaco Canyon, New Mexico. Reports of the Chaco Center, No. 6, Division of Cultural Research, National Park Service, Albuquerque.

REPORTS OF THE CHACO CENTER

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The Chaco Center, formally known as the Division of Cultural Research, a joint National Park Service/University of New Mexico facility, was established in 1971 to conduct multidisciplinary research in the area of Chaco Canyon, New Mexico. One of the Center's most important missions is to disseminate the results of its research to the professional community and to the interested public. Reports on research projects of the Center are issued either in the National Park Service Publications in Archeology Series or in the Reports of the Chaco Center series. The latter was established in 1976 to provide economical and timely distribution of the more specialized research undertaken by the Center. This report is issued as the sixth of that series.

With this report, the Chaco Center is pleased to welcome Bruce Panowski to its staff as archeologist-editor. Bruce had primary responsibility for the copy editing of this volume, and will continue to edit and coordinate the publication of future reports for the Center.

The Division of Cultural Research maintains an up-to-date list of all published papers, reports, and monographs dealing with Chacoan or Chaco-related research carried out under the general auspices of the Chaco Center, regardless of where they might be published. This list, entitled "Contributions of the Chaco Center," is available on request. Correspondence should be addressed to the Archival Assistant, Division of Cultural Research, National Park Service, P.O. Box 26176, Albuquerque, New Mexico, 87125.

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FOREWORD

Florence Hawley Ellis

My first reactions on opening this volume were mixed, with nostalgia not the least. A group of young persons working in the field, especially if the site is relatively isolated, forms a social unit even if occasionally disturbed by inner rifts. The site becomes a unifying symbol.

It was 1929. At Chetro Ketl we were 60 miles from the railroad; mail came only when our truck went for provisions. If summer storms struck, everyone gathered along the steep-sided but usually dry Chaco arroyo to watch the tricky return of the heavy vehicle through a tumbling torrent. Pushing might be necessary. Telephone connections between the little Chaco trading post and Crownpoint (administrative center and boarding school for the Eastern Navajo Reservation) finally were put in, the line being the top wire of 40 miles of ranch fencing. When a cow leaned against that fence, the phone went out.

A canvas bag of water was delivered to each occupant of the two-party tents every morning. Those who could not scrub teeth, underwear, and their persons in the single gallon must carry their own water. On weekends we washed our hair and then our jeans in a scant bucket of well water and finally used what remained to settle the sand of the tent floor. Then, virtuously clean, we could drop in to the post to watch the trader dicker for rugs, still sold by the pound, from Navajo women who with equal care took out their credit in flour, lard, sugar, Arbuckle's coffee, sometimes a small bag of hard candy, and perhaps a payment on some item of pawn hung back in the closet. If we were hungry we could do as the Navajo did: buy a can of tomatoes and a box of soda crackers. The trader opened the can and furnished the spoon; the consumer perched on the high counter to swing his heels and enjoy the treat.

There was the Fourth of July celebration with Navajos who brought their families in small covered wagons to camp and take part in the horse and foot and sack races, and the paydays when our Navajo laborers lined up for their checks and discovered once again that the custom of frequently changing their names in order to change their luck could bollix up the best intentions of white employers to pay on time.

Social life included an occasional late night Navajo squaw dance, with our young men warned ahead of time that custom gave unmarried girls their choice of partners and that a male so honored must not refuse. He also had to remember to pay the girl at the end of each dance with a dime, a quarter, or a silver button.

But most evenings included only a campfire; a rather philosophical lecture by Dr. Hewett, including experiences with living Indians; and perhaps some Zuni songs and myths by the two or three men from that pueblo who

had been hired by Judd during the uncovering of Pueblo Bonito, and now were back to do the same careful work for us.

The Chaco and the ruins which were its core were ours to love with youth's enthusiasm, but what of the excavations?

Whether Hewett or Judd was first to conceive the idea of a major Chaco excavation, one of the largest tasks to be contemplated by any Southwesternist, never has been said. A stiffness had existed between the two men since early Frijoles Canyon work when Neil Judd and a number of other young archaeologists-to-be were Hewett's students for a summer. But although I knew Judd, his mother, and his uncle (Dean Byron Cummings, my major professor at Arizona), and would work under Hewett for several years, I never heard a comment on the matter from anyone directly concerned. Hewett, directing the Museum of New Mexico and the School of American Research (at that time combined) and the Department of Anthropology at the University of New Mexico, put in two seasons of work on Chetro Ketl in 1920 and 1921. Then he withdrew while Judd ran his National Geographic-sponsored excavation of Pueblo Bonito between 1924 and 1927. Hewett returned in 1929 to direct work on Chetro Ketl in 8-week summer seasons, later shortened by 2 weeks per year to avoid August rains. His temporary withdrawal had been a wise move. Financial backing was less than that for Pueblo Bonito, and the simultaneous presence of two expeditions with comparable objectives in the Chaco would have led to endless comparisons of everything from Judd's kitchen, neatly set up in a back room of Pueblo Bonito with a white-suited professional Chinese cook in charge, to details of equipment and the relative importance of architectural features and artifacts encountered.

The student crews and most of the archaeologists who directly supervised the Chetro Ketl excavations were young. Other than hired Indian laborers, crews consisted of graduate students from schools widespread throughout the country, plus a small supervisory group recently out of UNM. Reginald Fisher's degree was in engineering, but he also had a background in anthropology from UNM and later in the '30s would take a Ph.D. from the University of Southern California. Paul Reiter, field director at Chetro Ketl from 1929 through 1933, had been working his way through school as Hewett's driver and general assistant at the Museum of New Mexico. He had a fresh B.A. in anthropology and by 1931 would finish his M.A. with a thesis on Chetro Ketl. His practical background had been largely as a supervisor in Hewett's undergraduate field school excavations of a moderate size pueblo, Unshagi, in the Jemez, on which the Reiter two volume report published in 1938 remains a basic source today. His Chetro Ketl notes were written in the line of duty, but one wonders whether he ever thought that the task of putting together the big report on Chetro Ketl might fall to him. That, of course, was Hewett's prerogative, but he never had and never would write a detailed archaeological report. A popular writer and always more a promoter than a scholar as such, Hewett was involved with encouraging the opening of a Department of Anthropology at USC as well as handling the state museum, and associated School of American Research, and the Department of Anthropology at UNM which he had founded. Bill Postlethwaite, bursar and instructor at Colorado College, acted as assistant director for much of the work at Chetro Ketl.

We can thank today's young field and laboratory personnel for presentation in a concise manner of all the data today available, together with their own sometimes pained comments on the problems of interpretation. It never is easy to work with notes set down by others, especially on work done before one's birth.

Hewett died in 1945, Reiter in the early 1950s, and Postlethwaite in that same decade. Fisher and Gordon Vivian, a student during our excavations who later continued with research as well as much of the preservation work on Chetro Ketl and other Chaco ruins, died in the 1960s. Gordon's son, Gwinn, who more or less grew up in the Chaco, has contributed important Chaco studies of his own. Sid Stallings had worked on Rio Grande tree-ring studies for the Laboratory of Anthropology for some years before he left the field; Roy Lassetter went on to a career in the Army, retired as a Major General, and died in 1976.

Nineteen twenty-nine ever will be remembered as the year the Great Depression broke over our heads like the eruption of a volcano which immediately wipes out some areas, gradually smothers others, and suffocates all for years to come with the fumes of poverty. Newspapers shocked the country with stories of ruined investors who threw themselves from skyscraper windows at the time of the Market Crash. England and France cried out against the reverberations, and in the greater Chaco area some of the Navajo, unable to feed their families on what little they now could make on sheep, wool, and rug sales, overcame their traditional fear of the dead and dug up prehistoric pottery to be sold in the Burnham Trading Post. The vessels were genuine enough and someone, thought I, should be gathering them for a museum. What worried me was who must have dug holes into the mug handles before firing--or more recently--and inserted a poor grade hand-cut chunk of turquoise. Those stones certainly never had been in place when the pot was fired, for they would have broken and turned to black. But even a surreptitious quick check with my magnifying glass on one specimen showed no glue around the edges.

Back on our campuses, some grad students quietly packed their bags. Others moved into swept garages equipped with a miniature cookstove-heater by sympathetic faculty members. I am thinking of my own school, the University of Arizona. The Great Depression, like a monster, would pursue individuals in their lives and work until it was gradually beaten off in the early years of World War II, 11 and more years later. The young archaeologists and dendrochronologists of today, struggling to reconstruct Chetro Ketl from the notes, maps, and too scanty publications and incomplete collections of the past, know little of the exigencies which have made their task difficult.

No one's efforts toward creative research are made in a vacuum, and after some thought it has seemed to me that as the only living member of the 1929-1933 faculty-supervisory group at Chetro Ketl (I missed the 1934 field season but continued with the UNM-sponsored field work on the south side of Chaco Canyon for a total of 11 seasons in the area), I owe the past generation and the present a sketch of that period and some events from the next decade. If this flashback understandably emphasizes the tree-ring work for which I was primarily responsible in the early years at Chetro

Ketl, it also should shed some light on the problems which have troubled today's dendrochronologists in endeavoring to organize existent data.

At graduation in 1929, Emil Haury, Clara Lee Fraps (now Tanner), and I had been told by Dean Cummings that if we would take our M.A. degrees in archaeology the following year, he could place all three of us as instructors in his enlarging Department of Archaeology. Hardly daring to believe in our good fortune, we thanked the Dean, the University, and whatever gods might be and dedicated ourselves to intensive labor.

My theses was on the succession of pottery types in the Middle Gila, later to be known as the Salado, a subject which my father and I had been working on for several years. In briefed form it would appear in Art and Archaeology in 1932, preceding the studies of Mr. Gladwin, who attached geographic names to my defined types and received credit by publishing them as his own.

In the summer of 1929, I thought to broaden my experience by joining Hewett's Chaco crew as a grad student. I was listed as a cataloger, but as there was little to catalog, much of my time was spent in washing and starting my own classification of Chaco pottery types. The sherds we washed, as I recall the explanation, had been removed from the east trash mound by use of a team and "slip" during examination of that mound in earlier work; we had no indication whatever of levels. Anna Shepard, my tentmate for that season, at the time was making a study of the Chetro Ketl East Dump by sinking a rather small pit down through its center, but her conclusion at the end of the season was that she found what she considered to be the same pottery types at the top as at the bottom, so stratigraphic interpretation was impossible.

In 1929 we three new teachers at the University of Arizona took up our classes with students but little younger than ourselves. My contract included research with pottery in the state museum located on the campus. But it was that school year when Dr. A. E. Douglass, director of the Steward Observatory and father of tree-ring dating, published the first dates on several prehistoric Southwestern ruins (1929) and also offered his first class in tree-ring dating. Haury, Gladwin, I and six to ten others promptly signed up for it. The following summer, equipped with one of Douglass' own tree-ring kits, I made for the Chaco.

The kit consisted of two borers made from pipe in his laboratory workshop, a file with which to sharpen and "set" their teeth when needed, and a diamond-shaped starting plate to nail onto a beam so that the borer, when set to drilling by turning a carpenter's brace, would not jiggle so badly from side to side that the outer rings of the specimen would be entirely lost. There also was a short piece of rubber tubing through which one puffed the accumulating sawdust away, and there was a slender rod with a chisel end which was to be used as a pry in breaking off the core after the drill had reached the center of the wood specimen. These all fitted into a narrow canvas bag with shoulder strap. Power came from one's good right arm and the force with which one leaned on the brace where possible. No one yet had even dreamed of a portable generator for that task. There

also were other items: a piece of wood tooled to provide plugs (to be driven into each hole after the desired core had been removed), tags to label the specimens, a pencil to mark plug and core with duplicate numbers so that the provenience of each core could be traced in the future, a pocket notebook for recording specimens and provenience, and a saw to use when a specimen could be cut from a log without despoiling something of archaeological importance.

The worker also carried a specially designed razor blade knife to cut a clean pathway which, when touched with a bit of kerosene, showed the rings and even the wood cells; a good 10x magnifying glass and sometimes others of higher power; and a copy of the master chart which provided a representation of the growth patterns running back from the twentieth century as far as the sequence at that time had been worked out. Derivation of dates was as non-mechanized as collection of the samples. This usually was done after the specimens were back in the laboratory where ring patterns carried by the unknown could be actually compared not only with the master chart record, but also with the patterns of previously securely dated samples of wood.

At Dr. Douglass' suggestion I bought a Swedish increment borer, devised by foresters for drilling into a living conifer without harming the tree in order to extract a pencil-size core which would carry all its growth rings. When "Dr. D." (as his co-workers affectionately knew him) discovered that the day when I must leave for the Chaco chanced to correspond with that on which he was going northeastward on other business, he invited me to accompany him to Gallup and we enjoyed some experimentation with the borer while driving through the forests of northern Arizona.

His reiterated precept was that we should collect and bring back "everything" that might possibly be datable from any and all prehistoric sites. You did not select the better of two logs; you sampled all as they were brought to light, no matter how the arm might ache from grinding away with the drill, infinitely slower than a bit and brace per se. Our only respite was the advice that drilling lintels probably was not necessary because the logs were small in diameter and rather frequently of cottonwood, as we, indeed, found. Furthermore, where lintels still were in place, it usually was most difficult to use the brace and bit even with a ratchet arrangement because of lack of space for the necessary arm movement.

In my first season of tree-ring work in the Chaco, I collected specimens from wood which previously had been uncovered and left in situ in Chetro Ketl, but I also took some specimens of logs which had been found loose in rooms and then removed to a pile for some possible future use. The latter, of course, could not be marked for provenience. Some from the 1920 and 1921 seasons, such as horizontally-laid bench pilasters in some of the small kivas, had suffered considerable decay in the intervening years.

I can well recall Dr. Douglass' excited delight when he checked my dating back in the laboratory on a slice from a dilapidated horizontal pilaster and found that the winding track I had cut to avoid holes left by decay went back to a center grown in A.D. 643. The entire record was

sensitive, and it carried across a gap in the early 700s with which he had been struggling for some time in the hope of securely tying down some of his still older specimens to the master chart as it then existed. That specimen, with its outer cortex entirely ground away by the prehistoric builders in squaring off the log as neatly as if it had come from a planing mill, provided no building date for the kiva, but it certainly illustrated the importance of "collecting everything."

My own primary concern with Chetro Ketl dates was in being able to attribute rounded or at least approximate time limits to the masonry types which could be recognized by their superposition to have been used as conceptual ideals for construction during successive periods. Wood in situ in association with those masonry types could provide such dates, though in order for them to be thought of in somewhat positive terms there necessarily must be numerous dates per masonry type. The possibility of single dates not being reliable as indicating the actual time of construction for anything always was emphasized by Douglass because of reuse of old salvaged wood for new building and of newly cut wood being used in repairs on old structures. The only aid one has in evaluating single dates--or even two or three on a specific structure--is the probability that if that structure is very similar in appearance to neighboring houses or is attached to neighboring houses (but keep watch for tied or non-tied abutments or continuous walls), and the single date on one fits with the single or several dates on the others, there is some probability (but not certainty) that the single date may be meaningful. Where styles of masonry are quite clearly identifiable, as in most of the great Chaco structures, the combination of superposition and date can provide approximate time periods for those styles found in rooms or sites even where no wood is available.

All the tree-ring specimens went back with me to Tucson, where the research portion of my job, after my first year, was reoriented toward their dating. This I did in the Tree-Ring Laboratory set up beneath the old baseball stadium. Dr. Douglass' rule, from which I never deviated, was that every date before being published or otherwise given out must be checked by another trained dendrochronologist. All of the specimens I dated or found too complacent or otherwise unsuitable for dating were turned in to Dr. Douglass himself, in groups, for his checking on my conclusions. That included the evaluation of reliability of dates on a scale running up to 10. Dates evaluated as 8, 9, or 10 were publishable; those at 7 or below were considered too unreliable for use. Usually, Dr. Douglass signed his initials on the tags of specimens he had checked, but this was difficult on specimens without tags, such as cross sections with identifying number merely marked on the wood itself.

Whether the too complacent or too erratic specimens (the latter usually juniper) were returned to Santa Fe, I am not sure, but at least through the first years the others, after Douglass had taken representative slices for his own records, went back to Dr. Hewett at the Museum of New Mexico. I vaguely recall that Dr. Douglass had Sid Stallings, then a student at the University of Arizona and working part-time as student assistant to Dr. D., make out a card index of my wood samples, but I do not recall ever having used those cards myself. The question proposed in this

present monograph as to why I ever would have changed the data in my charts from that of the Stallings cards does not quite make sense as the data were mine, I was using the notations as I had them, and Stallings was merely making an organized copy. Who miscopied or misinterpreted or felt there was reason for change cannot be reconstructed this many years later. Certainly we had a great deal of trouble in obtaining some of that data and admittedly were none too certain as to its all being accurate.

For several years distress has been radiating from our friends in the modern Tree-Ring Laboratory at the University of Arizona on the problem of "unprovenienced specimens" from our Chaco work and from that of others. Certainly the matter needs all clarification possible. I must admit that the term "unprovenienced" always incenses me because it implies that the persons who took the specimens did not bother to set down the data concerning whence they came. For shame! For shame, indeed!--as I would have said to later students in my own tree-ring classes at the University of Chicago and UNM.

But the only specimens for which I or either of my two successive assistants, Roy Lassetter or Faurest Davis (both brought to the Chaco to alleviate muscle work for me) did not set down a provenience (as far as I am aware) were those few for which none was available. This would cover the 1920, 1921, and 1929 excavated specimens if removed from their original setting before my collecting got under way. Roy, with the agility expected of a polo player, could wield borer and saw faster than I, and could climb to spots which daunted me. Faurest had been an assistant in the Douglass lab and also was a specialist in photography.

Except for specimens from wood no longer in situ, my samples criticized or lamented as "unprovenienced" were not lacking in designation of room or floor from which they were taken, as best we could interpret room number and floor at that time. The first problem was that there was a Reiter map and a Fisher map which differed somewhat in room numbering. The second problem was that most of the time I had no map at all. We asked the number of a room. We tried to estimate the floor, and if excavation was being done right there at the time, we discussed the matter with someone in charge. The reason we did not have a map is that the final and presumably correct map was in process of construction, a quite understandable situation. How can one make a map that is satisfactory until the ground floor rooms have been excavated? One obviously must start excavations from the sides and top if the pile to be worked through is widespread and several stories high. Eventually one reaches the ground floor. Today one looks at Chetro Ketl from the plaza level, peering down into the Great Kiva and up to count the number of stories which exist. But we had no plaza level until tons of fill had been removed.

The problem of what floor actually was represented by the sampled wood was our worst. I could see no way of determining, securely, a floor number until we knew where the original ground level had been. Whether as a result of my cry of distress on this point or not, a trench was put down inside and outside the back wall to determine how much silt, largely deposited by runoff cascading from the cliffs or swept in by the arroyo

during heavy storms, had raised the outside ground level to its present height. It proved to have grown by an amazing 12 feet!

That immediately brought the thought that there then must be a previously unguessed and still hidden entire floor of first-story rooms not yet reached. I remember pondering the setup. What should I do? Answer: I changed the floor numbers pertaining to some of the specimens I had taken in that specific part of the site that season, placing them one story higher than I previously had supposed them to be. So much for the "inflation" of floors hypothesis.

There remained the problem of specimens taken earlier and that of specimens taken at a distance from where the outside trench had been sunk. We had no overall line-level across the ups and downs of the excavated and unexcavated sections of the pueblo, and although a transit was used by those engaged in the mapping, it was not at my command. I did the best I could by eye and cheered myself with the supposition that when the excavations had progressed down to floor in several areas, I could recheck floors against specimens by means of the numbered plugs we had driven into the holes (left when specimens were bored in situ). But I admit that I worried a bit about how long the numbers would remain visible on the unprotected plugs. Not long enough, as we now know.

There was a considerable chance that floor numbers would not necessarily be consistent as recorded for rooms at a distance from each other, and even that they might not be consistent when recorded during successive seasons for rooms above each other. The only solution I can see today to such a predicament is use of a combination of transit and line-levels strung across top floors of a bank of rooms being excavated, or a quick test pit to the base of the whole, but large enough to permit a clear and visible story count. The suggestion that wood specimens should be collected after all excavation is completed means that any not securely anchored could be lost forever. Otherwise, we must return to the troublesome device of a recheck for all floor numbers after excavation has reached the bottom, which, for me, turned out to be impossible. The one consolation was that I always had the association between my dates (providing they were not from reused or repair wood) and masonry types.

In 1930, with the wood uncovered in earlier years largely sampled and that from contemporary excavations largely being handled by Lassetter under my direction, I turned my attention to the much dug but still unexplained Chetro Ketl East Dump.

My hope was that the strata which were visible on the sides of the old cuts might be found to contain distinctive pottery complexes, if not distinctive types, associated with the observably contrasting soil layers. I also was hopeful that some of the household charcoal deposited with other discarded materials comprising a stratum might turn out to be datable. The technique which proved this to be the case was new.

A trench with a series of stratigraphic sections was excavated through the East Dump. A scale drawing representing a side view of this long trench, divided into its sections and levels, was put upon a length of

wrapping paper, and the percentages of specific pottery types comprising the complex in each level of each section were copied into the appropriate box. Outlines of the observable soil strata distinguished by color and relative content such as ash piles, clay, and broken rock were superimposed over the original drawing. The dates that could be derived from a small proportion of the hundreds of charcoal specimens sifted from the units (each level within a section) also were set down in their appropriate boxes on the chart. Had the charcoal been largely from logs, the small remnants never could have carried enough rings for dating, but most of the pieces were from the branches of shrubs or trees, fuel for the household fire-pits.

Bit by bit a pattern emerged. Two of the four observable strata appeared to have been composed largely of household sweepings, but the other two, though partially of sweepings, had been considerably augmented by the trash of buildings torn down. Their usable material apparently had been reserved for reuse.

How did I chance to write the dissertation on tree-ring dating and the part it did or could play in unraveling the sequence of masonry types and trash mound strata with their burden of sherds? We are once more back to the first paragraph of this overview.

By this time the Great Depression was closing in. In 1932 the younger members of the faculty at the University of Arizona were told that the state must cut back for at least a year. We were to take an unpaid leave of absence, during which we might, they hoped, finish off our Ph.D.s. As we had been hired (if I can remember back that far) at $1350, and had been raised to $1500 (per year, not per month), my bank account would not cover me for more than one school year; that much was clear.

I wrote to the University of Chicago outlining what I had been teaching and suggested that my Chaco research using tree-rings, architecture, and pottery might be worked into a dissertation. Fay-Cooper Cole was encouraging and offered a small work scholarship, though he later was to apologize for its being cut even smaller. Fortunately, I had been teaching some of the classes I otherwise would have been required to take. I polished up on French and Spanish. A statistics course was required, so I promptly enrolled for a class given by a friend, head of the statistics department at Arizona. Clyde Kluckhohn for some years had been pushing the concept of applying statistics to anthropology, and when we reached the subject of statistical tests on significance of differences between two samples, it occurred to me that I might try it out in evaluating the shifts in proportions of specific pottery types between the observable strata of the Chetro Ketl East Dump. This became the first use of statistics in Southwestern archaeology, though because of my drastic time shortage I had to hire a friend to do part of the arithmetic after I had laid out data and formulae. A slide rule hung from the belt of every engineering student and a few campus offices had calculators, but computers still were in the land of dreams.

By the time I reached Chicago that fall, I had written the dissertation twice (and would write it twice more) but I still had to face Hoijer's linguistics, Radcliffe-Brown's beloved Australian kinship and the African

functional systems, Redfield's Central American social evolution, and osteology more advanced than the physical anthropology recently introduced at Arizona. I saw little of Chicago, but I passed the language exams, the written exams, the oral exams. And I passed the zero mark on my bank account and had to write for a $200 loan, a considerable sum at that time.

Then I learned of the rule then existent that one could not receive the degree unless the dissertation had been published!

So I wrote to Hewett asking if there was any chance of immediately putting it through the press at the University of New Mexico and he answered that it could be arranged. The editor explained that I would have no opportunity to see galley or page proofs but he would do his best. Worrying about how I was to repay my loan, I wrote to Dean Cummings asking if finances were any better in Arizona than when I left, meaning, with ladylike subtlety on subjects of money, "Did I for sure have my job for September?" He answered that finances were no better, meaning, with gentlemanly avoidance of direct reference to money, "Should you be hoping for a raise, there is no chance at present."

Panicking, I wrote desperately to UNM asking if they might have a place for a Southwestern archaeologist with overtones in dendrochronology. My friend Kluckhohn, teaching at UNM that year but about to leave for Harvard, may have opened up the place into which I was slipped, but not until I had signed the new contract did I discover that my University of Arizona classes all had been set up for their fall schedule, as originally promised. But the die had been cast.

Then I took off in a very second-hand Model A for 2 months to begin looking into the possibilities, as requested by Chicago, of establishing tree-ring dating in the Midwest and South, a task later to be resumed while on loan from the University of New Mexico with Dr. Douglass as advisor at a distance.

Thus I was not involved in the Chaco excavations of 1934, last of the major Chetro Ketl work. Why was the project dropped? There simply were no more funds. The floors from which my specimens had been taken never received that checking I had expected to do--"later." Reaching most of the plugs would have been difficult and much of the excavation, of course, still had not been done. The later years of Chaco work, under auspices of the University of New Mexico, all centered in (though they were not entirely confined to) the south side of the canyon. I continued to participate in work there for another 5 years or more.

Two possiblilities for discrepancies between my tables and the Protocol immediately come to mind. One is the chance that slips occurred in the necessarily hastily typed copies of the manuscript. The other is that corrective additions of a few outer rings found on some bit of circumference by Dr. D. or myself in final examinations of specimens may have been incorporated into the one but missed the other. One can apologize without being able to put a finger on exact causes of problems 50 years after the fact. The dating of successive masonry types, as far as our data extended at that time, could not have been appreciably affected by that problem.

I would have said that a check on the actual specimens, all of which in the long run supposedly were turned over to the new Tree-Ring Laboratory when it became the single central institution for tree-ring dating, should have cleared various problems. But I gather that neither the Tree-Ring Laboratory nor the Museum nor UNM ever located all of my wood specimens. One particular sample which hardly could have disappeared by chance was the partly carbonized specimen some 26 inches across, the base to the only remaining roof support from the Chetro Ketl Great Kiva. It had been laboriously wrapped with cloth strips and strengthened with a jacket of plaster. Finally it was crated and delivered to the Tree-Ring Laboratory while we still functioned beneath the old baseball stadium. Alas, it proved to be, as I feared after my examination of it in the field, too complacent for dating. But it would have provided a superb piece for a Chaco exhibit as well as offering some information in itself on the conditions under which it had grown.

Did other less impressive artifacts suffer the fate of disappearance after initial study? Where are the thousands of potsherds we classified and boxed? If I am not mistaken, they went from Santa Fe, where the Museum had no more storage space, to the basement of the then-new Administrative building at UNM. A few of the wood specimens later reached the high shelves of cupboards in my personal laboratory when our Department of Anthropology took over the old Student Union building, and a few of the Chaco sherds got into drawers in that same room. But the others? I remember hearing that when tunnels for heating pipes were being dug across the campus, some of the bursting sherd boxes were emptied beneath their floors and that others had been offered for driveway gravel. Yes, I was shocked, but it was too late to protest. And it is true there was no space, and what possibly could have been done I have no idea.

Some artifacts undoubtedly went to other museums; some may have merely "disappeared." I have no information. But I know of at least two other prominent Southwestern institutions which, at about that same time, each had its own discard pile outside the walls and cheerily encouraged visitors to plunder there rather than on unexcavated sites. Sherds, flakes, and even metates, manos, and some axes in those years did not carry the semi-sacred aura with which we invest them today (their numbers then seemed endless), and the problem of where to stack what might be considered second-class--or unprovenienced--items from past work, and yet leave space to store items from this year and the next, had no solution.

Projects, museums, and schools have been, characteristically, understaffed and frequently desperately short of space. The Great Depression added the problem of subsistance wages and the impossible pressure of time. Grants then were so little known that they hardly broke into one's consciousness; field trips and field work came out of one's grocery money.

The fact that efforts to handle the data and materials of large collections imposed almost insurmountable problems still is reflected in the present state of some artifacts housed in eastern and western institutions

alike, and in the dearth of data and of publications. The growing crisis may have been one piece of the background which resulted in a new direction for archaeology.

It was in the first half of the 1930s that problem-oriented archaeology began to receive intensive discussion, as was impressed on students in the Chicago classes and no doubt elsewhere, as well as in numerous articles in The American Anthropologist. Our foremost problem in the Southwest during the 1920s and early 1930s was exploration, the search for broad facts, knowledge of which must precede anything more detailed. We were discovering something of the overall definition of cultures represented by the prehistoric sites, together with an approximation of their distribution and extent by type. In the 1920s we also had begun to realize that distinctive similarities in pueblos and their artifacts could be expected within river drainages. Pottery types from such clusters were being defined and students were expected to know them. The Hohokam were just coming to be accepted as non-Pueblo because of specific divergences from Pueblo patterns, but we still knew nothing of Mogollon, Sinagua, and Hakatayan. Neither could we separate Paleo-Indian from Archaic cultures, though some items from each had been found and were accepted by a few professionals as contemporaneous with associated fossil animal bones.

In the Chaco, the '30s and '40s actually did not see so much change in concept as in reducing the size of projects. Numerous small ruins were excavated on the south side of the canyon with the intent of learning their period and relationship to the big ruins along the north canyon wall. Unfortunately, analysis was limited and publication scanty. Running the work as a field school with instruction, student papers, and credits to record contributed unforgettable experiences, but took up time and energy.

Problem-oriented archaeology introduced, first, an emphasis on hypothesis and, second, and a little later, the ever-increasing importance of statistical analysis, enhanced in part by the new magic of computers. For a time the techniques which might be used in solving a problem were receiving considerably more attention than the importance of a conceptualized problem or personal familiarity with the material culture involved. To the appalled realization of some then middle-aged archaeologists, a considerable number of the young people of that stage never got their elaborate spacecrafts off the ground. What can you do, even with a computer, if you never have learned to identify the sherds?

A matter which warrants discussion in more detail because it still plays a part of some importance in Chaco discussions is that of the hypothesis. A student was taught to define his "problem" and then to think up the several hypotheses, which conceivably might provide a key to unraveling that problem. The "hypothesis" was something to be investigated, and eventually accepted and turned into theory because it proved to be the probable explanation for a phenomenon, or discarded because the preponderance of evidence was against it. One did not start by believing in a certain hypothesis and then setting out to "prove" it. Such placing of the cart before the horse would set archaeology back to the period when prehistoric axes picked up in England were believed to have been thunderstones.

Yet, after at least 20 years of hopeful search in which no one has found actual evidence of Mexican importation into the Chaco of more than parrots (specifically macaws) and their feathers, plus I believe, a couple of sherds probably of Chalchihuites origin, we still find some archaeologists referring to the Chaco as a center for Pochteca trade. There also are, of course, some various concepts pertaining to the topic of religion, and, quite possibly, certain others concerned with architecture and some pottery shapes and designs pertinent to the Chaco itself.

The concept of trade with Mexico is not to be denied. Three possible hypotheses regarding the means come to mind. Feathers, birds, and the transfer of Mexican ideas to the Southwest could have come out of private trading emanating from Casas Grandes culture, or elsewhere south of our present border. One finds historical references to an occasional man with bird perched on his carrying basket as he comes from the south into New Mexico.

Or Pueblo traders going south could have brought feathers, birds, and ideas back from a visit into northern Mexico. The Pueblos still have traditions of ancestors making such a junket in the historic period, but in truth only a little evidence of Southwestern artifacts or products having reached Mexico has been reported.

Or the Pochteca could have sent a body into New Mexico periodically, though one would suppose that for such an expedition to be profitable, considerable goods should have been imported into the Chaco and considerable returned to Mexico in exchange.

At this point, data backing either of the first two hypotheses are scant, with that pertaining to the concept of Pochteca trade still more tenuous or even negative. But little of the turquoise found in Mexican sites has yet been proved to have originated in our Southwest, and in no case is Chaco workmanship proven for Mexican mosaics. On the other hand, we have no disproof, and we have no data at all in relation to trade of perishable craft items such as woven pieces with intricate surface painting or elaborate fabrication. Like baskets, fur, feather, and hide products, they could have yielded to decay. Neither have we data on such expendable goods as salt and foods. The subject is not yet closed, but wishful thinking certainly is not an archaeological technique. Convincing data to back any of the three hypotheses would be worth its weight in macaw feathers.

May we now examine another hypothesis, that of a native stratified society, which for some time has dogged comments on the Chaco?

The "proof" set forth by enthusiastic believers consists of the large Chacoan projects which would have required cooperative work. Yes, that could have been accomplished by a stratified society (hypothesis 1). Our own culture would handle it thus. But those accomplishments could have been made by an unstratified society (hypothesis 2). The technique we would apply to consideration of that hypothesis is variously known as ethnoarchaeology or ethnohistory, with the culture of the living Pueblos as our specific example.

In 1880, Bandelier chanced to visit and describe, though in scattered bits, the process of construction of a new village, together with replacement of their bridge across the Rio Grande, by the people of Santo Domingo. This tribe is one of the largest and definitely the most conservative of New Mexico's Pueblo peoples. The two tasks, both necessitated by total loss of the old site near the river bank in two successive floods, were anything but small. Like the annual work on major irrigation ditches in every pueblo, this labor was handled by all the men of the village under direction of the war captain. It was he who ordered the division of workers: some to bring timber from the mountains, some to construct the long continuous side walls for the several roomblocks, some to put in cross walls and woodwork, and some to lay the roofs. The women of each family that was to occupy one of the succession of contiguous apartments in a houseblock fed the men working on that area. Even the cacique, chief religious personage in a Rio Grande pueblo, was expected to participate unless ritual duties occupied all of his time (Lange and Riley 1966:97, 98, 105, 108, 111-115).

Those workers were neither slaves nor serfs, but they were not paid. They still came home singing at the end of a day. The new village and the bridge, like the ditches, were understood to be for the benefit of all and necessitated the cooperation of all.

Non-cooperation in a pueblo is interpreted as disloyalty to the group and can result in punishment through the office of the war captain. The best example I have witnessed occurred at Zia in the 1940s with the expulsion of two families from the pueblo, with complete loss of their homes and lands because they had refused to participate in plaza sweeping, church plastering, and cleaning of the ditches. All three activities were tied into the native religious calendar. The refusal had resulted from the recent affiliation of those families with one of the evangelical churches which tolerated no shred of continuing relationship to any other cult. The council of that pueblo, after debating the issue for several months, decreed that individuals had the right to select their own religion, but that refusal to cooperate in what were seen as public duties thereby cut those persons out of the tribe. It also was certain to result in extended and painful social sanction within the group.

The native authoritarian system in all the pueblos, though differing slightly in details, historically was--and is--fundamentally the same. Each officer was the personal representative of a parallel member of the hierarchy of supernatural beings. A man took his responsibility and the power which implemented it directly from his supernatural counterpart. The cacique (a term introduced by the Spaniards) or chief priest, as the human incarnation or representative of Earth Mother and thereby ultimately responsible for all that pertained to cultivated plant growth and food, was (at least into the 1940s and probably still) addressed appropriately as "Mother."

In the past a war (or outside) priest, an officer found today in modified form in only two pueblos, represented Sun Father. That "priest" carried the duty of primarily directing his people in village projects as well as protecting and tending shrines on tribal borders and keeping order.

His two assistants, representatives of the older and younger war gods, sons of Sun, gave a great deal of physical aid in those lines. When the position of war priest disappeared as the result of U.S. decrees against warfare and taking the scalp (deemed necessary to his office), the chief war captain or "war chief" took over the majority of his duties and has continued to handle them since, though some went to the governor, a Spanish-introduced office. The hunt chief and other lesser officers, once important but reduced to a minor role in the modern scene, or sometimes missing altogether, similarly were human representatives of somewhat lesser deities. All, and especially the cacique and war chief or war captain, were watched, especially by other officers, to see that their behavior did not fall below standards presumed for their sacred prototypes. It is appropriate to add that according to Pueblo concept, no supernatural beings are all good or all bad but deport themselves rather as human beings, with variation within a complex of attitudes.

The power of the religious officers was unquestioned because their duties and decisions were believed to be those of the supernatural beings with whom they ever must be in close touch. Their words were supposed to be those of a supernatural relayed through human lips. Their life style, however, was that of the people around them, though the cacique and his family were fed, clothed (none too well) and housed by the contributions of his villagers so that his time might be devoted to their service, as they might expect from an extension of Earth Mother. We have no evidence that any other officers were publically supported nor were they paid, though they were required to accept the position (like it or not and usually for life) when chosen according to local system. When the Spaniards insisted that each Pueblo "elect" a roster of secular officers, those actually were selected by the local religious hierarchy and required to serve their year of office unpaid (until the very recent period) as their personal duty to the community.

Officership, of whatever type, is a duty. The man was respected for what he represented but he was not expected to live above his fellows, had little chance to do so, and, like other members of a Pueblo, would have been criticized and probably have suffered retributions had such tendencies been apparent. His paraphernalia of office was not personally owned, though personal ownership of some religious-use articles intended for group ritual was not unusual. At death an officer, like other members of the religious societies, was buried in the costume and painted markings of his own group so that he would be recognized in the afterworld, but group-owned ritual items were kept for the next person holding the leadership position.

And--to hurredly answer the question which usually pops into the minds of non-Pueblo individuals--because personal ownership of artifacts was emphasized even more among the Pueblo people than among ourselves, at one's death whatever he had not given away before but still owned either went into the grave with him or onto a shrine for the dead. The spirit of the artifact would accompany the spirit of the person to the afterworld, and thus continue to be used in a life believed to be much like that on earth.

Would the presence of numerous vessels or other artifacts in a grave point to society stratification? This might depend on one's definition of "stratification." Numerous vessels should indicate that the person with whose body they were found was an ardent potter or that they had been given to the person, probably before death, by a potter relative. The grave of a Pueblo trader today could hold his own dance headdress, locally-made turquoise and shell necklaces, a Navajo blanket, pottery from other pueblos, and a few glass dishes, but the chances are that now the majority would be placed on or in a shrine by his relatives.

The study of Chaco culture, running from the unpatterned digging of the late nineteenth century to the carefully planned outlining, sampling, and interpretation which has characterized the Chaco Center, is by far the most inclusive ever covered by Southwestern archaeologists. It has not been completed. There remains yet a great amount of dirt to be sifted and questions to be answered by archaeologists of another generation. Errors will be made when new techniques are applied, as they have been in the past, but it is through trial and error that those new techniques, like those which arise in natural species, produce results hitherto unknown.

PREFACE AND ACKNOWLEDGMENTS

Stephen H. Lekson

Chetro Ketl is crucial to our understanding of Chaco. It has by far the most tree-ring dates of any Chacoan site--60% of the published dates from the Great Houses at Chaco come from Chetro Ketl. This one ruin has colored our perception of Chacoan chronology--boom and bust--for half a century. The whole notion of a Chacoan "florescence" is structured by the clustering of tree-ring dates, dates derived mainly from Chetro Ketl.

Chetro Ketl was excavated in the 1920s and 1930s. One publication from that era is a prototype for the present work: Florence Hawley's "Significance of the Dated Prehistory of Chetro Ketl," published 50 years ago in 1934. But a final report on the site never appeared. It is slightly ironic that the present volume was produced by the Chaco Center, located at the University of New Mexico, the institution responsible for most of the Chetro Ketl excavations.

Of course, this is not the long-awaited final report. Our report is basically descriptive, and is limited to architecture and dendrochronology. The data presented here were gathered for a larger study of Chacoan building, and would have been relegated to footnotes in that study or the Chaco Center Archives had Chetro Ketl not been Chetro Ketl. Because of its importance to the interpretation of Chaco Canyon, the Chaco Center decided to make the architecture and dendrochronology of Chetro Ketl more widely available.

This report is aimed at the archaeologist, and specifically at the Chaco scholar. For those not familiar with the jargon of Chacoan architecture, I have appended a Glossary and a brief review of Chacoan building (Appendix A).

The work leading to this report began in March 1978, when I tried to reconcile the published dendrochronologies of Chetro Ketl. That first attempt failed, dismally. The sad tale was committed to paper (Lekson 1978) and sent to the Laboratory of Tree-Ring Research for comment. William Robinson and Jeffrey Dean of the Tree-Ring Lab commiserated with me over Chetro Ketl's dendrochronological dilemmas, and encouraged further work on the problem. Our correspondence resulted, one year later, in a contract with the Tree-Ring Lab to redate Chetro Ketl.

As part of that contract, Julio Betancourt completed a painstaking review of the notes and records at the Tree-Ring Lab in May 1979 (Betancourt 1979). That same month, Jeff Dean and Richard Warren resampled the exposed wood at Chetro Ketl, while Peter McKenna and I were recording the standing walls. Between their portable generator and electic drill, and our miles of line-level string, the Park Rangers on Chetro Ketl tours must have been forced to invent some rather creative answers.

Old notes and maps from the UNM excavations at Chetro Ketl were housed in the Chaco Center Archives. McKenna and I decided to abstract what we could from our Archives, and from similar collections at other institutions, to supplement our architectural records. We sought notes, maps and other Chetro Ketl memorabilia at the Museum of New Mexico's Laboratory of Anthropology and at the New Mexico Photo Archives (among other places); their staffs ensured that our quest was both productive and enjoyable. These data, presented in Chapters I and II, were gathered, deciphered, correlated, textually criticized, and otherwise battled with during October 1979. The first version of Chapter IV, a trial run at the construction history of Chetro Ketl, was finished in November, as was the drafting of the wall elevations. Catherine Ross helped greatly in the archival work.

The important and time-consuming process of dating the tree-ring samples was the work of Dick Warren. A list of dates and Dean's initial chronological interpretations were received at the Chaco Center in November 1980. The following month, I revised my notions of Chetro Ketl's construction history accordingly, and wrote the first version of Chapter VI (which will appear in an expanded version in the aforementioned study of Chacoan architecture). The completed materials were then reviewed by the Chaco Center staff, most notably by Tom Windes, Wolky Toll and Bill Gillespie.

Dean worked out the details of the convoluted dendrochronology over the next half year. Most of his formidable study (Chapter V) was received by the Chaco Center in May 1981. At this point, we began to consider assembling the various Chetro Ketl materials in one volume, but beyond agreeing that a Chetro Ketl report was a nice idea, not much was accomplished over the next year. McKenna typed up Chapters I, II, III and IV; much of the drafting was completed by Jerry Livingston and myself; Dean continued to hammer away at the remainder of Chapter V. But the pace of production was not exactly frenetic. We all had other projects and commitments.

Towards the end of 1982, Jim Judge (Chief, Division of Cultural Research) began to press for completion. The pace quickened. Bruce Panowski was enlisted as technical editor, and in January 1983, we received Dean and Warren's finished report. Florence Hawley Ellis, professor emeritus at UNM, found time in her busy schedule to write the foreword. A draft of the volume was reviewed by Alden C. Hayes and Larry Nordby. After their comments were incorporated into the text (much to its benefit), final copy was prepared by Panowski and typed by Angie Bratcher and Lea Hott. Jerry Livingston did the drafting.

Bannister (1965) assigned a number of Chetro Ketl wood samples to a catagory called "Species X," which he tentatively identified as either spruce or fir. Recent scanning electron microscope work by Julio L. Betancourt has disclosed anatomical features that identify the majority of a group of Chetro Ketl Species X samples as spruce (Picea spp.), and the rest as fir (Abies spp.). The re-examination and classification of the remaining Species X specimens could not be accomplished before this volume went to press; therefore, the designation spruce-fir (SF), which includes samples belonging to one or the other of these genera, is used in place of Species X. Future examination of the Species X samples will allow true genus and species identifications to be made.

CHAPTER I

INTRODUCTION

Stephen H. Lekson and Peter J. McKenna

Chetro Ketl and This Study

Chetro Ketl is one of the largest ruins in Chaco Culture National Historical Park, New Mexico. The visible architecture of Chetro Ketl dates from the early eleventh to the early twelfth centuries A.D. The rear wall of the building is about 480' long. The ruins cover almost 3 acres, with almost half of that area consisting of enclosed plaza. Chetro Ketl, at its largest, had between 200 and 225 ground-floor rooms, and a total of 450 to 550 rooms on all stories. Twelve kivas are currently visible, including one Great Kiva in the plaza.

Chetro Ketl is one of the central group of Chacoan ruins (Figure I:1), 0.4 miles east of Pueblo Bonito. Low walls may have run between Chetro Ketl and Pueblo Bonito, forming a possible compound. Pueblo Alto is only 0.6 miles north-northwest, and Casa Rinconada (largest of the excavated Great Kivas) 0.4 miles to the southwest.

Numerous smaller sites and features surround Chetro Ketl (Figure I:1). The rear wall of the ruin is less than 100' from the canyon cliffs. For over 1300', from Talus Unit #1 (just west of Chetro Ketl) to the head of the rincon behind the ruin, this south-facing cliff served as the back wall for numerous structures. Just to the west of, and perhaps contiguous with Chetro Ketl, is a smaller square building, similar in plan to the "McElmo Phase" sites (Vivian and Mathews 1965). Southeast of Chetro Ketl, across a recently rechanneled gully, lies a large oval mound. Originally standing 20' above the surrounding valley bottom (Hawley 1934:31), it has been greatly obscured by repeated trenchings.

The name Chetro Ketl was first reported by Lt. Simpson (1852), relying on the knowledge of his native guides. While most names of Chacoan ruins are either Navajo or Spanish, Chetro Ketl is neither. Simpson's guides told him the name meant "Rain Pueblo."

More prosaically, Chetro Ketl has been given the following numerical designations at various research institutions:

Arizona State Museum	New Mexico B:13:3
Museum of New Mexico	LA 838
Museum of Northern Arizona	NA 2307
University of New Mexico	Bc 246
National Park Service	29 SJ 1928

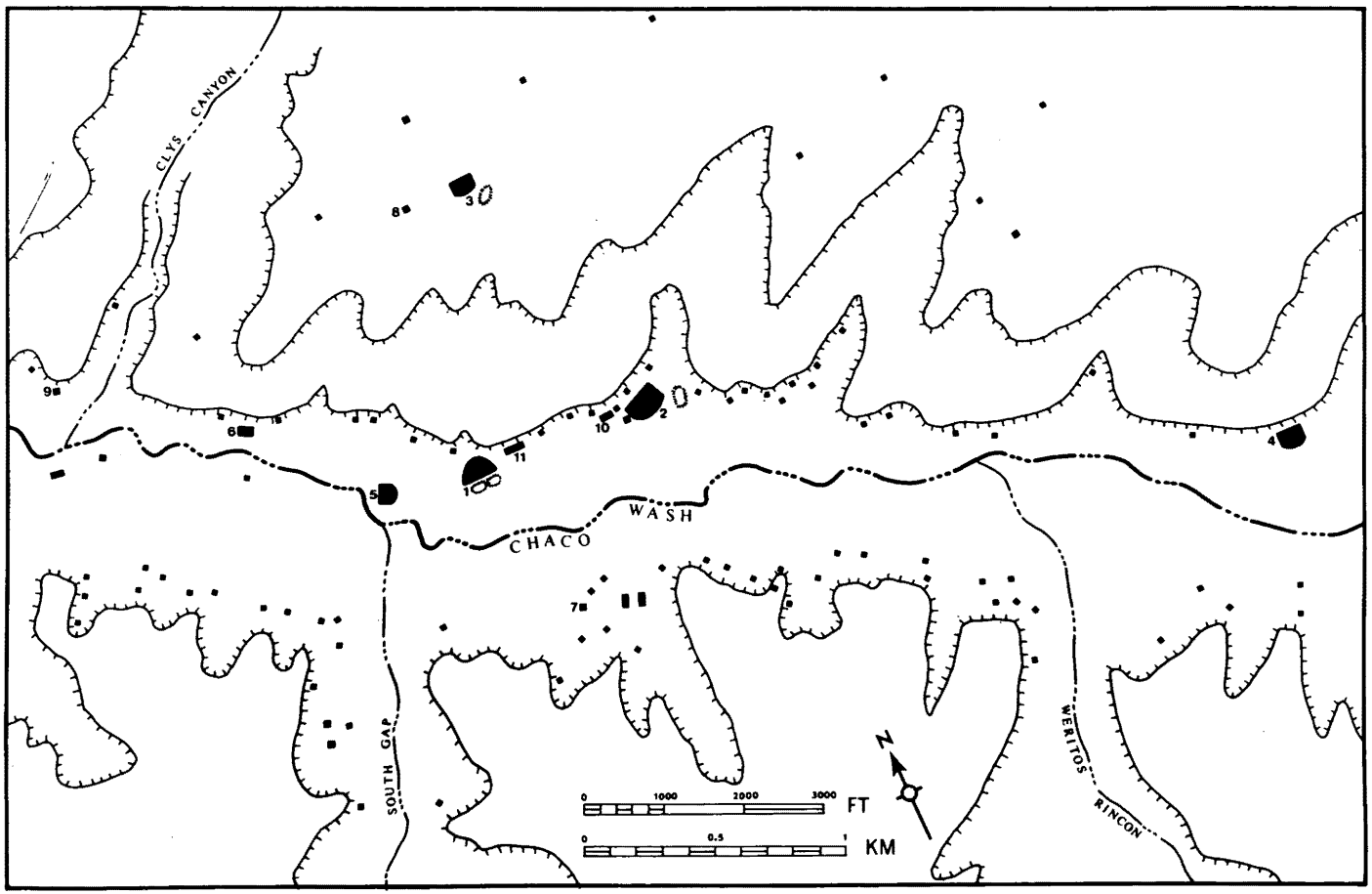


Figure I:1. The central part of Chaco Canyon.

Over half of Chetro Ketl was excavated in the 1920s and 1930s by Edgar Hewett. Hewett was variously and sometimes conjointly associated with the School of American Research, the Museum of New Mexico, and the University of New Mexico, as well as other institutions. A brief summary of his work is given in the second part of this chapter, History of Research.

Although several brief reports were published by Hewett and his students, no final detailed account of the excavations was ever written. "It is unlikely that there ever will be. We do not know of any set of notes or manuscripts covering this work" (Vivian and Mathews 1965:26). This study does not pretend to be that long-anticipated final report on Chetro Ketl.

The presentation follows the actual development of our research (see PREFACE). Lekson and McKenna recorded architectural data (Chapter II, EXCAVATION NOTES; and Chapter III, WALL NOTES), and defined preliminary construction stages based solely on architectural criteria (Chapter IV, BUILDING STAGES). Dean and Warren resampled and reinterpreted the dendrochronology using the preliminary construction stages as a framework (Chapter V, DENDROCHRONOLOGY). Finally, Lekson combined the architectural and dendrochronological data into a revised building sequence (Chapter VI, CONSTRUCTION HISTORY).

Three kinds of data are presented in this paper. First, EXCAVATION NOTES (Chapter II) compiles published and unpublished notes from Hewett's excavations and later work. This information cannot be obtained from the ruin as it exists today. Second are WALL NOTES (Chapter III) and drawings, presenting data recorded from the standing walls of the ruin. The third class of data is DENDROCHRONOLOGY (Chapter V). Together, these three classes of data--excavation notes, observations made on the standing walls, and dendrochronology--constitute the basic material available for the study of Chetro Ketl's architecture.

History of Research

The excavation of Chetro Ketl (Figure I:2) was sponsored by the School of American Research (Santa Fe, New Mexico) and the University of New Mexico, under the direction of Dr. Edgar Lee Hewett. Hewett first visited Chaco in 1902, when he was with New Mexico Highlands University.

> He initially negotiated with the Royal Ontario Museum of Archaeology and the Smithsonian Institution to join with the School of American Research in the excavation of Chetro Ketl in 1916. Hewett went to Chaco that fall to make preliminary studies. The First World War disrupted plans until 1919. In 1920 work was resumed but the Smithsonian was forced to withdraw their help due to lack of funds (Pierson 1956:31).

In 1920, Hewett began work on the southeast corner of the site. "An area ninety feet square was laid off for excavations and a large outlying area staked off for examination" (Hewett 1936:57). The trash mound was trenched on its long and short axes. The trenches were 11' wide (Hawley 1934:31 erroneously dates this work to 1922).

The next season (1921) excavations in the southeast corner were completed, and the Great Kiva was cleared to its last floor. Wesley Bradfield was field director, and Sam Huddleson was in charge of stabilization (Vivian and Reiter 1960:27).

From 1922 to 1928, work halted "to make way for another expedition" -- the National Geographic Society's work at Pueblo Bonito (Judd 1964). In 1922 and 1925, several beams at Chetro Ketl were sampled for dendrochronological study by Judd (Bannister 1965:139).

When work resumed in 1929, Hewett returned with the University of New Mexico graduate field school (the undergraduates were at Unshagi, near Jemez, New Mexico). Chetro Ketl was still in private hands. Hewett leased the site for excavation, and continued to do so until it was acquired by the Park Superintendent in 1937. The staff in 1929 consisted of Paul Reiter, field supervisor; Anna Shepard, ceramic analyst; Florence Hawley, cataloging; Stanley Stubbs and Reginald G. Fisher, in charge of the camp; Sam Huddleson, stabilization; and 22 students plus Navajo laborers (Pierson 1956:32). Mine railroads and hoists were moved from the completed excavations at Pueblo Bonito to Chetro Ketl. Work in the ruin shifted from the southeast corner to Kiva G and Rooms 16 to 22 (Stubbs 1929). Another pit was sunk in the center of the trash mound by Shepard (Hawley 1934:31) and tests were made below the floor in the Great Kiva.

In 1930, Paul Reiter was again field supervisor. Within the ruin itself, work centered on Kiva G and rooms to the north of it (Rooms 23, 39, 39A, 41, 42, 43, 43A, 44, 45). "Trenches were put down both inside and outside the back wall to discover the total number of stories" (Pierson 1956:32). Hawley (1934:61) dates the trench along the rear wall to the previous season. Subfloor excavations in the Great Kiva began in earnest, and continued for three seasons under the direction of W.W. Postlethwaite. Dendrochronological samples were taken this season and the next by Hawley, Roy Lassetter, and Reiter (Bannister 1965:139).

In 1930, Florence Hawley assumed direction of work on the trash mound:

> It was decided to sink a trench ... through the west side of the dump, to examine the center with a single pit, and to carry a trench down the eastern slope ... The western trench was started where a wash had eaten into the edge of the mound. For the first 16 feet east of that cut excavation was carried no lower than the stratum of sand which appears to have blown over the dump shortly after its abandonment and before the debris from the center of the mound washed down over it in a 16 inch cover. The next 12 feet, sections 5, 6, and 7 [each of the sections used as units in this work being 4 feet square and its contents removed in 8-inch levels for screening] were thoroughly

examined to the bottom, 16 feet below the surface. The west central pit uncovered the original valley floor at a depth of 20 feet. The east trench, 18 feet deep where it approached the center of the mound, was 13 feet deep at its eastern end, 36 feet from the center, where the dump surface meets the present ground level (Hawley 1934:32).

Hewett took steps to preserve the excavated portions of the ruin. In 1930 a dam was built behind Chetro Ketl to divert runoff from the rincon behind it.

During the 1931 season, W.W. Postlethwaite was assistant director; Reginald Fisher was responsible for engineering and survey; Paul Reiter was in charge of excavation and the field museum; and Sam Huddleson, stabilization (Pierson 1956:33). Subfloor excavations in the Great Kiva continued and the first of the large bead caches was found. The Court Kiva was tested (Vivian and Reiter 1960:45). The difficult deeper excavations under Kiva G were begun by Fisher and Miller but were not completed until the summer of 1934 (Miller 1937). Rooms 24, 25, 26, 27, 28, 29, 30, 31, 35, 38, 46, 48, 50, 77, and Kiva I were opened. A major ancillary excavation, at Casa Rinconada, was also begun in 1931.

In 1932, work continued in the deep excavations below Kiva G, and subfloor in Kiva I. Kiva J and Rooms 32, 33, 47, 51 through 57, 60, 65, 83, 84, 88, and 89 were opened. In the Great Kiva, the sealed niches of the lower bench were opened and the famous bead caches discovered. Subfloor work in the Great Kiva also disclosed the seating pits for roof support beams and lower floor features. The staff presumably was about the same as in 1931.

In 1933 the focus of excavation began to shift to Talus Unit #1, a smaller Chacoan structure just west of Chetro Ketl (Figure I:1). At Chetro Ketl, Kiva N (the "West Tower Kiva") and several rooms to the west and south of it were opened. Final excavations were completed in and around the Great Kiva (Vivian and Reiter 1960:27).

> Rooms and the moat across the front of Chetro Ketl were partially excavated in 1933, the plaza was cleared and features in the southeast corner were uncovered. Postlethwaite was in charge of the moat excavations. Rooms just south of the north wall (presumably including some rooms opened in 1932 and Room 101) were cleared...Paul Walter Jr., assisted Dr. Hewett; Paul Reiter was again in charge of excavations; [Winifred] Reiter in charge of the museum; and 9 students completed the group (Pierson 1956:33).

The summer of 1933 also saw the first major stabilization at Chetro Ketl, a Civil Works project directed by Gordon Vivian.

In 1934 J. Marshall Miller began a detailed study of the Kiva G complex (Miller 1937). The Court Kiva (Chetro Ketl III in Vivian and Reiter 1960) was excavated by W.W. Postlethwaite and Janet Woods. This was the last major season directed by Hewett at Chetro Ketl.

"Two rooms were cleaned out in Chetro Ketl, a test hole was dug, and a room (106) with mural on the wall were [sic] cleared in 1936.... In 1937 W.W. Postlethwaite checked, by pits, the entire length of the moat across the front of the village" (Pierson 1956:34). This ended the University of New Mexico and the School of American Research excavations at Chetro Ketl.

In 1940, Deric O'Bryan obtained a number of tree-ring samples from Chetro Ketl for Gila Pueblo, a private research foundation in Globe, Arizona. The dendrochronology of Chetro Ketl later became grist for the mill of the Gila Pueblo's controversial director, Harold Gladwin (see discussion in Chapter V, Previous Dendrochronological Work).

On August 22, 1947, 6 years after Threatening Rock fell on Pueblo Bonito, Chetro Ketl suffered its most serious modern disaster. A flash flood, the runoff from heavy thunderstorms, roared out of the rincon behind the ruin. The torrent escaped the normal arroyo channel, and struck the rear wall of the ruin, which acted like a dam, forming a large pond of water in the area north of Kiva G (Reed 1947; see also Vivian 1948). "A lake formed in the 'cellars' (deeper excavations in Rooms 39 through 60), water standing to the height of the adjacent ground level outside the walls--a depth of 6 to 15 feet. The...adobe mortar of the deep walls, thus immersed, dissolved; and the walls of some twenty rooms collapsed. A forty foot segment of the exposed section of the 500-foot back wall fell inward. Large cracks developed in the adjacent high center section" north of Kiva G (Reed 1947:238). Gordon Vivian was in charge of stabilization at the Monument. He supervised the extensive repairs necessary after the disaster, rebuilt the roof of Room 39 (Vivian 1948), and collected over 180 beams that washed out of collapsed walls (Bannister 1965:139). The flood also led to the excavation of an intact second-story room (Room 93) to relieve the weakened first-story walls by removing the rubble and other deposits from the floor above. During this excavation a remarkable collection of painted wood artifacts was recovered (Vivian et al. 1978).

Additional excavations accompanied maintenance stabilization. In particular, Rooms 61, 62 and 63 were excavated by stabilization crews in 1949-1950 (Vivian 1949). In the fall of 1964, Room 92, directly in front of Room 93, was excavated to relieve pressure on the wall between those two rooms (Voll 1978).

The Deterioration of Chetro Ketl

Ceramic evidence suggests that Chetro Ketl was abandoned no later than 1250. Over the next six hundred years, the building gradually fell into ruin. After its rediscovery in the mid-1800s, the pace of dissolution increased alarmingly. Chetro Ketl has deteriorated at a faster rate over the last century and a half than in the previous six.

Lieutenant Simpson, photographer Jackson and Special Agent Holsinger (1901) all described the ruin, of course; but these early observers saw a

great deal more standing in 1848, 1877 and even as late as 1901 (respectively) than we do today. Chetro Ketl's most vulnerable flaw in the modern age is its wood. In a land of little wood, cattlemen, soldiers and transients stripped the beams from Chacoan ruins, and Chetro Ketl was no exception. The balcony along the rear wall, described by Holsinger in 1901, was gone two decades later.

Ripping out beams weakened the fabric of the building. The four-story walls and partially intact roofs of Rooms 108-111, standing in 1920, had fallen within the decade. Treasure hunters pursued their avocation; perhaps less at Chetro Ketl than in nearby Pueblo Bonito. Cattle and horses grazing in the canyon added to the process of ruin, simply by leaning on the weakened walls.

During the 1920s and 1930s, Chetro Ketl fell prey to the tender mercies of archaeologists, and its problems increased. Excavation exposed walls and beams formerly buried and protected, and hurried their ruin. By diverting arroyo flow and opening deep excavations to inundation, archaeology was responsible for the disastrous effects of the 1947 flood. Hewett undertook major repairs, and even considered reconstruction of parts of the ruin. Later, the Park Service took over the seemingly endless but ultimately doomed task of keeping the walls standing.

Dean (in Chapter V) traces the bewildering migrations of beams during stabilization. Our records of the standing walls (in Chapter III) assess what is real and what is not. The extent of earlier stabilization can only be judged from the walls themselves; NPS stabilization is more carefully documented. But the fact remains that the visible building is far from pristine. Most walls have undergone generations of structural and cosmetic treatment.

This study describes the architecture and dendrochronology of Chetro Ketl as they are today. The walls Florence Hawley saw in 1934 were not the same walls we recorded 45 years later. If Chetro Ketl still stands in 2034, it will have been altered even more. The National Park Service maintains the structural integrity of the ruin; but the very process of stabilization unavoidably diminishes its archaeological value. This is not a condemnation of Park Service policies, but simply a statement of fact: Chetro Ketl is an artifact deteriorating before our eyes. If the reader is inspired to questions that cannot be answered by the present study, be advised that Chetro Ketl's ability to answer in detail is slowly, but surely, disappearing.

Numbering and Conventions

Throughout this paper, cardinal directions are discussed as though Chetro Ketl conforms to a North-South, East-West grid. That is, the long rear wall is assumed to run east-west (it actually runs southwest-northeast) and the east exterior wall is assumed to run north-south (it actually runs northwest-southeast). A "building north" simplifies already

cumbersome description. In all references, "front" means toward the plaza; "rear" means away from the plaza.

Because the measurements in the notes are given in feet and inches, we have decided to use traditional measurements in Chapters I and II. When a source reports a dimension as "about 2 feet," it seems pointless to translate that into "about 61 cm."

Room numbers are those used currently by the NPS, and in general, follow Paul Rieter's and Gordon Vivian's systems (Bannister 1965:Figure 13). Room numbers from earlier excavations are a source of considerable confusion: McKenna and Lekson, using the archives at the Chaco Center, produced the correlation of old and new numbers given in Table I:1; Dean and Warren, using notes at the Laboratory of Tree-Ring Research, produced a second correlation, Table V:3 . These two correlations agree, but we have decided to retain them as separate tables since they were produced from largely different sources.

During the excavation of the site, Chetro Ketl was divided into six "sectors": "the main wall with its parallel room tiers, A sector; the east and west wings, B and C sectors; the central wing [south of the line of rooms from Room 39 to Room 68?], D sector; the curved room tiers connecting the distal ends of the east and west wing, E sector; and the plaza, F sector" (Reiter 1933:55). For part of UNM and the School of American Research's work at Chetro Ketl, rooms were numbered serially within sectors; it also appears that rooms may have been assigned provisional numbers for note-taking purposes, and later assigned permanent numbers. In many cases, misnumbered rooms were identified using field note descriptions of unusual features.

Story designations are also an interesting historical study. In this paper, the story designation is specific to the room being described. That is, the lowest story is the first, the next above that the second, etc. In some areas, this can lead to an unequivalence of story numbers in adjacent rooms. This situation will be discussed in BUILDING STAGES (Chapter IV).

All dates are anno Domini.

Table I:1 Chaco Center Correlation of Chetro Ketl Room Numbers

Room	Other Numbers	Source
8	7	Kluckhohn 1933
6	2	Kluckhohn 1933
10	1	Howe 1933
11	2	"
12	3	"
13	4	"
16	II	Stubbs 1929
17	I	"
18	V	"
19	IV	"
20	VI	"
21	VII	"
22	III	"
26	45	Foraker 1931
27	44,41	Clinnard 1931
28	43	Reiter 1933
31	44	Pierce 1932
35	42	Howe 1933
38	1-2	"
39	0-26	"
121	101	Hawley 1934:25
130	5,95,170	Howe 1933, Postlethwaite 1933 &
131	6,96,171	Reiter 1933
132	7,97,172	"
133	8,98,173	"
134	9,99,174	"
135	10,100,175	"
136	11,101,176	"
137	12,102,177	"
138	13,103,178	"
139	15,104	Howe 1933, Postlethwaite 1933

Kiva	Other Number, Name	Source
A	12	Hewett 1921b
B	13	"
C	10	"
D	15	"
E	14	"
F	11	"
G	East Tower	
G-5	H	Hawley 1934
I	G,Q	Harwood 1932
N	West Tower, K	Betancourt 1979
Court Kiva	West Plaza Kiva	
	Chetro Ketl III	Vivian and Reiter 1960
Great Kiva	Chetro Ketl I & II	Vivian and Reiter 1960
	Great Sanctuary, Great Bowl, Sun Temple	Hewett, various

CHAPTER II

EXCAVATION NOTES

Stephen H. Lekson and Peter J. McKenna

Data were obtained from early published accounts (mainly Hewett 1921b and 1936), theses (Reiter 1933; Leinau 1934; Miller 1937), stabilization reports on file at Chaco Culture National Historical Park (e.g., Richert and Voll 1964; Vivian 1948; Vivian and Lancaster 1947; Voll and Mayer 1964), and unpublished field notes and reports at the NPS Chaco Center and the Museum of New Mexico's Laboratory of Anthroplogy. The most important source of data was six volumes of field notes and papers, belonging to Paul Reiter (Chaco Center Archives, #1825 to #1955). More recent publications include Vivian and Reiter's (1960) study of Great Kivas of Chaco Canyon and Vivian et al. (1978) for Rooms 92 and 93. Throughout this chapter, we have used the present tense to describe structures, features, or architectural elements that exist as of this writing. The past tense is utilized to discuss features no longer extant or visible.

Rooms 1 and 4

These rooms are actually one room on the first story, but are divided into two rooms on the second. The masonry of the second-story cross wall is similar to that of the other walls of the room. The cross wall is supported on a pair of large beams slightly above the level of the beams of the first story. The floor of the first story may have run under the cross wall. Stabilization has eliminated a small, blocked door in this cross wall, and has added a square masonry support beneath it.

The first story of Rooms 1 and 4 (as well as Rooms 2, 3, 5, 6 and 7) was intentionally filled while the second story was in use; the second stories of these rooms are approximately on level with the final plaza surface (Reiter 1933).

No floor features are reported by Hewett (1921b, 1936) or Reiter. The map in Hewett (1921b), which shows features in some detail, shows none in these rooms (or in Rooms 2, 3, 5, 6 and 7).

A photograph of these rooms during excavation (Hewett 1921b:50; 1930: 308) shows two or three huge beams lying on the first-story floor (running under the cross wall separating Rooms 1 and 4). The largest beam is well over 12" in diameter and 12' long. In the same photograph, there is a suggestion of thin (perhaps jacal) cross walls on the first story, one located midway between 4W:7 (Room 4, west wall, feature 7 in the wall drawings, Chapter III) and the second-story cross wall (4S), and another just north of 4W:7. These possible walls are <u>not</u> indicated on the wall drawings, Chapter III.

Rooms 2 and 3

These two rooms were originally a single room, later divided by a single wythe wall (now heavily stabilized). See Rooms 1 and 4.

Rooms 5, 6 and 7

See Rooms 1 and 4; also Figure III:16.

Room 8

Room 8 is the easternmost of the line of rooms running inside the "Moat" (see page 32). The line of rooms was added to the Moat, and Room 8 was superimposed over Room 9, an earlier structure on the same level as the Moat. Beyond this, the stratigraphy of the southeast corner of Chetro Ketl is presently ambiguous. The area had fallen into almost complete ruin when it was stabilized in 1963; there are several versions of its pre-stabilization appearance (Figure II:1). The sequence of construction in the southeast corner may have been: Rooms 1, 2, and 3; followed by Room 9; followed by the Moat; followed by Rooms 8, 10, 11 etc.

Room 9

Room 9 is only one story, added to and on the same level as Rooms 1, 2, and 3. The west wall is clearly abutted to the southwest exterior corner of Room 3, but roof beams of Room 9 are socketed in the exterior wall of Rooms 1, 2 and 3. See discussion of Room 8 and the Moat.

Rooms 10, 11, 12, and 13

These rooms were added to the plaza-facing side of the Moat. They are shown as featureless in Hewett's 1921 map and Howe's 1933 map.

Rooms 14 and 15

Rooms 14 and 15 were part of a complex of poorly-built rooms around and over Kiva F. The square construction in Kiva F may represent the foundations for an extension of Rooms 14 and 15 to the east.

Room 14 was featureless (Hewett 1921b), but Room 15 contained an elaborate firepit complex: a long, narrow, shallow firepit (at least partly slab-lined), paralleled by a long, narrow bin. Leinau (1933) shows a semicircular appendage to the north end of this complex, and indicates that the firepit complex was "much later" than the walls of the room. Rooms 14 and 15 are not presently visible.

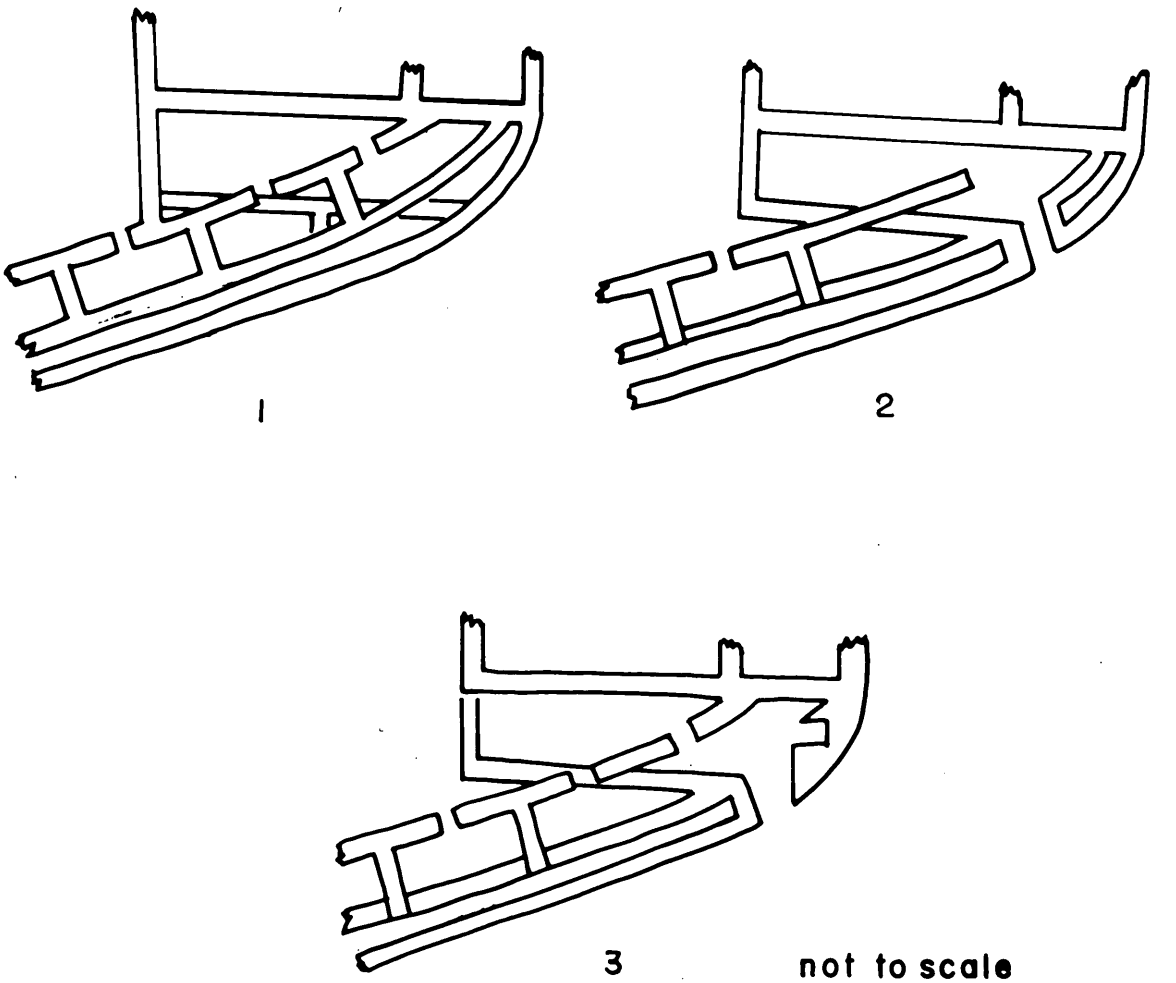


Figure II:1. The southeast corner according to various maps (schematic, no scale).

Rooms 16 and 17

Rooms 16 and 17 are described by Stubbs (1929), along with Rooms 18 through 22. Unfortunately, Stubbs employs a room numbering system (I through VII) which could not be completely correlated with our numbers. Room 16 is probably Stubbs' Room I; Room 17 is less certainly his Room II. Both are reported as featureless, except for seven roof support posts (each 5" in diameter) in unspecified locations in Room 16. Both rooms had well-defined floors.

Stubbs notes that all these rooms had evidence of fires built directly on the floor, occasionally with stone "pot rests" around the burned area. Stubbs (1929:9) writes, "There were no fireplaces in the rooms;...half the rooms were rubbish filled." Two feet of trash, deposited from the east, covered the floor of Room 17.

Rooms 16 and 17 were built over Kiva G-5 and other earlier structures. See Kiva G.

Room 18

Room 18 (Stubbs' Room V, see Rooms 16 & 17) is divided by a low single wythe wall, which has a small door, masonry steps on the east side of the door, and a vent. The wall "never reached the ceiling" and "was roofed over, making a room within a room" (Stubbs 1929). Sockets for the "roof" beams of the "room within a room" are not now apparent. This feature was almost certainly a room-wide platform (see Glossary). It was probably a later addition to the room, since the beams were not seated at the time of initial wall construction.

Designs incised on the plaster of the sealed door in the south wall (Figure II:2) were matched by other incised designs in Stubbs' Room III (assumed to be Room 22).

Rooms 19 and 21

Rooms 19 and 21 are assumed to be Stubbs' Rooms IV and VI respectively. Both were featureless, except for roof supports along two unspecified walls of Room 21. Room 21 was partially trash-filled.

Room 20

Room 20 is tentatively identified as Stubbs' Room VII. This room was trash-filled, perhaps completely, and had a well-defined floor, with a firepit in an unspecified corner. Three roof support posts were located along unspecified walls.

Foundations under one wall of Room 20 consisted of a 3'-deep "ditch filled with flat stones on which the walls were laid" (Stubbs 1929:8).

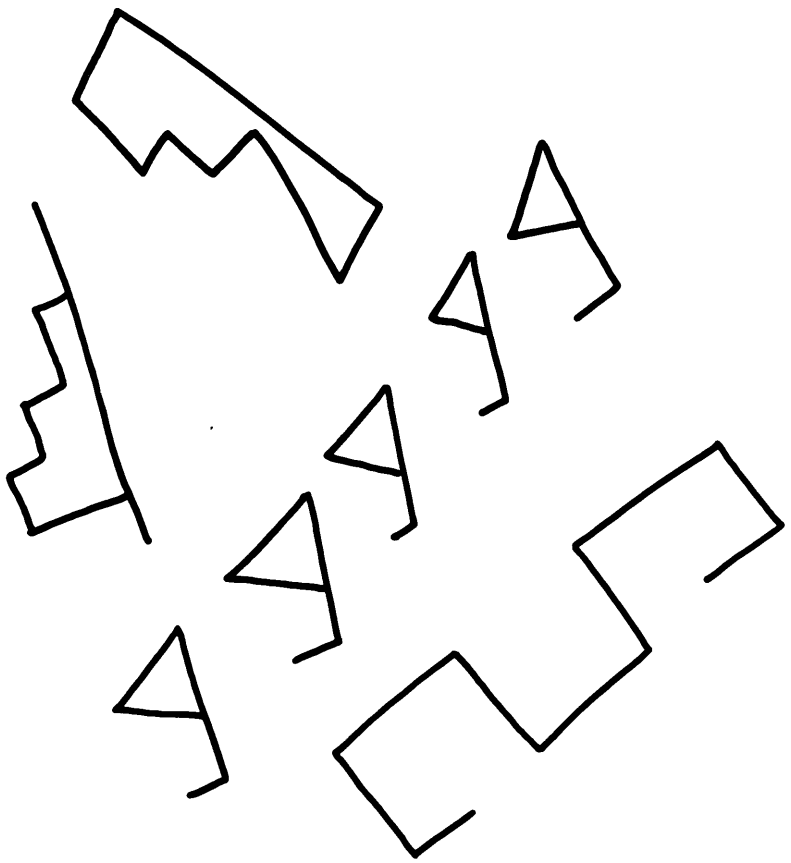


Figure II:2. Designs engraved in the plaster of the east jamb of door in south wall, Room 18 (no scale) (Chaco Center Archive No. 1886).

Room 22

This room is positively identified as Stubbs' Room III by the "T" door opening east onto the plaza. This room, like Room 18, had numerous designs inscribed into the plaster (Figure II:3). No features are reported.

Room 23

Miller (1937) notes no features. Below the floor, excavations revealed two walls (running east to west) and a masonry-lined duct (1'3" wide), perhaps a section of ventilator tunnel (running from northwest to southeast). The ventilator could not be associated with any features outside Room 23; but the east-west walls appear to be the same walls traced under Room 38, Kiva G-3 and Kiva I.

Room 24

Room 24 was an irregular, walled area added onto Rooms 22 and 38, on an upper-plaza surface. One of the largest firepits at Chetro Ketl was located within this room. It is described by Reiter (1933) as being 3' square by 2'6" deep, smoothly plastered, and filled to within a few inches of the top with ash.

Room 25

Room 25 was probably contemporary with Room 24. No features are noted by Reiter.

Room 26

Clinnard (1931) indicates no features.

Room 27

Reiter (1933) describes a rectangular slab-lined and slab-covered cist 11" x 7" x 6" deep in the southwest corner of Room 27. The cist was empty.

Room 28

Clinnard (1931) records no features, and none are shown on Reiter's (1933) map. Room 28 was trash-filled (Reiter 1933).

Rooms 29, 30, and 31

These rooms were modifications of an unnumbered kiva. The kiva, a one-story tall cylindrical structure, was divided first into two (north and south) semicircular rooms, and then the south half was divided again

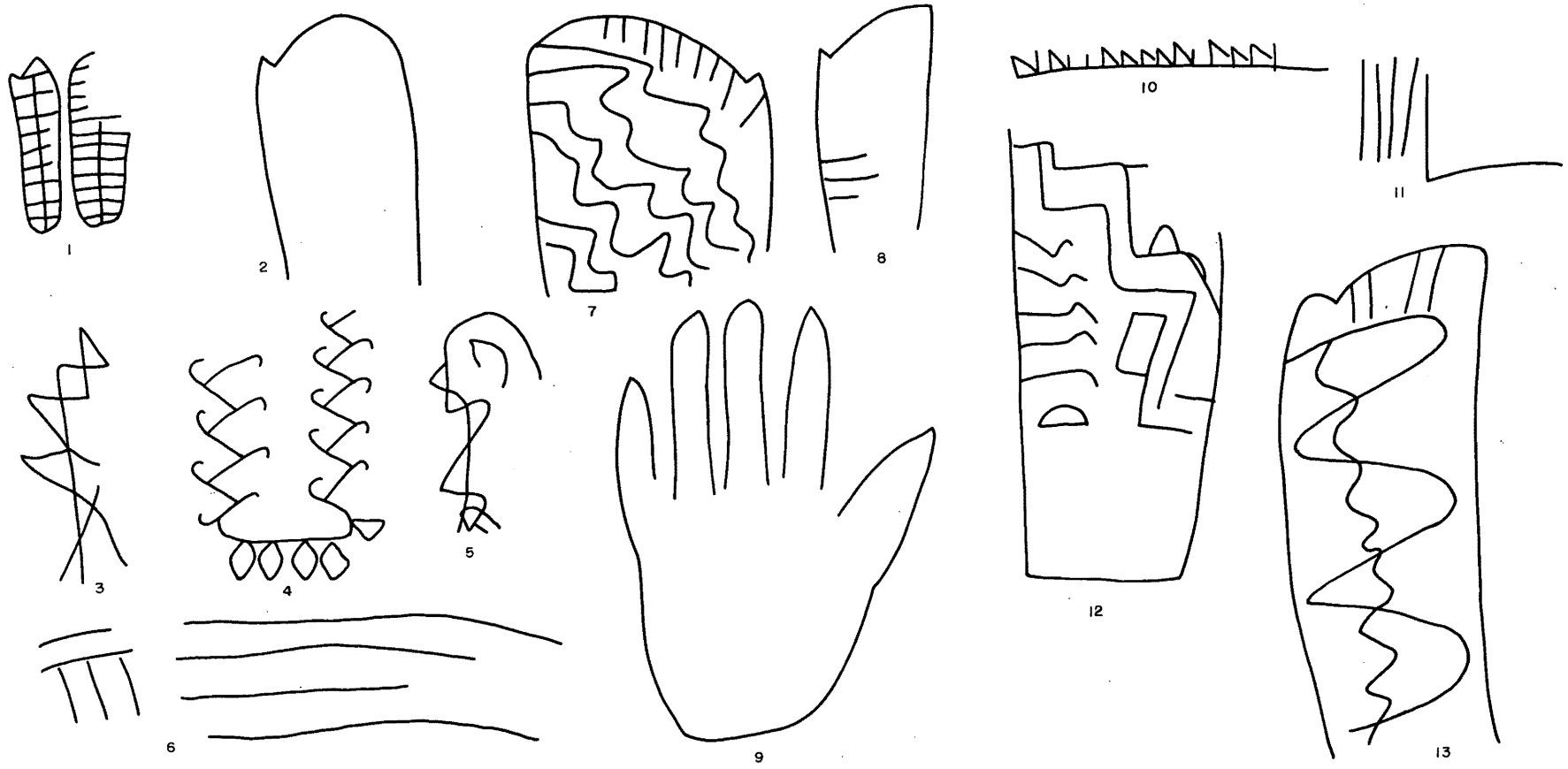


Figure II:3. Designs engraved in the wall plaster of Room 22 (no scale) (Chaco Center Archive No. 1886).

into southwest and southeast quartercircles (Rooms 29 and 30). Clinnard (1931) specifies no features in these rooms.

Room 31 is the second story built over the filled northern half of the kiva. A slab-lined firepit was located in an unspecified location on this floor (Foraker 1931).

Room 32

See Room 81.

Room 33

No floor features are shown on any known maps.

Room 33/73

No floor features are shown on any known maps.

Room 35

The wall plaster of Room 35 was smoke-blackened, but no firepits were found. Four slab-lined mealing bins were located at the north end of the room, but their precise location is unknown. They appear to have formed a row running north-south. The slabs projected slightly above floor level. Three metates were present in the bins: two of the metates were "grooved" and the third was "flat" (Clinnard 1931; Reiter 1933). Clinnard describes three of the mealing bins: 3'6", 2'1", and 1'10" long; and each 1'11" wide and 10.5" deep.

Reiter also notes "in the south half of the room...two poles crossing the room about three feet above the floor and about three and six feet from the south wall." This may have been a room-wide platform.

A test along the south wall revealed sandstone foundations (Clinnard 1931).

Rooms 36 and 37

These rooms were never excavated, but were badly damaged when their north walls collapsed after the flood of 1947.

Room 38

Room 38 is one of the best documented of the rooms at Chetro Ketl (Winifred Reiter 1932). Room 38 was added to the exterior of Room 39, and

overlies several razed walls, some of which continue west under Room 23, and Kivas G and I.

The uppermost floor of the room (Figure II:4, levels 1 and 2) had a small circular firepit in the center of the floor. Another, raised square hearth stood in the southwest corner of the floor.

A second floor was encountered about 4" below the first (Figure II:4, levels 1 and 2). In the center of the lower floor was a large (4' x 2' x 1.1' deep), oval, stone-lined firepit. Also on the second floor was a slab-lined "tub" or bin, "under the south door and apparently running under it" (Winifred Reiter 1932).

The foundation of the south wall is a rubble-filled trench. The south wall appears to have been offset 1'6" on this foundation, which terminates in a problematic "tub" in the southwest corner of the room.

A confusing array of razed walls were found directly beneath the second floor of Room 38 (Figure II:4, levels 3 & 4). A simple firepit, running under the north wall, may have been associated with these walls. Below a poorly-defined surface (perhaps an earlier plaza level?), a second set of razed walls were encountered (Figure II:4, level 5).

The major east-west wall of levels 3 and 4 continues under Room 23 and Kivas G and I. The east-west wall of level 5 may be the same as the northern of two subfloor walls below Room 23.

NPS stabilization crews discovered a small Sosi or Black Mesa Black-on-white pitcher in the core of the west wall of Room 38.

Room 39

Rooms 39 and 39A originally shared a common roof. Apparently, only the first story was subdivided. The first story of Room 39 was filled with trash, while the first story of Room 39A was left open. The second story of Room 39 is described by Pierce (1932), Case (1932), Harding (1923), and Reiter (1933). The floor consisted of three levels. The lowest floor level (i.e., the original second-story floor) had a firepit in either the northwest or southeast corner and a post step (seated in the trash-fill of the first story) below the south door. The second (middle) floor level had a hexagonal, stone-lined firepit (14" x 12" x 4'6" deep) in the center of the room; a partially buried jar in the southeast corner (11" neck diameter x 1'3" deep corrugated pot; 3" exposed); and of course the post step from the lowest floor. The uppermost floor had a firepit in either the northwest or southwest corner--the firepits of the lowest and highest floors were at opposite corners but precisely which firepit was in which corner is not known. Because of the location of the buried jar of the middle floor, it seems likely that the latest floor's firepit was in the northwest corner, locating the lowest floor's firepit in the southeast corner.

Vivian notes that Room 39A was built over an earlier, unrelated wall. Most of Room 39A was destroyed in the flood of 1947, after which the north

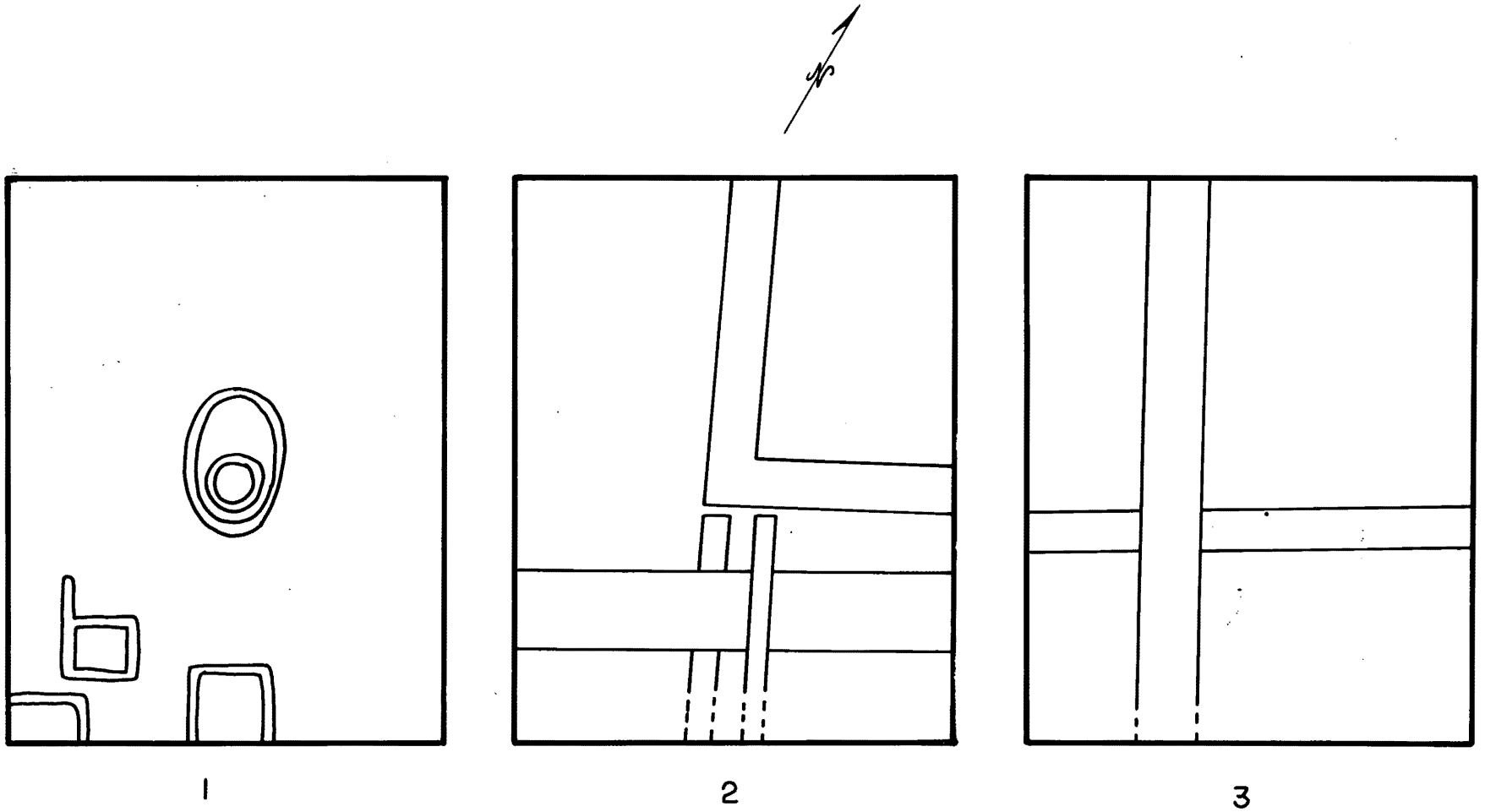


Figure II:4. Floor and subfloor features, Room 38 (schematic, no scale). (1). Floor, levels 1 and 2. (2). Subfloor, levels 3 and 4. (3). Subfloor, level 5. (Chaco Center Archive No. 1877).

and west walls of Room 39 and the roof were rebuilt. The earlier walls were presumably seen during these postflood repairs (Vivian and Lancaster 1947).

Rooms 40 through 45

Reiter shows no floor features in these rooms on his 1933 map. These rooms suffered heavily in the 1947 flood.

Room 46

The south wall of Room 46 is the double exterior wall that extends west to and possibly beyond Room 94, and east into Rooms 44 and 45. The double wall was added to allow seating of roof beams for the row of rooms added to the existing building's exterior wall (two-story Rooms 103 to 43A). See discussion of North Block C, Chapter IV.

Room 47-52

This room was subdivided on the first story into Rooms 47 and 52; the second story was a single room. A corner vent, in the northeast corner of Room 52, was blocked by the addition of the double exterior wall (see Room 46). No features are shown on any maps.

A full story of construction probably was exposed below that shown on our wall drawings (Vivian and Lancaster 1947:57). This was probably part of a structure predating the presently visible Chetro Ketl (see North Block A, Chapter IV).

Room 48

No floor features are noted for this room, but a four-pole room-wide platform was built into the east end of the first story.

Rooms 49 to 55

No floor features are noted on any known maps.

Rooms 56 and 57

A partition wall on the first story divides a large room into these two smaller rooms.

Rooms 58 through 62, 64, 65

No floor features are noted on any maps.

Room 63

Vivian describes roof materials from Room 63. Since roof features are no longer visible, they must have been observed in the now-filled first story during excavations incidental to stabilization (Vivian 1949:39-40).

Nine willow mats were arranged above the secondary beams (Figure II:5). The mats formed the base of the second-story floor, and would have been visible in the first-story ceiling. A typical mat was "made of alternate bands of peeled, white willow rods and dark red bands where the bark had been left on the willow. There were four white bands and each one held 22 rods; the five dark red bands were made up of 28 rods. That was a total of 228 rods, and each one had 11 holes punched in it. Stringing 11 cords through the holes in the 228 rods had used up 38 feet of yucca cord..." (Vivian 1949:14).

The primary (and perhaps secondary ?) beams were surrounded by thin "cedar shakes" in their sockets. Lintels for unspecified doorways were wrapped with yucca strips.

Rooms 68 and 106

These two rooms are divided by a substantial wall on the first story. The second-story wall dividing Rooms 68 and 106 is an NPS addition. The east wall of the first story of Room 106 is decorated with geometric murals (see Figure II:6).

There are no floor features in the preserved section of the second floor (i.e., the Room 106 portion, see Figure II:7), and no floor features in the first story of Room 106. The first story of Room 68 was probably not excavated.

Room 70

Room 70 was added to existing Rooms 68-106 and 63. The north wall is a double wall, and allows the seating of beams for the first-story roof (Figure III:20). The double wall is very similar to the double wall of the rear row of rooms (see Room 46). The first story of Room 70 was probably not excavated.

Rooms 71, 71A, and 72

No floor features are indicated for Rooms 71 and 71A on available maps. Room 72 was not excavated to its original floor. Removal of upper fill exposed a tangle of walls that included a fragmentary arc of a razed kiva (see Figure II:8). The sequence of construction of the walls is unclear.

Vivian (1949) describes a "room out in front of [Room 63] and down about a half a story" with board shelves in a "little cranny between the

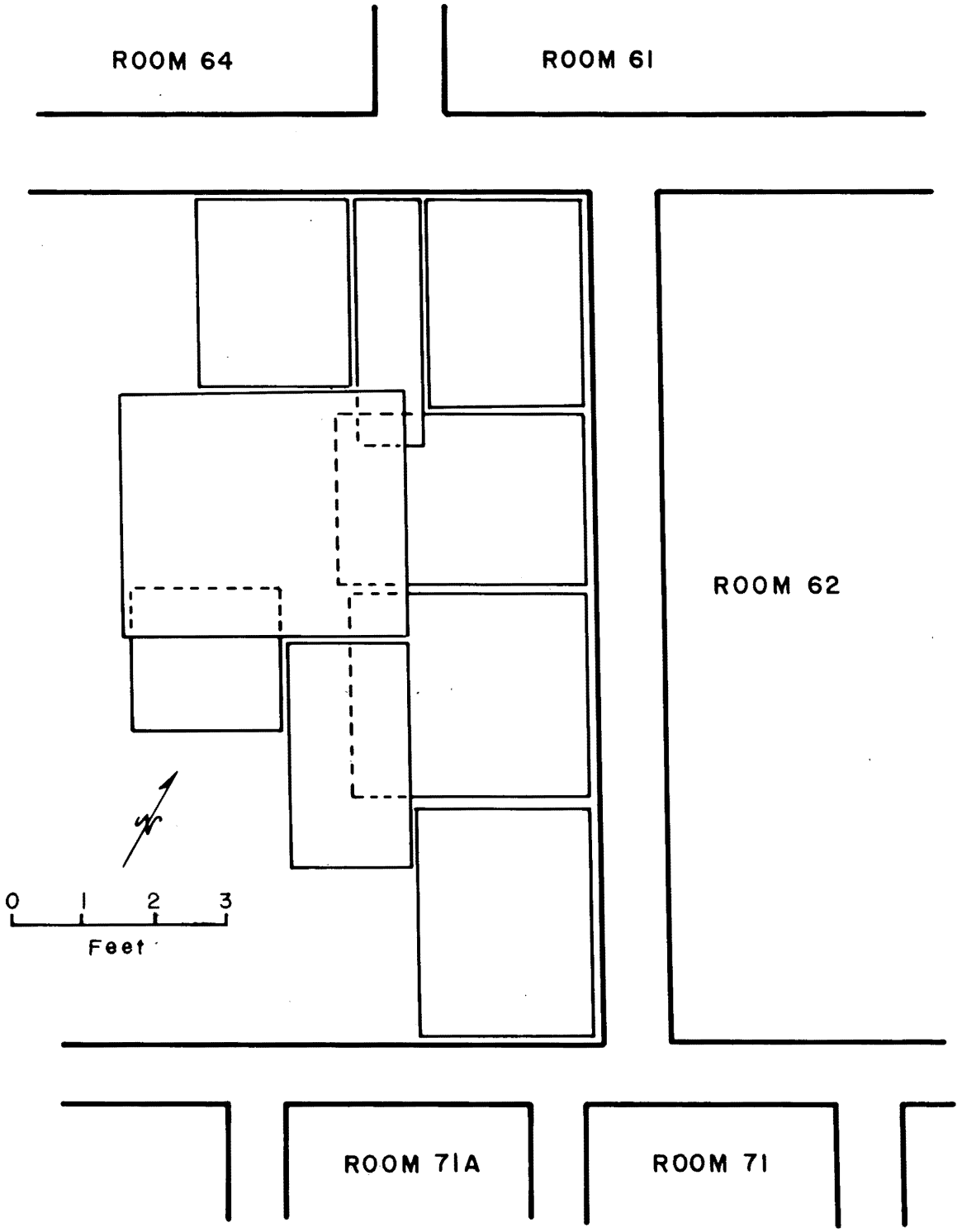


Figure II:5. Willow-rod mats in first-story roof, Room 63 (Chaco Center Archive No. 593).

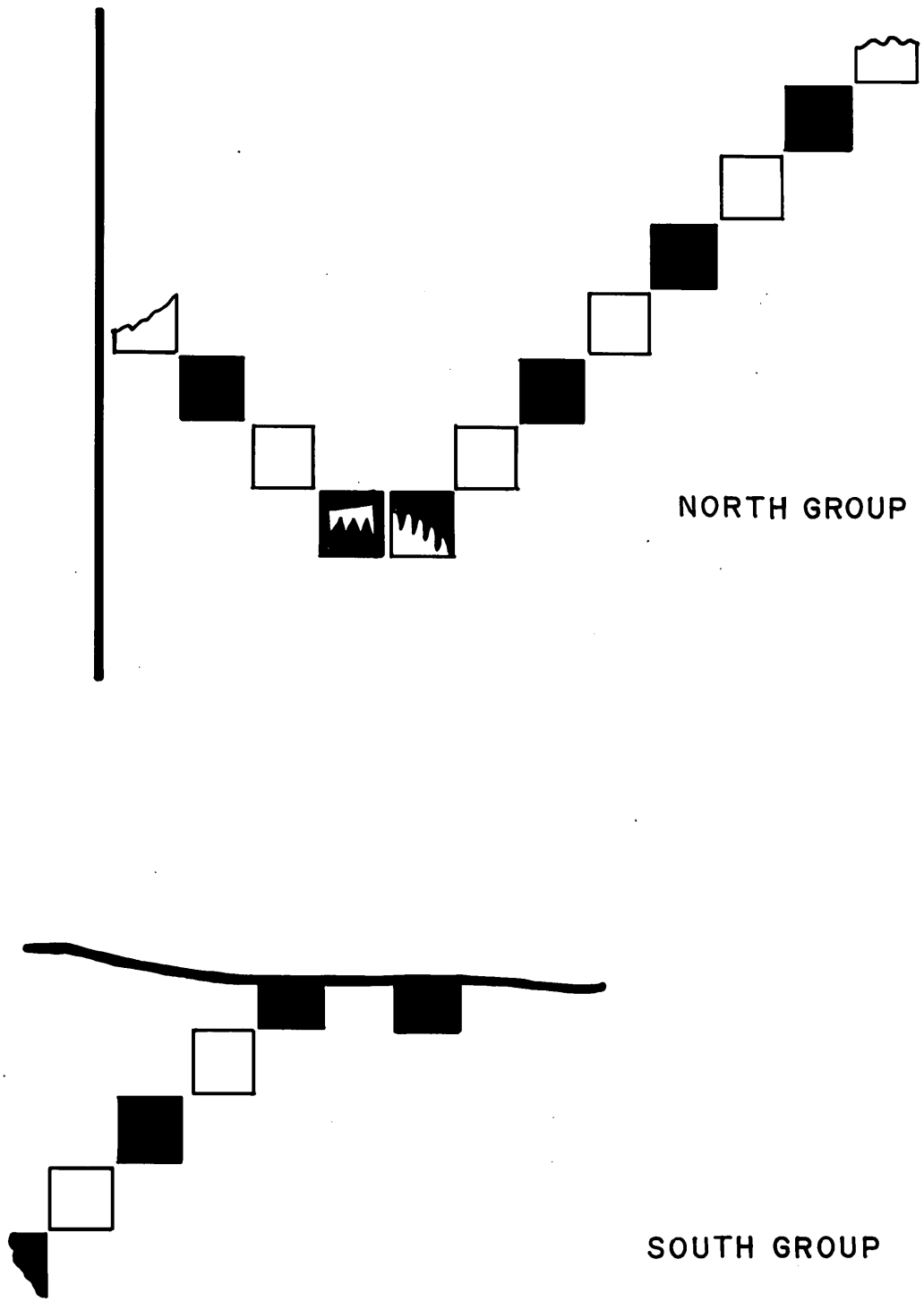


Figure II:6. Murals on east wall, Room 106 (no scale).

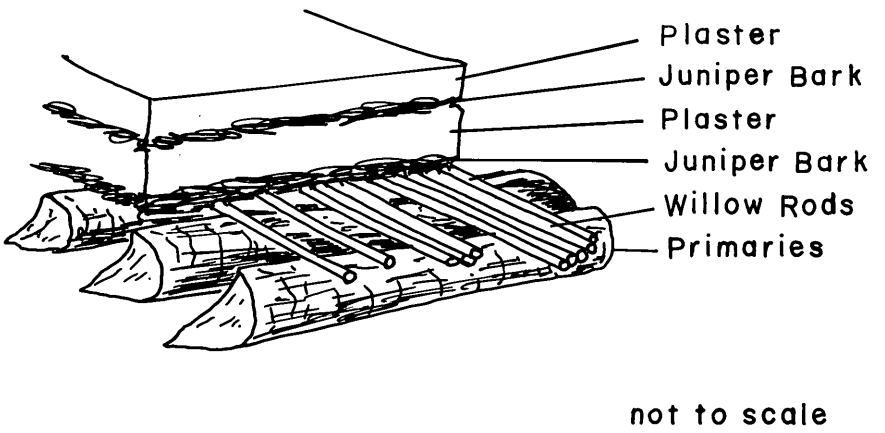
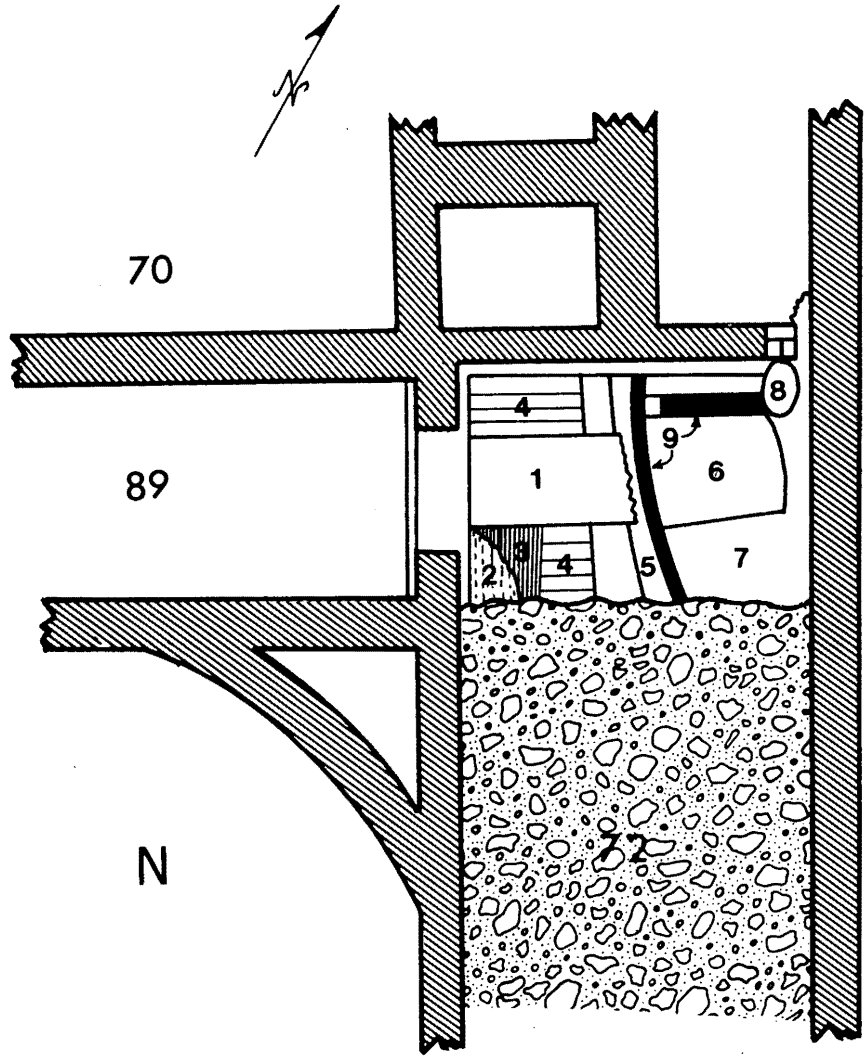


Figure II:7. Roof construction details, Room 106 (no scale).



1 "Platform," stone pavement over floor
2 Floor plaster
3 Juniper shakes
4 Primary beams
5 Top of curved wall
6 Irregular stone surface
7 Irregular stone surface
8 Unspecified feature
9 Deep cavities between walls

Figure II:8. Plan of north end of Room 72 (schematic, no scale) (Chaco Center Archive No. 1957).

old wall and the abandoned kiva." This could refer either to Room 71A or lower Room 106; the razed kiva makes Room 71A more likely. The shelf consists of three horizontal pine boards in an alcove, that were found "covered by...six more beautifully worked planks" (Vivian 1949:41). This may be our Feature 71AS:1, although it may also be our Feature 106S:1 (see WALL NOTES, Chapter III).

Rooms 73 and 74

These rooms were probably never excavated.

Rooms 75, 76 and 78

For Rooms 75 and 78, see Room 80; for Room 76 see Room 81.

Room 77

Room 77 is the eastern end of the row of rooms (Rooms 77, 75, 78, 80 and 82--see Room 80) added to the front of the Colonnade (Room 81). Clinnard (1931) reports that the area south of Room 26 (i.e., Room 77) was cleared "to ceiling which had a firepit on top of it." The precise meaning of this note is not clear. No cross walls, and no features, are shown on any maps.

Room 80 (including Rooms 75 and 78)

This long room was clearly added to the Colonnade (see Room 81). No features are shown on any maps.

Room 81 (including Rooms 32, 76, 105)

These rooms are subdivisions of the famous "Colonnade" (Ferdon 1955). Rooms 81 and 105 are defined by a single wythe wall that is clearly later than the original Colonnade. The Colonnade itself is a single-story gallery along the front of the western half of the central roomblock. The plaza-facing wall is a line of square masonry pillars.

No floor features are noted on any maps, except three roof support posts (about 4-5" in diameter) along the base of the south wall of Room 81. One post was located in the southeast corner of the room, and the second and third posts at distances of 5.1' and 12.2' from the first, respectively (Kluckhohn 1933).

Vivian suggests that these rooms were built over earlier, unrelated walls (Vivian and Lancaster 1947).

Rooms 82, 83, 84 and 86

These rooms continue the row of rooms described in the section on Room 80, around the west side of the central roomblock. They were constructed later, and were much less well built than Rooms 81, 85, and 87. Floor features were absent, except for a single firepit along the north wall, possibly outside of Room 84 (Kluckhohn 1933). The firepit is not described.

Room 85

Room 85 contained a complex of bins. While the exact location within the room is unknown, the complex was somewhere along the west wall. "Low walls extend out [from the west wall] into the room forming two partitions in the smaller of which is set up a log in a vertical position" (Keur 1933).

Room 87

Room 87 had a fireplace with a possible deflector to its west (Keur 1933).

Subfloor excavations in Room 87, incidental to stabilization of Kiva N, revealed an unusual passage or shaft about 8' below floor level (Figure II:9). The passage was only partly exposed; it consisted of parallel masonry walls (2'3" apart and 2' tall), roofed with wooden planks, willow rods and mud. In one of the walls there was a niche with at least two board shelves. The orientation of the passage or shaft is unknown; however, it has been suggested that it was an underground entry to Kiva N (notes on file at the Laboratory of Tree-Ring Research).

Room 88

Room 88 has room-wide platforms at each end, with the stub of a single wythe wall near the center of the room. The wall now stands only a few courses, but appears to have had a central door (see Figure III:6). This wall may have enclosed an area below a room-wide platform (see Room 18).

The western half of the room was burned, but the platform roof survived intact. It consists of primary beams across the short axis of the room; above them, reeds (up to 5' long) perpendicular to the primaries; above the reeds, two layers of thin poles or rods, set in mud mortar; then another layer of reeds, parallel to the axis of the primary beams; and on top of all this, another layer of mud mortar (Hewett 1936:72). The east platform was less well preserved, but evidently cedar bark replaced reeds over its secondary beams. The west platform was restored in 1932.

No plastered floor was exposed in excavations. No features are shown on any maps.

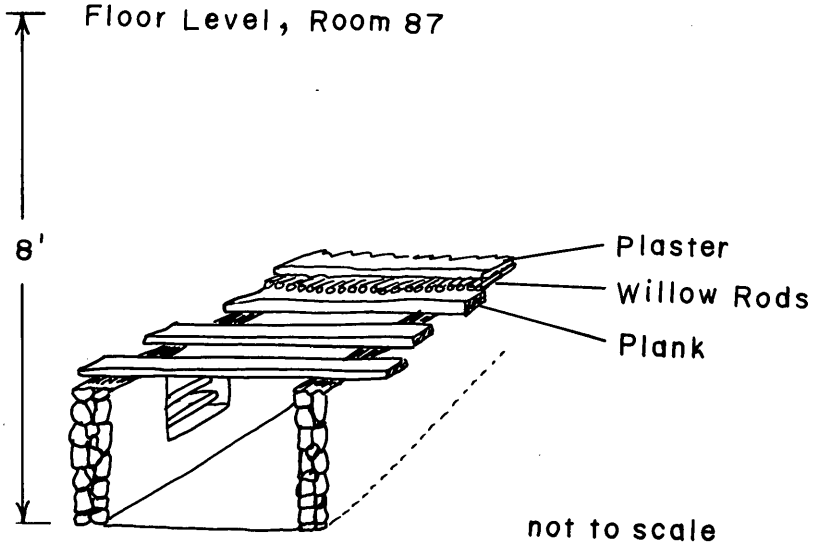


Figure II:9. Subfloor construction below Room 87. Orientation unknown, no scale (Laboratory of Tree-Ring Research files).

Since the base of the south wall of Room 88 is much higher than the north wall, Room 88 was probably added onto the Kiva N enclosure. A circular "crypt" beneath the north wall of Room 88 was probably associated with the Kiva N enclosure. This "crypt" contained sherds, bone awls, and broken manos and metates (Woods 1932a).

Room 89

A fragment of roofing "consisting of flat boards (of cedar?) covered with transverse cedar strips" (Woods 1932a) was found in the upper fill of Room 89. No floor features are known.

Rooms 92 and 93

These rooms are described by Vivian et al. (1978). No floor features are noted. Room-wide platforms are located in both the east and west ends of the first story of Room 92, and in the east end of the first story of Room 93. Subfloor excavations in the west end of Room 92 disclosed a buried structure. See North Block A, Chapter IV.

Room 94

Room 94 was never excavated.

Rooms 101 and 102

No floor features are indicated on any available maps.

Room 103

Room 103 was never excavated.

Room 104

Room 104 had two room-wide platforms in its west end, and possibly a third in its east end. A fragmentary wall, indicated in the wall drawings (Chapter III), may be a cross wall. No other floor features are described.

Room 106

See Room 68 and Room 71A.

Rooms 107 to 111

These rooms were probably not excavated. They are indicated as excavated on one map (Fisher 1934), but not on Reiter's (1933) map. The rooms

once carried an additional story (Plate 24, Figure III:14).

Room 114

At least the southern third of Room 114 was excavated (Reiter 1933). No features are shown on any maps.

Rooms 115 to 123

These rooms were never excavated.

Room 130

Room 130 had a slab-lined firepit (1"4" x 1"8") near the middle of its north wall (Howe 1933; Postlethwaite 1933).

Rooms 131 and 132

No features were recorded (Howe 1933; Postlethwaite 1933).

Room 133

"In the northwest corner of this room, in front of a closed doorway was a well constructed platform of masonry 1'2" x 1'6" and 1' high...In the northeast corner was a small fireplace of rough stone" (Postlethwaite 1933:4).

Howe (1933) also notes a 14" deep corrugated pot buried beneath the floor.

Room 134

Howe (1933) and Postlethwaite (1933) describe three floor features: a "cooking pot found under floor level" and two firepits, at the base of the north and the east walls. The firepit at the base of the north wall was directly beneath a sealed door to the plaza. This feature was a relatively small, square, rimmed pit on a semicircular adobe platform (2" x 1'10" and about 1' tall). This feature evidently overlay an earlier, semicircular firepit (radius 1'6").

The firepit on the east wall was more complex. This appears to have been a relatively deep firepit (2' or more deep, perhaps 1'6" in diameter) with several distinct burned layers of fill. Excavated into the top of this ash-filled, large pit was a later, smaller, basin-shaped firepit.

Room 135

Postlethwaite (1933) describes a possible partition wall (4" wide and about 1' tall) running about 2'8" south from the west edge of the doorway in the plaza-facing wall. There may have been burned areas on the floor in the corners of the room, but this is unclear. Room 135 may have been trash-filled.

Rooms 136 and 137

These rooms lacked formal floor features, although Room 136 had burned areas on the floor in corners or along the wall bases.

Room 138

There may have been a large firepit at the base of the west wall.

Room 139

This room had a large (perhaps 2' x 2') slab-lined firepit in the southwest corner (Howe 1933).

Unnumbered room southwest of Kiva J

This room was excavated, but no floor features are known.

The "Moat"

Two closely spaced parallel walls, running from the southeast corner of the East Wing across the front of the plaza, are called the "Moat." The function of the Moat has been a source of conjecture over the years. The plaza behind the Moat eventually filled almost to the roof level of this construction; so when excavated, the parallel walls appeared subterranean and were dubbed a "moat." Of course, the Moat never held water; but lacking a more appropriate term for this structure, we will continue its use here.

The west end of the Moat was never excavated. For the west end, our map follows Coffin's reconstruction (in Hewett 1936) and Reiter's (1933) map, slightly modified by our field observations. While the east end of the Moat was excavated, the precise articulation of the Moat with the East Wing is problematic (see discussion of Room 8, and Figure II:1).

Postlethwaite's (1937) test pits along the Moat proved that it was continuous across the front of the plaza. The two walls were finished on all four faces; between them was a well-defined plaster floor. No evidence of roofing was found. There were no cross walls; cross walls shown on our map are continuations of cross walls of a row of plaza-facing rooms, built

after the moat itself was filled. That is, these cross walls were built on fill, above the Moat floor.

Originally, the Moat must have been freestanding; however, it eventually became a retaining wall for plaza deposits. After plaza deposits reached the probable roof level of the Moat, the plaza-facing row of rooms was built.

After the Moat was filled, a firepit was built south of Room 132 on top of the exterior Moat wall (Howe 1933).

Howe (1933) notes that there was little or no cultural material recovered from excavations in the Moat.

Kiva A

Leinau (1934) describes this kiva as "18 feet in diameter" with "five masonry pilasters, 1.5 feet high; a firepit, [ventilator] shaft and tunnel; and a high narrow bench without recesses." The pilasters were solid piers, rather than the horizontal log type (Leinau 1934:10).

Although a subfloor ventilator was indicated, our record of Kiva A includes an above-floor ventilator (see Figure III:15); this may be Leinau's (1934:13) "crypt." The "crypt" was probably a heavily modified above-floor ventilator shaft. Perhaps the subfloor replaced the above-floor system. There is presently a "recess" in the bench opposite the ventilator.

The firepit is masonry-lined, circular, 2'4" in diameter and 11" deep. No deflector is present.

This kiva is subterranean, without enclosing walls, and is probably associated with an upper plaza level.

Kiva B

Kiva B lacks pilasters of any kind, according to Hewett's (1921b) map, Leinau's (1934:13) description and our observations. However, Reiter notes "6 stone" pilasters (Reiter 1933:73). We believe that Reiter is in error. This kiva had a stone-lined, circular (1'10" diameter) firepit and a subfloor ventilator, but no deflector.

Kiva B is probably associated with an upper plaza level.

Kiva C

Kiva C is an odd, above-ground structure, built over razed rooms. It was not an enclosed kiva (i.e., the plaza face of the kiva was not built into a rectangular room). Bench and pilaster features are irregular, and are best understood by reference to Figures III:15,16 and Figure II:10. The kiva has a masonry-lined, circular firepit (3'4" diameter). There was

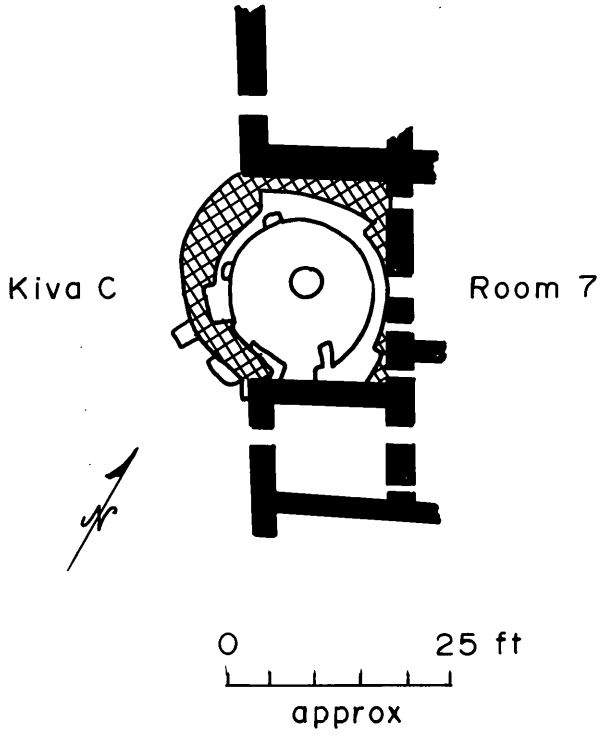


Figure II:10. Kiva C. See also profile, Figure III:16 (Hewett 1921b).

neither ventilator nor deflector, but Kiva C did have restricted ventilation, through a heavily modified doorway into Room 7 (Figure III:16).

Kiva D

Kiva D cuts into earlier Kiva E. Like Kiva B, it lacks both pilasters and a bench recess. Kiva D had a circular, masonry-lined firepit (1'4" diameter), and a subfloor ventilator system. Reiter states that Kiva D had a deflector (1933:73); but Leinau (1934:16) does not mention this feature, and it was not shown on Hewett's (1921b) map. Again, Reiter is probably in error.

Kiva E

The western third of Kiva E was destroyed by the building of Kiva D. Although Reiter states that a bench and a ventilator were present, Kiva E lacks features except for a masonry-lined, circular (1'4" diameter) firepit. Kiva E, as stabilized appears to be associated with an upper plaza level.

Kiva F

Much of the bench of Kiva F is presently obscured by a later structure, which we suggest in the discussion of Rooms 14 and 15 is the foundation for a complex of surface rooms. On the exposed bench remain three of probably six original horizontal log pilasters. Kiva F apparently had a subfloor ventilator and a large masonry-lined circular firepit; Reiter notes a deflector, but none of the other sources support this. This is the largest of the kivas in the southeast part of the plaza, and is the only one with horizontal log pilasters. It does not appear to have had a floor vault, but a floor vault might be buried under the later structure.

Kiva G

Kiva G is an elevated, enclosed kiva that had been remodelled at least twice. Contrary to popular conception, the structure is not a tower, but a series of superimposed, independently constructed kivas. Miller (1937) designates earlier, unrelated kivas and structures as parts of the Kiva G complex (Kiva G-4, Kiva G-5, etc.), but only Kivas G-1, G-2, and G-3 are part of Kiva G on our map. Kivas G-5 through G-8 will be considered separately. Stubbs (1929) excavated Kiva G-1, while Miller was responsible for all other work.

Kiva G-1 is a simple modification of earlier Kiva G-2; the floor level of Kiva G-2 was raised about 1', and the bench was re-veneered. Kiva G-1 is a classic Chacoan kiva (Figure II:11). Floor features include: a masonry-lined, circular firepit (2' diameter, 1'6" deep) half filled with charcoal and ash; the stub of a plastered deflector (2'6' long, 6" high, 3" wide); and a subfloor ventilator shaft which was intact when excavated.

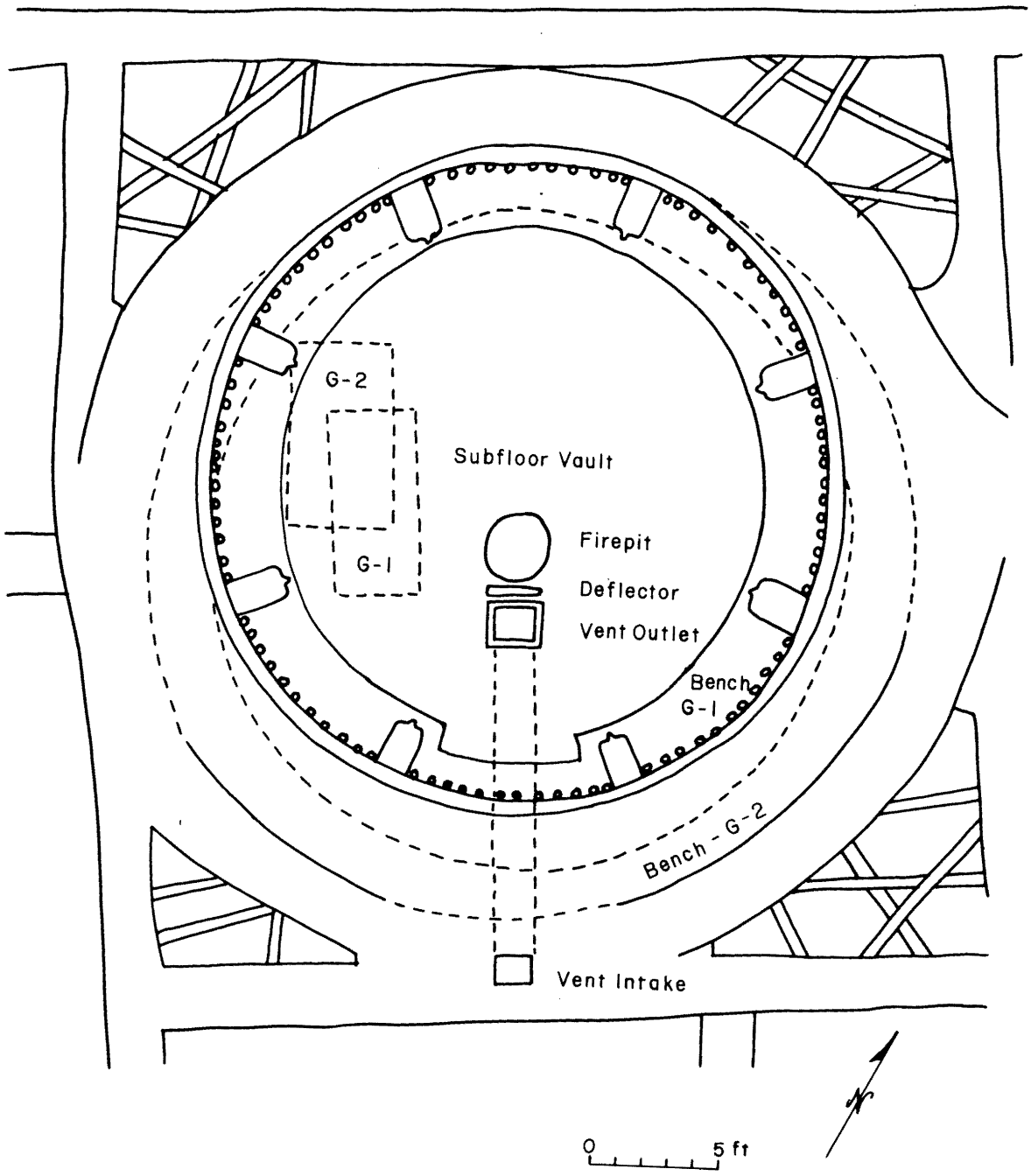


Figure II:11. Kivas G-1 and G-2 (Miller 1937:Figures 1 and 6).

The ventilator has a square opening, which insets slightly into the floor, with a square stone slab cover. Partially obstructing the vertical portion of the shaft was a lattice of 2" wide "bark strips." Apparently these were not closely spaced, and would have allowed the passage of air, but there is a suggestion that there was a thin layer of plaster over this lattice, which was at about the same level as the top of the bench (Stubbs 1929:3). The final floor feature was a rectangular subfloor vault, apparently sealed over in the kiva's last use.

The bench supports eight horizontal log pilasters, and a plastered pole-and-wattle "wainscotting" along its rear. Stubbs found three 6" diameter beams lying on the pilasters, and four more similarly sized beams in the fill 2' above the floor. The "wainscotting" consisted of a series of 2-3" diameter posts, 6-10" apart, seated in a trench along the back of the bench. Some form of wattle ran between the posts; and the space between these and the kiva wall (which was plastered) was packed with "reeds, bark, grass, leaves, bones, etc." (Stubbs 1929:2). The whole extended at least 18" above the bench top.

Kiva G-2 (Figure II:11), the original version of Kiva G-1, was slightly larger, and may have shared some of the floor features of Kiva G-1 (that is, many of the floor features of Kiva G-1 were originally in use in Kiva G-2). Miller (1937) notes a subfloor vault (7' x 4') slightly north of the vault of Kiva G-1, and an earlier bench. Not enough of the bench was exposed to allow comment on pilasters and "wainscotting." The area where firepits, deflectors, and ventilators would be expected was not excavated.

A square exterior enclosure, about 10' tall, surrounds both Kivas G-1 and G-2. This enclosure was built over the enclosure of earlier Kiva G-3. Each corner of the enclosure is crossed by numerous beams, tying the square enclosure to the exterior of the circular kiva wall; these corners appear to have been at least partly trash-filled.

Kiva G-3 (Figure II:12) was partially razed, and reduced to a height of about 4'8". It was slightly smaller in diameter than Kiva G-2, which was built on the razed walls of Kiva G-3. Neither bench nor floor were found. No features were discovered, but the quarter of the kiva beneath the floor features of Kiva G-1 was not excavated. Only one corner of the exterior enclosure was excavated, and it too was crossed by timbers tying the enclosure and kiva walls.

Below the floor of Kiva G-3, Miller uncovered a complex of partially razed walls, some of which are probably the same walls noted below Rooms 23 and 38, and Kiva I. See Figure II:12.

Kivas G-4, G-6, G-7, G-8

These kivas (Figure II:13) were defined from short arcs of razed walls below Kiva G-3 and nearby rooms. Kiva G-4 was built within an enclosing wall (at least on its east) and had the remains of a bench. Kiva G-6 had no enclosing wall, but did also have a razed bench. In both Kivas G-7 and G-8, only the wall of the kiva itself was defined; no enclosing wall was found.

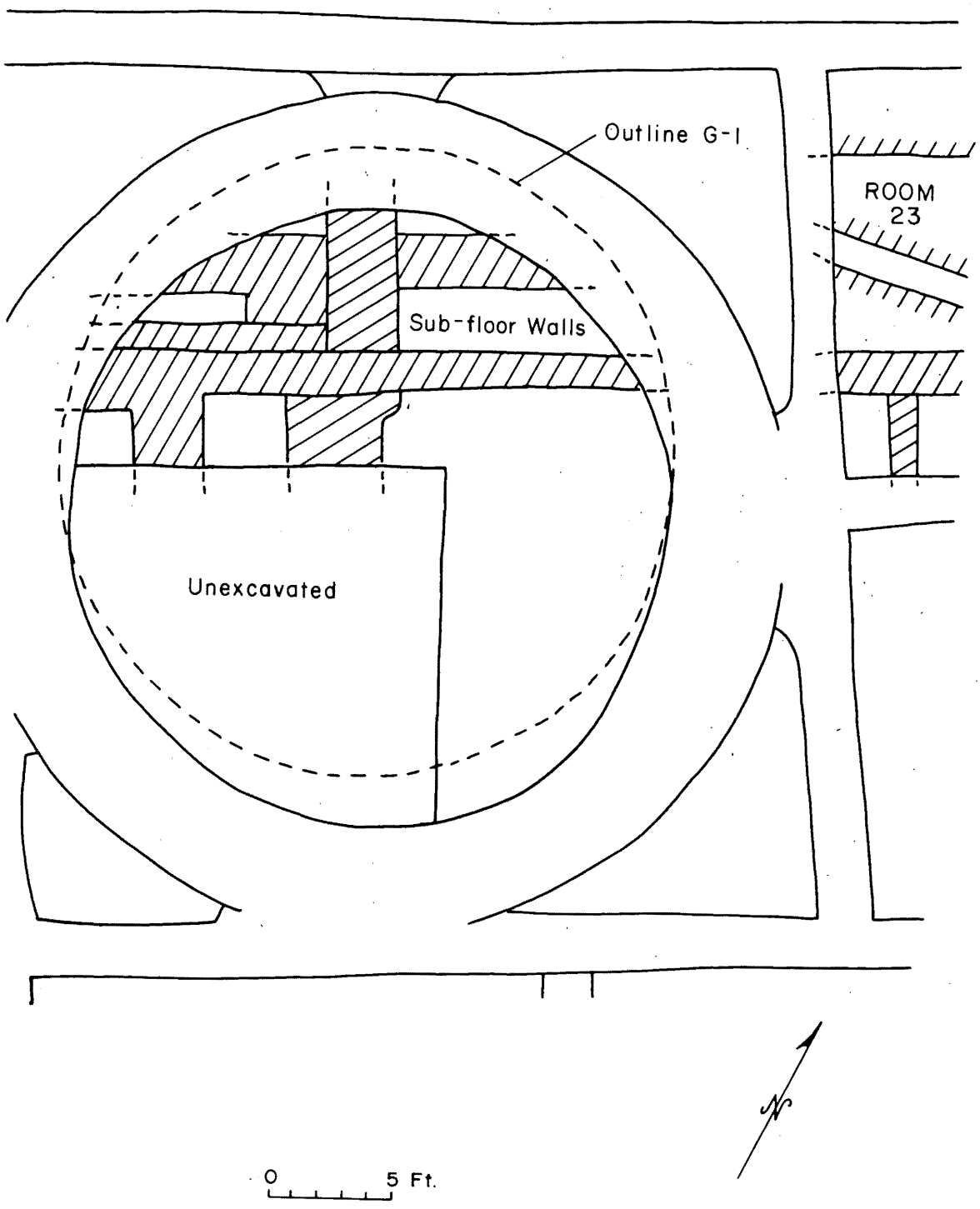


Figure II:12. Kiva G-3 (Miller 1937:Figure 8).

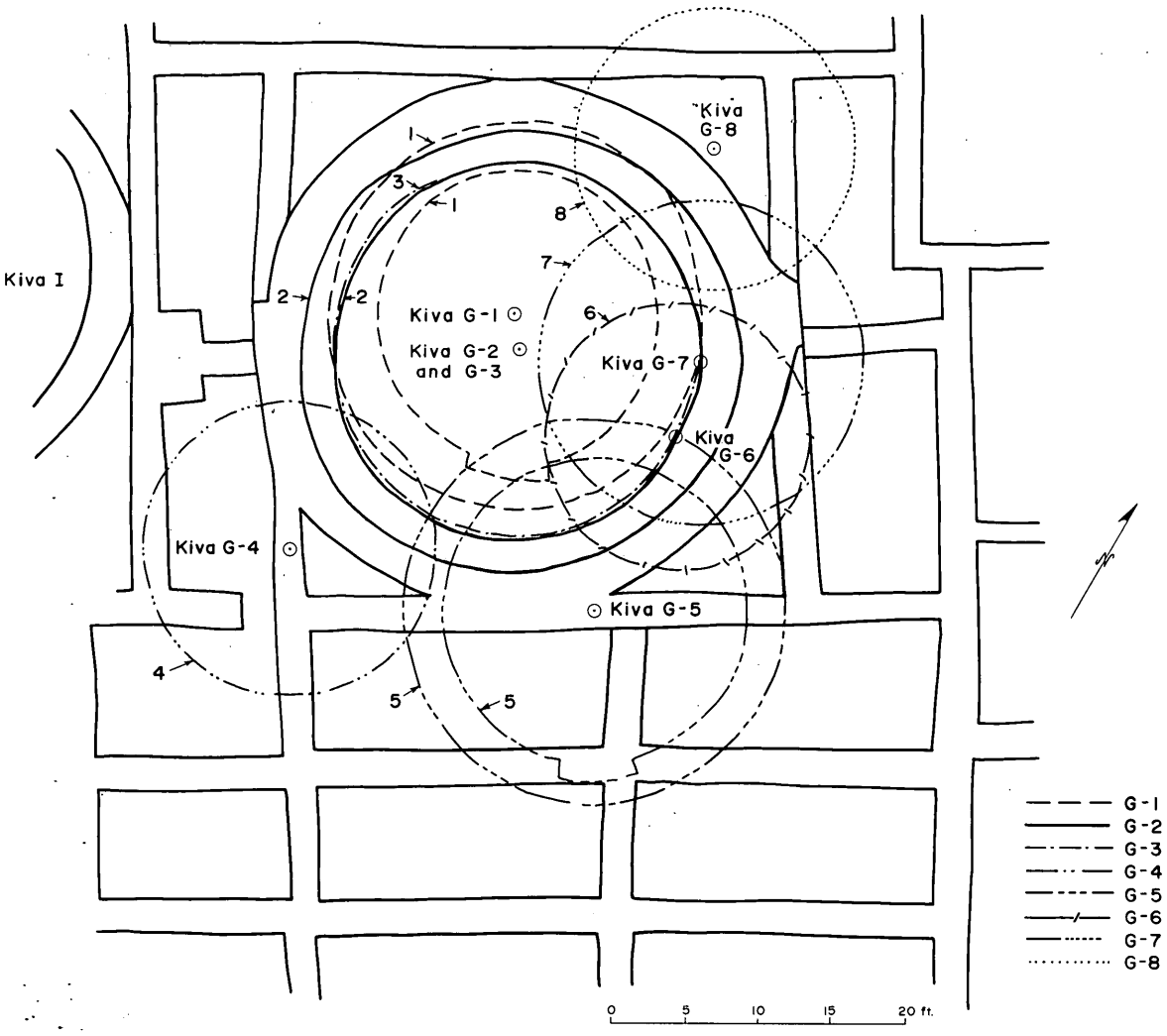


Figure II:13. Kiva G Complex (Miller 1937:Figure 27).

No floor features were present in the small areas of floor exposed for any of the kivas. Miller (1937) considers Kiva G-8 the oldest of any of the G kivas.

Kiva G-5

Kiva G-5 is fairly well preserved. All but the westernmost portion of the kiva--that part lying under Kiva G-4 and its eastern enclosing wall (Miller 1937:Sec. VIII)--was excavated. See Figure II:13.

Kiva G-5 is also shown in Figure II:14. Only one floor feature was found: a circular, masonry-lined firepit (2'2" diameter, 1'6" deep, with a rim raised 2.5" above the floor). No ventilation system was defined. The bench had been razed, and pilasters (if any) destroyed. However, "niches" just above the bench top level are probably voids left for seating horizontal log pilasters; if so, Kiva G-5 would have had six pilasters. The setback at the top of the kiva wall indicates seating of horizontal beams which either spanned the kiva, or rested on a cribbed framework rising from the bench.

Kiva I

Leinau describes this kiva (Figure II:15):

> On the bench are eight pilasters of squared logs covered with a layer of masonry blocks. These pilasters are not spaced at equal intervals apart but vary in their spacing, those at the south being furthest apart. A vertical [ventilator] shaft and firepit are both present...The firepit measures 2'5" in diameter and is lined with two layers of stone. West of the firepit, and just below the level of the floor, is a rectangular vault measuring inside 3'10" x 8', and about 1' deep (Leinau 1934:22).

There is a recess in the bench over the ventilator. The bench itself has settled unevenly over a complex of subfloor walls.

Leinau (1934) quotes Reiter as saying that "the remains of boards, 1'6" thick, with plaster coating about 6" thick, were found on the floor of the pit [floor vault] of Kiva I."

Harwood (1932) and Woods (1932b) describe the wainscotting of Kiva I. A wattle "wainscotting," similar to that described for Kiva G-1, ran around the rear of the bench. The "wainscotting" stood 25" tall and projected 7.5" from the wall of the kiva.

Below the Kiva I floor was a razed section of east-west wall (traced under Kiva G and Rooms 23 and 38), the northern part of an earlier kiva (which apparently continued beyond Kiva I to the southeast), and two problematic wall sections running perpendicularly to the ventilator shaft.

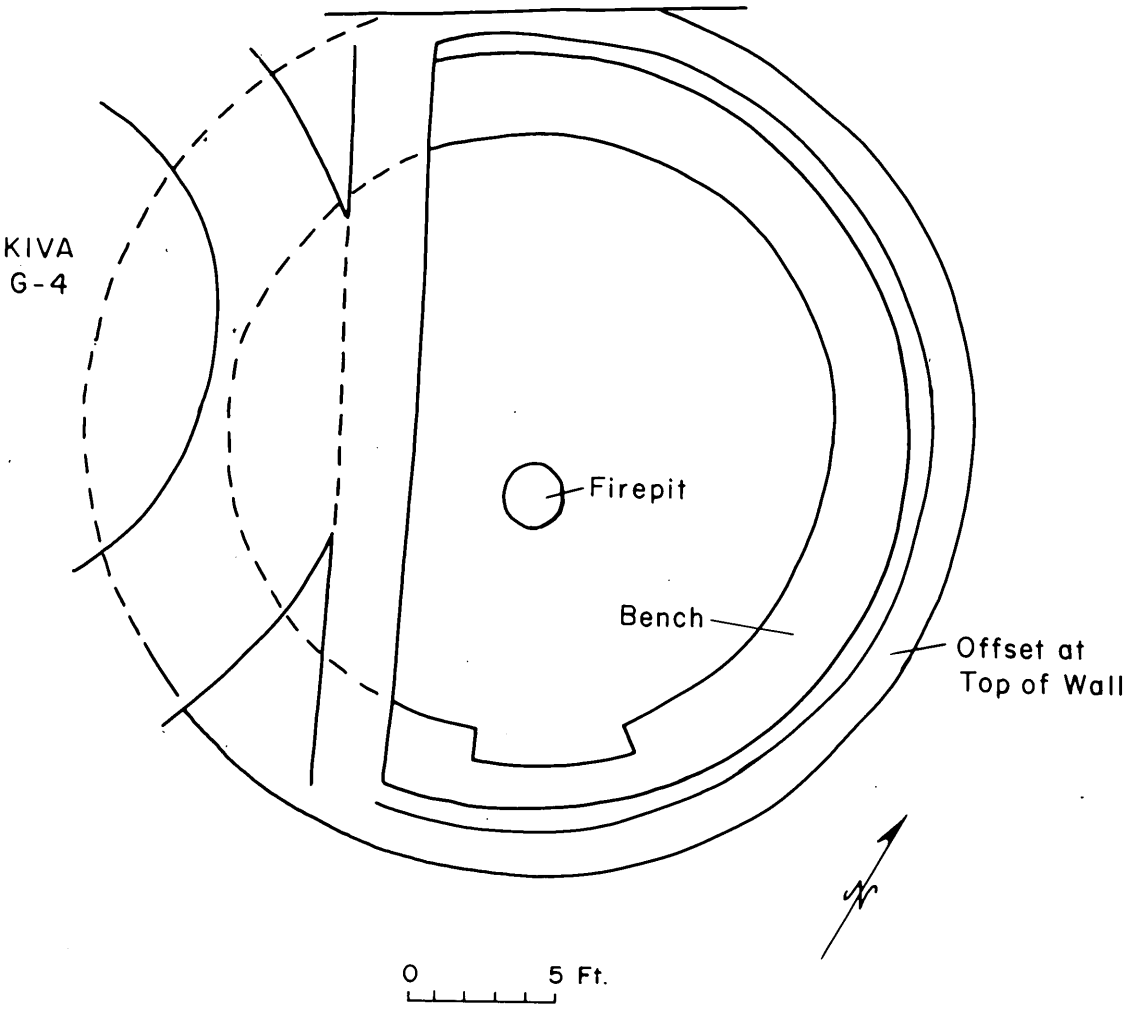
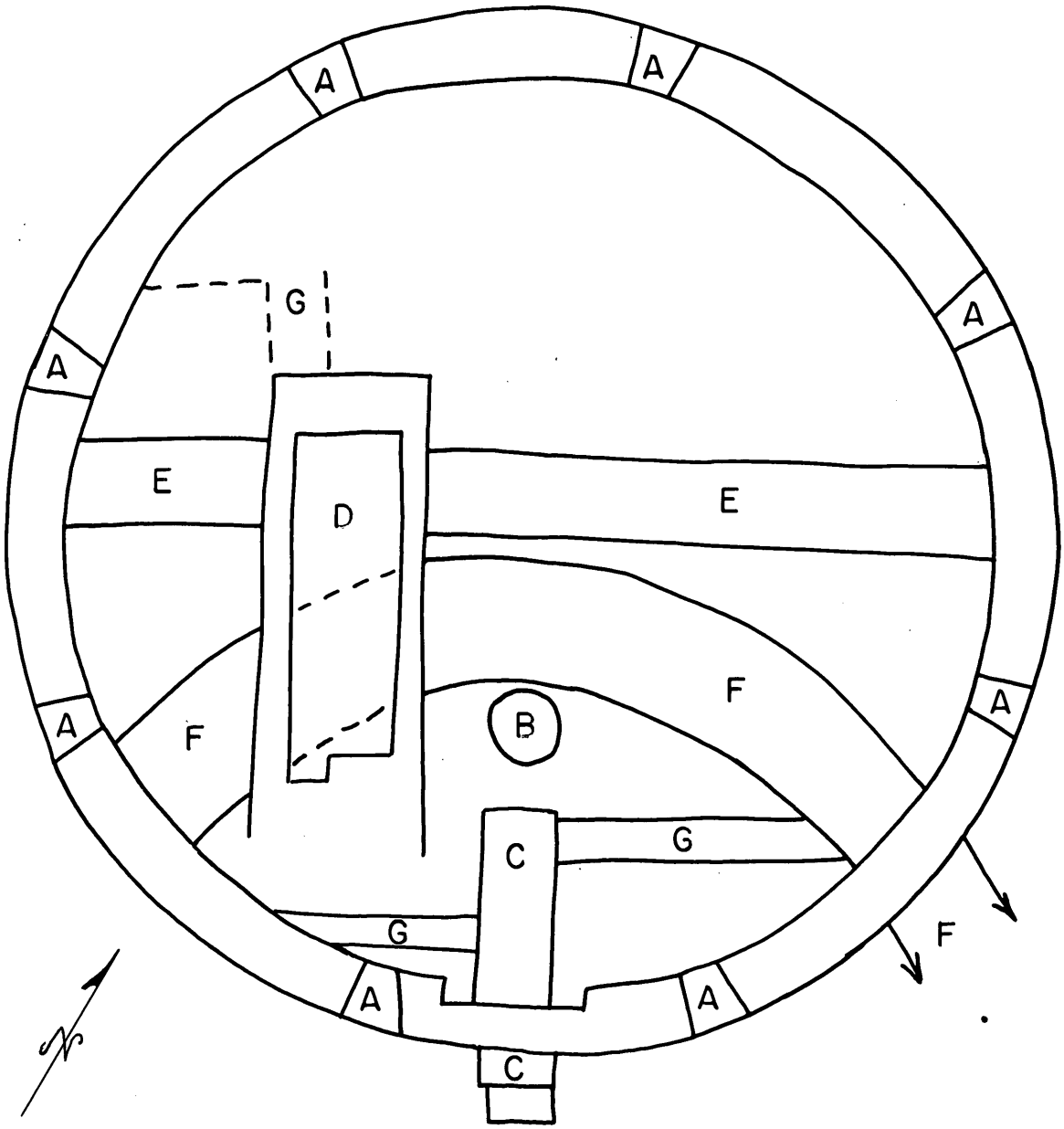


Figure II:14. Kiva G-5 (Miller 1937:Figure 16).



A Pilasters on Bench
B Firepit
C Vent Shaft
D Sub-floor Vault
E Wall 4' Below Kiva Floor
F Kiva Arc Below Floor
G Sub-floor Walls

no scale

Figure II:15. Kiva I (no scale) (Chaco Center Archive No. 1877).

Kiva J

Kiva J is very similar to Kiva I. It lacks a subfloor vault, and may not have had "wainscotting"; the pilasters are squared logs without masonry boxes. No subfloor excavations were attempted.

Kiva N

Kiva N is a two-story cylinder; the second story appears to have had kiva features, while the features of the first story are problematic. The floor of the second story is not intact, but a bench encircles the structure, and a recess is evident in the east arc of the bench (Figure III:21). Leinau describes the floor features of the first story, which had no bench:

> At the base of the doorway (the T-shaped door in the west wall) and projecting out two feet towards the center of the tower is a low wall, the use of which is not yet understood. On the east side of the tower and a little to the south is a large cylindrical structure, finished on the outside with a layer of masonry similar in type to that used on the wall. This cylinder was examined and proved to be composed of packed rubble. It measures about 6'10" in height and 5'9" in diameter (Leinau 1934:27).

No record of subfloor tests remain, but see Room 87. Kiva N is a tower kiva.

Chetro Ketl III (The Court Kiva):

This kiva is well described by Vivian and Reiter (1960) who relied on the report of Woods (1934). Since the first source is readily available, only a summary description will be given here. The Court Kiva was a subterranean "Chacoan" kiva (without an enclosure), which was subsequently modified into a Great Kiva (Figure II:16). Vivian and Reiter describe the original kiva as follows:

> The bench was comparatively low...It is believed to have had eight radially placed horizontal wood pilasters on the bench, and rising from the bench back, against the kiva wall, a thin bark padding or wainscotting. The bench was continuous, without a recess, and the ventilator opening was in the bench face at the south...The floor features consisted of firepit and rectangular masonry box...on the west side. The firepit was circular, stone-lined, 3 feet 3 inches in diameter. The foot drum [subfloor vault] was 11 feet long, 4 feet wide, and 28 inches deep (Vivian and Reiter 1960:45).

This kiva was converted into a Great Kiva with the addition of masonry pillars, a raised fire box, an antechamber, floor vaults and other features detailed by Vivian and Reiter (1960:45-50).

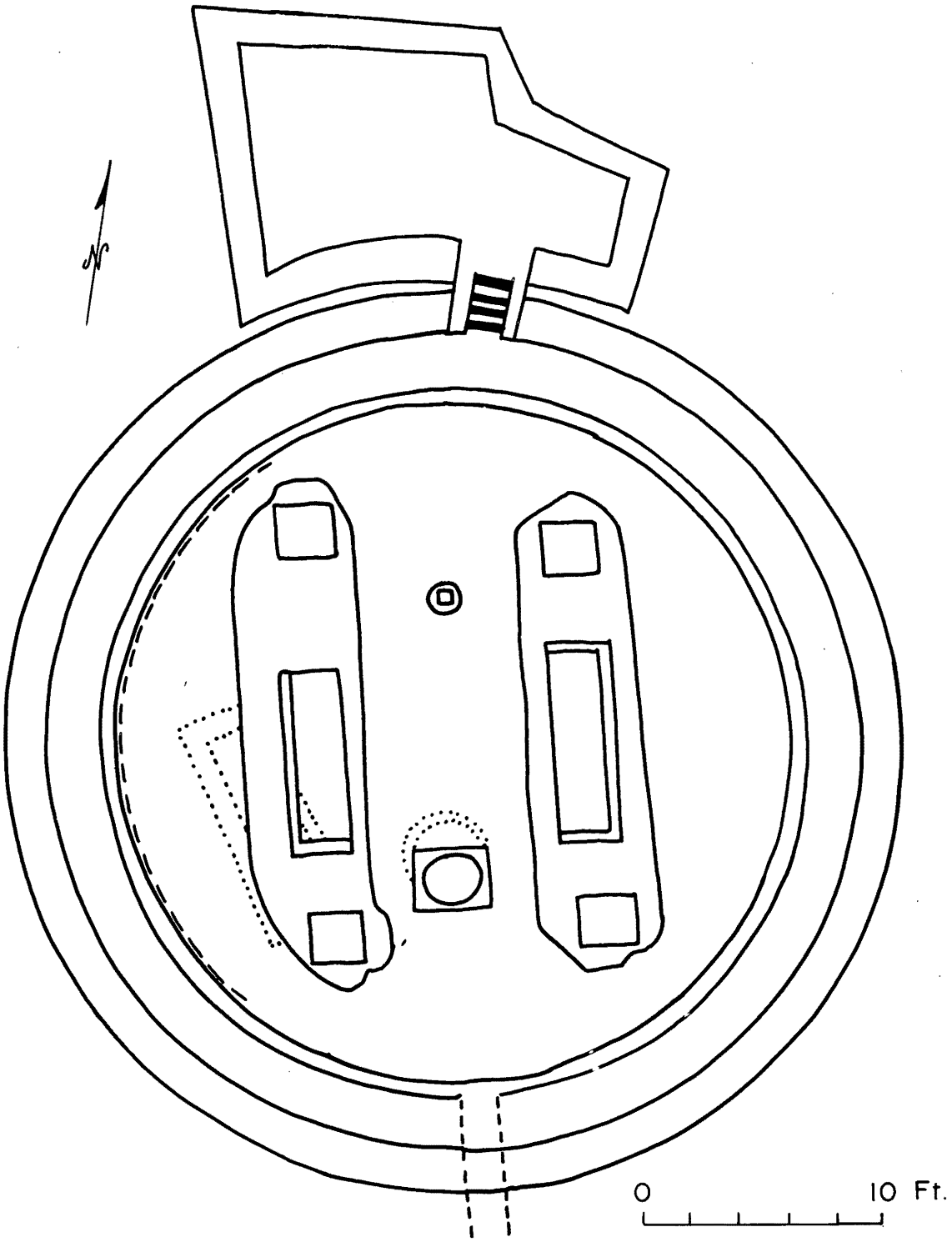


Figure II:16. The Court Kiva (Vivian and Reiter 1960:Figure 20; courtesy School of American Research).

Chetro Ketl I and II (The Great Kiva)

The Great Kiva is described in detail by Vivian and Reiter (1960: 27-42). Since this work is still in print and is widely available, only minor points, not covered in that study, are addressed here.

The Great Kiva, in its last configuration, had several peripheral rooms. The radial walls of these rooms probably abutted the Great Kiva wall, although this is not indicated in Figure II:17. The area immediately around the exterior of the Great Kiva was disturbed by Hewett's trenches.

The last floor of the Great Kiva, which may be associated with a crude veneer over the bench, sealed deposits containing Mesa Verde Black-on-white sherds (Hawley 1934:62).

At least three earlier walls, two of which are parallel, run northeast to southwest below the lowest floors of the Great Kiva, some 15' below the final plaza surface. See the discussion of the Plaza, below.

Trench along the back wall

A 3' x 8' trench, perpendicular to the rear wall of Chetro Ketl outside Room 43, reached the base of the rear wall at a depth of 12'2". The upper and lower 2' of the exposed deposits were wall debris and cultural material; the intervening 8' was "almost pure sand" (Anon. n.d.a and n.d.b). Cultural material continued below the 12'2" level for an unspecified depth. No foundation for the rear wall was discovered.

Hawley (1934:61) describes what probably is the same trench, although she dates the excavation to a year earlier than the trench described above:

> The 1929 excavations included a trench cut down to the base of the back wall of Chetro Ketl, 14 feet below the present surface. Under the accumulation of sand that has drifted into the space between the back wall and the cliffs of the north side of the canyon were found charcoal, piles of ash, fragments of deerhorn, and potsherds.

Hawley (1934:Table VI) lists numbers of sherds recovered from this trench as follows:

Below surface	Sherds
0-2 ft.	5
2-4 ft.	56
[4-8 ft.]	[0]
8-12 ft.	21
12-14 ft.	108

Only 21 sherds were recovered from the 8' of deposits from 4' to 12' below surface; while the lowest 2' (12-14') contained most of the ceramics from the unit. This agrees with the other descriptions of the trench (Anon. n.d. a and n.d. b).

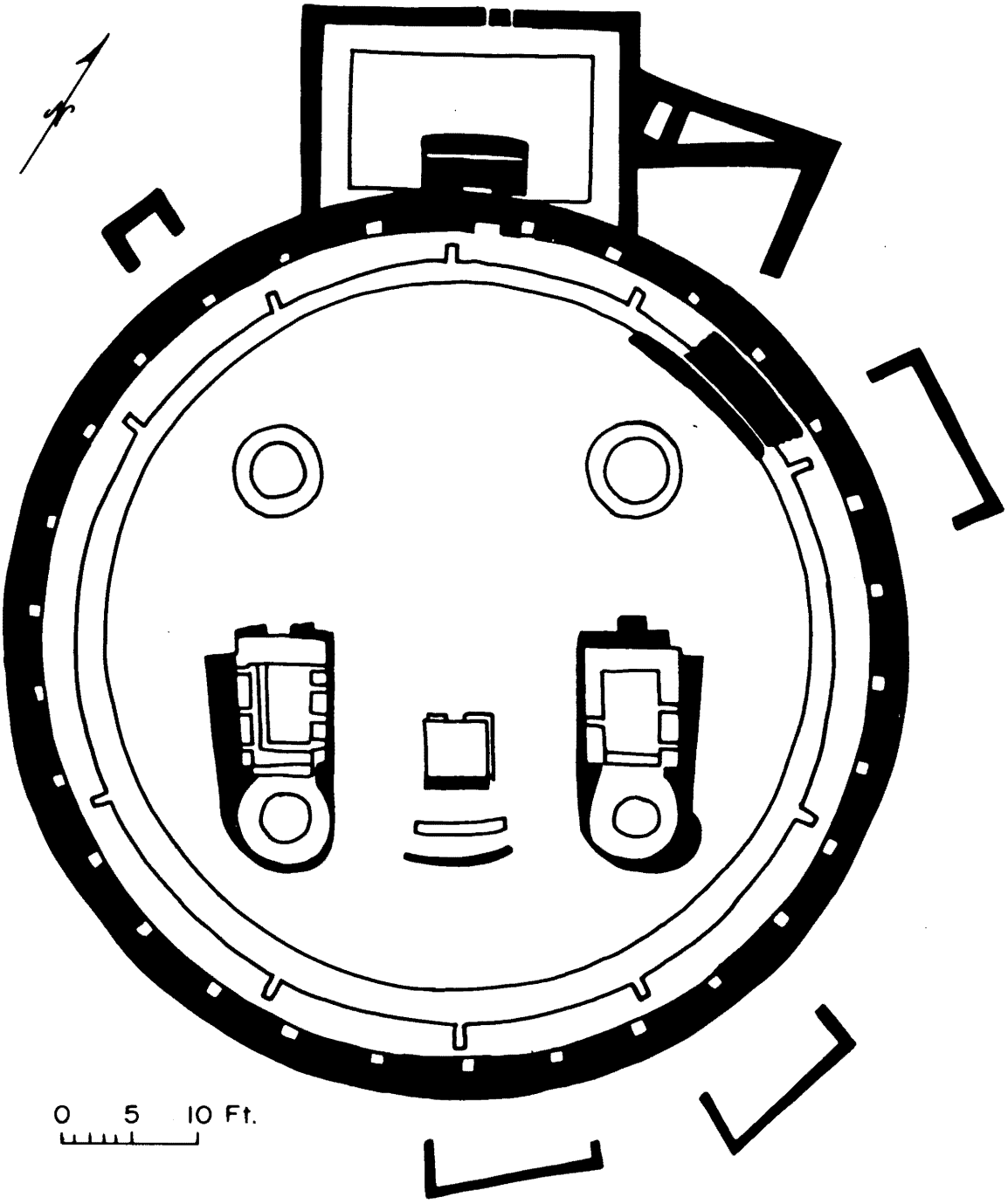


Figure II:17. The Great Kiva, Chetro Ketl I and II (Vivian and Reiter 1960:Figure 12; courtesy School of American Research).

Reiter's (1933) map suggests a similar trench was excavated along the east exterior wall (outside the north end of Room 4), but no notes have survived.

Balconies on the back wall

Early accounts mention balconies along the second and third stories of the rear wall. Cantilever beams, projecting at least 3', are shown in early photographs, and grooves at the ceiling levels of interior walls can still be seen along the back wall. See WALL NOTES, Chapter III, Rear Wall. Balconies along the second and third stories of the rear wall were probably continuous.

The Plaza

Two main plaza levels, separated by 3' (and occasionally up to 6') of fill were found over all excavated plaza areas (e.g., Reiter 1933:58). The most extensive plaza excavations were undertaken in the southeast corner, first in 1920-1921 by Hewett, and again in 1933 by Postlethwaite.

The northern limit of plaza features (Figure I:2), roughly a line from Room 14 to Room 130, is probably the result of Hewett's excavation strategy: the 1921 map represents Hewett's "area ninety foot square" (1921b:56) extended somewhat to the north. The area between Hewett's excavations and the southeast arc of the Great Kiva was stripped in 1933; the absense of features in this area is probably real.

The maps (Hewett 1921b; Postlethwaite 1933) of this work show numerous plaza features. Aside from kivas and Rooms 14 and 15 (described elsewhere), three different types of features were noted:

1) poorly constructed rooms, similar to Room 14 and 15 (e.g., the room just outside Rooms 12 and 134).
2) large, elaborate firepit complexes (e.g., features around Kiva B).
3) buried, razed walls, generally running northeast to southwest (e.g., the walls running from Kiva C, running from the southwest corner of Rooms 3 and 123, under Kiva A, and quite possibly, the parallel walls under the Great Kiva. The parallel walls suggest an early version of the Moat. These walls may have enclosed the plaza and were later replaced by similar walls to the south as the East Wing grew in that direction.

No record of systematic excavations elsewhere in the plaza remains. Some (an unspecified area) of the plaza was cleared south of Rooms 20 and 21, exposing a hard packed surface with "a few small outdoor fires [firepits?]" (Stubbs 1929:8).

The Trash Mound

Just 60' east of the southeast corner of Chetro Ketl lies "one of the largest trash piles ever found in connection with southwestern Pueblo

sites" (Hawley 1934:31). It is one of several large mounds at Chaco, the others associated with Pueblo Bonito, Penasco Blanco and Old Alto (see Windes 1980 for a general discussion of these mounds and other trash deposits at Chaco).

The mound has been all but destroyed by repeated trenching and by rechanneling of the small arroyo that runs between it and Chetro Ketl. It was orignally an oval with rather parallel long sides, measuring 205' long, 120' wide, and standing at least 20' tall. Windes (1980:12) calculates that it contained between 219,000 and 275,000 cubic feet of fill. Hawley (1934:33) describes this fill as consisting of thick layers of "ash, charcoal and potsherds heaped in small overlapping mounds as thrown from... baskets" and "debris removed from some abandoned section of the pueblo... or from an old dump."

The mounds at Pueblo Bonito are clearly architectural features, with masonry facings, stairways and surfaces. The brief accounts of the excavation of the Chetro Ketl mound do not mention any of these trappings, but the Chetro Ketl mound too is probably an architectural feature.

Jackson (1878:440) thought he saw two other large mounds, south of the ruin; and Hawley (1934) suggestively refers to the mound as the "East Mound." No trace remains of these mounds today, nor of certain others reported by Jackson at other Chacoan sites. It is not impossible that Hewett removed the missing Chetro Ketl mounds (Windes 1980:13) leaving no trace, comment, or memory. But the absence of others of Jackson's mounds in undisturbed areas suggests that whatever Jackson saw, it was not comparable to the mound discussed here.

CHAPTER III

WALL NOTES

Stephen H. Lekson and Peter J. McKenna

Measured drawings (elevations) were made of almost all of the exposed walls at Chetro Ketl. Walls not recorded include the interior walls of the rooms in the front arc; the greatly reduced wall north of Kiva C; the walls of Kivas G-1, G-5, and the Great Kiva; and the walls of the unexcavated kiva in the West Wing.

The Chetro Ketl elevations were part of a larger project, recording the undocumented large sites in the canyon. The kinds and quality of data recorded were determined by the requirements of that study. Horizontal control was provided by a photogrammetric base map (NPS Branch of Remote Sensing Archive Number 6A3); horizontal distances within each room were taped. Vertical control was established with line levels (with all their attendant problems), a series of connected rooms being drawn to one level. Each group of rooms was later tied to a single reference elevation with a transit. Drawings were made at a scale of 1" = 125 cm, directly on gridded paper; thus the size of wall features are only approximate. The wall elevations should not be considered extremely accurate.

Our drawings are a compromise between the extremely time-consuming architectural measured drawings (e.g., Historic American Building Survey drawings) and sketches with no scale. Our field work took about 1 man-month, while HABS drawings of one-third of Pueblo Bonito took over a year with a crew of three or more.

On all drawings, each wall or line of walls is shown in relation to a vertical datum line. This line is approximately equal to an elevation of 100.3' (30.6 m) on the unpublished contour map of Chetro Ketl (Archive No. 6A3, above).

Notes are keyed to wall elevations (Figures III:4 through III:15). Walls are designated by room number and cardinal direction (see Chapter I, Numbering and Conventions). Particular features on walls are numbered sequentially on each wall face: e.g., Room 92, East Wall, Door may be designated 92E:1. Features going through walls will receive a different designation on two sides of a wall. Thus, door 92E:1 might be 93W:4 in the adjoining room. "Interior" and "exterior" are relative to the room, not the building itself. "Dendro #" is the dendrochronological sample number; note that only those samples observed in the field by Lekson and McKenna are included here.

Wall elevations approximate continuous North-South or East-West lines (Figures III:1 and III:2). The dashed horizontal lines on all drawings represent the level of the site datum. If two dashed parallel lines are joined to form a rectangle, the drawing represents two faces of a single wall. If folded along an axis between the two parallel dashed lines, the drawings would assume the configuration of the real wall (Figure III:3). Kivas are drawn as strips that correspond to the circumference of the bench face (if the bench is present) or the kiva wall (if the bench is absent).

Appendix A defines several features encountered on Chetro Ketl walls. Unique or unusual features are shown in separate figures, as noted.

1N This wall was completely rebuilt and includes iron rails and cut lumber, and a stone pier (1N:4) built for support. A blocked door and a vent, shown in early photos (Hewett 1921b) were eliminated during stabilization. The wall was originally built on two beams, set slightly above floor level (see EXCAVATION NOTES, Room 1), and was further strengthened by a pair of intramural beams which originally ran just above the door. (Figure III:8,R).
1 Exposed intramural beams, 15 cm dia.; dendro # CK-135
2 Beam supporting wall, 30 cm dia.; dendro # CK-129
3 Small intramural beam, continues into Room 2; dendro # CK-1117
4 Masonry pier, modern

1E The south quarter of a continuous wall from Room 4. (Figure III:9,T).
1 Lower right corner of door or vent
2 Beam socket; same as 1N:1
3 Beam socket; same as 1N:2
4 Ledge, 5-10 cm deep
5 Ledge, 5-10 cm deep

1S (Figure III:8,S).
1 Ledge, 20 cm deep
2 Door; see 8&9N:6

1W (Figure III:9,V).
1 Door, single, slightly squared lintel, 25 cm probably modern; dendro # CK-1116
2 Beam socket; same as 1N:1
3 Beam socket; same as 1N:2
4 Small intramural beam; same as 1N:3

2N East half of continuous wall from Room 3. (Figure III:8,R).
1 Small intramural beam; same as 1N:3
2 Beam socket, empty, less than 10 cm dia.

2E (Figure III:9,U).
1 Door; same as 1W:1

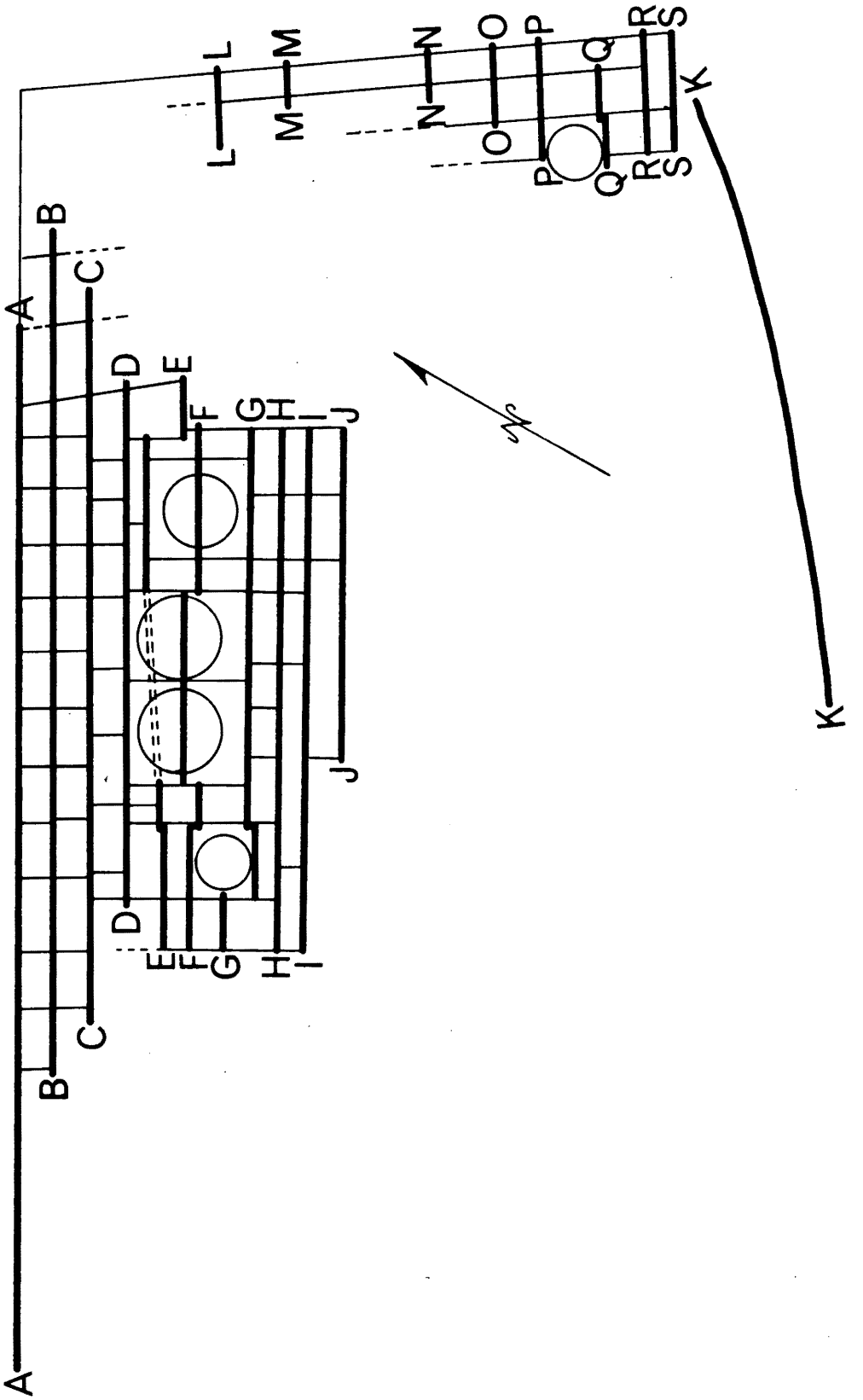


Figure III:1. East-west wall elevation lines.

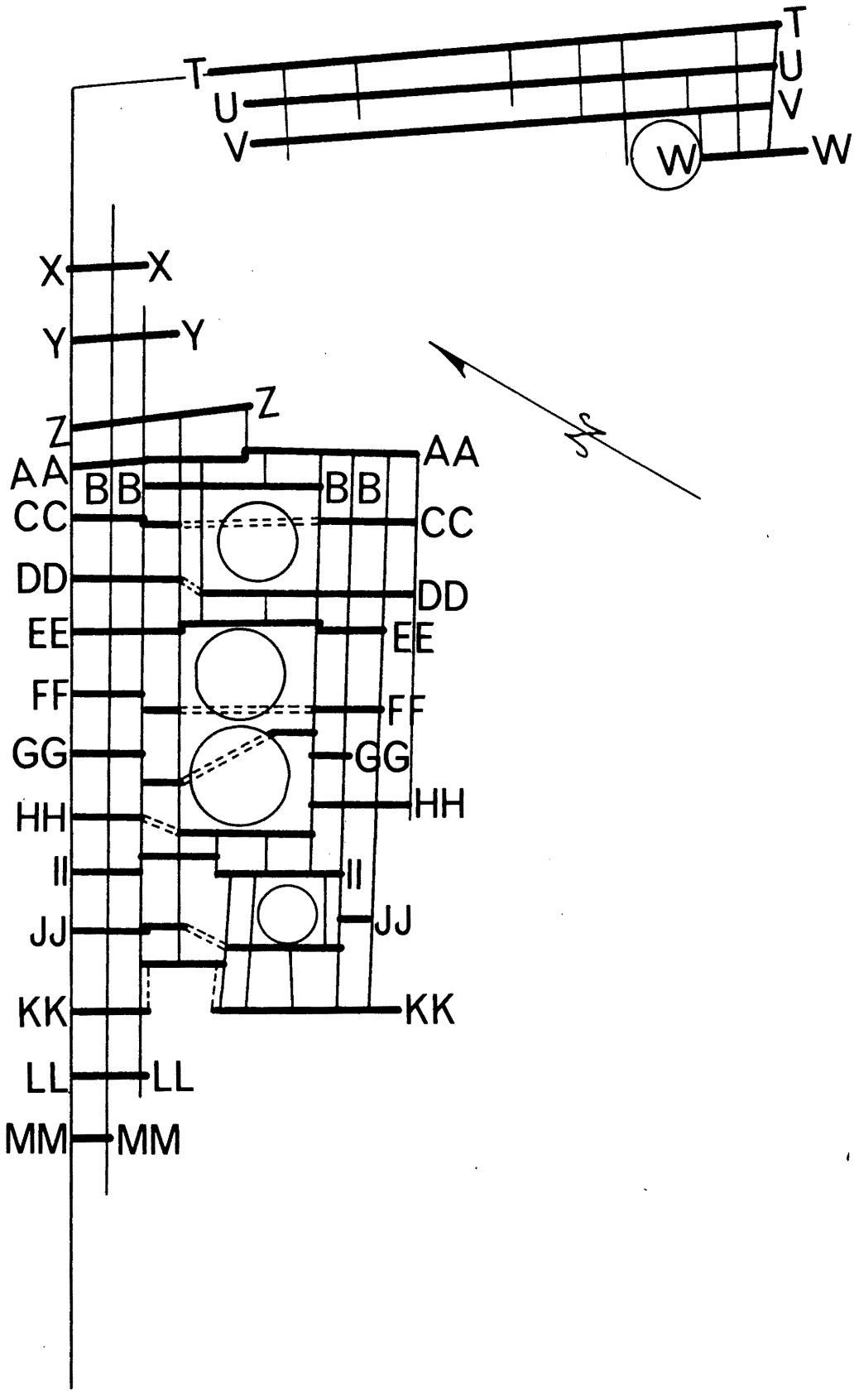


Figure III:2. North-south wall elevation lines.

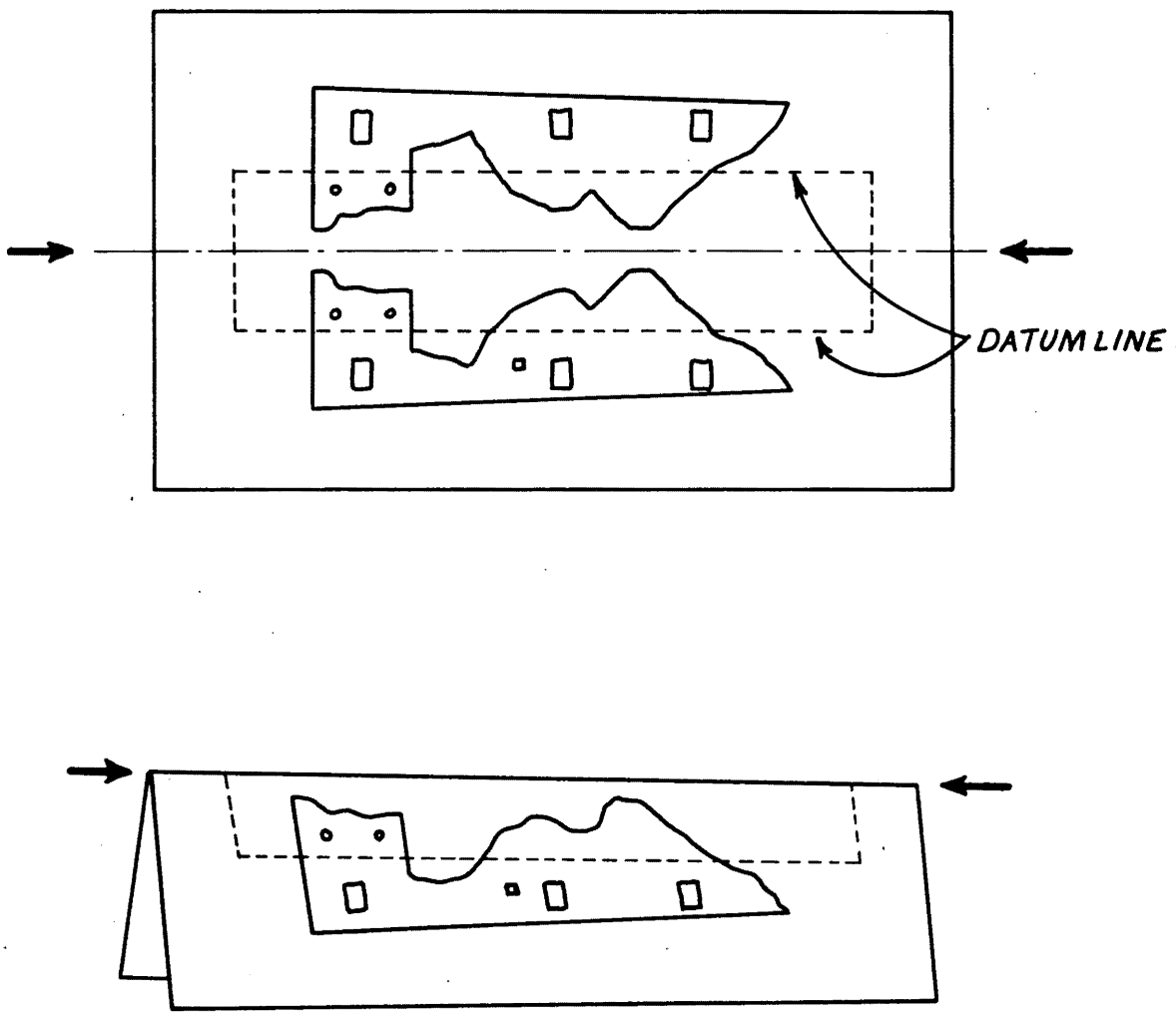


Figure III:3. Wall elevation, schematic.

3N (Figure III:8,R).
1 Lower portion of door or vent
2 Niche, stone lintel, 20 cm deep
3 Niche, wood lintel, 50 cm deep
4 Niche, stone lintel, 15 cm deep
5 Blocked vent

3W (Figure III:9,W).
1 Door with six-pole sill, poles 5 cm dia.

3S (Figure III:8,S).
1 Vent, stone lintel, one wood lintel

4E (Figure III:9,T).
1-5 Primary roof beam sockets, first story, 25-30 cm dia.; dendro #s 1=JPB-142C, 4=CK-1119
6 Beam socket; same as 4S:2
7 Beam socket; same as 4S:3
8-9 Beam sockets, empty, 10 cm deep
10 Overhang, irregular
11 Ledge, irregular
12 Vent, wood lintels
13 Blocked vent, stone lintel, one wood lintel (exterior)

4S (Figure III:8,R).
1 Pier; same as 1N:4
2 Beam, supporting wall, 25 cm dia.
3 Exposed intramural beam, 20 cm dia.; dendro # CK-129
4 Modern masonry patch supported on board

4W (Figure III:9,U).
1 Vent, stone lintel
2 Two beam sockets, 5-7 cm dia.
3 Exposed small intramural beam
4 Beam socket; same as 4S:2
5 Modern masonry patch
6 Beam socket; same as 4S:3
7 Door
8 Ledge, 5 cm deep
9 Primary roof beam socket, 30 cm dia., first-story roof opposite end of 4E:4; dendro # CK-1119

5N (Figure III:8,Q).
1 Partially blocked vent, wooden lintels, stone lintel visible in Room 7; see 7W:2
2 Door

5E (Figure III:9,U).
1 Vent, stone lintel
1 Modern masonry patch
3 Door

5S (Figure III:8,R).
1 Blocked vent/niche, 50 cm deep

2 Blocked vent/niche, 45-50 cm deep
3 Blocked vent/niche, 30 cm deep
4 Modern masonry patch

5W (Figure III:9,V).
1 Vent, eight 5-cm-dia. lintels, probably modern
2 Door, five modern wood lintels
3 Blocked niche/vent, stone lintel, 40 cm deep

6E (Figure III:9,V).
1 Door; see 5W:2
2 Vent; see 5W:1

6S (Figure III:8,R).
1 Door
2 Niche, 30 cm deep
3 Small door/vent, single split-pole lintel supporting stone lintel
4 Niche, 40 cm deep

6W (Figure III:9,W).
1 Door
2 Blocked door, at least 2 stages of construction

7S (Figure III:8,Q).
1 Door
2 Partially blocked vent; see 5N:1

7W (Figure III:9,V).
1 Blocked vent
2 Blocked vent, three wood lintels on Kiva C side (see 5N:1), stone lintel on Room 7 side
3 Blocked door, heavily stabilized; four 5-7-cm-dia. lintels and steel bars, 5-cm secondary lintel; bottom portion of door blocked from Room 7, upper portion from Kiva C. See Figure III:16.

8&9N (Figure III:8,S).
1-5 Primary roof beams, first story; 3=dendro # CK-30
6 Door, ten 10-cm lintels; dendro #s CK-1113, CK-1114, CK-1115, CK-1118
7 Blocked vent
8 Vent

16N (Figure III:6,G).
1 Ledge, 5-10 cm deep
2 Vent, four wood lintels
3 Butt of Kiva G butress
4 Stabilization over Kiva G-5

16E (Figure III:11,AA).
1 Door

16S (Figure III:6,H).
1 Blocked door
2 Stabilization over Kiva G-5

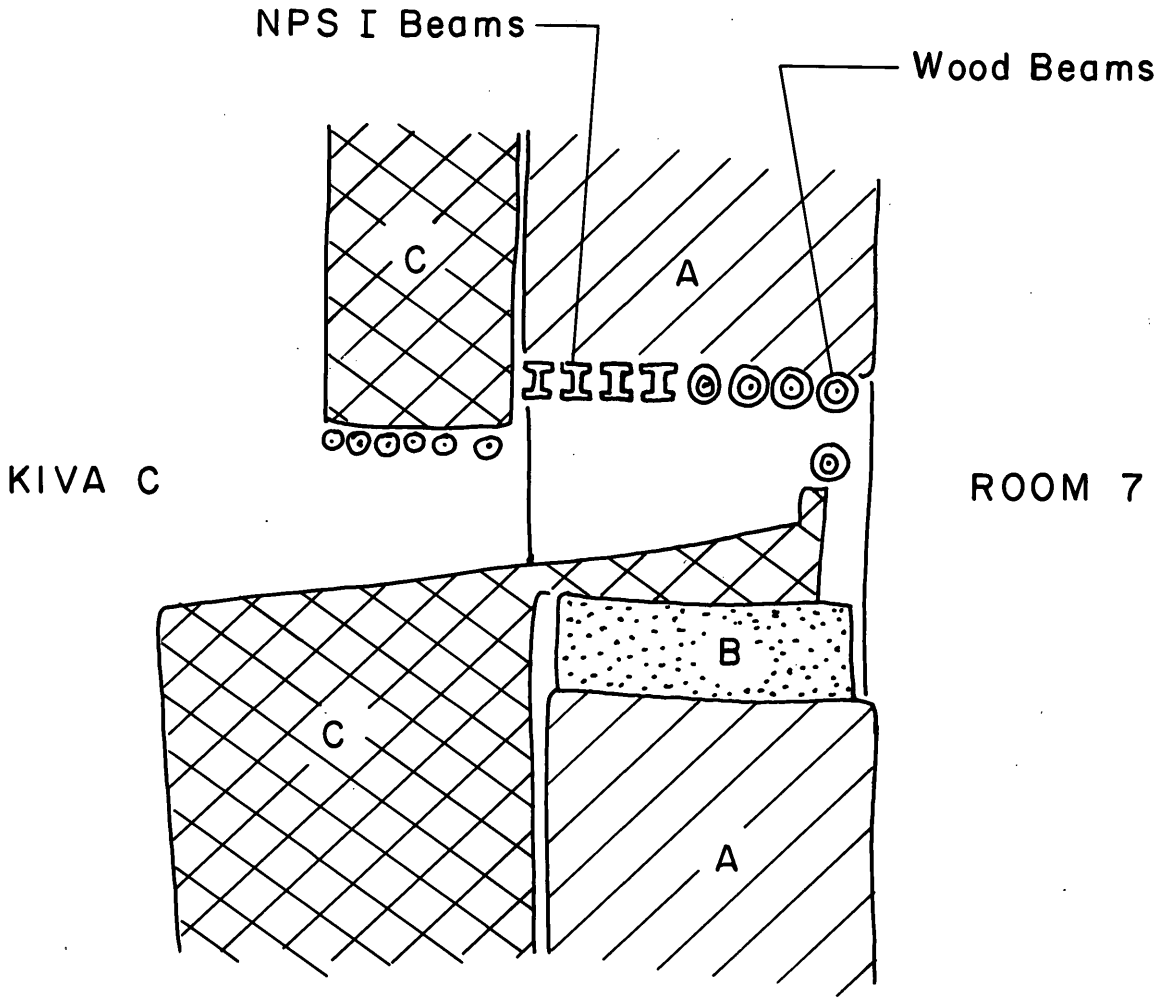


Figure III:16. Cross section, door between Room 7 and Kiva C (schematic, no scale). A, B and C represent sequence of construction: room wall (A), partial blockage of door (B), and kiva wall (C).

16W (Figure III:11,CC).
1 Six secondary roof beams and stabilized inset
2 Stabilization over Kiva G-5

17N (Figure III:6,G).
1 Ledge, 15 cm deep
2 Primary roof beam, with wood lintel over socket
3 Stabilization over Kiva G-5

17E (Figure III:11,CC).
1 Partially embedded primary beam
2 Ledge, 20-25 cm deep
3 Blocked vent (?)

17S (Figure III:6,H).
1 Primary beam, opposite end of 17N:2
2 Door, modern wooden lintels, secondary lintel on north side, 10 cm back from wall face
3 Stabilization over Kiva G-5

17W (Figure III:12,DD).
1 Secondary roof beam sockets
2 Blocked door, upper portion forms niche 35 cm deep, three wood lintels visible

18N (Figure III:6,H).
1 Blocked door, lower portion forms niche 45 cm deep
2 Stabilization over Kiva G-5

18E (Figure III:11,AA).
1 Door

18S (Figure III:7,I).
1 Blocked door, upper portion forms a niche 45 cm deep; five wood lintels 5-10 cm dia.; dendro #s CK-1124, CK-1125, CK-1126; incised designs on east door jamb (Figure II:2)

18W (Figure III:11,CC).
1 Stabilization over Kiva G-5

19N (Figure III:6,H).
1 Ledge, 5-10 cm deep
2 Intramural beam socket
3 Primary beam socket
4 Primary beam socket
5 Door, seven wood lintels, probably modern
6 Stabilization over Kiva G-5

19E (Figure III:11,CC).
1 Partially exposed intramural beam
2 Stabilization over Kiva G-5

19S (Figure III:7,I).
1 Door, lintels modern, secondary lintel on north side of door

19W (Figure III:12,DD).
1 Blocked door

20N (Figure III:7,I).
1 Blocked door

20E (Figure III:11,AA).
1 Door

20W (Figure III:11,CC).
1 Door, three modern wood lintels, one reused original lintel; dendro #s CK-1120, CK-1121, CK-1122, CK-1123 (CK-1123 is original)

21N (Figure III:7,I).
1 Door, seven modern wood lintels

21E (Figure III:11,CC).
1 Door; same as 20W:1

22N (Figure III:6,F).
1 Secondary roof beam sockets and groove
2 Door, six modern wood lintels, single secondary jamb sloping up towards Room 23

22E (Figure III:11,AA).
1 "T" door

22W (Figure III:11,BB)
1 Ledge, 5-10 cm deep
2-6 Primary roof beam sockets

Incised designs on walls of Room 22 (Figure II:3). A series of drawings (Chaco Center Archives #1889) shows these designs. No exact provenience within this room is available.

23S (Figure III:6,F).
1 Groove with juniper splints roofing in west end
2 Primary roof beam socket
3 Door, six modern wooden lintels

23W (Figure III:11,BB).
1 Ledge, 5 cm deep

24 & 25W (Figure III:11,AA).
1 Door; see 20E:1
2 Door; see 18E:1
3 Door; see 16E:1

4 "T" door; see 22E:1
5-6 Intramural beam butts

24N (Figure III:5,E).
1 "T" door; see 38S:2
2 Blocked vent

26N (Figure III:6,H).
1 Ledge
2 Primary roof beam socket
3 Primary roof beam socket
4 Possible door

26E (Figure III:12,DD).
1 Blocked door

27N The upper part of this wall was extensively rebuilt (Vivian and Lancaster 1947:19). (Figure III:6,G).
1 Door
2 Modern steps up to Kiva G
3-7 Primary roof beam sockets; 6 & 7 are modern replacements; dendro #s 3=CK-1284, 4=CK-1285, 5=CK-1286, 6=CK-1287, 7=CK-1288
8 Ledge
9 Beam socket, empty
10 Door, modern lintels, east jamb unfaced
11 Overhang

27E (Figure III:12,DD).
1 Secondary roof beam sockets
2 Blocked door
3 Lintels; see 27N:10

27S (Figure III:6,G).
1-2 Primary roof beam sockets: 1 is opposite end of 27N:3; 2 is opposite end of 27N:4
3 Possible door

27W The top of this wall is heavily stabilized. (Figure III:12,EE).
1 Ledge

28E (Figure III:12,DD).
1 Overhang
2-4 Primary roof beam sockets

28S (Figure III:6,G).
1 Ledge
2 Door; see 27N:10

28W (Figure III:12,EE).
1 Primary roof beam, opposite end of 28E:2

29&30N (Figure III:6,H).
1 Primary beam socket, 30 cm dia., empty

2 Incised building stones
3 Ledge, 50 cm deep
4 Intramural beam, 25 cm dia.

31N (Figure III:6,G).
1 Door
2 Ledge

31S (Figure III:6,H).
1 Ledge

32N See 81N.

32S See 81S.

33N (Figure III:6,G).
1-2 Primary beam sockets, empty, 30 cm dia.

33S (Figure III:6,H).
1 Door

33W (Figure III:13,GG).
1 Blocked door

33/73N (Figure III:6,G).
1 Blocked vent, stone lintel

33/73E (Figure III:13,GG).
1 Blocked door

33/73S (Figure III:6,H).
1 Partially blocked "T" door; see 81N:12
2 Vent; see 81N:11

35E (Figure III:12,DD).
1-2 Primary beam sockets
3 Overhang, 10 cm deep
4 Room-wide platform beam socket, empty, 15 cm dia.
5 Niche, 20 cm deep

35W (Figure III:12,EE).
1 Room-wide platform beam socket, empty, intramural beam (20-25 cm dia.) exposed at rear of socket
2 Niche, 30 cm deep
3 Door, slightly angled through wall
4 Vertical break in wall

37W (Figure III:12,EE).
1 Abutment and change in masonry style

38N (Figure III:5,D).
1 Door
2 Door, blocked prior to 1947 flood
3 Door, wooden lintels
4 Secondary beam butts, from Room 39

38E ((Figure III:10,2).
1 Ledge, 20 cm deep
2 Blocked vent or door
3 Vertical break in wall, aligned with razed east-west wall in level 3; see EXCAVATION NOTES, Room 38

38S (Figure III:5,E).
1 Vent/niche, wood lintels
2 Partially blocked "T" door; wood lintels; dendro #s CK-1136, CK-1137, CK-1138, CK-1139
3 Niche (?)
4 Beam sockets, 10-15 cm dia., empty

39N Wall partially rebuilt in 1947. (Figure III:5,C).
1 Secondary roof beam sockets; dendro #s CK-1240, CK-1241, CK-1243, CK-1244, CK-1245, CK-1246, CK-1247, CK-1248, CK-1249, CK-1250, CK-1251
2 Door, rebuilt in 1947, wood lintels
3 Door

39E (Figure III:10,Z).
1 Blocked door, second story
2 Beam butts, into Room 107
3 Door, bottom heavily stabilized, partially blocked, double secondary jambs and lintels; dendro #s CK-1254, CK-1255, CK-1256; intramural beam forms part of sill; dendro # CK-1253. See Figure III:17
4 Primary roof beam socket; dendro # CK-3366; opposite end of 39W:3

39S (Figure III:5,D).
1-2 Doors; see 38N:1-2
3 Door, wood lintels
4 Partially blocked (modern?) door, wood lintels
5 Secondary roof beam sockets; dendro #s CK-1223 through CK-1239, inclusive

39W Wall completely rebuilt in 1947. (Figure III:11,AA).
1 Door with modern wood lintels
2 Primary roof beam butt into Room 39A
3 Primary roof beam socket; dendro # CK-336, opposite end of 39E:4

39AN Wall rebuilt in 1947. (Figure III:5,C).
1 Corner door from Room 41; same as 39AE:3; see 41S:4
2 Door

39AE Wall rebuilt in 1947. (Figure III:11,AA).
1 Primary beam socket, modern replacement
2 Door, rebuilt, wooden lintels; see 39W:1
3 Corner doorway from Room 41; same as 39AN:1; see 41S:4

39AS (Figure III:5,D).
1 Ledge
2 Blocked (modern?) door

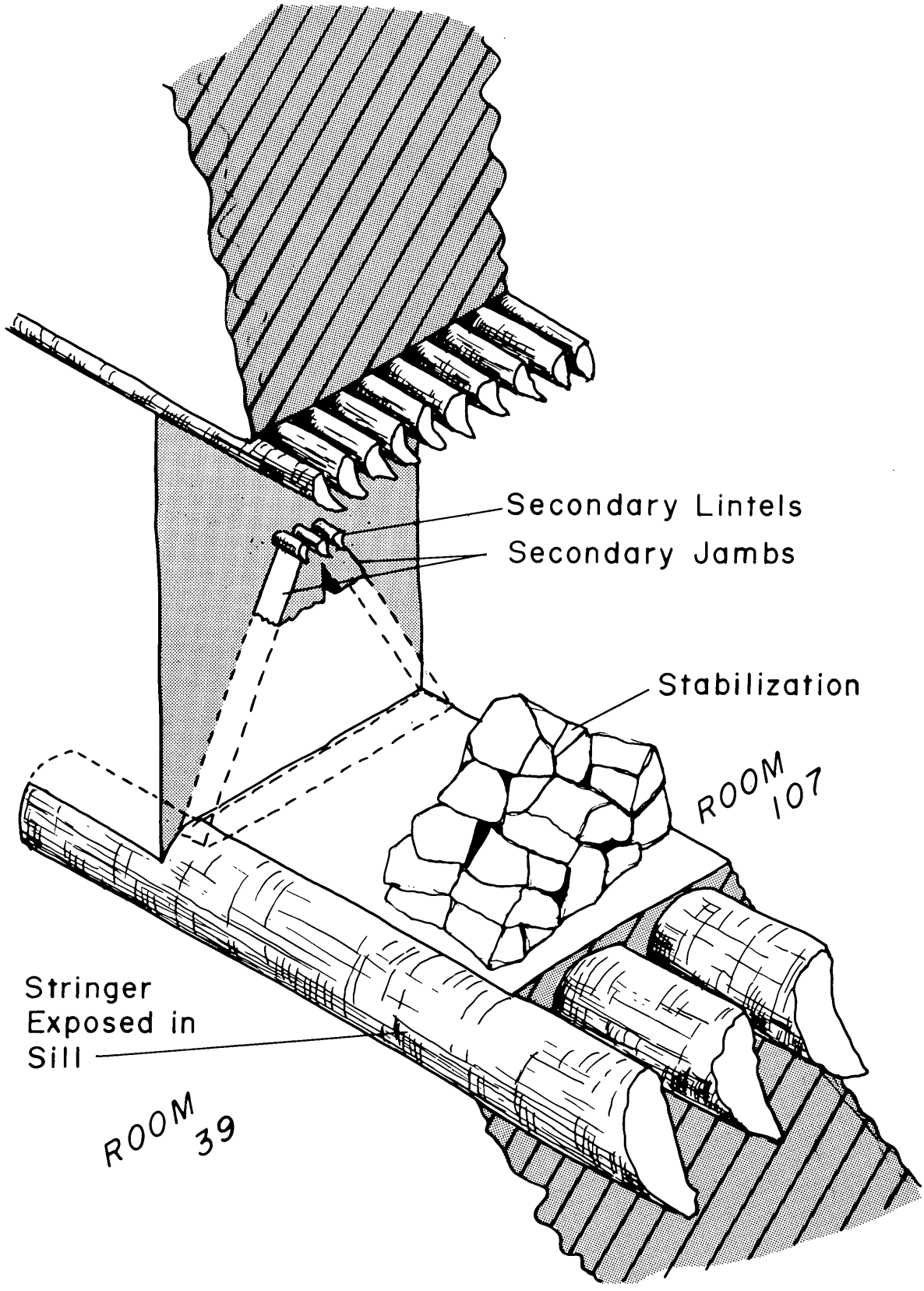


Figure III:17. Feature 39E:3, Room 39, detail.

40S (Figure III:5,D)
1 Blocked door
2 Ledge
3 Secondary beam sockets, empty, stabilized
4 Blocked door. Open prior to 1947 (Vivian and Lancaster 1947:33)
5 Blocked door

41E (Figure III:10,Z).
1 Door
2 Groove, 10 cm wide x 15 cm deep
3 Blocked door, wood lintel
4 Primary roof beam socket, 25 cm dia.; dendro # CK-1151
5 Lintels exposed in stub of wall between Rooms 41 and 43, heavily stabilized, probably a vent in destroyed 41N
6 Possible vent lintels exposed in stub of wall between Rooms 41 and 43

41S (Figure III:5,C).
1 Ledge 35 cm deep, east; disappears to the west
2 Door
3 Door; see 39N:2
4 Corner door into Room 39A; dendro #s CK-1152, CK-1153.

41W See 43W.

42N (Figure III:4,B).
1 Vent, nine 5-cm-dia. wood lintels

42E Features A and B from pre-stabilization photos. (Figure III:11,AA).
A Intramural beam
B Blocked door/vent
1 Primary roof beam; dendro # CK-1156
2 Ledge, 5 cm deep
3 Door, eight 5 to 7-cm-dia. wood lintels; dendro # CK-1155

42S (Figure III:5,C).
1 Door

43AN Features A and B from pre-1947 photos. Vivian and Lancaster (1947:46) show a full story below present fill level. (Figure III:4,B).
A Primary roof beam socket
B Door
1 Ledge, 5-10 cm deep
2 Vent, eight 5-cm-dia. wood lintels
3 Vent, eight 5-cm-dia. wood lintels

43AE Vivian and Lancaster note a wall plate/intramural beam at the first-story roof level (1947:45). (Figure III:12,DD).

43AS (Figure III:5,C).
1 Door

43W (Includes 41W) (Figure III:11,AA).
1 Door
2 Lintels exposed in cross wall, heavily stabilized, possible vent

3 Door, eight 8 to 10-cm-dia. wood lintels; dendro # CK-1154
4 Possible vertical break in wall, perhaps the end of north wall of Rooms 103-42; see North Block D, Chapter IV
5 Primary roof beam, opposite end of 41E:4; dendro # CK-1151
6 Corner door into Room 39A; see 41S:4

43N (Figure III:4,A).
1 Vent, 13 wood lintels; dendro #s CK-1146, CK-1147
2 Blocked vent
3 Door, ten 5-cm-dia. lintels; dendro #s CK-1148, CK-1149, CK-1150; probably blocked after 1947 flood
4-5 Primary roof beams, 25 cm dia.; dendro #s 4=CK-1145, 5=CK-1144
6 Blocked door, seven 10-cm-dia. lintels; dendro #s CK-1158, 1159
7 Blocked vent, nine 5-cm-dia. wood lintels
8 Blocked vent
9 Ledge, 5 cm deep

44N Wall originally 2 1/2 stories high (Vivian and Lancaster 1947:48-49). (Figure III:4,A).
1 Vent left in blocked door
2 Blocked door
3 Possible blocked vent
4 Groove
5-6 Primary roof beams, possibly modern; dendro #s 5=CK-65, 6=CK-1157
7 Vent, at least twelve 5 to 7-cm-dia. lintels
8 Vent, ten 5 to 7-cm-dia. lintels
9 Blocked door

44E (Figure III:11,AA).
1 Door
2 Secondary roof beam sockets, stabilized, over ledge

44S (Figure III:4,B).
1 Ledge
2 Vent, nine 5-cm-dia. wood lintels

44W (Figure III:11,CC).
1 Door
2 Secondary roof beam sockets, stabilized, over ledge

45N Wall destroyed in 1947; features A-C from early photos. (Figure III:4,A).
A Primary roof beam sockets
B Vents
C Blocked door
1 Groove, 10 cm wide, 5 cm deep
2 Primary roof beam socket; dendro # CK-1160
3 Primary roof beam socket, empty, stabilized
4 Blocked vent/niche, at least three 5-cm-dia. wood lintels, 15 cm deep
5 Blocked door

45E (Figure III:11,CC).
1 Door
2 Secondary roof beam sockets, stabilized, over ledge

45S (Figure III:4,B).
1 Primary roof beam, opposite end of 45N:2
2 Vent, eight 5-cm-dia. lintels
3 Vent, eight 5-cm-dia. lintels

46N Wall partially destroyed in 1947 flood; features A-G from early photos (Vivian and Lancaster 1947:51). (Figure III:4,A).
A Vent
B Blocked door with vent in upper left corner
C Blocked niche (?)
D-E Primary roof beam sockets
F Vent
G Vent left in upper right corner of blocked door
1 Primary roof beam socket
2 Vent, twelve 5 to 7-cm-dia. wood lintels
3 Blocked door, stabilized; see G above
4-5 Primary roof beams, 25 cm dia.; dendro # 4=CK-1161
6 Blocked door, stabilized, wood lintel; dendro # CK-1162
7 Ledge, 5 cm deep

46E Partially destroyed in 1947. Feature A taken from Vivian and Lancaster (1947). (Figure III:12,DD).
A Door
B Double wall stub; see North Block C, Chapter IV

46S (Figure III:4,B).
1 Opposite end of 46N:4, not socketed into earlier rear wall
2 Lintel (?); no visible niche or vent
3 West jamb of large niche in double wall; see 93S
4 Vent/door in early rear wall; see 48N:2

46W (Figure III:12,EE).
1 Double wall
2 Door
3 Door, ten 7-cm-dia. lintels; two of cast concrete, remainder of wood

47-52N (Figure III:4,B).
1 Possible door
2 Corner door to Room 46, blocked from Room 46, 15-cm-dia. intramural beam exposed in west jamb of door
3 Ledge, 5-10 cm deep
4 Overhang
5 Ledge, 10-15 cm deep
6-7 Primary roof beam butts, 20 cm dia.; see 53S:2-3
8 Vent; see 53S:8
9 Vent; see 53S:6
10 Door, rebuilt in 1947; see 53N:7

47-52E (Figure III:12,EE).
1 Corner door from Room 46; see 47-52N:2
2 Secondary roof beam sockets
3 Void; eroded door or historic vandalism

47-52S (Figure III:5,C).
1 Ledge, 10 cm deep
2 Door, rebuilt in 1947, concrete lintel

47-52W (Figure III:12,FF).
1 Secondary roof beam sockets
2 Door, rebuilt in 1947, concrete lintels

48N (Figure III:4,B).
1 Ledge, 5 cm deep
2 Door/vent, seven 10-cm-dia. lintels; dendro #s CK-1163, CK-1164, CK-1165
3-6 Room-wide platform sockets, 10-12 cm dia.; dendro #s CK-1166, CK-1167, CK-1168.

48S (Figure III:5,C).
1-4 Room-wide platform sockets, opposite ends of 48N:3-6
5 Door
6 Vent, eight 5-cm-dia. lintels; probably built in 1947
7 Exposed bonding stones

48W (Figure III:12,EE).
1 Ledge
2 Void, stone "lintel" from stabilization; either an eroded door or historic vandalism

49N Upper part of wall destroyed in 1947. Features A-B taken from early photos. (Figure III:5,C).
A Door
B Primary roof beam socket
C Vent/niche (?)
1 Door

49S (Figure III:5,D).
1-2 Primary roof beam butts for Room 37, 25 cm dia.
3 Primary roof beam sockets, 25 cm dia.
4 Blocked door/vent, wood lintel, open prior to 1947
5 Blocked door, wood lintel

50N Wall partially destroyed in 1947. Features A-C taken from old photos. (Figure III:5,C).
A Primary roof beam sockets
B Ledge
C Vent
D Door
1 Vent, eight 5-cm-dia. wood lintels
2 Door

50S (Figure III:5,D).
1 Blocked door, wood lintel

51N (Figure III:5,C).
1 Ledge, 5 cm deep

51S (Figure III:5,D).
1 Blocked door, at least two construction episodes

51W (Figure III:12,FF).
1 Blocked door (?)
2 Irregular groove, 10 cm deep, roofing material in north end

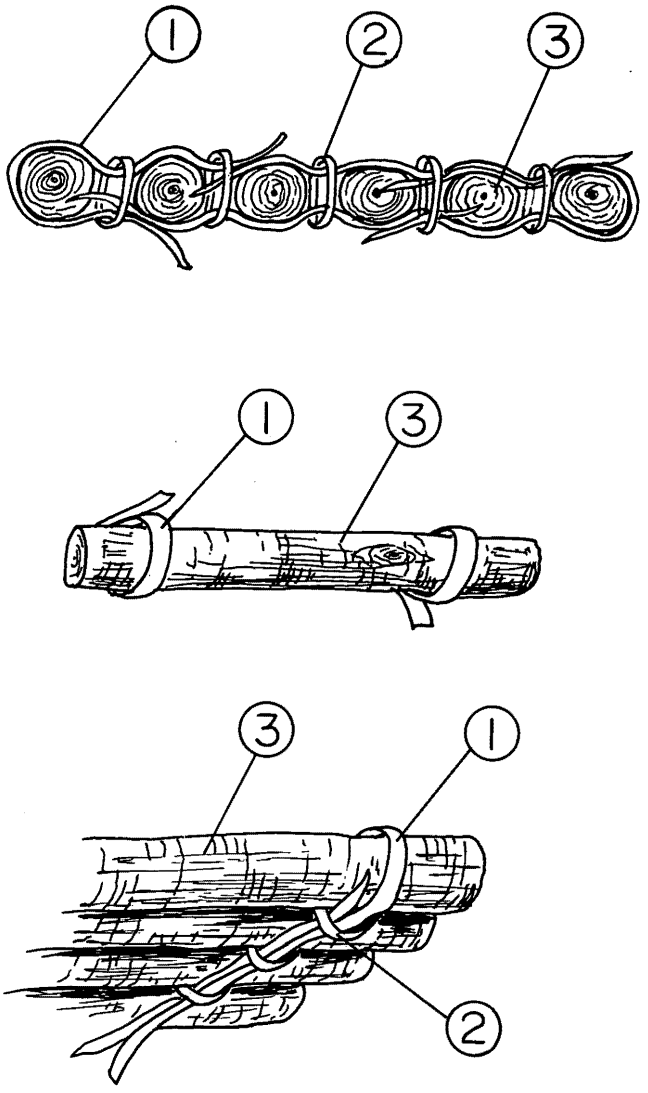
53N (Figure III:4,A).
1 Blocked door
2-4 Primary roof beam sockets, empty; 2=30 cm dia., 3=20 cm dia., 4=40 x 40 cm
5 Vent, six 5-cm-dia. wood lintels, stone lintel on exterior
6 Blocked door, vent left in upper left corner, five 7 to 10-cm-dia. wood lintels; dendro #s CK-1169, CK-1170
7 Vent
8 Groove, irregular, heavily stabilized
9 Primary roof beam socket, empty
10 Primary roof beam socket, 20 cm dia.; dendro # CK-1161
11 Vent, unexcavated
12 Blocked vent/niche, 30 cm deep, five 5-cm-dia. wood lintels visible
13 Blocked door/niche (?), heavily stabilized, eight 5-cm-dia. wood lintels visible
14 Ledge, 10-15 cm deep
15 Vent, five 5 to 7-cm-dia. wood lintels

53E (Figure III:12,EE).
1 Door
2 Secondary roof beam sockets, empty, stabilized
3 Door; see 46W:3
4 Area of bonding stones for double wall

53S (Figure III:4,B).
1 Possible door
2-3 Primary roof beam sockets, 20 cm dia., packed in juniper bark strips; dendro #s CK-150, CK-2205
4 Ledge, 5 cm deep
5 Intramural beam, end exposed
6 Partially blocked vent, 13 wood lintels
7 Door, rebuilt in 1947, eight 7 to 12-cm-dia. wood lintels; dendro #s CK-1169, CK-1170
8 Partially blocked vent, ten 5 to 7-cm-dia. wood lintels; see Figure III:18
9 Double wall stub

53W (Figure III:12,FF).
1 Door sill
2 Double wall stub
3 Secondary roof beam sockets, stabilized
4 Door

54N (Figure III:4,A).
1 Blocked door
2 Ledge, 5 cm deep



① Split Yucca Wrap
② Two or Four Ply Cordage
③ Lintel Pole

Figure III:18. Feature 53S:8, Room 53, detail.

3 Primary roof beam socket, 20 cm dia.
4-5 Primary roof beam sockets, empty, 20 cm dia.
6 Blocked vent, twelve 5-cm-dia. wood lintels
7 Door, nine 7 to 10-cm-dia. wood lintels; dendro #s CK-1172, CK-1173
8 Vent, modern (?)
9 Ledge, 20 cm deep west, 5 cm deep east
10-11 Primary roof beam sockets; dendro #s 10=CK-1192, 11=CK-1191
12 Blocked vent/niche, at least thirteen 5-cm-dia. wood lintels
13 Blocked vent/niche, 50 cm deep, at least seven 5 to 7-cm-dia. wood lintels; dendro # CK-1194
14 Blocked door/niche, nine 7-cm-dia. wood lintels; dendro # CK-1193
15 Blocked vent, seven 5 to 7-cm-dia. lintels; dendro # CK-1171

54E (Figure III:12,FF).
1 Door; same as 53W:4
2 Double wall area

54S The double wall in this room disappeared during the 1947 flood. (Figure III:4,B).
1-2 Primary roof beams, opposite ends of 54N:10-11, not seated in 54S, originally socketed in double wall

54W (Figure III:13,GG).
1 Door

55N (Figure III:4,B).
1 Ledge, 10 cm deep

55E (Figure III:12,FF).
1 Secondary roof beam sockets, stabilized
2 Door, completely rebuilt in 1947, concrete lintel

55S (Figure III:5,C).
1 Ledge, 5 cm deep
2 Partially blocked door

55W (Figure III:13,GG).
1 Ledge, 10 cm deep

56-57N (Figure III:5,C).
1 Primary roof beam butt; see 58S:1
2 Partially blocked door; see 58S:6
3 Partially blocked door; see 55S:2

56-57E (Figure III:12,FF).
1 Blocked door (?)
2 Blocked corner door to NW corner of Kiva I enclosure
3 Exposed intramural beam/wall plate
4 Secondary roof beam sockets, 10 cm dia. with some closing material exposed over central section

56-57S (Figure III:5,D).
1 Blocked door
2 Blocked door
3 Vent (?)

4 Groove, 5-10 cm deep
5-7 Primary beam sockets, 20-25 cm dia.
8 Exposed intramural beam/wall plate; see 56-57W:1
9 Blocked niche (?)
10 Blocked door, dotted line shows door on opposite (Kiva J) wall face

56-57W (Figure III:13,GG).
1 Concrete cast of exposed intramural beam/wall plate
2 Stabilized secondary roof beam sockets, empty

58N (Figure III:4,B).
1-2 Primary roof beam sockets, 20 cm dia.; dendro #s 1=CK-1208, 2=CK-1207
3 Ledge, 10 cm deep

58E (Figure III:13,GG).
1 Ledge, 5 cm deep

58S (Figure III:5,C).
1-2 Primary roof beam sockets, opposite ends of 58N:1-2
3 Primary roof beam butt; see 62N:2
4 Ledge, 10 cm deep
5 Ledge, 5-10 cm deep
6 Blocked door, stabilized

58W (Figure III:13,HH).
1 Ledge, 5-10 cm deep

59N (Figure III:4,A).
1 Ledge, 5 cm deep
2 Groove, 5 cm deep
3-5 Primary roof beam sockets
6 Vent, interior stone lintel, exterior seven 7 to 10-cm-dia. wood lintels
7 Door, nine 7 to 10-cm wood lintels; dendro #s CK-1174, CK-1175, CK-1176
8 Blocked vent, one wood lintel (5 cm dia.) visible
9 Ledge, 5 cm deep
10-11 Primary roof beam sockets, 20-25 cm dia.; dendro #s 10=CK-1206, 11=GP-2201
12 Blocked vent, at least ten wood lintels, 5 cm dia., lintels extend beyond northwest room corner
13 Vent, interior 14 wood lintels 5 cm dia. (extend beyond northeast corner of room), stone lintel exterior
14 Blocked door, at least ten wood lintels (5 cm dia.) visible

59E (Figure III:13,GG).
1 Door
2 Secondary roof beam sockets, empty, stabilized

59S (Figure III:4,B).
1 Double wall stub
2-3 Primary roof beams, socketed into south wall, may continue as primary beams of Room 58, sockets packed with juniper bark strips, but this wall may be completely rebuilt above secondary stub wall.

59W (Figure III:13,HH).
1 Secondary roof beam sockets, stabilized, empty
2 Door, eight 5 to 7-cm-dia. wood lintels (possibly modern reuse); dendro #s CK-1201 through CK-1205, inclusive
3 Double wall stub, no bonding stones above top of stub; wall above this level may be rebuilt, or first story of Room 59 may have had a southwest corner entry; see Room 93

60N (Figure III:4,A).
1 Irregular ledge, less than 5 cm deep
2&4 Primary beam sockets, empty, 20 cm dia.
3 Primary roof beam socket, 20 cm dia.
5 Blocked vent, one 5-cm-dia. wood lintel visible
6 Vent left in upper left corner of blocked door
7 Blocked door with vent, nine 7 to 10-cm-dia. wood lintels
8 Partially blocked vent, fifteen 5-cm-dia. wood lintels, lintels continue beyond northeast corner of room (east wall is bonded to north wall)
9 Irregular groove, heavily stabilized
10-11 Primary roof beam sockets; dendro #s 10=CK-534-2b, 11=GP-2202C
12 Blocked vent, two wood lintels visible
13 Blocked vent/niche (?), six 5 to 7-cm-dia. wood lintels visible
14 Blocked vent/niche (?), 45-50 cm deep, seven 5 to 7-cm lintels visible

60E (Figure III:13,HH).
1 Door; see 59W:2
2 Secondary roof beam sockets, stabilized

60S (Figure III:4,B).
1-2 Primary roof beams, not socketed into early rear wall, opposite ends of 60N:10-11
3-4 Primary roof beam butts, 20 cm dia. into Room 61; see 61N:1-2
5 Door sill and jamb
6 Ledge, 10 cm deep
7 Blocked vent, vent outline not visible on this face; see 61N:3; visible lintel is lashed with yucca strip

60W (Figure III:14,II).
1 Door
2 Exposed intramural beam, possibly lintel for vanished vent (?)
3 Secondary roof beam sockets, empty
4 Double wall stub

61N (Figure III:4,B).
1-2 Primary roof beam sockets, 20-25 cm dia.; dendro #s 1=CK-1198, 2=CK-1199
3 Blocked vent, one 5-cm-dia. yucca-wrapped wood lintle visible
4 Ledge, 10 cm deep
5 Door sill and jamb
6 Ledge, 10 cm deep

61E (Figure III:13,HH).
1 Ledge, 10-15 cm

61S (Figure III:5,C).
1 Blocked door with secondary lintel. Exposed lintels and secondary lintels are 5-cm-dia. wood
2 Ledge, 5 cm deep
3 Ledge, 5-10 cm deep
4 Primary roof beam butt; see 62N:4
5-6 Primary roof beam sockets, opposite ends of 61N:1-2
7 Blocked door, probably rebuilt, wood lintel, 10 cm dia.; dendro # CK-1200
8 Blocked door, probably rebuilt, wood lintel visible

61W (Figure III:14,II).
1 Ledge, 5 cm deep
2 Ledge, 10 cm deep
3 Blocked door

62N (Figure III:5,C).
1 Primary roof beam butt; see 58S:2
2&5 Primary roof beam sockets, empty, 20-25 cm dia.
3 Ledge, 10-25 cm deep
4 Primary roof beam socket, 20-25 cm dia.; dendro # CK-1197
6 Primary roof beam butt; see 61S:5
7 Primary roof beam butt; see 61S:6
8 Intramural beam

62E (Figure III:13,GG).
1 Ledge, irregular, less than 5 cm deep
2 Secondary roof beam sockets
3 Ledge, irregular, 5 cm deep

62S (Figure III:5,D).
1 Blocked door
2 Blocked door
3 Blocked "T" or half "T" door; see Figure III:19
4 Groove, 5-7 cm deep
5-6 Primary roof beam sockets, empty, opposite ends of 62N:1&2
7-9 Primary roof beam sockets, 25 cm dia.; dendro # 8=CK-1197
10 Niche, 30 cm deep in upper left corner of blocked door
11 Blocked door, 10 to 15-cm wood lintel
12 Lintel, 5 cm dia. for unknown feature
13 Niche, 35 cm deep, three 10 to 15-cm-dia. wood lintels
14 Door/vent/niche (?), one wood lintel visible

62W (Figure III:14,II).
1 Partially blocked door
2 Groove, 5-7 cm deep, with secondary roof beam sockets
3 Wall plate/intramural beam
4 See 62N:7

63N (Figure III:5,C).
1 Door
2-3 Blocked doors, 10-cm-dia. wood lintels; dendro # 2=CK-1211

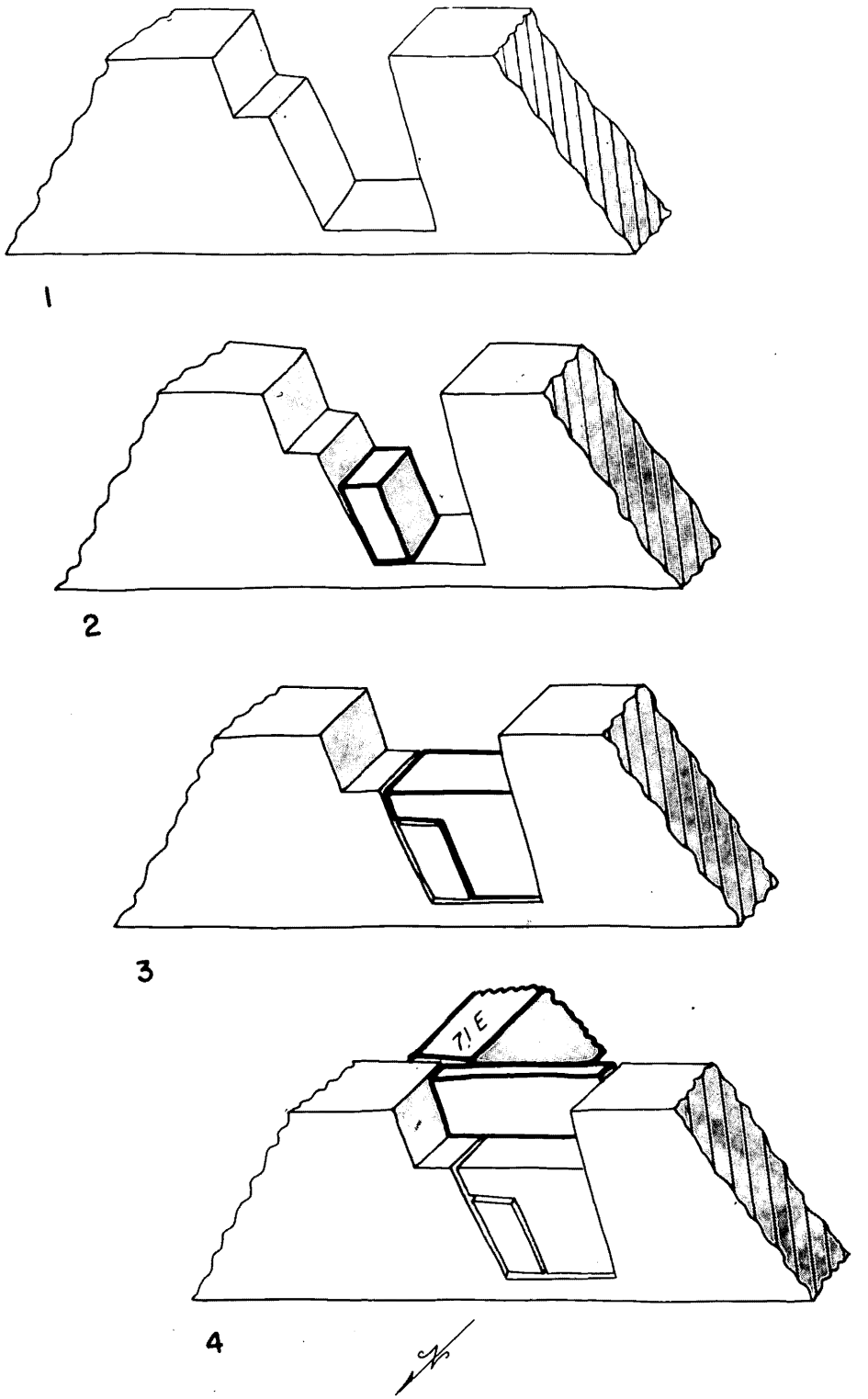


Figure III:19. Feature 62S:3, Room 62, sequence of construction.

63E (Figure III:14,II).
1 Partially blocked door

63S (Figure III:5,D).
1 Blocked door (?)
2 Door/vent

63W Modern wall, built to protect 106E. (Figure III:14,JJ).

64N (Figure III:4,B).
1 Door
2 Blocked vent, wood lintel
3 Vent, eight 5 to 7-cm wood lintels
4 Ledge, 15 cm deep
5 Ledge, 10 cm deep
6-8 Primary roof beams, 15-20 cm dia., juniper bark packing; dendro #s 6=CK-1209, 7=CK-534-1b, 8=CK-1210 (?)

64E (Figure III:14,II).
1 Ledge, 15 cm deep
2 Ledge, 5 cm deep
3 Ledge, 5-15 cm deep

64S (Figure III:5,C).
1 Door
2 Blocked door with secondary lintel, wood lintels
3 Primary roof beam (?) butt, into Room 63
4 Ledge, 5-10 cm deep
5 Ledge, 5-10 cm deep
6 Primary roof beam (?) butt, into Room 63
7-9 Primary roof beam sockets, opposite ends of 64N:6-8

65N (Figure III:4,A).
1 Blocked door, wood lintel visible
2 Ledge, 0-5 cm deep
3-5 Primary roof beam sockets; dendro #s 3=CK-1182, 4=CK-1181, 5=CK-1180
6 Small beam socket, empty, 30 cm deep
7 Blocked vent, ten 5-cm wood, yucca wrapped lintels
8 Row of willow rods projecting from wall, above level of secondary beam sockets (65W:1), probably willow mat closing material
9 Door, eight 5 to 7-cm-dia. wood lintels; dendro #s CK-1177, CK-1178
10 Irregular groove
11 Vent, at least seven 5 to 7-cm-dia. lintels, yucca strip lashing
12 Blocked vent; at least ten 5 to 7-cm-dia. lintels, yucca strip wrapping
13 Blocked door/niche (?), at least seven 10-cm-dia. lintels, yucca strip wrapping

65E (Figure III:14,II).
1 Door
2 Secondary roof beam sockets, stabilized
3 Area of double wall

65S Double wall fell in 1947. Features A & B from pre-1947 photos. (Figure III:4,B).
A Vent or niche

B "Alcove" or very large niche
C Doublewall roof line
1 Door
2 Vent, wood lintels
3 Blocked vent/niche, 40 cm deep, wood lintel
4-5 Primary roof beam butts into Room 64; see 64N:7&8
6 Double wall stub

65W (Figure III:14,JJ).
1 Secondary roof beam sockets, empty, under ledge
2 Door, 10-cm-dia. wood lintel
3 Secondary roof beam sockets, empty
4 Bonding stones for double wall

68N (Figure III:5,C).
1 Possible door

70N This wall is a double wall, much like the double walls between Rooms 45 to 94 and Rooms 42 to 103. (Figure III:20, Figure III:5,D).
1 Modern wall to protect 106E
2 Door
3 Door/large niche
4-7 Primary roof beam sockets, dia. 30, 30, 20, and 30 cm respectively; dendro #s 4=CK-5386, 5=CK-1215, 6=CK-539b, 7=CK-536-2b
8-9 Intramural beams, each 10 cm dia.; dendro # 9=CK-1216
10 Door, wood lintel
11 Peg (5 cm dia., 30 cm long), end rounded

70E Wall is heavily stabilized. (Figure III:14,II).
1 Double wall; see 70N
2 Partially blocked door
3 Blocked vent/door
4 Lintel butts; see 71AS:1
5 Possible blocked feature
6 Door with secondary lintel, heavily stabilized, concrete lintel

70S (Figure III:5,E).
1 Ledge, 15-20 cm deep
2-3 Primary roof beam sockets, empty
4 Ledge, 5-10 cm deep
5-9 Primary roof beam sockets; see 70N:4-7
10 Door with secondary lintel; main lintels seven 10-cm-dia. wood set over primary roof beams; dendro #s CK-1217, CK-1219, CK-1220, CK-1221
11 Juniper splint closing material
12 Door with secondary lintel; main lintels are all replacements

71N (Figure III:5,D).
1 "T" door, blocked, niche in lower left corner; see 62S:3
2 Niche

71S (Figure III:5,E).
1 Small, 10-cm-dia. beam butt

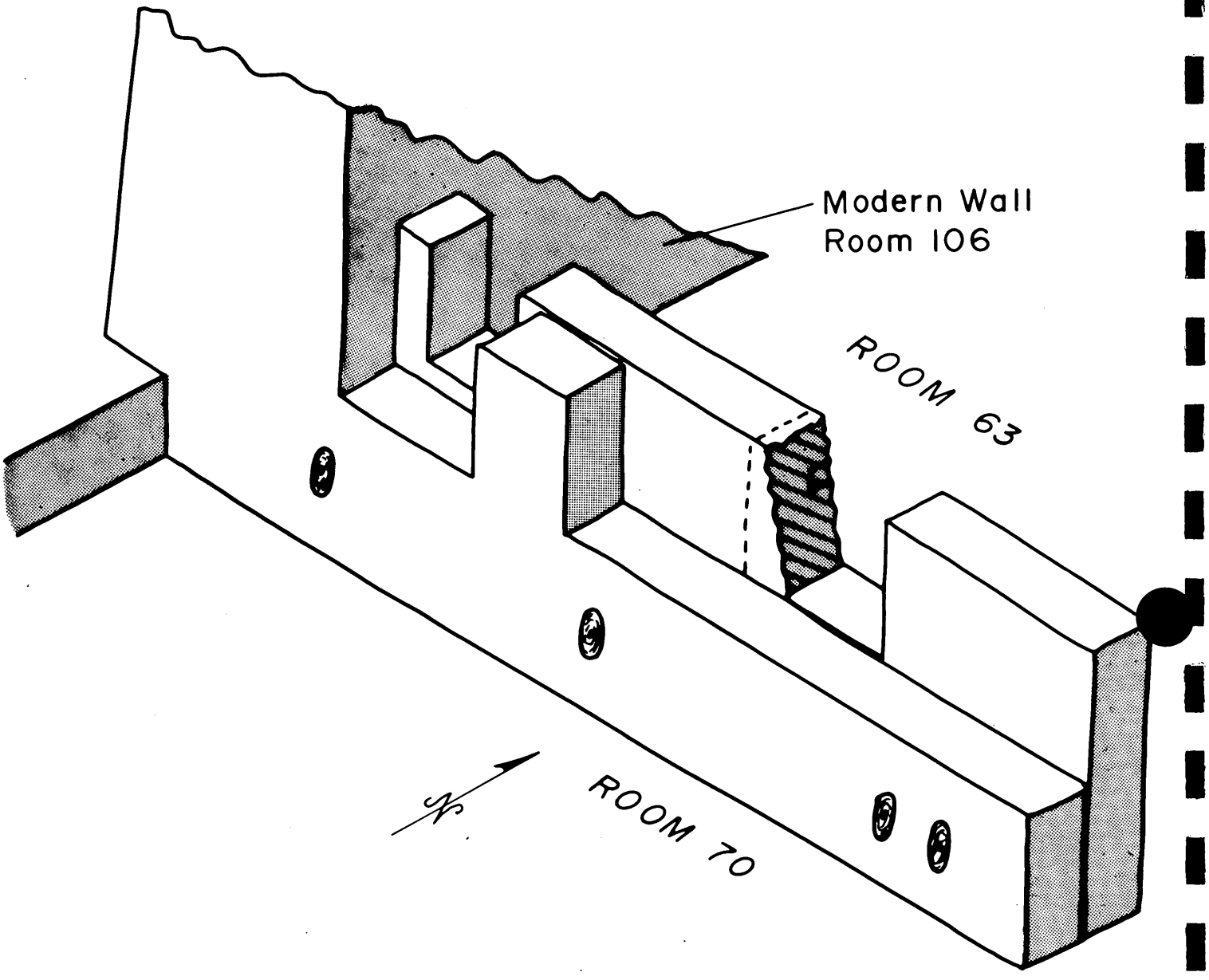


Figure III:20. Room 70, north wall (schematic).

71W (Figure III:13).
1 Door, top completely stabilized

71AN (Figure III:5,D).
1 Irregular groove

71AE (Figure III:13).
1 Door; see 71W:1
2 Small pole butt
3-5 15-cm-dia. lintels over 71AS:1
6 10-cm-dia. beam sill of 71AS:1, not seated into 71AE
7 Above this line, a layer of veneer has fallen from the wall; however, exposed wall is also faced (with the exception of several bonding stones, probably forced into the old face to provide bonding for new veneer)

71AS (Figure III:5,E).
1 Door; three 15-cm-dia. lintels; dendro #s CK-1212, CK-1213, CK-1214. The secondary jambs consist of upright poles and one thin board set in mud plaster, which shows reed mat impression, suggesting the door was sealed with a reed mat; the sill consists of a 10-cm-dia. beam which is not seated in either 71AE or 71AW. See EXCAVATION NOTES, Room 71A

71AW (Figure III:14,II).
1 Partially blocked door
2 Ledge, 10-15 cm deep
3 Small pole butt
4-6 Lintel sockets; see 71AE:3-5
7 Beam sill, not socketed into 71AW; see 71AS:1

72N (Figure III:5,E).
1 Ledge, 10-20 cm deep
2 Door jamb and sill

72S (Figure III:6,F).
1 Door jamb

72W (Figure III;14,II).
1 Door

73N (Figure III:6,G).
1 Primary roof beam 30 cm dia.
2 Ledge, 10 cm deep

73W (Figure III:14,II).
1 Ledge, 10 cm deep

74N (Figure III:6,F).
1 Door jamb

74W (Figure III:14,II).
1 Door

75E (Figure III:13,HH).
1 Door; same as 77W:1

75N and 78N -- see 80N.

76N -- see 81N.

76S -- see 81S.

77N -- see 80N.

77W (Figure III;13,HH).
1 Door; same as 75E:1

80N (includes 75N, 77N, 78N) The Colonnade: a series of square piers that originally probably continued to the west wall of Room 77. The spaces between the piers were later blocked with masonry. (Figure III:7,I).

81N (Includes 105-76-32N) (Figure III:6,H).
1 Irregular niche or beam socket, 15 cm deep
2 Vent, wood lintels
3 Primary beam socket, 20 cm dia.
4-6 Primary roof beam butts, into Room 85; see 85S:1-3
7 Door, possible secondary jamb on west, sloping up towards Room 85. Wood lintels (stabilized), sill is lower in Room 85
8 Primary roof beam, 25 cm dia.
9 Vent, wood lintels
10 Blocked door
11 Vent
12 Partially blocked "T" door
13 Door, possibly "T"
14 Vertical break in masonry

81S (Includes 105-76-32S) The Colonnade; see 80N. (Figure III:7,I)

83-84E (Figure III:14,KK).
1 Niche, heavily stabilized, 45 cm deep
2 Door; see 85W:1
3 Niche (?)

85N (Figure III:6,G).
1 Secondary roof beams, built into wall like intramural beams

85E (Figure III:14,JJ).
1 Secondary roof beam butts (?), 10-15 cm dia., in 10-cm-deep groove
2 Lintel of Kiva N:1
3 Door, board lintel, sill (heavily stabilized) over exposed intramural beam; dendro # CK-1261
4 Door, eight 7 to 10-cm-dia. wood lintel; dendro #s CK-1258, CK-1259, CK-1260; secondary jamb on north, sloping up towards Room 88; see 88W:4

85S (Figure III:6,H).
1-3 Primary roof beams, 25-35 cm dia.
4 Door; see 81N:7
5 Niche, stone lintel, 20 cm deep
6 Niche, stone lintel, 35 cm deep
7 Niche, stone lintel, 20 cm deep
8 Ledge, 15-20 cm deep

85W (Figure III:14,KK).
1 Door
2 Vent (?), stone lintel

87N "The north wall [87N], exposed and backfilled, contains two rare niches that turn after entering the wall and continue some distance after entering the wall. They are plastered" (Vivian and Lancaster 1947:102). (Figure III:6,F).
1 Partially blocked door
2 Door
3 Blocked door/niche (?), heavily stabilized, wood lintel possible replacement; dendro # CK-1257; see 104S:14
4-5 Primary roof beam butts

87E (Figure III:14,JJ).
1 Possible blocked door
2 Secondary roof beam butts or sockets over ledge, 5 cm deep
3 Partially blocked "T" door; see Kiva N:1

87S (Figure III:6,G).
1 Partially blocked "T" door in east wall; see Kiva N:1

87W Heavily stabilized, originally contained an intramural beam (Vivian and Lancaster 1947:102). (Figure III:14,KK).

88N (Figure III:6,G).

2-3 Room-wide platform beam sockets, 20 cm dia.; dendro #s 2=CK-1269, 3=CK-1268
4 Intramural beam/wall plate supporting 2-cm-wide board tertiary roof members
5 Niche/step (?), 10 cm deep
6-7 Primary roof beam sockets, 25-40 cm dia.
8-10 Room-wide platform sockets, 15 cm dia.; dendro # CK-1267
11-13 Room-wide platform sockets, empty
14 Room-wide platform socket, 15 cm dia.
15 Niche, stone lintel, 25 cm deep
16 Niche or beam socket, irregular depth
17-18 Room-wide platform sockets, empty
19-21 Primary roof beam sockets, 25-40 cm dia.
22 Irregular ledge, 5 cm deep

88S (Figure III:6,H).
1 Blocked vent
2-4 Room-wide platform sockets, empty
5 Room-wide platform socket, 15 cm dia.
6 Area of eroded beam sockets (?)

7-9 Room-wide platform sockets, opposite ends of 88N:8-10
10-11 Room-wide platform sockets, opposite ends of 88N:2-3
12-13 Primary roof beam sockets, opposite ends of 88N:1 and 19
14 Shelf

88W (Figure III:14,JJ).
1 Secondary roof beams, or room-wide platform secondaries (?); dendro #s CK-1262, CK-1263, CK-1264, CK-1265; secondaries support 2-cm-wide wood boards; heavily stabilized
2 Door; see 85E:3
3 Shelf or platform extending at least half the length of Room 88; see EXCAVATION NOTES, Room 88
4 Door, partially blocked; see 85E:4

89N (Figure III:5,E).
1 Primary roof beam socket, empty, opposite 89S:3
2 Primary roof beam socket, empty, opposite 89S:2
3 Primary roof beam socket (?), empty; see 89S:1
4 Ledge, 15 cm deep
5-7 Shelf support pole sockets, opposite 89S:5-7 (?)
8&10-12 Primary roof beam butts into Room 70
9 Door, wood lintel; dendro # CK-1218; see 70S:10
13 Door, wood lintels; see 70S:12
14 Vent/niche in east wall; see 89E:1

89E (Figure III:14,II).
1 Vent or niche, wood lintels
2 Small beam butts
3 Possible niche, exposes two intramural beams; dendro # CK-2199c
4 Door
5 Ledge, 30 cm deep

89S (Figure III:6,F).
1 Primary roof beam butt (?)
2-3 Primary roof beam sockets, opposite ends of 89N:1-2
4 Small beam socket, empty
5-7 Room-wide platform sockets (?); see 89N:5-7
8 Blocked door (?); see Kiva N:2

89W (Figure III:14,JJ).
1 Vertical break in wall
2 Secondary roof beam butts into Room 104; see 104E:1

91N (Figure III:5,C).
1 Door jamb and sill
2 Intramural beam or wall plate, 25 cm dia.

92N (Figure III:4,B).
1 Niche, 25-35 cm deep
2 Groove, 5 cm deep, with juniper splint closing material in east end
3-4 Primary roof beam sockets
5-12 Room-wide platform sockets, empty
13 Ledge, 15-20 cm deep

14 Primary roof beam socket; dendro # CK-1274

92E (Figure III:14,KK).
1 Secondary roof beam sockets, empty, over ledge, 25 cm deep

92S (Figure III:5,C).
1 Door jamb and sill
2 Beam socket, empty, probably stabilized opposite end of 92N:4
3 Primary roof beam butt, into Room 91; dendro # CK-1274
4 Primary roof beam socket, empty, opposite end of 92N:3
5 Juniper splint roof closing material projecting from wall
6-13 Room-wide platform sockets, empty, opposite ends of 92N:5-12
14 Door, secondary jambs on east and west, stabilized
15 Groove, 5 cm deep
16 Primary roof beam socket (?)
17 Primary roof beam socket (?)

92W (Figure III:14,LL).
1 Secondary roof beam sockets, empty, stabilized
2 Secondary roof beam sockets (5-7 cm dia.), under overhang
3 Type II wall
4 Rubble veneer over Type II wall

93N (Figure III:4,A).
1 Vent, nine 7 to 10-cm-dia. wood lintels
2 Partially blocked door, ten 7 to 10-cm-dia. wood lintels; dendro # CK-1185
3 Partially blocked vent, eleven 5 to 7-cm-dia. wood lintels
4 Primary roof beam socket
5 Ledge, modern
6-8 Primary roof beam sockets
9 Stabilized void, possibly modern vandalism
10 Blocked vent, at least seven 10-cm-dia. wood lintels, yucca wrapping
11 Blocked door, at least eight 7 to 10-cm-dia. wood lintels, yucca wrapping
12 Partially blocked vent, thirteen 5 to 7-cm-dia. wood lintels, yucca wrapping
13 Nine room-wide platform sockets; several empty

93E (Figure III:14,KK).
1 Blocked door
2 Secondary roof beam sockets
3 Stabilized void, probably modern vandalism
4 Double wall

93S (Figure III:4,B).
1 Ledge, modern
2 Square shaft in double wall, with hatch opening to second story; see 93W:2
3-5 Primary roof beam sockets, opposite ends of 93N:6-8
6 Partially blocked vent or niche, seven 5 to 7-cm-dia. wood lintels, does not appear to continue through 92N
7 Nine room-wide platform sockets, several empty, opposite ends of 93N:12

8 "Alcove" or very large niche, 95 cm deep, wood lintels
9 Niche or step to square shaft (93S:2), 7 cm deep

93W (Figure III:14,LL).
1 Partially blocked door with secondary jamb on north; see 94E:1
2 Square shaft in double wall, stone coping
3 Secondary roof beams
4 Stabilized void, probably modern vandalism
5 Double wall

94N (Figure III:4,A).
1 Blocked door
2 Door, nine 5 to 7-cm-dia. wood lintels; dendro #s CK-1271, CK-1272, CK-1273
3-5 Primary beam sockets, empty, sockets consist of a square vent-like opening which was filled around the beam after the beam was seated in juniper bark
6 Groove, west; ledge, east
7 Blocked vent, wood lintels
8 Vent, wood lintel
9 Ledge, 5 cm deep
10 Primary beam socket, empty
11 Primary roof beam socket, 23 cm dia.; dendro # CK-1270

94E (Figure III:14,LL).
1 Door, secondary jamb on north sloping up towards Room 93, eight 5 to 7-cm-dia. wood lintels
2 Secondary roof beam sockets, empty
3 Double wall

94S (Figure III:4,B).
1 Blocked door
2 Double wall
3 Probably square shaft; see 93S:2 and 93W:2

94W (Figure III:14,MM).
1 Door
2 Secondary roof beams, heavily stabilized, probably did not extend south through double wall

101N (Figure III:4,A).
1 Blocked door
2-5 Heavily stabilized primary roof beam sockets, stone lintels; see description of 94N:3-5. Beam in 5 packed in juniper bark
6 Vent, ten 5 to 7-cm-dia. wood lintels
7 Partially blocked door, nine 5 to 7-cm-dia. wood lintels; dendro #s CK-1183, CK-1184
8 Groove, 5 cm deep
9 Ledge

101E (Figure III:14,JJ).
1 Ledge, 15-20 cm deep
2 Blocked door

3 Secondary roof beam sockets

101S (Figure III:4,B).
1 Vent, wood lintels

101W (Figure III:14,KK).
1 Blocked door

102N (Figure III:4,B).
1 Vent, stone lintel interior, five 5 to 7-cm-dia. wood lintels exterior

102S (Figure III:5,C).
1 Possible door jamb

103N (Figure III:4,B).
1 Blocked door; see 94S:1

104N (Figure III:5,E).
1 Vent or niche, exposed upright timber in wall, 25 cm dia.
2 Room-wide platform sockets, empty, opposite ends of 104S:3
3 Room-wide platform sockets, empty, opposite ends of 104S:4
4 Paired pole sockets, opposite 104S:1
5 Paired pole sockets, opposite 104S:2
6 Possible line of room-wide platform sockets, no corresponding sockets on south wall

104E (Figure III:14,JJ).
1 Secondary roof beam sockets over ledge, 5 cm deep; butts exposed in 89W. Vivian and Lancaster (1947:116) show a wall plate directly under the secondary beams

104S (Figure III:6,F).
1 Paired pole sockets; see 104N:4
2 Paired pole sockets; see 104N:5
3 Room-wide platform sockets; see 104N:2
4 Room-wide platform sockets; see 104N:3
5 Door
6 Partially blocked door
7 Groove, 5-10 cm deep, with juniper splints projecting from wall
8-9 Primary roof beam sockets, wood lintels over beams
10 Heavily modified door
11 End of possible cross wall in Room 87
12 Niche built in upper part of blocked door
13 Lintel (?), not seated in east jamb
14 Door/vent left in lower portion of blocked door, lintel not seated in east jamb of door 104S:10

105N -- see 81N.

105S -- see 81S.

106N (Figure III:5,C).
1 Vent or niche

2 Level of primary roof beams; see 106E:6

106E See Figure II:6 for mural details. (Figure III:14,JJ).
1 Blocked "T" door
2 Scar in plaster indicating a masonry step
3 Scar in plaster, possibly water erosion
4 Blocked door, wood lintels, fiber ring-holes on either side
5 Flooring; see Figure II:7 for details.
6 Small primary roof beam sockets; dendro #s, from north: CK-1309, CK-1308, CK-1307, CK-1306, CK-1305, CK-1304, CK-1303, CK-1302, CK-1301, CK-1300, CK-1299, CK-1298, CK-1297, CK-1296, CK-1295, CK-1294, skipped beam, CK-1293, CK-1292, CK-1291
7 Pole socket, cut after wall was plastered, opposite 106W:4
8 Absence of plaster below lintel (standing water erosion?)

106S (Figure III:5,D).
1 Blocked door, wood lintel (modern replacement); dendro # CK-1311; see EXCAVATION NOTES, Room 71A
2 Blocked vent/niche; see 106W:1

106W (Figure III:14,KK).
1 Blocked vent/niche (unexcavated), at least six 5-cm-dia. wood lintels; dendro # CK-1310; pole (secondary lintel?) crosses rear of feature
2 Small primary roof beam sockets; see 106E:6
3 Irregular hole, modern vandalism (?)
4 Small beam socket, opposite 106E:7
5 Ledge, 5 cm deep

107N Early photo shows beams 2 and 3 projecting into Room 107. (Figure III:5,C).
1-3 Primary roof beam sockets or butts, possibly replacements
4-6 Probable room-wide platform, intramural beam exposed at rear of 5
7 Ledge, 5-10 cm deep
8 Exposed intramural beams
9 Possible door jamb

107E (Figure III:10,Y).
1 Three exposed intramural beams
2 Secondary roof beams (stabilized), over ledge, 10 cm deep, beams appear to have been paired

108N The third and fourth stories of Rooms 108, 109, 110, and 111 collapsed between 1890 and 1920. Some details of these walls are visible in eary photographs by Mindeleff (e.g., Plate 24) and Bandelier (NM 194). These features are designated by letters A-D. (Figure III:4,B).
A Ledge
B Primary roof beam sockets
C Vent
D Door
1 Ledge, 20-25 cm deep
2&4 Primary roof beam butts into Room 109
3&5 Primary roof beam sockets, 25-30 cm dia.
6 Vent; see 109S:6
7 Door; see 109S:7

8 Blocked door (?)

108E (Figure III:10,Y).
A Secondary roof beam sockets
1 Door, completely rebuilt

108S (Figure III:5,C).
1 Intramural beams; see 107N:8
2 Ledge
3&5 Primary roof beam butts into Room 107
4 Primary roof beam socket, opposite end of 108N:5
6 Blocked vent, one 7-cm-dia. wood lintel visible
7 Possible door jambs

108W (Figure III:10,Z).
1 Door

109N (Figure III:4,A).
A Ledge
B Primary roof beam sockets
C Vent
D Blocked vent
E Room-wide platform sockets
F Primary roof beam sockets
1 Ledge, 10-15 cm deep
2 Primary roof beam socket
3 Niche (?)
4 Vent, ten 10-cm-dia. wood lintels
5 Possible door, heavily stabilized

109E This wall is not visible in early photos; all three stories are now gone. (Figure III:10,Y).

109S (Figure III:4,B).
A Primary roof beams
B Vent
C Door
D Ledge
1&3 Primary roof beam butts into Room 108
2&4 Primary roof beam sockets, 25-30 cm dia.
5 Vent, one stone and six wood lintels
6 Door, seven wood lintels, 10 cm dia.; dendro #s CK-1130 through 1135, inclusive; see 108N:7
7 Possible blocked door
8 Irregular groove

110E (Figure III:10,X).
1 Door, completely rebuilt, four wood lintels, 5-7 cm dia.; dendro # CK-1129

110S (Figure III:4,B).
A Blocked vent
B Ledge
C Vent
D Probable room-wide platform sockets

E Primary roof beam sockets
F Ledge
1 Door, six wood lintels, 5-7 cm dia.; dendro #s CK-1127, CK-1128
2 Blocked vent
3 Vent, stone lintel

110W (Figure III:10,Y).
A Secondary roof beam sockets
B Secondary roof beam sockets
C Projecting beams on back wall, probably balconies

Unnumbered room east of Room 110, south wall (Figure III:4,B).
1 Niche, 40 cm deep
2 Vent (?), wood lintel

Unnumbered room east of Room 110, west wall (Figure III:10,X).
1 Door; see 110E:1

111N (Figure III:4,B).
A Blocked vent
B Ledge
C Vent
D Ledge
E Primary roof beam sockets
1 Vent, stone lintels (modern repair)
2 Door; see 110S:1
3 Blocked vent/niche, 60 cm deep, five wood lintels 5 cm dia.

111S (Figure III,5,C).
1 Possible vent jamb and lintels
2 Exposed intramural beam

111W (Figure III:10,Y).
A Secondary roof beam sockets
1 Ledge, 10 cm deep
2 Door, completely repaired, see 108E:1

Unnumbered room south of Room 111, west wall (Figure III:10,Y).
1 Secondary roof beams, possibly paired, stabilized
2 Lintels exposed in wall, possible vent

113E (Figure III:9,U).
1 Vent, stone lintel
2 Ledge, 7 cm deep
3 Ledge, 7 cm deep
4 Primary roof beam socket (?), badly eroded

113S (Figure III:8,L).
1 Door jamb and sill
2 Ledge, 7 cm deep
3 Secondary roof beam sockets, stabilized

113W (Figure III:9,V).
1 Blocked door
2 Primary roof beam socket, 25 cm dia.

3 Primary roof beam butt

114E (Figure III:9,T).
1 Ledge, 5 cm deep
2 Ledge, 5 cm deep
3-4 Primary roof beam sockets

114S (Figure III:8,L).
1 Ledge
2 Secondary roof beam sockets, 5-7 cm dia.
3 Secondary roof beam sockets, 5-7 cm dia., over ledge, 5 cm deep

114W (Figure III:9,U).
1 Vent, stone lintel; see 113E:1
2 Ledge, 5 cm deep
3 Ledge, 5-10 cm deep
4 Primary roof beam socket (?)

115N (Figure III:8,L).
1 Door
2 Ledge, 10 cm deep
3 Secondary roof beam sockets, stabilized

115E (Figure III:9,U).
1 Ledge, 5 cm deep
2 Blocked vent/niche, 40 cm deep
3 Ledge, 5 cm deep
4 Ledge, 5 cm deep
5 Primary roof beam butt, 30 cm dia.

115W (Figure III:9,V).
1 Overhang, 7-10 cm deep

116N (Figure III:8,L).
1 Ledge, 5 cm deep
2 Ledge, 5 cm deep
3 Secondary roof beam sockets

116E (Figure III:9,T).
1 Vent, three wood lintels interior, stone lintel exterior
2 Vent, fifteen 5 to 7-cm-dia. wood lintels
3 Ledge, 20 cm deep
4 Primary roof beam socket, 30 cm dia.
5-6 Primary roof beam sockets (?), empty

116W (Figure III:9,U).
1 Ledge, 5-10 cm deep
2 Ledge, 5 cm deep
3 Primary roof beam socket (?), empty

117E (Figure III:9,T).
1 Ledge, 10-15 cm deep

118E (Figure III:9,T).
1 Vent, fourteen 5-cm-dia. wood lintels
2 Ledge, irregular
3-5 Primary roof beam sockets, 25-30 cm dia.

118S (Figure III:8,N).
1 Groove, 10 cm deep
2 Void, possibly over collapsed first-story door

118W (Figure III:9,U).
1 Vent, ten 5-cm-dia. wood lintels
2 Ledge, 5 cm deep

Unnumbered room west of Room 118, east wall (Figure III:9,U).
1 Vent; see 118W:1

119N (Figure III:8,N).
1 Void, possibly over collapsed first-story door

119E (Figure III:9,T).
1 Vent, eighteen 3 to 5-cm-dia. wood lintels
2 Vent, eighteen 3 to 5-cm-dia. wood lintels
3 Ledge, 5 cm deep
4 Ledge, 5 cm deep
5-7 Primary roof beam sockets, 25-30 cm dia.

119S (Figure III:8,O).
1 Secondary roof beam sockets, stabilized
2 Beam socket or butt (?)

119W (Figure III:9,U).
1 Vent, nine 5-cm-dia. wood lintels
2 Ledge, irregular

120E (Figure III:9,U).
1 Vent; see 119W:1
2 Groove, 5 cm deep

120S (Figure III:8,O).
1 Blocked vent, one 3-cm-dia. wood lintel visible
2 Blocked door, one 7-cm-dia. wood lintel visible
3 Secondary roof beam sockets, 5 cm dia.

121N (Figure III:8,O).
1 Ledge, irregular

121E (Figure III:9,T).
1 Vent, thirteen 3 to 5-cm-dia. wood lintels
2 Paired pole sockets, 7 cm dia.
3 Ledge, 5 cm deep

121S (Figure III:8,P).
1 Overhang, 10 cm deep

122N (Figure III:8,O).
1 Blocked vent/niche, eleven 3 to 5-cm-dia. wood lintels; see 120S:1
2 Blocked door; see 120S:2

122S (Figure III:8,P).
1 Beam socket, 11 cm dia.
2 Overhang, 10 cm dia.

Unnumbered room southwest of Kiva J, south wall (Figure III:6,G).
1 Vent, wood lintels
2 Blocked vent
3 Blocked door/niche with secondary jamb on east, sloping up to north; shelf (?) inset half way up from sill of door; lintels are wood and steel replacements

Unnumbered room southwest of Kiva J, west wall (Figure III:13,HH).
1 Peg (?) socket, 5 cm dia.

Unnumbered room southeast of Kiva J, south wall (Figure III:6,G).
1 Ledge, 3-10 cm deep
2 Niche (?) jamb and sill
3 Projecting stones

Unnumbered room south of Kiva I, south wall (Figure III:6,G).
1-5 Primary roof beam sockets or butts
6 Intramural beam butt
7 Ledge, 5 cm deep
8 Outline of Kiva I ventilator shaft
9 Door; see 31N:1

The rear wall (Figure III:4,A).
1-2 Primary roof beam butts; see 109N:B
3 Blocked vent; see 109N:D
4 Vent; see 109N:C
5-7 Primary roof beam butts; see 109N:2,F
8 Ledge, 5-10 cm deep
9 Vent; see 109N:4
10-12 Primary roof beam butts (?)
13 Possible door; see 109N:5
14 Vertical break, heavily stabilized (pre-1929 photo shows a large void)
15 Blocked vent; see 43N:8
16 Blocked door; see 43N:6
17 Blocked vent; see 43N:7
18 Blocked vent; see 44N:3
19 Vent; see 44N:1
20 Blocked door; see 44N:2
21 Modern stabilization feature
22 Blocked door; see 46N:3
23 Vent; see 46N:2
24 Primary roof beam butt; see 53N:2-4
25 Vent (?)
26 Vent; see 53N:5
27-29 Primary roof beam butts; see 53N:2-4

30 Blocked door; see 53N:1
31 Blocked door; see 53N:6
32 Vent; see 53N:15
33 Ledge, 10 cm deep
34 Ledge, 25 cm deep
35 Blocked door; see 54N:1
36–38 Primary roof beam butts; see 54N:3–5
39 Blocked vent; see 54N:15
40 Door; see 54N:7
41 Blocked vent; see 54N:6
42 Modern stabilization feature (?)
43 Groove, 7 cm deep
44 Blocked vent, not visible on 59N
45–47 Primary roof beam butts; see 59N:3–5
48 Vent; see 59N:6
49 Door; see 59N:7
50 Ledge, 25 cm deep
51 Vent (?); see 59N:13
52 Groove, 7 cm deep
53 Blocked vent; see 60N:5
54–56 Primary roof beam butts; see 60N:2–4
57 Blocked vent; see 60N:5
58 Blocked door; see 60N:7
59 Vent (?); see 60N:12
60 Blocked door; see 65N:1
61–63 Primary roof beam butts; see 65N3–5
64 Blocked vent; see 65N:7
65 Door; see 65N:9
66 Vent (?); see 65N:12
67 Vent (?); see 65N:11
68 Ledge, 10–15 cm deep
69 Groove, 7 cm deep
70 Blocked door; see 101N:1
71 Vent; see 101N:6
72–75 Primary roof beam butts; see 101N:2–5
76 Door; see 101N:7
77 Blocked vent (?)
78 Groove, 7 cm deep
79 Blocked vent; see 93N:3
80 Primary roof beam butt; see 93N:4
81 Groove, 10 cm deep
82 Vent; see 93N:1
83 Blocked vent; see 93N:12
84 Blocked vent; see 93N:10
85 Blocked door; see 93N:2
86 Blocked vent; see 94N:7
87 Ledge, 15 cm deep
88 Primary roof beam butt; 94N:5
89 Groove, 10 cm deep
90 Door; see 94N:2
91 Vent (?)
92 Primary roof beam butt; see 94N:4
93 Primary roof beam butt; see 94N:3–5

94 Partially blocked vent; see 94N:3-5
95 Vent (?)
96 Groove, 5 cm deep
97 Ledge, 10 cm deep
98 Groove, 10 cm deep
99 Blocked door
100 Vent, six wood lintels
101 Vent, fourteen 5-cm-dia. wood lintels
102 Blocked door, ten 5 to 7-cm-dia. wood lintels; dendro #s CK-1187, CK-1188
103 Groove, 10 cm deep
104 Ledge, 20 cm deep
105 Primary roof beam socket
106 Blocked vent, nine 5 to 7-cm-dia. wood lintels
107 Blocked vent, eighteen 5 to 7-cm-dia. wood lintels
108 Vent (?)
109 Door
110 Vent (?)
111 Door
112 Vent (?)
113 Vent, seven 5 to 7-cm-dia. wood lintels
114 Blocked door
115 Vent (?)
116 Vent (?)

East exterior wall (Figure III:9,T).
1 Vent; see 116E:1
2-4 Primary roof beam butts; see 116E:4-6
5 Primary roof beam butt (?)
6 Vent; see 116E:2
7 Primary roof beam butt (?)
8 Vent; see 118E:1
9 Vent; see 119E:1
10 Vent (?)
11 Paired small beam sockets
12 Vent; see 119E:2
13 Vent; see 121E:1
14 Paired small pole sockets
15-19 Primary roof beam socket or butt (?)
20 Primary roof beam socket or butt (?)
21 Possible vent or door; see 1E:1

Rooms 3 and 6, exterior (plaza facing) wall (Figure III:9,W).
1 Blocked door; see 6W:1-2
2 Exterior curve of Kiva C
3 Masonry veneer over 2 above
4 Door; see 3W:1

Plaza-facing wall of front arc (Drawings were not made of the interiors of Rooms 8, 10-13, 130-139.) (Figure III:7,K).
1-2 Primary roof beam sockets, Room 9
3 Exposed wall foundation
4-17 Blocked doors

18 Vent (?)
19 Outline of raised fire-box; see EXCAVATION NOTES, Room 134
20 Vent (?)
21 Primary roof beam socket, Room 9
22 South wall, Room 9
23-24 Foundation wall, plaza-facing wall of plaza-enclosing arc
25 South wall, Room 9
26 Secondary roof beams, Room 9; dendro # CK-1112

Kiva A (Figure III:15).
1 Pier-type pilasters
2 Recesses
3 Bench
4 "Crypt" or ventilator; See EXCAVATION NOTES, Kiva A

Kiva B (Figure III:15).
1 Bench

Kiva C (Figure III:15).
1 Bench
2 Niche, 30 cm deep
3 Niche, 40 cm deep, partially blocked
4 Niche, 35 cm deep
5 Niche, 20 cm deep
6 Niche, 20 cm deep
7 Vent; see Figure III:16
8 Pier-type pilaster
9 Recesses in wall behind bench
10 Gap in bench

Kiva D (Figure III:15).
1 Bench

Kiva E (Figure III:15).
1 Ledge, 5-25 cm deep

Kiva F (Figure III:15).
1 Intrusive rectangular wall; see EXCAVATION NOTES, Plaza
2 Horizontal log-type pilaster
3 Bench

Kiva G-1 (Figure III:6,F; and Figure III:15).
1 Bench
2 Horizontal log-type pilaster
3 Recess in bench

Kiva G-2 (Figure III:6,F).
1 Bench

Kiva G-5 (Figure III:6,G).
1 Bench stub
2 Modern pier

Kiva I (Figure III:6,F; and Figure III:15).

1 Bench
2 Horizontal log-type pilaster
3 Recess in bench
4 Lintel of ventilator shaft

Kiva J (Figure III:6,F, and Figure III:15).

1 Bench
2 Horizontal log-type pilasters (shaped beams without masonry box)
3 Recess in bench
4 Wall tie pole butts

Kiva N (Figure III:15).

1 "T" door; three masonry steps modified the angles of "T," which was also partially blocked by the south wall of Room 87; stabilized, steel and 2x4 lintels
2 Blocked door/niche; upper portion of door exposed rubble or wall core; see Figure III:21 and 89S:8; five 10-cm-dia. wood lintels; dendro #s CK-1280 through 1283, inclusive
3-5 Primary roof beams; dendro #s CK-1277, CK-1278, CK-1279
6 Door; see 72-74W:1
7 Bench of second story kiva
8 Recess in bench
9-14 Primary roof beam sockets
15&16 Primary roof beam butts into Room 88 or tie beams from kiva to enclosure
17 Eighteen small wall-tie butts
18 Niche, 15 cm deep
19 Blocked niche (?)
20 Large masonry pier; See EXCAVATION NOTES, Kiva N
21 Niche, 45 cm deep

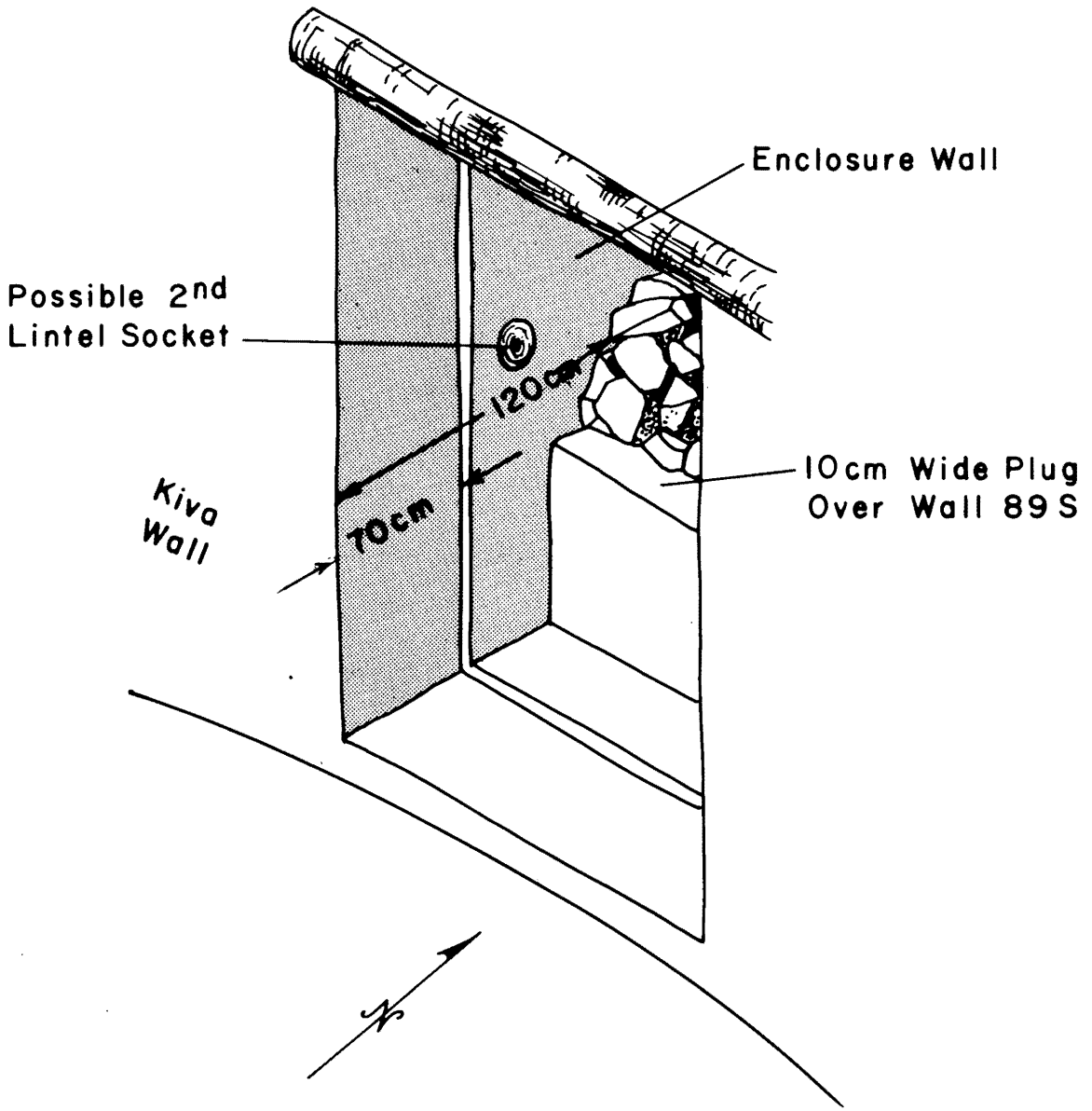


Figure III:21. Feature N:2, Kiva N, detail.

CHAPTER IV

BUILDING STAGES

Stephen H. Lekson

The attentive reader will have noticed that there has been little mention of masonry "types," one of the staples of Chacoan architectural studies. There are two reasons for this. First, objective, quantified masonry style analysis (Morenon 1977) is extremely time-consuming. This in itself would not be a damning indictment, but two considerations suggested that the time involved in a detailed, attribute analysis might be more effectively spent in other approaches to architecture: attribute analysis of masonry style is still in an experimental stage and the causes of variation being recorded in those analyses are problematic at best; and, the precision of measurements required for this approach would be of dubious validity on walls stabilized, restabilized, and in more than a few cases rebuilt over the last half century.

The second reason for generally ignoring masonry styles in our observations is that we see no reason to modify Hawley's doctoral study (Hawley 1934), undertaken before most walls had been stabilized. (See also "masonry styles" in the Glossary, and Figure A:3.)

Building stages will be defined here mainly on the basis of excavation and wall notes (Chapters II and III). Physical evidence for building stages will be supplemented by Hawley's observations and her masonry types, where appropriate.

It should be noted that our approach to size (number of stories, number of rooms) is conservative. Our estimates are in reaction to a tendency among Hewett's students to err towards the large. There is an obvious trend in the student notes, and the field supervisor's summaries, to make Chetro Ketl compare favorably with Pueblo Bonito. That Hewett had less than amiable feelings towards the excavators of Pueblo Bonito is no secret, and the occasional reference to that ruin as "Chetro Ketl's little sister down the canyon" indicates that Hewett's biases were shared by his colleagues.

The excavated portion of Chetro Ketl is divided into two sections, the "East Wing" (southeast corner and front arc) and the "North Block" (the main or rear rooms). These sections, of course, met at the northeast corner of ruin, but today no continuous wall can be traced between the two. The northeast corner was much reduced even prior to the first records of the site; the corner is today totally obscured by a rail embankment and backdirt mound dating from the 1930s.

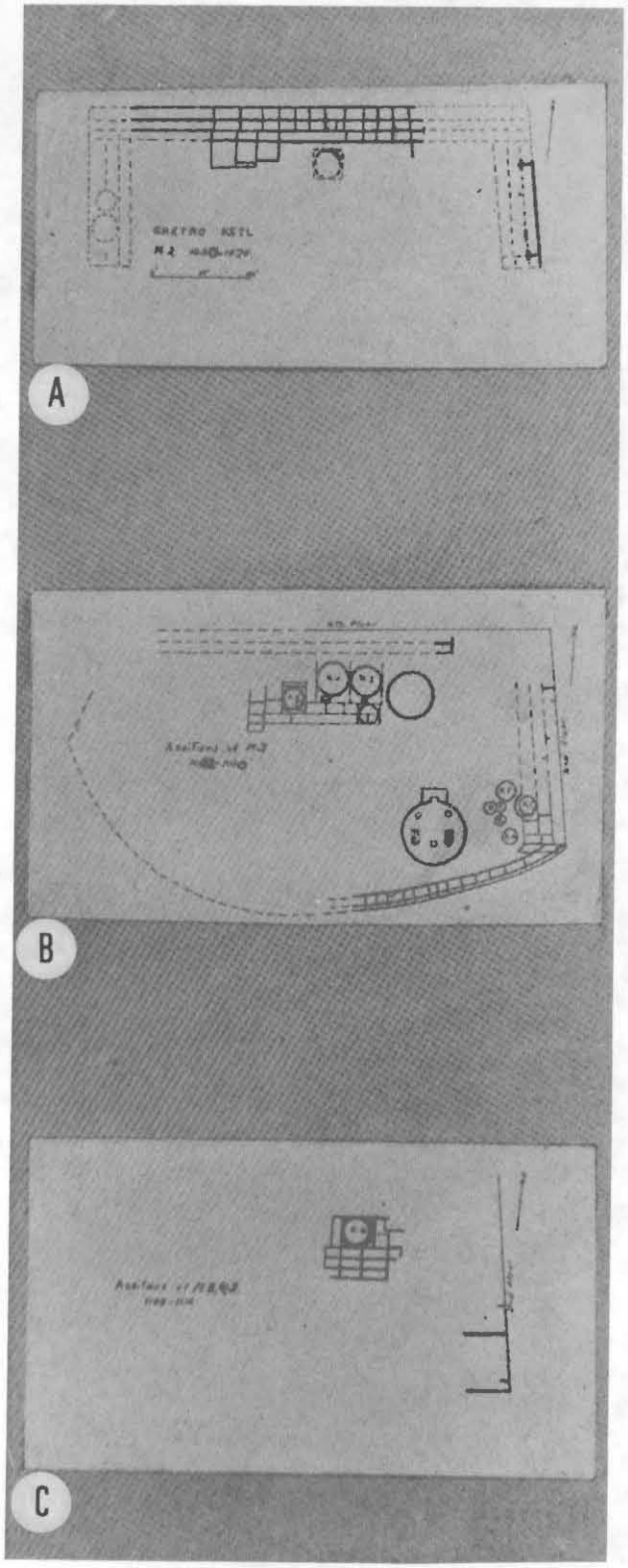


Figure IV:1. Hawley's architectural history of Chetro Ketl A - 1030 to 1070; B - 1062 to 1090; C - 1100 to 1116+ (Hawley 1934:Plate XII, courtesy School of American Research and the University of New Mexico).

North Block A

North Block A is currently visible only in the west third of Room 92 (Voll 1978). Below Room 92 is part of a relatively low (1.75 to 1.85 m tall) room. This "earlier structure built of Type I, unfaced slab masonry, was intentionally robbed of ceiling materials, filled with sand, and built over by a series of Type II, narrow banded with core, masonry rooms" (Voll 1978:142). This later series of rooms is our North Block B; the rooms below it are North Block A.

The existence of a "lower story" under much of the rear of the North Block is recorded in the excavation notes and later stabilization reports. Lower walls were exposed below Room 63 (hence Vivian's [1948] interpretation of the roof of that room as the second story), Room 47-52 (Vivian and Lancaster 1947), and probably in the trench outside Room 43 (see EXCAVATION NOTES, Chapter II). This trench went 3.7 m below ground surface to the base of the rear wall. The ground surface in our wall drawings is undoubtedly somewhat lower than that in the 1930s, but comparison of old photos to the existing wall indicates that the difference is not great. The extension of the rear wall 3.7 m below the present ground surface indicates that the wall extends about 1.75 m below the ground floor of Room 43.

North Block B

"When first built the rooms of the back section were but two tiers deep" (Hawley 1934:23), running west from Rooms 39 and 41 to Rooms 91, 92 and 103, and perhaps beyond. North Block B appears to have been two stories in height. The ceiling of the first story was at a level about 3 m below our datum plane.

In addition to the two tiers, we believe there was a third row of single-story rooms to the south (towards the plaza). This row of rooms is indicated by razed walls found beneath Rooms 23 and 38, and Kivas G and I. These walls probably continue under Kiva J (which was never excavated below the floor level). For reasons made clear in the discussion of North Block C, it seems unlikely that the rooms extended west beyond Rooms 71 and 71A.

Our only profile of this wall comes from below Kiva G, where it was designated "Construction G-3-1" (Miller 1937:55). Miller's profiles and our wall drawings suggest that the base of G-3-1 is at the same height as the floor of the first story of the other rooms of North Block B. Moreover, a distinct vertical abutment in the short wall 37W (between masonry Type II to the north and masonry Type IV to the south) is duplicated in an identical abutment in the north end of the wall separating the square enclosures of Kivas I and J, and perhaps repeated in the wall between Rooms 71 and 71A. This line of abutments can be interpreted two ways: 1) a line of second-story north-south rooms was razed to the south of a line of east-west doorways; or 2) the second-story north-south walls were continued

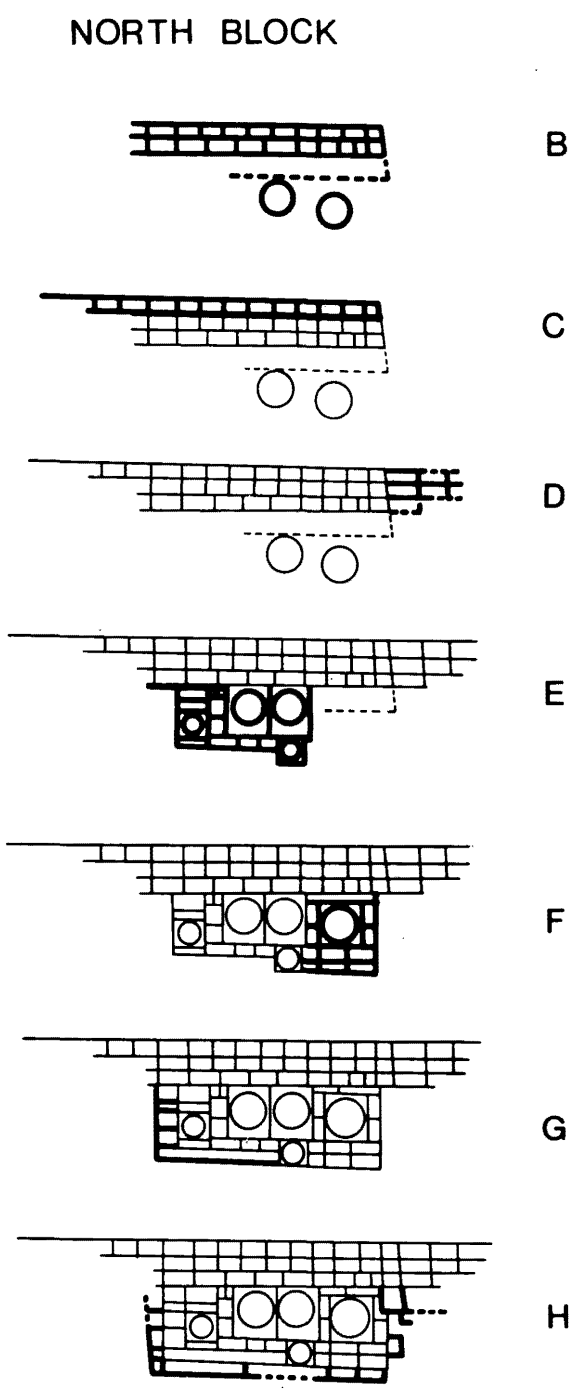


Figure IV:2. Preliminary building stages, North Block.

for a short length out over the roofs of a plaza-fronting tier of one-story rooms (a situation seen at historic Pueblos). We prefer the latter interpretation, because the row of rooms represented by Construction G-3-1 probably was plaza-fronting, and therefore, probably single story.

The main evidence for the assertion that this row of rooms faced the plaza are two buried (not razed) kivas directly in front of Construction G-3-1. These are Kiva G-5, and the unnumbered kiva whose northern arc was discovered almost touching the extension of G-3-1 under Kiva I. The tops of both of these kivas are at the level of the floor of the first story of North Block B.

To summarize, North Block B consists of two rows of two-story rooms, originally fronted by a row of larger single-story rooms, as well as at least two large, subterranean kivas.

North Block C

North Block C is a line of two-story rooms added to the back wall of North Block B. As indicated by the trench outside Room 43, North Block C was probably built directly on the abandoned walls of North Block A. This suggests that the difference in time between North Blocks B and C was not great, since the same buried building may have served as a foundation for both.

The first-story beams of North Block C were seated in a "double" wall parallel and adjacent to the old rear wall of North Block B. The wall was over 90 cm wide, and a full story tall. It was tied to the cross walls of North Block C, but not, of course, to the rear wall of North Block B.

An identical technique was used to add Room 70 to the front of Room 63 (Figure III:20), and for this reason, it is possible that Room 70 was built as part of North Block C. This assignment is, of course, arguable, but if true, it suggests that Room 89 and probably Kiva N (in some form) are also part of North Block C. However, Hawley assigns the Kiva N complex to a later building stage, which we have identified as North Block E.

North Block D

The relative sequence of North Blocks D and E is uncertain. We have placed D before E because the building of D did not require the abandonment of earlier structures, while North Block E did.

North Block D is defined by the masonry abutment in the second-story rear wall between Rooms 43 and 109. This abutment has long been admired by visitors to the ruin, but as noted in Chapter III

(Rear Wall:14), the area is very heavily stabilized--almost rebuilt. Hawley (Figure IV:1) does not show a break on the first or second stories (her first through third) but does note a break on the third (her fourth).

North Block D, then, is the second and third stories of three rows of rooms, running east from Rooms 107, 108, and 109 for an unknown distance, and probably the third story running west over North Block C. Inclusion of the third story over North Block C follows Hawley (Figure IV:1), although, as suggested above, we feel her reconstruction adds a story, making the fourth story of her Plate XII our third story. Hawley's first story is probably the "lower story" of North Block A.

The first story of our North Block D is not currently visible. Hawley (Figure IV:1) indicates that our first story of these rooms was of masonry Type II (as are North Blocks B and C). These rooms were never fully excavated, so their articulation with North Blocks B and C is problematic. We suggest that the first story of North Block D represents a stage between North Block C and, naturally enough, the upper stories of North Block D. See Correlation of North Block and East Wing, below.

North Block E

North Block E probably includes several building (and rebuilding) stages, particularly in its west end (see comments on Room 70 and Kiva N under North Block C, and Room 72 in Chapter II). Most of North Block E is equivalent to Hawley's second construction period (Figure IV:1), but see North Blocks G and H.

North Block E consists of four major units: Kivas I, J and N, and the unnumbered kiva later divided into Rooms 29-31. Most other rooms in North Block E are modifications of areas between kivas and their enclosures, or between kiva enclosures and earlier structures. Kivas I and J were built as a unit (the walls of the two kivas merge). As noted above (North Block C) Room 70, Room 89 and Kiva N are probably part of a construction unit. The relative sequence of Kivas I and J, and Kiva N, is undeterminable; we favor temporal priority for Kiva N. The kiva under Rooms 29-31, perhaps a tower kiva, may have been built with Kivas I and J, but more likely was added to the front of the Kiva I enclosure. In any event, the row of rooms running west of the unnamed kiva (Rooms 33, 73, 88) clearly postdates Kiva N, since the base of the south wall of Room 88 was considerably higher than the base of its north wall. The south wall of Room 88 is probably the same as the south wall of Rooms 73 through 33.

Kiva I, and probably Kiva J, were built over buried walls of North Block B. Rooms 71 through 74 were never excavated below floor but Vivian and Lancaster (1947) suggest that the rooms fronting North Block E (i.e., Rooms 81, 105, 76, 32) were also built over earlier, unrelated walls.

North Block B, and plaza features related to North Block B, probably extend under most of North Block E.

North Block F

North Block F corresponds to Hawley's third construction period (Figure IV:1). Hawley includes Rooms 20 and 21; we exclude them here, but as discussed later, these rooms could possibly belong in this building stage. Room 38 clearly predates North Block F, but its correct assignment is unknown. Possibly it is equivalent in construction date to North Block C or D.

North Block F appears to be a coherent unit, built of "McElmo" masonry. This unit was subsequently modified very little, except for a later version of Kiva G. Rooms 16 and 17 were two stories; Rooms 22 and 23 might have been. All other rooms were very likely only one story tall, with three-story tall Kiva G towering over the surrounding rooms of North Blocks B, E, and F.

North Block F was built over parts of North Block B, as described above.

North Block G

This row of rooms on the west and south sides of North Block E was clearly added onto that block. The wall between Rooms 85 and 87 partially blocks the "T" door into Kiva N. The juncture of North Block G with the southwest corner of the kiva under Rooms 29-31 is much reduced and stabilized; we think it was originally an abutment. The south face of North Block G is the Colonnade, probably one story tall. The rooms along the west wing of North Block G may have been two stories tall, but were more likely only one.

North Block H

North Block H includes the row of single-story rooms surrounding North Block G, Rooms 20 and 21 (assumed to be an extension of the row fronting the Colonnade, although they may actually belong with North Block F) and two rooms east of North Block F, Rooms 24 and 25. These, with the exception of Rooms 20 and 21, are clearly additions to the existing North Block. The openings between columns of the Colonnade may have been blocked to provide seating for roof beams for the row of North Block H rooms fronting it.

East Wing A

Hawley (Figure IV:1) shows the first floor of the East Wing as far south as Rooms 121, 122, and 123 as masonry Type II. East Wing A is the first story of the East Wing from Room 114 to Rooms 121, 122, and 123. East Wing A was about the same size as the currently visible West Wing. Very little of East Wing A was excavated, and almost none is currently visible.

East Wing B

The second story over East Wing A, and both first and second stories of Rooms 1 through 7, make up East Wing B. Construction is of masonry Types III and IV (we see these types as a continuum). Hawley shows a third story of Type IV masonry in the East Wing, but evidence for a third story is limited only to the extreme north end of the East Wing (e.g., Room 114).

East Wing C

The stratigraphy of Room 9 and the Moat, which together make up East Wing C, is unclear. Both postdate East Wing B and predate East Wing D.

East Wing D

East Wing D consists of rooms added to the plaza side of the Moat. We have also included Kiva C. East Wing D may have included most, if not all, of the subterranean kivas in the southwest plaza.

The arc of plaza-facing rooms (Rooms 8, 10-13, and 130-139) were built over the Moat after the Moat had been filled. The plaza behind the Moat had also accumulated over 1.5 m of deposits--up to the Moat roof level. This deposition would bring the plaza level well over the level of the first-story ceiling of East Wings A and B. Reiter (1933) notes that the first story of East Wing B was intentionally filled, making the second story a ground floor--evidently on about the same level as the upper plaza surface. If this is so, then Kiva C may also belong to East Wing D. Kiva C was built over a razed East Wing B room; the razed walls protrude slightly above the upper plaza level.

Since most of the kivas in this area were built from the upper plaza level (that is, their walls extended to the upper level), they too might be assigned to East Wing D. Certainly the surface rooms and firepits in the southeast plaza are East Wing D or later.

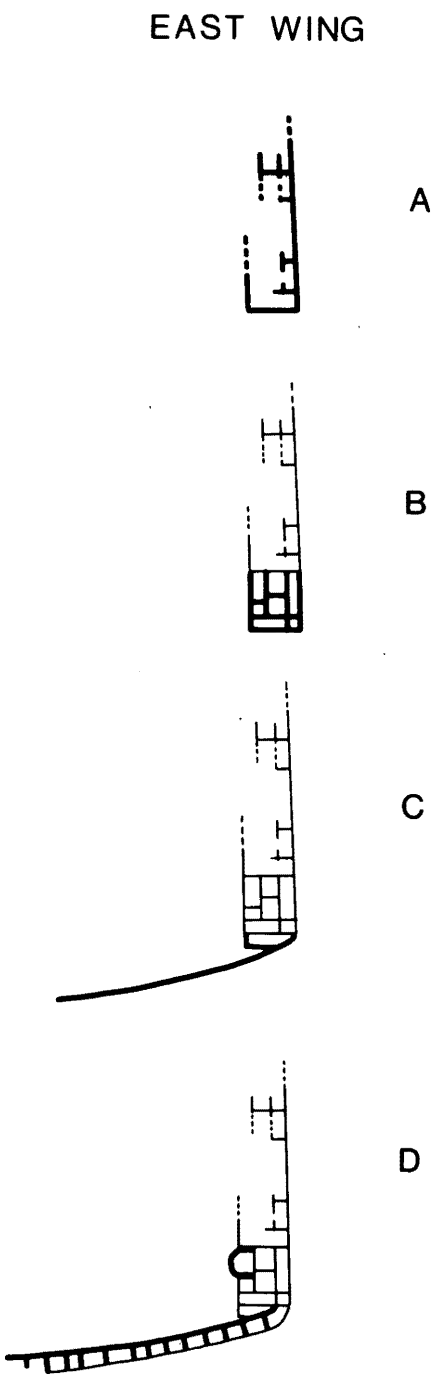


Figure IV:3. Preliminary building stages, East Wing.

Correlation of North Block and East Wing

Since there are no continuous walls between the North Block and East Wing, correlations of building stages between the two are somewhat speculative. Here again, we have recourse to Hawley's masonry types.

In the discussion of North Block D, we noted that the first story of this unit was built of Type II masonry, as were North Blocks B and C, and East Wing A. The first story of North Block D may represent an intermediate building stage between stages A and B, and stage C. The first story of North Block D may have continued into East Wing A. North Block D then becomes equivalent to East Wing B--much as Hawley suggested in her "second period of construction" (Figure IV:1). Direct correlations are impossible, but it is likely that East Wing D was equivalent to North Block G and/or H. Here we differ from Hawley, who saw our East Wings B and D as contemporary with North Blocks E, F, and G. Our trial correlation of building stages follows:

North Block	East Wing
A	
B	
C	
. . . . .	A
D	B
E	
F	C
G	
. . . . .	D
H	

CHAPTER V

DENDROCHRONOLOGY

Jeffrey S. Dean and Richard L. Warren

Previous Dendrochronological Work at Chetro Ketl

As one of the largest of the spectacular Chacoan sites, Chetro Ketl early attracted the attention of archaeologists. This interest is reflected in the amount of tree-ring material collected here. Bannister details the source of most of the Chetro Ketl tree-ring material:

> A few samples for the JPB series were taken from Chetro Ketl by [Neil M.] Judd in 1922 and 1925. Florence M. Hawley and Roy Lassetter made an extensive collection (the CK series through CK-599) in 1930 and 1931, and several pieces (CK-A's) are thought to have been collected by Paul Reiter at about the same time. In 1940 Deric O'Bryan visited the ruin for Gila Pueblo and obtained the GP's. GP-2437 through GP-2445, however, were actually collected during the course of the School of American Research excavations and turned over to O'Bryan. A flash flood in 1947...did considerable damage to the rear (north) wall of the ruin. In the repair and salvage work that followed, Gordon Vivian collected all the logs that had been washed out...CK-700 through 965... (Bannister 1965:139, 146).

Samples CK-966 through 1051 and CK-1101 through 1110 were collected at different times in connection with various stabilization efforts of the National Park Service's Ruins Stabilization Unit. Specimens CK-1052 through 1100 were collected by the Laboratory of Tree-Ring Research in 1969.

Considering the size and importance of Chetro Ketl, it is not surprising that several scholars have attempted to use the many tree-ring dates to develop an internal chronology for the site. The first and most comprehensive of these attempts was Hawley's (1934) detailed analysis of 143 dates in relation to their architectural associations. Hawley focused on dating the different masonry styles and on developing a constructional history of the site. She identified three major building periods, each characterized by a discrete range of tree-ring dates and by a diagnostic combination of masonry styles. The earliest period, A.D. 945-1030, was recognized on the basis of reused wood included in rooms of late construction; no features actually built during this interval were recognized. The second period, 1030-1090,

was characterized by major construction, remodelling, and additions that produced the site layout apparent today. The last period, 1100-1116+, was one of alterations and additions to the basic structure erected during the preceding interval (Figure IV:1).

Harold S. Gladwin, in his relentless quest to reshape Southwestern prehistory to conform to his preconceptions, took a shot at reinterpreting the tree-ring dates from Chetro Ketl (Gladwin 1945:122-124). Troubled by the apparent contemporaneity of the monumental Bonito Phase pueblos and the pedestrian Hosta Butte Phase sites, Gladwin sought some way of establishing the "correct" sequence by showing that the Bonito Phase postdated and thereby developed from the simpler Hosta Butte Phase. Adopting the novel--and wholly inappropriate--technique of averaging tree-ring dates for each of three reported "floors" at Chetro Ketl, he discovered that the mean dates were progressively older from the first floor (mean = 1061) to the third floor (mean = 1032). He interpreted this gravity-defying distribution to mean that, due to exhaustion of the meager timber resources of the local environment, the upper stories were built with beams salvaged from older structures. This interpretation allowed the Bonito Phase pueblos to be dated to the twelfth century, thus placing them in the "proper" temporal relationship to the eleventh century Hosta Butte Phase sites. Bannister (1965: 150-151) has delineated the fallacies in Gladwin's analysis, and they need not be repeated here.

Bannister's (1965:138-153) list of 380 tree-ring dates from Chetro Ketl includes all dates previously produced by Douglass, Hawley, and Gila Pueblo plus 201 dates derived by Bannister from logs exposed by the 1947 flood. These data allowed him to refine Hawley's dating of masonry styles and to elaborate on her chronology of internal development at Chetro Ketl. Bannister used the fact that all logs dated prior to 1030 were reused to infer the former existence of a pueblo built between ca. 990 and 1030 and razed around 1039 and its building materials incorporated into the edifice presently recognized as Chetro Ketl. The new dates derived from the logs washed out of the area of North Blocks B and C (Chapter IV), coupled with those already available from this part of the site, enabled Bannister to break Hawley's second construction period (1030-1090) into at least three building events. He postulated major construction of ground floor rooms beginning around 1039 with subsequent additions, primarily to upper floors, in the 1040s and early 1050s. Dates in the late 1050s and 1060s were ascribed to repair activities. In the absence of new data pertinent to post-1054 developments, Bannister declined to elaborate on the later part of Hawley's second building period and all of the third.

In the 1960s the Tree-Ring Laboratory, through a series of grants from the National Science Foundation, reanalyzed all Southwestern tree-ring samples in its possession. Among these were the 927 Chetro Ketl samples in the Tree-Ring Laboratory and Gila Pueblo collections. This restudy resolved many of the inconsistencies and ambiguities resulting from previous analysis by several individuals and eliminated all recognizable instances of specimen duplication to produce only one date from each tree represented in the collections. The 501 dates

derived by this work were published by Robinson, Harrill, and Warren (1974:16-24) who, because of the plethora of existing interpretations and because few new data were produced by the Chetro Ketl restudy, eschewed detailed evaluation of the Chetro Ketl dating situation.

The Current Research

The work reported here is a direct result of Lekson's (1978) analysis of the architectural development of Chetro Ketl. His study revealed that the developmental chronology of this important site was poorly understood despite the availability of more than 500 tree-ring dates. He ascribed this situation primarily to the lack of the tight provenience control for the majority of tree-ring samples, essential for the construction of an adequate internal site chronology. He called for a systematic restudy of the dendrochronology of Chetro Ketl to remedy the deficiencies of the existing situation. As a result, the National Park Service supported comprehensive analysis of the dendrochronology of Chetro Ketl by the Laboratory of Tree-Ring Research.

Focus of the Study

The basic objective of the Chetro Ketl dendrochronological research is to bring order to the confused dating situations. One aspect of this effort is a reassessment of all existing tree-ring material from the site. This involves a careful search of the records pertaining to the Chetro Ketl collections and an attempt to collate the published dates and their proveniences. Major goals of this reassessment are the elimination of inconsistencies that can be resolved on the basis of extant information and the isolation of problems that cannot be resolved. A second aspect is the collection, thorough documentation, and analysis of samples from in situ timbers at Chetro Ketl. The third and final phase of this work is the integration of the old and new dendrochronological and architectural data into a room-by-room synthesis of the temporal relationships of the structural components of Chetro Ketl. This synthesis is combined with detailed architectural data (Chapters II and III) into a refined study of the temporal and structural development of this large Chacoan pueblo (Chapter VI).

The production of a room-by-room sequence of construction, if it can be done, should help resolve several more specific problems that have become apparent as a result of previous work. One of these problems is the significance of the dates between 945 and 1030, which Hawley and Bannister were unable to associate with any extant rooms at Chetro Ketl. The derivation of additional dates along with the improved provenience data may support the inference that the 945-1030 timbers were salvaged from an older, razed structure and reused after 1038. Conversely, it may now be possible to isolate rooms that date to the 945-1030 interval. A related problem is that of the initial construction dates of the rooms now present at Chetro Ketl and the

location of the early rooms within the site. Another set of questions concerns the nature of Hawley's building periods and the significance of the date clusters within these intervals. Can discrete constructional episodes be recognized, dated, and localized within the pueblo? If so, the development of a finely controlled construction sequence should be possible. On the other hand, it may be possible to demonstrate that the date clusters represent tree cutting events rather than building episodes. If so, we will be able to make a good case for the systematic stockpiling of logs to the detriment of precise temporal placement of individual rooms. The dating of a number of rooms may permit the testing of Lekson's preliminary construction sequence (Chapter IV). The Chetro Ketl dendrochronological research may specify certain types of prehistoric wood use behavior such as stockpiling, reuse, repair, and others. Finally, a careful study of the current dendrochronological status of Chetro Ketl as compared to that of 1930 when many of Hawley's samples were collected should elucidate the impact of extensive modern stabilization and repair activities on archaeological tree-ring dating situations.

Inventory of Samples Collected Before 1947

The first phase of the Chetro Ketl dendrochronological research was an assessment of 345 tree-ring samples collected from the ruin before the 1947 flood (Betancourt 1979). Material collected after 1947 was omitted from this study either because there is no confusion as to its provenience or because there is no hope of improving the available provenience information. The assessment involved a thorough search of the Tree-Ring Laboratory files for all information pertaining to the pre-1947 samples. Field notes, laboratory tabulations, analytical records, and published references were collected to produce the most reliable provenience data possible from existing information. Proveniences were assigned by matching individual tree-ring samples with pertinent references in the records. Recognized instances of sample replication, both within and among institutional collections, were collapsed whenever possible to produce a single provenience ascription for each tree. These procedures clarified the origins of most of the specimens, although a small residue of samples remained unallocated. It was expected that further collection from Chetro Ketl would reduce the residue by providing new samples to replace ones of ambiguous provenience or by allowing provenience assignment through the identification of specimen duplications between the new and old collections.

Collection of Tree-Ring Samples

The second major aspect of the study was the collection of tree-ring samples from Chetro Ketl both to complement and supplement the

existing collection. The primary goal of this phase of the project was to sample all accessible previously unsampled timbers, especially those still in situ. This work was expected to increase the number of well controlled dates from previously dated rooms as well as to provide dates for previously undated proveniences. Special attention was to be given to elements, particularly lintels, that because of their integral association with particular wall segments might provide unambiguous room construction dates. A second objective was to resample some previously sampled timbers. Matching new samples with their counterparts in the existing collections was expected to resolve problems caused by ambiguous or conflicting provenience data on the previously collected samples. The procedure, by confirming or correcting room assignments, was expected to clear up many of the interpretative limitations of the original Chetro Ketl collections. Resampling also was expected to provide more precise provenience data on the extant samples in that primary timbers could be differentiated from secondary beams and other types of elements. Careful resampling was expected to replace some noncutting dates with cutting dates and thereby increase the relevance of the dates for the temporal placement of associated features. Finally, it was our intention to ignore material that was not in place or that obviously had been moved. We already had a surfeit of unprovenienced dates from Chetro Ketl, and more would produce no useful increment in our knowledge of the site. As is apparent in the discussion that follows, we were not always able to accomplish these goals.

Beams were sampled by removing a 1/2-inch-diameter radial core with a Henson archaeological core extractor attached to an electric drill powered by a 1400 watt gasoline generator. The holes left by the extraction process were plugged with corks inscribed with specimen field numbers. Detailed notes were taken on the provenience, associations, and physical attributes of each sampled timber. In addition, architectural observations relevant to the application of the dates to the rooms were recorded. Upon completion of the field work the samples were transported to the Laboratory of Tree-Ring Research at the University of Arizona in Tucson for analysis.

Sample Analysis

Standard methods of dendrochronological analysis (Dean 1978) were applied to the Chetro Ketl tree-ring material. The cores were sanded to expose the cellular structure of the wood, and were dated by inspection or by the skeleton plot technique. Sample preparation and analysis was done by Warren. In addition, a thorough attempt was made to identify instances of specimen replication among all the collections, an effort that involved the examination of most of the Chetro Ketl tree-ring samples. This was done to help resolve many of the existing provenience problems and to ensure that each date was reported only once. Old and new samples were then sorted into provenience categories, and a contextual analysis of the dates was performed to provide a unit-by-unit chronology of the growth of the pueblo.

The Provenience Problem

Before attempting to develop a chronology for Chetro Ketl, it is necessary that we address the problems revealed by unprovenienced samples and by specimens with conflicting provenience ascriptions. Lekson (1978) correctly identified provenience inadequacies as the major deficiency of the Chetro Ketl dating picture. It is doubtful, however, that at the beginning of the dating project any of us anticipated the magnitude of this problem. Betancourt's (1979) inventory delineated the nature of the situation and alleviated some of the prevailing confusion. Subsequent field collection and sample analysis confirmed and elucidated many of his observations. These studies show the provenience problem to lie not so much in the paucity of detailed provenience for many of the samples as in the lack of potential to verify or refine extant provenience assignments by resampling and reexamination of the site.

Table V:1 lists the number of dated samples ascribed to each room by Hawley (1934:Protocol 1), Bannister (1965:Table VIII), and Robinson, Harrill, and Warren (1974:17-23), the number of dated and undated samples collected from the same rooms before 1947 (Betancourt 1979), the total number of samples recovered from each room prior to 1979, and the number of beams in situ in May of 1979. The situation is even less auspicious than is indicated by the 226 unit excess of samples (393) over timbers currently present (167) in these rooms. The removal from the list of Rooms 39 and 93, which have no provenience problems, creates a difference of 262 between existing samples (343) and in situ logs (only 81). These figures clearly indicate the lack of potential for resolving provenience problems through the resampling of wooden elements at Chetro Ketl. The wood from which most of the provenienced samples were taken simply is no longer there.

Another aspect of the provenience problem is elucidated by the distribution throughout the site of replicate samples identified through correspondences in ring morphology. Several individual logs, identified by duplicate samples in the 1930 and 1979 collections, have conflicting provenience designations. In Table V:2, the 1979 locations of beams with replicate samples are compared with the locations of the same beams in 1930. Fully half of these timbers are now situated in rooms different from those to which they were attributed in 1930. This problem is particularly acute in Room 27 and Kiva N. Many of the logs originally ascribed to these chambers are now located elsewhere or have disappeared from the site. Most of the beams now present in these two units were assigned to other rooms in 1930. Because there is no reason to question Hawley's original room assignments, these logs must have been moved since 1930. At present there is no way to tell whether the in situ timbers represented by 1979 nonreplicated samples are in their original locations or whether they too have been moved. This circumstance casts a pall of uncertainty over the authenticity of many of the timbers now in place in Chetro Ketl.

Table V:1. Dated and total samples per room

Room No.	Number of dated samples			Number collected samples		Number present
	Hawley 1934	Bannister 1965	Robinson, Harrill, Warren 1974	Before 1947 (Betancourt 1979)	Total to 1979	May 1979
1	4	4	5	6	6	5
2	3	3	2	3	3	0
4	5	5	6	13	12	5
8, 8a	4	4	4	5	4	2
9	0	0	0	1	1	5
27	7	7	5	8	5	5
31	1	1	1	1	1	0
35	5	5	4	5	5	2
37	1	1	1	1	1	0
38	2	2	1	2	1	0
39	1	1	2	1	1	37
40	6	6	6	8	7	0
42	3	3	3	3	3	1
43	7	8	9	12	13	2
43a	0	6	6	0	6	0
44	19	23	20	34	31	2
45	0	3	3	0	3	1
46	6	9	9	17	18	2
47	2	2	2	2	2	2
48	15	17	14	20	20	4
49	1	1	1	1	1	0
53	7	8	5	9	8	1
54	1	3	3	1	3	2
55	1	9	10	7	15	0
57	1	21	22		22	0
58	1	23	25	8	30	2
59	3	4	3	6	7	2
60	0	0	0	3	3	2
61	0	0	0	1	3	2
64	3	3	3	3	3	3
65	0	7	7	0	7	3
68	0	0	0	1	1	0
70	0	0	4	8	4	5
89	0	0	0	3	2	6
92	0	0	32	0	32	1
93	0	0	44	0	49	49
101-103	3	3	4	4	4	1
107	0	1	0	1	1	3
Kiva A	4	4	2	15	13	0
Kiva G	19	19	16	30	27	?
Kiva H	1	1	1	1	1	0
Kiva I	4	4	1	4	5	0
Kiva J	1	1	4	7	7	0
Kiva N	1	1	1	2	2	10
Totals	142	223	291	257	393	167

Table V:2 Replicate tree-ring samples from Chetro Ketl

Sample Tree-Ring Lab Catalog Number CK-	Location of Sample (Room Number) 1930 (Hawley 1934)	1979
129	1	1
131	1	1
134	1	1
135	1	1
64,1157	2	44
130-1	4	9
130-2,1119	4	4
30	8	9
308,1276	27	Kiva N
309,1284	27	27
336	39	39A
159,1151	42	41
99,1160	43	45
65	44	44
158,1145	44	43
101,1278	46	Kiva N
84,1277	48	Kiva N
144,1156	48	42
149,1161	53	46, 53
534-2	60	60
531,1182	64	65
534-1	64	64
536-2	70	70
537	70	70
538	70	70
539	70	70
55,335	Kiva G	40
136,1290	Kiva G	Kiva G
319,1285	Kiva N	27
307,1286	?	27
337,1252	40	39A
354,1192	?	54
525,GP-1206	?	59
535-2,1199	?	61
564,1208	55	58

Apart from the usual uncertainties injected into any archaeological tree-ring dating situation by the behavior of the occupants of a site and by the processes that produce the archaeological record, the provenience problems at Chetro Ketl have three major causes. The first of these is the behavior of the archaeologists and dendrochronologists who sampled the ruin. The poor provenience data on the samples collected by Judd is characteristic of tree-ring collection in the 1920s when interest centered on the construction of a master ring chronology and on the dating of sites rather than components of sites. The current absence from the ruin of most of the beams sampled by Hawley and others in the 1930s is probably due to the removal of these elements during excavation. If the situation in Room 92, illustrated by Voll (1978:141, Figure E.4), is typical of the rest of the site, removal of logs during excavation would have been almost mandatory. Situations like that illustrated by Voll also would account for the lack of floor ascriptions for many samples that do have room proveniences.

Notational differences between Stallings' and Lassetter's field records and Hawley's (1934:Protocol 1) published information create two major provenience problems: (1) correct room identification and (2) proper floor level assignments within rooms. Both Stallings and Lassetter (and, apparently, Hewett as well) used a provisional room numbering system that differs from Hawley's (1934:Plate X) system and the one currently in use (Bannister 1965:Figure 13; this volume, Figure I:2). These numbering schemes must be collated before the dates can be evaluated. If such a collation ever was produced by the individuals involved in the sampling and dating of Chetro Ketl, it has not reached us; therefore, we are forced to create our own correlation.

One method of correlating the room numbering systems is to compare the field maps with the published maps. Regrettably, no floor plan showing all the provisional room numbers is available. Stallings' sketch map (Figure V:1) shows and numbers only those rooms from which samples were collected in 1930. Matching Stallings' map with Hawley's (1934:Plate X) floor plan is not unduly difficult except for a block of 12 contiguous rooms along the north wall, which (naturally) turns out to be the source of most of the samples. Given the schematic nature of Stallings' representation of the rooms in this section of the pueblo, two correlations of his room numbers with those of Hawley and the Park Service are possible (Table V:3). The configurations of the rooms and the relationships of the walls to one another in the questionable area of Stallings' map strongly favor Correlation 2. On the other hand, the relationships of the rooms to the depicted kivas offer weaker support for Correlation 1, a scheme characterized by serious ambiguities in the area of rooms 39, 39A, and 40 that are absent from Correlation 2. Thus, comparison of the floor plans yields no unequivocal choice between the two possible correlations, and other evidence must be brought to bear on this problem.

An obvious line of attack on this problem is to compare Hawley's (1934:Protocol 1) room proveniences with those in Stallings' (1930)

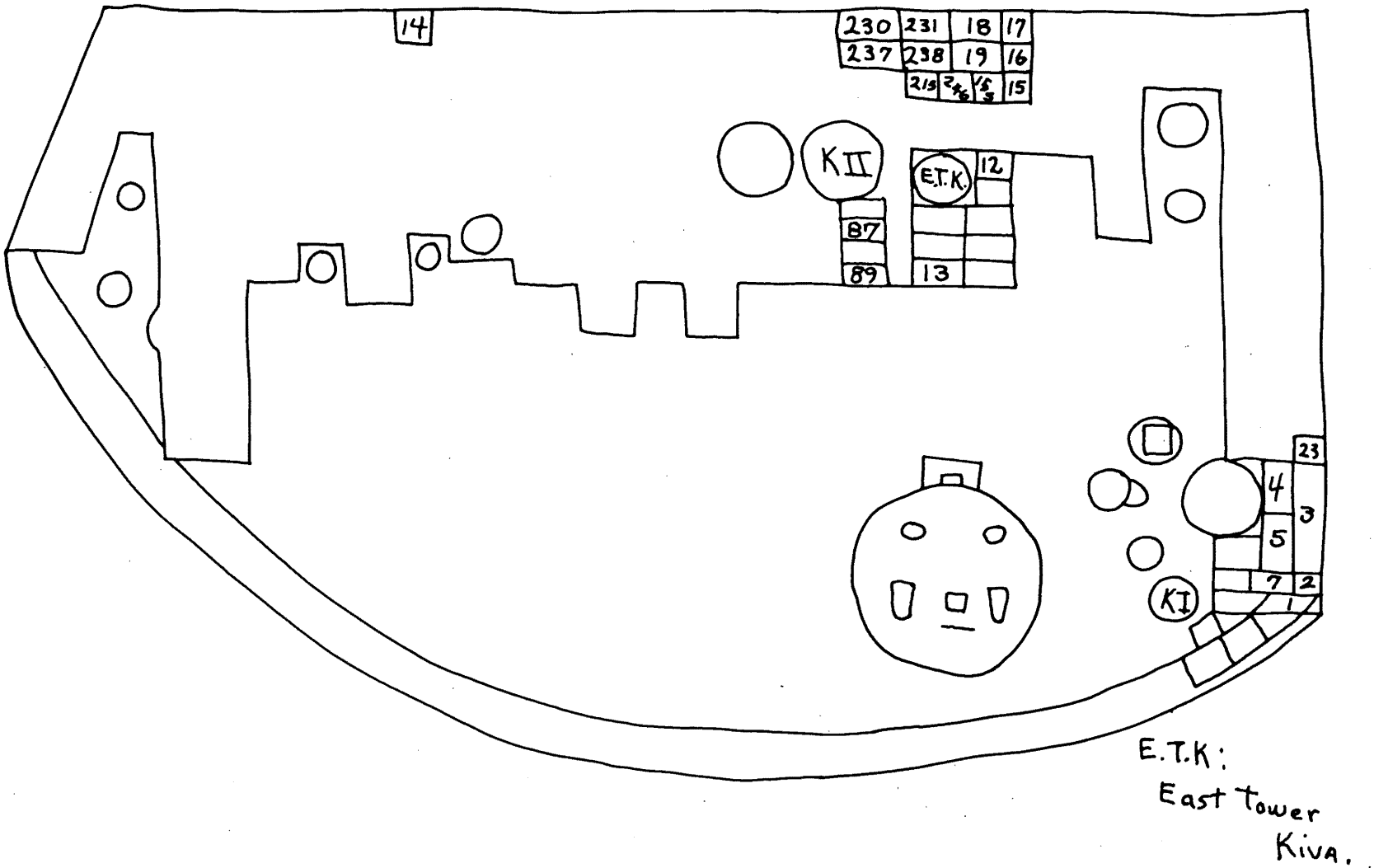


Figure V:1. Stallings' sketch map. (Redrawn from copy on file at the Laboratory of Tree-ring Research, University of Arizona.)

Table V:3 Tree-Ring Laboratory correlation of Chetro Ketl room numbering systems

Hawley 1934 Protocol 1	Correlation 1 NPS	Correlation 1 Hawley 1934 Plate X	Stallings 1930[a]	Correlation 2 Hawley 1934 Plate X	Correlation 2 NPS
8,8a	8	8	1	8	8
1	1	1	2	1	1
4	4	4	3	4	4
40	7	7	4		39A
	5	5	5	5	5
	8, 9	8, 8a, 9	(6)		
2,44	2	2	7	2	2
	23 or 38	23 or 38	12	23 or 38	23 or 38
	21	21	13	21	21
	?	?	14	?	?
40	39A	West 1/2 39	15	East 1/2 39	39
42	42	42	16	41	41
44	44	44	17	43A	43
	45	45	18	44	44
43	43A	43	19	42	42
101	121	101	23	101	121
102	119	102			
103	118	103			
37	37	37	(66)		
35	35	35	(67)		
31			87		
	77?		89		
27	27	27	(90)		
	40	40	158	West 1/2 39	39A
59	59	59	(228)		
54	54	54	(229)		
53	53	53	230	46	46
46	46	46	231	45	45
	58	58	(235)		
	55	55	(236)		
47	47	47	237	48	48
48	48	48	238	43	43A
	50	50	245	49	49
49	49	49	246	40	40
			(251)		
Kiva A	Kiva A	?	Kiva I	?	Kiva A
Kiva I	Kiva I	Kiva I	Kiva II	Kiva I	Kiva I
Kiva G	Kiva G	Kiva G	E.T.K.	Kiva G	Kiva G

a. Parentheses indicate rooms not shown on Stallings' sketch map.

field catalog. As indicated by the left hand column in Table V:3, Hawley's room assignments conform to Correlation 1, representationally the weaker of the two possibilities. Additional support for Correlation 1 is provided by Hawley's (1934:Plate IX.8) photograph of her Room 48, which clearly depicts the present Room 48 and shows an in situ roof beam that is attributed to Room 238 in Stalling's field category. Correlation 1 equates Stallings' Room 238 with Room 48. Duplication between samples collected in 1930 and 1979 offers further tests of the two correlation schemes. Of five such pairs from the relevant part of the pueblo, three (CK-149=1161, CK-158=1145, and CK-159=1151) support Correlation 2, and two (CK-64=1157 and CK-65=FN55) support Correlation 1. Considering the amount of timber translocation in this part of Chetro Ketl resulting from the 1947 flood, this distribution hardly seems conclusive. Given the indeterminate nature of the room numbering situation, we follow Hawley and use Correlation 1. She was present at Chetro Ketl when the samples were collected, and her firsthand knowledge of the situation is accorded precedence over secondhand efforts to relate Stallings' schematic sketch map to more accurate site plans.

Lassetter also used the provisional room numbering system employed by Stallings. Unfortunately, Stallings' map depicts only those rooms sampled in 1930 and does not show those collected later by Lassetter. No map indicating the rooms sampled by Lassetter is available. Consequently, we rely on Lassetter's own designations, which appear on Tree-Ring Laboratory catalog cards and in a manuscript he prepared for Douglass' 1934 dendrochronology class, and on Hawley's (1934:Protocol 1) attributions. Relevant sample duplication reveals few unexplained discrepancies between Lassetter's room assignments and the present locations of the same timbers. For these reasons, we have few reservations as to the accuracy of the room proveniences assigned by Lassetter and Hawley after 1930. The number designations of sampled chambers not depicted on Stallings' sketch plan are enclosed in parentheses in the "Stallings 1930" column of Table V:3. The current designations of these rooms are shown only in Correlation 1.

Deric O'Bryan, when he collected from Chetro Ketl in 1940 for Gila Pueblo, assigned field numbers to the rooms he sampled and produced a sketch map (Figure V:2) even more schematic than Stallings' plan. Our correlation of his room numbers with those currently in use is based on Betancourt's (1979) painstaking comparison of O'Bryan's map with more accurate site plans and on identities among his specimens, Hawley's samples, and our cores. Our assignments of the Gila Pueblo samples are listed in Appendix B and are justified in the individual room discussions.

Room assignment discrepancies among field tags still attached to some of the samples, Stallings' and Lassetter's field records, and Hawley's (1934:Protocol 1) published date list are additional sources of room provenience confusion in the Chetro Ketl tree-ring collection. Although these ascriptions usually are consistent with one another, in a few cases, they are not. Those that do not conflict with one another, along with our final room assignments, are presented in Table

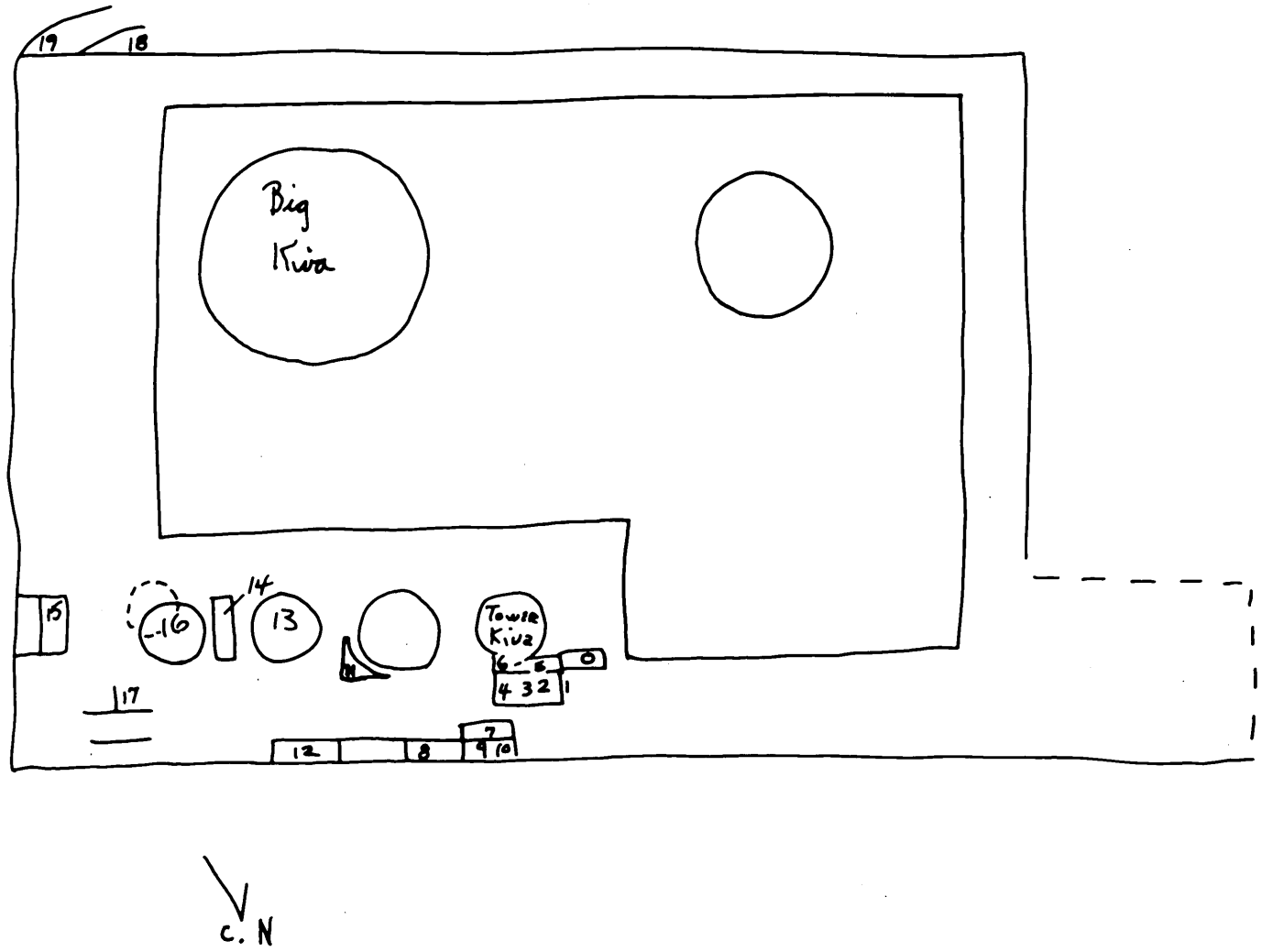


Figure V:2. O'Bryan's sketch map. (Redrawn from original on file at the Arizona State Museum, University of Arizona, Neg. No. 61309.)

V:4. Our final placements of these samples are based on evidence such as consistencies within and between the three classes of provenience information and especially sample replications. In the absence of such evidence, we accept the field tag information on the assumption that the tag data are likely to be the most accurate because they were recorded closer to the time of sampling than were the field catalog and published provenience ascriptions. The reasoning behind each of the final provenience dispositions indicated in Table V:4 is developed in the appropriate individual room discussions that follow.

Two major problems exist in connection with floor level assignments within rooms: (1) discrepancies between field records and publications and (2) correlation of early floor level designations with the stories presently identified in Chetro Ketl. Undoubtedly, both problems derive in part from the difficulty of determining during excavation what floor level a particular timber represented. If the jumble of logs in Room 92 (Voll 1978:Figure E.4) is typical of other rooms, this difficulty must have been formidable indeed. Voll (1978:Table E.2) was able to securely assign only 8 of the 73 timbers recovered from Room 92 to specific stories. This problem could only have been compounded by the facts that the wood samples were collected as the ceilings were exposed from top to bottom and that permanent floor level designations could be made only when the bottom was reached, an event that sometimes occurred a year or more after the sampling of the upper stories. The situation was exacerbated by the attempt of Hewett's group at Chetro Ketl to establish the preeminence of their site over Pueblo Bonito, which was being excavated by Judd. One manifestation of this rivalry was the inflation of story levels (Chapter IV), which no doubt contributes to the prevailing provenience uncertainties.

The considerable potential for provenience confusion inherent in the Chetro Ketl field situation does not entirely explain the floor level discrepancies between Stallings' and Lassetter's field records and Hawley's (1934) Protocol 1. Appendix B specifies several instances in which samples assigned by Stallings to a single floor level are attributed by Hawley to different floor levels. Room 44 is a particularly good example of this conflict. At present, we have no information as to why Hawley altered Stallings' floor assignments in the way that she did. At one point we were inclined to attribute these changes to systematic floor level inflation (Betancourt 1979), but Appendix B clearly shows this not to be the case. In several instances some change seems justified by the presence of too many primary sized beams (up to six in some rooms) for a single story, but the criteria on which the particular floor level transformations are based are unknown. A further problem in this regard rises from the fact that Hawley (1934: Protocol 1) lists only those samples that she dated. Thus we have no indication of where she would have placed the samples that did not date. Attempts to resolve discrepancies between Stallings' and Hawley's floor assignments through sample duplication usually foundered on the current paucity of upper-story wood. Room specific floor level provenience problems are detailed in the individual room discussions. In every case in which an unresolvable conflict exists, we provide a

Table V:4 Chetro Ketl tree-ring sample room assignment ambiguities and discrepancies

Sample Number (CK)	Room Number			
	Field Tag	Stallings' Catalog	Hawley 1934 Protocol 1	Final Assignment
9	1	3	4	9
10	1	3	8a	9
25	1		Kiva A	9
26	1			9
27	6		8	8/8a
29	12			
30	6	1	8	9
32	14			
34	14		40	
38	17	19		
39	17	19		
41	17	19		
127	89	89		77?
148		87	31	31
334	12			

separate assessment of the dates for each set of floor level proveniences.

Correlation of Stallings', Lassetter's, and Hawley's floor levels with the three or four stories now recognized in various parts of Chetro Ketl suffers from all the uncertainties enumerated above. In most instances, floor level correlation is best accomplished by the analysis of duplication between the early samples and those collected from in situ elements in 1979. Unfortunately, this procedure is of limited utility because of the current absence from the ruin of most of the logs sampled by Hawley, Stallings, and Lassetter (Table V:1) and because of the rearrangement of wooden elements resulting from the 1947 flood and subsequent stabilization activities (Table V:2). As shown in Appendix B, relevant instances of sample duplication reveal the early workers' floor designations generally to be one or two levels higher than their modern counterparts. The many exceptions to this general relationship prohibit the derivation of a rule for transforming early floor level designations into their modern equivalents. Lacking such a rule, floor level correlations must be performed on a room-by-room basis. These operations are described in the individual room sections of this report.

The second major source of provenience difficulties is the flood of 1947, which caused the collapse of a number of rooms along the middle of the back wall of the site. The flood, which left more than 500 logs floating in the water that filled the rooms, had a greater impact on the dendrochronology of Chetro Ketl than any other event. Two hundred one of the 501 dates reported by Robinson, Harrill and Warren (1974) come from logs washed out in the flood (Bannister 1965: 146). Gordon Vivian was able to assign many of these floating timbers to specific rooms or to determine that they had been embedded in the masonry walls between particular rooms. Specific intraroom provenience designations, such as floor levels, were impossible. In addition, many of the logs could not even be assigned to particular rooms and merely were included in a "general" provenience category. The conditions created by the flood account for the lack of intramural provenience information on the large collection of wood resulting from this catastrophic event and for the impossibility of improving their provenience documentation through resampling.

The third major cause of provenience problems is the extensive rebuilding, restoration, repair, and stabilization to which Chetro Ketl has been subjected in the last 60 years. These activities often resulted in the removal, translocation, and reinstallation of beams for structural or aesthetic purposes. Hewett undertook extensive restoration and stabilization in the 1920s and 1930s, especially in the area of the Kiva G complex. Unfortunately, no records concerning the nature and extent of wood use and relocation in connection with this work are available. However, Judd's ascription of two of his samples to "Hewett's scrap pile" perhaps implies a stockpile of logs to be used in restoration. At present no way exists to assess the impact of Hewett's restoration activity on wood distribution.

The most ambitious reconstruction work at Chaco Ketl was Gordon Vivian's 1948-1950 effort to repair the extensive damage wrought by the 1947 flood. Three rows of rooms along the middle of the back wall were extensively repaired or totally rebuilt. The hundreds of logs displaced by the collapse of the walls were not reimplanted in the masonry. Instead, after cloth tags recording their flood origin were nailed to them, they were set aside for tree-ring dating and for use in stabilization. Although no records as to the fate of individual flood beams exist, some evidence allows us to trace the disposition of many of them. Hundreds of the larger beams were transported to the Southwestern Archeological Center at Globe, Arizona, where many were sectioned for tree-ring dating (Bannister 1965). When SWAC moved to Tucson, the Chetro Ketl logs went along. After residing in Tucson for several years, the flood beams were sent back to Chaco Canyon National Monument where they now repose in an abandoned dynamite bunker. At present the only clues to the origin of these logs are the cloth tags still attached to a few of them. Many of these timbers appear to be unsampled; however, because none have any useful provenience data, we did not core them. More unattributed dates from Chetro Ketl would serve no useful purpose.

Some flood timbers were kept at Chetro Ketl and used for repair and stabilization. Many of these elements are identified by the presence of tags or nails that survived the removal or deterioration of the tags. Lintels originating from the flood are particularly recognizable on this basis, for they commonly are situated so that the tags are protected from weathering and decay. Tagged lintels are not restricted to the flood damaged portions of Chetro Ketl. Rather they occur in most areas of the site, such as in the rooms surrounding Kiva G, which indicates that more recent stabilizers also exploited the stockpile of lintels produced by the flood. Obviously, the probability that the tagged lintels are in their original position essentially is zero. Furthermore, the apparent absence of nails and tags is not an infallible indicator of original lintels, for the possibility always exists that the timbers are turned so as to obscure these features. This unassessable possibility coupled with the widespread distribution throughout the site of tagged and otherwise spurious (concrete, milled lumber) lintels casts doubt on the authenticity of nearly every lintel at Chetro Ketl. Once we realized the significance of tags and nails, we ceased sampling lintels that had them. However, we did not begin systematically recording the presence of these features until the revelation occurred about halfway through the sampling process, and so we cannot say with absolute certainty that these features are absent from some of the lintels for which they are not recorded. In addition, many lintels proved to be undatable because they had too few rings, were too complacent, or were the wrong species. Lintels recognized in the field as Populus, an undatable genus, were not sampled. Because of these factors and because of the severe provenience problems, lintels turned out to be a far less satisfactory source of dates than either Lekson or we had anticipated.

Finally, the change in beam locations revealed by the distribution of replicate samples throughout the site provide clues to the

relocation of logs washed out in the flood. The data in Table V:2 show that many of the displaced logs in fact came originally from and now repose in flood-damaged rooms. However, repairs in connection with the flood do not account for the beam relocations evident in Rooms 1, 4, 8, 9, and 27 and in Kiva N, none of which were damaged in the flood. These distributions probably result from Hewett's activities, from post-1950 Park Service efforts to retard the inevitable deterioration of Chetro Ketl, or from both.

The problems outlined in the foregoing discussions have serious implications for a dendrochronological study of Chetro Ketl. Perhaps the most discouraging aspect of the extant situation is the impossibility of verifying or improving the provenience control on most of the previously dated samples. By and large the timbers that produced these samples are no longer present at the site. The second major deficiency of the current situation is that there is no assurance that apparent in situ timbers actually are in the locations in which they were left by the inhabitants at Chetro Ketl. As a result of this, it often is impossible to determine whether a given log is in its original location or whether it has been moved since 1920. These formidable difficulties can be overcome, if at all, only through the meticulous analysis of the dates within the context of the individual rooms from which they come.

Chronological Analyses

One hundred forty-five tree-ring dates were derived from the 220 wood samples collected in May 1979. Elimination of the 39 replicate samples in this group reduced the number of new individual dates to 106 and brings the total number of tree-ring dates from Chetro Ketl to 591. Our analyses of old and new material and data produced at least minimal provenience information for 575 of the 591 dates sampled. This leaves a residue of 16 dated samples of unknown, questionable, or irrelevant provenience.

The 591 tree-ring dates from Chetro Ketl are listed in Appendix B. Because we are interested in dating construction events in the history of Chetro Ketl, Appendix B includes only dates from the ruin itself. Dates from the trash mound are irrelevant to our purpose and are excluded. The dates are listed in ascending order within the most precise provenience categories available. Basically, this means they are segregated by rooms with intramural provenience specified when possible. Additional data on each sample include Tree-Ring Laboratory catalog number, field designation when informative, species, the nature of the terminal ring (complete or incomplete), and other information pertinent to the evaluation of the date.

The dendrochronological dating of an archaeological site can be approached in several different ways depending on the problem focus of the research and on various site specific factors. The special nature of the Chetro Ketl dating problem and the unusual site circumstances

dictate an especially rigorous approach to the analysis of the tree-ring dates. Such an analysis involves the careful consideration of all available provenience data (old and new), of the relationships of the dated timbers to one another and to other features with which they are associated, of the physical attributes of the logs themselves, and of the distributions of the dates. This kind of approach is best conducted within the context of the smallest meaningful provenience unit available, in this case the individual room. Therefore, we turn our attention first to a room-by-room assessment of the dates.

Analysis of tree-ring dates as a group independent of intrasite provenience often produces useful information that supplements the data resulting from room-by-room analyses. The temporal distribution of dates from a site indicates something of the timing and nature of tree cutting activities as opposed to the construction events that are dated by the room analyses. Similarities and differences between the timing of tree felling and room construction reveal practices such as the stockpiling of timbers, the repair of structures, the reuse of material salvaged from older structures, the use of dead wood, and others. Knowledge of such practices enhances the archaeologist's ability to evaluate the dates from individual provenience units. The overall distribution of dates provides one convenient way of comparing the chronological structure of a site with the temporal structures of other sites. Chetro Ketl is especially suited to this kind of analysis because of the large number of dates and the many poorly provenienced dates. A site level consideration of the dates follows the room-by-room analyses.

Room Dating

Lekson (Chapter IV, Figures IV:2 and 3) divides Chetro Ketl into two discrete units, the North Block and the East Wing, whose relationships to one another are obscured at the northeast corner of the site. Each of these large units is segmented into several smaller units consisting of groups of contiguous rooms that are thought to represent sequent construction episodes. The internal temporal sequences are inferred on the basis of attributes of the site plan, wall abutments, room additions, and information abstracted from original excavation and stabilization records. Letters designate the subunits, A through H for the North Block and A through D for the East Wing. Lekson's building stages provide a convenient framework for the analysis of the tree-ring dates because the stages are based on evidence that is independent of the tree-ring dates. Because of this independence, the tree-ring dates can be expected to contribute to the resolution of three chronological problems. First, they should allow the objective testing of Lekson's sequences by providing ranges of dates for at least some of the building stages. Second, the dates may specify dated construction sequences within the building stages, perhaps especially in regard to different floor levels in individual rooms. Finally, the lack of an observable physical connection between

the North Block and the East Wing leaves tree-ring dating as the only means of relating the construction episodes in the two main units to one another.

North Block A

The oldest construction events connected with the North Block were revealed by four scattered tests beneath the lowest floor level, which are directly related to the walls that define the present configuration of Chetro Ketl. Although the four exposures are too few and too widely spaced to give an accurate picture of these subfloor features, the evidence available led Lekson to infer that "a buried single story underlies much and perhaps all of North Block B." This imperfectly glimpsed unit (or units) is considered to represent the earliest construction associated with that part of Chetro Ketl and is therefore designated North Block A.

Forty-five years previously Hawley (1934:77) proposed an early construction period, lasting from 945 to 1030, that was not represented by architectural features excavated up to that time. Similarly, Bannister (1959:96-7, 1965:148-49) postulated "the earlier existence of a structure (or structures) which was built intermittently from the 990's through 1029...[and] was probably razed around 1038 or 1039...." Bannister was unaware of evidence for subfloor construction, and his inferences of earlier construction events were based solely on tree-ring dates from rooms that postdated 1038. In 1964, excavations beneath the first-story level in the western third of Room 92 (Voll 1978) revealed that the walls of this chamber rest on the walls of a lower structure. The facts that the walls of the upper structure are not exactly aligned with those of the lower unit and that the lower unit was purposely filled, indicate that the upper and lower structures are independent entities. Voll's work confirmed the existence of Bannister's hypothesized early structure, but, unfortunately, produced no tree-ring dates that could be used to test Hawley's and Bannister's postulated dating of the earlier construction.

Some years later the forces of nature intervened to provide a possible remedy for this situation. Erosion of the face of Voll's subfloor test pit in Room 92 exposed a horizontal log oriented north-south across the width of the room. Both ends of this timber are obscured by fill, and we do not know if the log is socketed in the walls. Nevertheless, it undoubtedly is a roof beam associated with the subfloor room, a companion to the rotted beam stub found socketed in the south wall by Voll (1978:142). As the only usable piece of wood directly associated with the early structure underlying Chetro Ketl, the newly exposed timber is of enormous potential importance for testing Bannister's inferential dating of the early unit.

The subfloor roof beam in Room 92, CK-1274, has several interesting characteristics. Species alone sets it apart from the other beams from Chetro Ketl. With one possible exception, it is the only juniper

roofing timber yet collected from Chetro Ketl. The possible exception is CK-834, which was washed out of Room 58 in the 1947 flood and which probably is an intramural log rather than a roof beam. On the basis of CK-834's cutting date at 1026, this timber would be interpreted by Bannister as a log salvaged from the razed early unit and reused in the new structure after 1038. The existence of these two beams hints at an early use of juniper that was not continued by the builders of Chetro Ketl. It seems possible that additional juniper logs may have been left in the older structure when it was razed, but only more excavation will confirm or refute this possibility. Unfortunately, the condition of the CK-1274 log in Room 92 does not allow an unambiguous test of Bannister's inferential dating of the lower structure. Rot and weathering have destroyed the sapwood; therefore, the date of 963 is not a cutting date. Experience suggests that the missing sapwood could have contained 50 to 150 rings, but the actual number cannot be accurately estimated. Because we cannot determine the number of sapwood rings removed from this log, the date contributes little to the temporal placement of the subfloor unit, although it does not refute Bannister's postulated dating. The very existence of the beam does, however, suggest that in situ wood suitable for dating the early structure may yet be unearthed.

Kiva G-5

Later in this chapter we develop the possibility that Kiva G-5, which is buried beneath the Kiva G Complex and which is assigned to North Block B by Lekson, actually originated around 1029 as a component of North Block A. If true, Kiva G-5 is the only North Block A structure to be directly dated by dendrochronology.

North Block A, Summary

As Hawley and Bannister discovered, nearly all the dates relevant to North Block A construction were derived from logs from later contexts, primarily North Blocks B and C. Most such dates represent intramural-aperture elements recovered from North Block B where they form three principal clusters: 1020-1021, 1026, and 1028-1030. Only one pre-1030 cluster occurs in North Block C: 1008-1010. These clusters indicate at least four possible construction episodes in the history of North Block A, but of course it is impossible to locate these episodes within the site. The distribution of dates within North Blocks B and C suggests that the supply of timbers salvaged from North Block A was nearly exhausted during North Block B construction and that an early component of North Block A (built around 1010) may have escaped demolition until North Block C was begun. This distribution, however, may be somewhat misleading in that many of the reused North

Block A timbers come from the upper stories of North Blocks B and C, which were built more or less synchronously after 1050.

North Block B

The second recognizable unit in the North Block now consists of two rows of rooms, extending from Rooms 39 and 41 on the east to Rooms 91 and 103 on the west, that lie inside the back row of rooms. These chambers, identified by Hawley (1934:23) as the oldest unit visible in Chetro Ketl, were fronted on the south by one or two rows of single-story rooms adjoining a plaza that contained at least two large kivas (Chapter IV). No tree-ring dates can be attributed to the southern row(s) of rooms, which now lie buried beneath the rooms and kivas of North Blocks E and F; therefore, our chronological analyses are restricted almost entirely to the two rows of rooms that Hawley (1934: 22-23) assigned to her second building period.

Rooms 39 and 39A. Hawley's (1934:Plate X) floor plan of Chetro Ketl depicts the space occupied by Rooms 39 and 39A as a single large chamber. Lekson and McKenna (Chapter II) indicate that this chamber was divided into the two units designated 39 and 39A only on the first-story level, and that the second story was unpartitioned as shown on Hawley's map. Room 39 possesses one of the few complete roofs now accessible in Chetro Ketl. A single east-west primary beam spans the middle of the room and supports the unsocketed ends of 36 secondary beams, 18 in the northern half of the ceiling and 18 in the southern half. Split wood shakes comprise the closing material atop the secondaries. After being heavily damaged in the 1947 flood, the northern half of the ceiling was rebuilt, primarily with material originally associated with the room (Chapter II; Vivian 1948:35). Presumably as a result of immersion in the flood waters, the secondary beams and closing material in the north half of the ceiling are less smoke blackened than are the elements in the south half. Two north half secondaries (Beams 27 and 28) have metal ax and saw marks diagnostic of recent modification. Lack of smoke blackening betrays four other north half secondaries (Beams 21, 23, 24, and 25) as recent additions to the room. The rest of the beams appear to be authentic, although those in the north half undoubtedly were rearranged when the ceiling was rebuilt in 1948. A primary sized beam stub in the wall between Rooms 39 and 39A may be a remnant of the roof of the latter chamber.

Hawley and her colleagues collected four samples of potential relevance to Room 39 and 39A. CK-336, which she attributes to the second floor of Room 39, is duplicated by our sample 131 from the first-story primary beam in Room 39. CK-337, which she attributes to the second floor of Room 40, is matched by our sample 161 (CK-1252) from a first-story primary sized beam stub in the wall between Rooms 39 and 39A. A photograph taken before repair of the flood damage (Vivian 1948:35)

shows what appears to be the same log in the same position in the same wall. These sample identities establish the equivalence of Hawley's second floor and our first story. CK-174, which is attributed to Room 40 by Hawley, is now assigned to the undivided second-story chamber above Rooms 39 and 39A on the basis of the correspondence between Stallings' Room 15 and the present Room 39A (Table V:3) and of Stallings' (1930) and Hawley's (1934:Protocol 1) assignments of the sample to the third floor.

In addition to sampling the primary beam and the beam stub in the wall between Rooms 39 and Room 39A, we cored 28 of the 36 secondary beams in the intact first-story ceiling of Room 39. Seventeen of the 18 southern secondaries were sampled. Only 11 of the northern secondaries were cored because of the alterations to this half of the ceiling resulting from the repair of the 1947 flood damage. One obviously foreign beam (Beam 28) and three possibly introduced timbers (Beams 22, 23 and 24) were cored to determine if the status of these elements as "ringers" was reflected in the dating. We also sampled wooden elements in three of six apertures associated with Rooms 39 and 39A. Four of 11 lintels over a high, open doorway in the south wall of Room 39 were sampled. The other lintels in this door were disregarded because of small size (three logs), excessive decay (one), and unsuitable species (three Populus). Lintels over a low, blocked doorway in the same wall are inaccessible and were not cored. A sill log and three of six visible lintels in a blocked doorway in the east wall of Room 39 were cored. Nearly all the lintels associated with entries in the west and north walls of Room 39 and with a corner doorway between Rooms 39 and 41 are identified by stabilization records (Chapter III) and "flood tags" as recent replacements of no relevance to the dating of these apertures. Only two of these lintels were sampled, both in the doorway connecting Rooms 39 and 41.

Dates from the primary beam and 20 secondary beams in the first-story ceiling form a tight cluster at 1050-1052. An earlier date of 1039 (Beam 24) and a later date of 1088 (Beam 28) come from north half secondaries recognized in the field as recent repair timbers. These undoubtedly are logs rescued from the 1947 flood waters. Another early date (1044+) from a north half secondary (Beam 37) could reflect either Park Service repair or the prehistoric use of a salvaged or stockpiled log. Early dates of 1034 (Beam 11) and 1047+ (Beam 7) from south half secondaries undoubtedly represent reused or stockpiled timbers because this part of the roof seems not to have been modified in modern times. Given the distribution of the dates, the conclusion that the first-story ceiling of Room 39 was built in 1052 or not long thereafter is inescapable.

Other first-story dates from Rooms 39 and 39A require some elaboration of this conclusion. Given the preponderance of dates in the 1050s, the noncutting date of 1038 (CK-337, 1252) from the beam remnant in the Room 39/Room 39A dividing wall probably represents a stockpiled timber or a reused beam salvaged from an older version of Room 39-39A or from some other chamber. The 1045 date (CK-1253) from the sill of the blocked doorway in the east wall could signify that the first story

of a large chamber built in 1045 (Room 39-39A) was divided into two rooms in or after 1052. Alternatively, the sill could be a reused or stockpiled timber incorporated into a room built around 1052. If the sill was added when the door was blocked rather than when it was built, the date places a lower limit of 1045 on the blocking of the aperture. The date of 1054 (CK-1141) from the south doorway that opens into Room 38 gives rise to three possibilities. First, Rooms 39 and 39A could have been erected in or after 1054 with the first-story ceiling of Room 39 built mostly of stockpiled timbers cut in 1050-1052. Second, the south doorway could be a late addition to the room associated perhaps with the construction of a second story around 1054 or with construction in the adjacent Room 38. Third, this lintel could be an undetected modern repair element whose date is irrelevant to the construction of the doorway. This possibility seems unlikely because the dated lintel is situated in the middle of the row of lintels and because the doorway appears not to have been stabilized. Two noncutting dates, one of 1046 (CK-1152) from a flood tagged lintel over the north doorway and one of 1060 (CK-1107) from a plank found in the room after the flood, are not relevant to the dating of this room.

As indicated by the date of CK-174, the single chamber that formed a second story over Rooms 39 and 39A probably was built in 1054 or later. This placement coincides with the probable date of the high first-story doorway that gives access to Room 38, which is a late addition to the front of Room 39 (Chapter II). The contemporaneous dating of this doorway and the second story could mean either that both stories and the doorway were constructed in or after 1054, or that the second story and the doorway were added a couple of years after the approximate 1052 construction of the first-story ceiling.

Despite an abundance of well controlled dates, Rooms 39 and 39A cannot be unambiguously dated. Four possibilities are supported by the available evidence. First, initial construction occurred around 1038 with the erection of a large chamber encompassing what now are Rooms 39 and 39A. If the first-story east doorway in Room 39 was an original component of the room, it was blocked in 1045 or later. On the other hand, if it was a late addition, it would have been built no earlier than 1045. Subsequently, in 1052 or later, the first story of the chamber was divided into two smaller rooms, Rooms 39 and 39A, and Room 39 was completely reroofed. One beam may have been salvaged from the original Room 39-39A and implanted in the Room 39/Room 39A dividing wall at this time. In or after 1054, a second-floor chamber and a first-story doorway in the south wall of Room 39 were added. Probably the closing of the lower doorway in the south wall and the addition of the upper entry coincided with one another and were connected with the construction of Room 38 over the partially razed walls of North Block B chambers south of Rooms 39 and 39A. Second, Rooms 39 and 39A were constructed around 1045, partitioned in 1052, and modified by the addition of the north doorway and a second story in or after 1054. Third, Rooms 39 and 39A were separate units from the beginning with the first story built and roofed around 1052 and with the second story and high south doorway added in 1054 or later. Fourth, both stories were erected together in or after 1054 with the first-story ceiling of Room 39 built

entirely of reused or stockpiled timbers, most of which had been cut in 1050-1052. Based on the general dating of North Block B, which is discussed later, we believe the extant Room 39 ceiling to be a replacement for an earlier roof that covered a single Room 39-39A, and that the first dating option outlined above specifies the true situation. Thus, for reasons developed more fully in the discussion of the general North Block B chronology, we think it probable that Room 39-39A was built around 1040 and that all the first-floor dates from Room 39 apply to remodelling events.

Our inferential dating of Rooms 39 and 39A (the first dating option) is similar to Hawley's (1934:24, Table 1) placement of Room 39. She assigns a date of 1038 to the second floor, which probably is equivalent to our first story. Although the reasons for this determination are not obvious, it probably is based on her dating of nearby chambers such as Rooms 40 and 42. Hawley gives a date of 1051 for the third floor, probably on the basis of the date of CK-336, which is listed in Protocol 1 as coming from the second floor and which actually comes from the primary beam that supports the first-story ceiling. Since the available evidence indicates that this beam has always been in this location, its date must apply to the extant first-story ceiling and not to a second or third story.

Room 40. Confusion reigns as to the true proveniences of the samples attributed to this chamber by Hawley (1934:Protocol 1). Two of these, CK-174 and CK-337, are now assigned to Rooms 39 and 39A for reasons outlined above. Two others, CK-33 and CK-34, belong to a series of four consecutively numbered specimens, CK-31 through CK-34, that are given no room provenience by Stallings (1930), but which obviously came from the same place. Two of these samples, CK-32 and CK-34 (Table V:4), bear tags ascribing them to "Room 14" (CK-31 is missing from the collection and CK-33's tag has been lost). Room 14 appears on Stallings' sketch map (Figure V:1) as a back row chamber isolated from the rest of the sampled rooms. Despite the distance separating this room from Room 40, we are inclined to break our rule giving precedence to tag information and to accept Hawley's ascription of these samples to Room 40. Our decision is based on several considerations that, while individually unimpressive, are fairly compelling in the aggregate. The equivalence of Stallings' Room 15 and the present Room 39A (Table V:3) raised the possibility of the number 14 being assigned to an adjacent chamber in ignorance of the use of the number for another room. The possibility of inadvertent room number duplication is strengthened by the information both on the tags and in the field catalog that Hawley collected these samples, which subsequently were cataloged by Stallings. Stallings' provenience ascription for CK-67, "room 4 (beside room 15)," suggests that Hawley might have used the number 14 for a chamber adjacent to Stallings' Room 15 (Room 39A). The number 14 on the tag might subsequently have been mistakenly transcribed as a "4" when Stallings compiled the catalog. Our final reason for assigning these samples to Room 40 is totally circular but does support the other evidence for this decision. The dates from CK-33 and CK-34 are consistent with the dating of North Block B but not with that of North Block

C, of which Stallings' Room 14 is a part. CK-67 is assigned to Room 40 on the basis of the equivalence between Stallings' Room 15 and Room 39A and of Hawley's ascription of the sample to Room 40, the chamber adjacent to the west side of Room 39A.

Floor level ascription of the Room 40 samples also is plagued with discrepancies. Stallings (1930) assigns CK-31 through CK-34 to the second floor, while Hawley (1934:Protocol 1) attributes them to the third floor. Stallings gives no floor provenience for CK-67, a sample Hawley assigns to the third floor. Given the current absence of wood from Room 40, these ascriptions cannot be checked. A row of first-story secondary beam sockets in the south wall (Chapter III) specifies a possible source for the secondary sized beams, CK-31 through CK-34. If the room walls, which currently do not attain second-story ceiling height, were no higher in the 1930s, there is no apparent source of in situ second- and third-story timbers, although logs assigned to these levels could have come from the upper fill of the room. In light of the available evidence and of the floor level inflation characteristic of the Chetro Ketl records, it seems reasonable to suppose that those samples assigned to the second floor by Stallings (CK-31 though CK-34) and Hawley (CK-335) actually belong to the first story. CK-67, which Hawley ascribes to the third floor, may belong to the second story.

Precise dating of Room 40 is inhibited by the provenience problems enumerated above. However, if our provenience assignments are correct, it seems likely that the first-story ceiling was built shortly after 1037 and repaired or remodelled in or after 1051. Modification of the first-story ceiling probably was a prelude to the addition of a second story in 1053 or later. At the very least, the dates indicate activity in the 1050s that coincided fairly closely with the replacement of the first-story ceiling in Room 39 and the construction of a second story over Rooms 39 and 39A next door. This dating of Room 40 is consistent with Hawley's (1934:23, Table 1) building date of 1038 for the second floor, which probably is our first story. Hawley's (1934:24, Table 1) date of 1054 for the third floor apparently is based on the date of CK-174, a sample we believe to belong to Rooms 39 and 39A.

Room 41. This room was badly damaged in the flood and almost entirely reconstructed in 1947 and 1948. As a result, none of the associated wood is original. A large beam socketed in the east wall was cored and found to be CK-159, which came originally from Room 42 (Hawley 1934:Protocol 1) and which undoubtedly was placed in Room 41 after the flood. Lintels in the doorways connecting Room 41 with Rooms 39, 39A, and 42 bear "flood tags" and are not in their original locations. Even so, two lintels in the 39/41 doorway and two in the 41/42 entrance were cored. The former pair produced one irrelevant noncutting date, and the other lintel samples had too few rings to be datable. Intramural logs embedded in the north wall are inaccessible and in any case probably were placed there in the aftermath of the flood. Neither the field catalog (Stallings 1930) nor Hawley (1934) list samples from Room 41, and this chamber remains undated.

Room 42. Room 42 is another chamber that was heavily damaged in the flood and rebuilt. It is unlikely that any of the wood now there--a large beam stub in the east wall and lintels in a doorway in the east wall and a ventilator in the north wall--actually belongs to this room. Most of the lintels are either too small to core or have "flood tags." The two doorway lintels that were sampled (CK-1154, 1155) produced no dates. A core taken from the beam stub proved to be a duplicate of Hawley's (1934:Protocol 1) CK-144, which she assigned to Room 48.

Given the current absence of original wood in Room 42, we must fall back on the three roof beams attributed to this chamber by earlier workers. Stallings (1930) assigns all these samples to the second floor (probably our first story), while Hawley (1934:Protocol 1) assigns two of them (CK-159 and CK-166) to the second floor and one (CK-143) to the third. Three dates with conflicting provenience ascriptions provide a poor basis for dating the room. The first-story ceiling probably dates to around 1039 but could postdate 1066 if Stallings' provenience assignments are correct. More probably, the date from CK-143 relates to repair of the first-story roof nearly 30 years after it was built. If Hawley's assignment of CK-143 to the third (second?) floor is correct, the first story could date around 1039 and the second story around 1066, or the 1066 date could represent a second-story repair event. Without additional comparative dates these conflicting possibilities cannot be resolved. Hawley gives building dates of 1040 for her second floor (our first story) (Hawley 1934:23, Table 1) and 1070 for her third floor (our second story) (Hawley 1934:24, Table 1).

Room 43A. A room number transposition confuses the provenience situation in regard to Room 43A. Rooms 43 and 43A on Hawley's (1934: Plate X) site plan are equivalent respectively to Rooms 43A and 43 on Figure I:2; consequently, samples assigned by Hawley (1934:Protocol 1) to Room 43 really belong to the chamber now designated 43A. This fairly simple number transposition is complicated by discrepancies between room proveniences for CK-38, 39, and 41 given on the specimen tags by Stallings and Hawley (Table V:4). It looks as if Stallings mistook the number 17 on the tags, which were filled out by Hawley, for 19 and that Hawley subsequently followed Stallings' catalog ascriptions in assigning these samples to Room 43A, the equivalent of Stallings' Room 19 (Table V:3). Although CK-40 has lost its tag, its position within the CK-38 through 41 sequence coupled with Hawley's placement of it along with the others in Room 43A suggests that it should share the doubtful status of the other three. Lacking any objective means of resolving these provenience conflicts, we invoke our rule giving precedence to the tag information and, with some trepidation, assign CK-38 through 41 to Room 44, the equivalent of Stallings' Room 17 (Table V:3). This unsatisfying resolution of the provenience problem leaves only seven Hawley samples for Room 43A. Nine logs exposed by the 1947 flood are ascribed to this chamber (Bannister 1965:143-145, Table VIII-E), but no intraroom provenience data on them exist. Our sample 58 (CK-1160) from a beam in Room 45 is a duplicate of CK-99 from

Room 43A. Undoubtedly, this log was implanted in Room 45 after the flood had dislodged it from Room 43A. The total absence of wood in Room 43A today precludes any resolution of the floor level discrepancies between Stallings' catalog and Hawley's Protocol 1.

Provenience problems complicate the assessment of the dates now attributed to Room 43A. If Stallings' floor ascriptions are accepted and if his second floor is equated with the present first story, the first-story roof probably was built shortly after 1037, which is consistent with the proposed dating of equivalent ceilings in Rooms 39-39A and 42. If CK-38 and CK-40 really belong to this room, their dates could specify remodelling or replacement of the first-story ceiling in the early 1050s. Hawley's assignment of CK-42 to her third floor suggests that second-story construction followed in 1059 or later. This dating is similar to Hawley's (1934:23, 24, Table I) building dates of 1037 and 1057 for, respectively, the second and third floors, which probably correspond to our first and second stories. Alternatively, all stories of this room could have been erected at the same time in 1059 or later. Although the latter possibility cannot be absolutely ruled out, parsimony and the original field provenience data favor the first alternative; that is, first-story construction around 1038 with upper floors added in or after 1059.

Nine dates from 12 intramural logs associated with Room 43A form weak clusters at 1029, 1037+-1039, and 1042-1045. In the absence of better provenience control, it is impossible to determine why Hawley's intramural log dates cluster differently from those of the flood logs. It is tempting to infer that the different clusters represent different levels within the walls. However, as is the case throughout Chetro Ketl, most of these intramural elements probably are reused or stockpiled timbers whose dates do not relate directly to the construction events with which they are associated. Given the usual correspondence between Hawley's second floor and our first story, CK-146 and CK-147 could represent logs salvaged from razed portions of North Block A and reused in the first-story walls of Room 43A. The 1037+-1039 cluster could represent freshly cut logs used in the first story around 1039 or timbers cut for first-story North Block B construction that were incorporated into the upper stories in or after 1059. The 1042-1045 cluster probably is composed of elements cut for use in the first story of North Block C that were used in the upper-story walls of Room 43A in the later 1050s or early 1060s. None of these inferences are supported by hard provenience data, and they remain highly speculative. We can say for certain, however, that some wall construction in Room 43A occurred in 1045 or later.

Room 47 (47-52). Like other rooms in this section of Chetro Ketl, Room 47 was badly damaged in the 1947 flood. Photos taken before the flood (Vivian and Lancaster 1947) depict a room that bears little resemblance to the room of today. It is obvious from these pictures that postflood reconstruction considerably altered the room and introduced many spurious wood elements into it. Hawley collected two samples from Room 47, which are assigned to the second story in Stallings' (1930) field catalog and to the third story by Hawley (1934:Protocol 1).

Given the relationships in other rooms among Stallings' and Hawley's floor ascriptions and the current situation, it is probable that these logs come from what is now recognized as the first story. Wall collapse in 1947 exposed 24 logs, presumably intramural timbers, of which 20 yielded dates (Bannister 1965:Table VIII-E). At present, Room 47 contains two primary sized beam stubs in the north wall, the easternmost of which passes through the wall and projects into Room 53. Both of these logs were placed in the wall as part of the flood repair work. The western "primary" is too weathered and rotten to be cored; the eastern one was cored on the Room 53 side of the wall. Lintels in first- and second-story doorways, ventilators and niches were not sampled because of small size, unsuitable species, or decay. In any event, most of these elements are the result of recent stabilization activity (Chapter III) and would contribute nothing to the dating of the room.

Application of the dates to this room is problematical at best. The date from the "primary beam" in the north wall is irrelevant because the log was placed there after 1947. If Hawley's samples are assigned to the first floor, their dates, along with that of the questionable lintel over the north wall vent, suggest that first-story construction occurred around 1039. On the other hand, the even distribution of flood log dates, which, excepting a date of 1000+, range fairly continuously from 1026 to 1051, is consistent with the idea that all stories of Room 47 were built in a single operation in or after 1051 and that the earlier intramural and roof timbers represent reused or stockpiled elements. Weak flood log date clusters at 1026, 1028-1030, 1036+-1040, 1043-1044 and 1051 may relate to successive wall construction episodes; however, this possibility cannot be evaluated in the absence of story proveniences for the samples. In view of the dating of other North Block B rooms, we think it probable that the first story of Room 47 was built around 1039 with upper stories added in the early 1050s. If this is correct, the intramural log date clusters at 1026 and 1028-1030 would represent reused material salvaged from North Block A, the 1036+-1040 cluster would represent either freshly cut material or stockpiled elements depending on whether these timbers came from the first or upper stories, the 1043-1044 cluster would probably reflect the use in the upper stories of material cut for the first-story construction in North Block C, and the 1051 cluster would represent freshly cut wood used in the upper stories in the early 1050s. Whichever dating alternative is correct, it is certain that some wall construction occurred somewhere in Room 47 in 1051 or later.

Hawley's reasons for assigning building dates of 1054 to the second (our first) story (Hawley 1934:23, Table I) and 1060 to the third (second) story (Hawley 1934:24, Table I) of Room 47 are obscure. She lists only two tree-ring dates from this chamber, one each at 1037 and 1038, and attributes them to the third floor (Hawley 1934:Protocol 1). Both dates are identified in (Hawley's) Table I as representing reused beams, probably because she thought that "third floor" beams should not date that early. The source of the 1054 and 1060 dates is

unknown; they may be based on analogy with building dates assigned to nearby rooms.

Rooms 47-52 and 48. Three samples (CK-340, CK-344, and CK-346) bear tags ascribing them to "Rooms 237-238." We take this to indicate that these samples come from intramural elements in the wall between Rooms 47-52 and 48, the modern equivalents of Rooms 237 and 238 (Table V:3). CK-341, a duplicate of CK-346 is assigned by Hawley (1934: Protocol 1) to "Room 48, 50." On the basis of the identity between CK-341 and CK-346 and of our rule giving precedence to field tag information, we assign these samples to Rooms 47-52 and 48 rather than Rooms 48/50. Three unattributed samples that fall within the numerical sequence range of the provenienced samples are tentatively assigned to Rooms 47-52 and 48. CK-342 is missing from the collection; CK-343 and CK-345 are without tags. These provenience clarifications are fairly futile, however, because none of these samples date. Hawley's (1934: Protocol 1) date of 1054 for CK-341 was rejected during our reanalysis of the Chetro Ketl collection.

Room 48. Hawley and her colleagues sampled 21 timbers in this room. Four of these are identified in the field catalog as probable roof beams found in first-story fill. Hawley (1934:Protocol 1) dated two of these logs, assigning one of them (CK-160) to the second floor and giving no floor provenience for the other (CK-164). All four probably are discarded beams thrown into the first-story chamber. Stallings ascribes all other samples to the second-floor roof, which probably is equivalent to our first-story ceiling. Hawley repeats these assignments except for CK-73, which she attributes to the third floor. The provenience problem connected with CK-73 is compounded by Hawley's (1934) Plate IX.8, which is captioned "Large beam dated 1060 A.D., room 48...." If this caption is correct, the beam must be CK-73, which is the only log assigned to Room 48 that gave a date approximating 1060 (1059 in Hawley 1934:Protocol 1; 1061 in Appendix B). The photograph shows a large beam set at ceiling height above a room-wide platform and a doorway identical to the platform and aperture now situated in the first story of Room 48 rather than the third floor to which CK-73 is attributed. Several explanations for this discrepancy can be advanced. First, the caption may erroneously identify the log shown as the one that produced the 1060 date. Second, the log may be correctly identified in the caption and mistakenly assigned a third-floor provenience in Protocol 1. Assignment of the beam in the photo to the first story, which is required by both the first and second explanations, is inconsistent with Stallings' characterization of Room 48, in which all first-floor beams are portrayed as being loose in the fill. A first-story assignment, however, is congruent with the probable correspondence between Stallings' second floor, to which he attributes CK-73, and our first story. Third, the beam may be correctly identified, and it and the features pictured with it are situated in the first story. This would mean that identical doorways and platforms existed in both the first and third stories of this chamber or that in the course of 1947 flood repairs, similar features were placed in the

first story using Hawley's photograph as a model. Because the features in Plate IX.8 appear to be identical to those present today and because the apparent height of standing wall indicates the existence of at least one story above the roof beam, we think it probable that the photograph depicts original first-story features and that CK-73 should be assigned to the first story. However, the possibility that the picture portrays a second- or third-floor room consistent with Hawley's assignment of CK-73 cannot be absolutely ruled out. Whatever the true situation, a pall of doubt is cast over the provenience of CK-73 and over the authenticity of the doorway and room-wide platform. Two of the other beams attributed to Room 48 by Stallings and Hawley are now located in other chambers. CK-144 is in Room 42 and CK-84 is in Kiva N, both obviously moved in connection with recent stabilization activities.

Although Room 48 is in the area of maximum flood damage, only four logs exposed by this event are attributable to this chamber. Only two of these timbers dated (Bannister 1965:143-145, Table VIII-E). After the flood, Room 48 was almost totally rebuilt. Lintels associated with ventilators in the north and south walls are modern additions (Chapter III) and were not sampled in 1979. Although the north wall doorway and the room-wide platform across the end of the room appear to be identical to those pictured by Hawley (1934:Plate IX.8), they too could be recent stabilization features. Despite their questionable relevance, three of the doorway lintels were cored, the other four being inaccessible. Although it is not clear whether the platform is an original feature or a modern addition, we sampled three of its component logs, the fourth being too small to be dated.

Accurate dating of Room 48 is hampered by the provenience problems associated with CK-73, by floor assignment conflicts between the field catalog and Hawley's publication, by the implications of the photograph of Room 48 (Hawley 1934:Plate IX.8), and by uncertainties relating to flood repairs. The interpretive key is the provenience of CK-73, which could come from the first (Hawley 1934:Plate IX.8), second (field catalog), or third (Hawley 1934:Protocol 1) story. Let us first examine the dating possibilities when the photograph is considered to depict the true first-story situation and when the roof beam in the photo is considered to be correctly identified as CK-73. If CK-73 is a first-story primary, as is required by these assumptions, we could have first-story ceiling construction in 1061 or even later. This seems a bit late for this section of the pueblo, and CK-73 could be a repair timber. Given the possibility of ceiling repair, the dates from the doorway and platform loom large in any effort to estimate the first-story construction date, assuming that these features are original and not artifacts of stabilization. The doorway could be associated either with initial first-story construction of Room 48 or with the later addition of the contiguous Room 46 as part of North Block C construction. The lintel date of 1042 is more consistent with the latter event. Two dates of 1039+ from the platform suggest construction around 1040. Unless the doorway lintel and platform beams are reused beams, we have first-story construction around 1040, the addition of a

doorway in or after 1042, and repair or replacement of the roof in 1061 or later. What then of the loose logs in the first-story fill that are identified as probable roof beams? Three possibilities are suggested: (1) they represent original roof timbers that collapsed because they were older and weaker than the replacement beam CK-73; (2) they are original ceiling beams that were removed and discarded when the roof was rebuilt; (3) they are discards from events not related to the first story of Room 48. The noncutting dates from these logs are compatible with all these possibilities. The first hypothesis is the most probable, if only because it is the most parsimonious. It seems unlikely that old roof beams replaced by newer elements would be dumped into the room whose ceiling had just been rebuilt (alternative 2) unless the lower room was vacated and the repairs were designed to strengthen the floor of the second-story chamber above. Continuing under these assumptions and accepting Stallings' and Hawley's ascriptions of the other samples to the second floor, the strong date cluster at 1052-1054 would signify second-story ceiling construction in or after 1054 involving the reuse of some older beams cut in the late 1030s. There are no third-story dates given these assumptions; however, construction would have been no earlier than 1054.

If we accept the field catalog's ascription of CK-73 to the second story, the dating situation is changed. Given this and the further assumption that the first-story features are genuine, we have first-story construction around 1040 with the addition of a doorway in 1042 or later or room construction in or after 1042 involving the use of some timbers cut a few years earlier. With CK-73 and all the other samples assigned to the second story we have two dating possibilities for that level. Either the second-story ceiling was built in or after 1061 primarily of timbers cut several years earlier, or it was constructed around 1054 and repaired in 1061 or later. The available data allow no clearcut choice between these alternatives, although the distribution of the dates favors the latter. Once again, there are no dates for the third story, which in this case would postdate 1054 or 1061 depending on the construction date of the second story. Assigning CK-73 to the third story would involve the familiar dating of the first story to the early 1040s, the dating of the second floor to the middle 1050s, and the placement of third-story construction in 1061 or later. Finally, any assumptions allow the interpretation that all three floors of Room 48 were built at the same time in 1061 or sometime thereafter and that all the earlier dates represent reused or stockpiled material.

An entirely different set of possibilities is created if, as appears to be the case in other rooms at Chetro Ketl, the field catalog's second floor corresponds to our first story. In that event, first-story construction could have occurred in the middle 1050s or even in 1061 or later. If this were true, the doorway lintel and room-wide platform beams would be reused elements. This interpretation fails to account for the loose logs in the first-story fill. A better hypothesis might be that initial construction occurred in the early 1040s with major repair or total replacement of the ceiling in the middle 1050s or early 1060s, or with major repair in the 1050s and minor repair around 1061. Thus, the 1061 date would represent a first-story construction or repair event or a second-story construction event

depending on whether CK-73 is assigned to Stallings' second (our first) or Hawley's third (our second?) story.

Although the provenience muddle that characterizes the Room 48 wood collection precludes the unassailable dating of this chamber, we do favor one of the dating options presented above. Based on the dates from the rooms and on the dating of North Blocks B and C, we consider the following sequence of events to characterize the history of Room 48. Initial first-story construction occurred around 1040. This was followed in the late 1040s by the punching of a doorway through the north wall to provide access to the newly constructed Room 46 in North Block C. In the middle 1050s the first-story ceiling of Room 48 was substantially modified, probably in connection with the construction of a second-story chamber above it. Further alterations were made to the first-story ceiling in the early 1060s when four beams were removed, at least one of which was replaced by a timber cut in 1061. That the first story no longer was in use at this time is indicated by the fact that the displaced beams were dumped into the vacated first-story chamber. Probably the first-story ceiling was repaired to support the continued use of the second-story room, of which it formed the floor. This construction is not inconsistent with Hawley's building dates of 1053 for the second floor (Hawley 1934:23, Table I) and 1060 for the third floor (Hawley 1934:24, Table I), unless her second and third floors equate with our first and second stories, in which case our dating is considerably earlier than hers.

Room 49. Hawley collected only one sample from this room, and both she and the field catalog assign it to the second floor. In all probability, the beam represents the first-story ceiling. Five dates (Bannister 1965:Table VIII-E) come from nine logs washed out of the wall between Rooms 49 and 50 in 1947. In the absence of comparative dates, it is not possible to determine whether the roof beam was used when cut in 1039 or whether it is a reused or stockpiled element. The strong cluster at 1038-1039 formed by the roof beam and the intramural logs would be good evidence for a building date of 1039 were it not for the frequent reuse of wood dating to this time in intramural contexts elsewhere in Chetro Ketl. It is virtually certain, however, that the wall separating Rooms 49 and 50 was not erected before 1039. We can tentatively conclude that the first story of Room 49 was built in 1039, with the proviso that the possibility that it dates to a later time cannot be entirely ruled out. This dating is consistent with Hawley's (1934:23, Table I) second-floor (our first-story?) building date of 1038.

Room 50. The only dates associated with Room 50, those from logs washed out of the Room 49/50 wall, establish a minimum date of 1039 for the construction of that wall. However, in view of the possibility that these are reused timbers, the wall could have been built at any time after that. Hawley (1934:Table I) gives a building date of 1060 for the third floor (our second story?) probably on the basis of her

date of 1054 for CK-341, which was rejected during our reanalysis of the Chetro Ketl tree-ring collections.

Room 55. Seven samples are attributed to this room on Tree-Ring Laboratory specimen cards ostensibly filled out by Lassetter. On the cards two samples (CK-559 and CK-568) are assigned to the first story. Hawley (1934:Protocol 1) repeats this provenience for CK-559, which is now missing from the collection. Of the others, two are attributed to the second story and three to the third floor on the specimen cards. One of the third-story beams, CK-564, is a duplicate of our field sample 110 (CK-1208) from a log in Room 58. Obviously, this beam was moved from Room 55 to Room 58 in the aftermath of the 1947 flood. Another third-floor sample, CK-567, is a duplicate of CK-881, a flood log attributed to Room 58 by Gordon Vivian (Bannister 1965:143-145, Table VIII-E). Nine dates (Bannister 1965:Table VIII-E) come from 12 probable intramural logs washed out in 1947 and assigned to Room 55. Currently no wood exists in Room 55; consequently, we collected none there in 1979 to serve as checks on the proveniences of the previously collected material.

If Lassetter's floor level assignments are correct and if he was numbering the floors from bottom to top, some sense can be made of the dates. The noncutting date for the first story contributes little to the placement of that level. The second-story dates hint at construction around 1050 and repair 15 years later, or at construction around 1065 in which at least one older log was reused. As is discussed below, the dates from the intramural logs lend some support to the first alternative. Reuse probably accounts for the early dates from the third-story ceiling, which probably postdates 1050 and may postdate 1065. The lack of story provenience on the flood logs inhibits refined assessment of the dates derived from them. As is typical of intramural logs exposed by the flood, all but one of these yielded dates in the 1030s and 1040s. Most of these probably are reused or stockpiled elements, except for CK-896 whose 1104 date must apply to a repair event of some sort. Apart from dates derived from a couple of loose boards, this is the latest date from this section of Chetro Ketl. If we disregard the 1104 date, the latest intramural log date is 1049, which is only 1 year off the 1050 date from a second-story roof beam. This near coincidence in dating supports the idea of original second-story construction around 1050 and relegates CK-543 to the status of a repair timber.

Because Room 55 seems to lack some of the provenience contradictions characteristic of other rooms at Chetro Ketl, it superficially is easier to date. An initial first-story ceiling construction date in the late 1030s or the early 1040s, based on analogy with adjacent chambers, is not contradicted by the extant tree-ring date or by Hawley's (1934:Protocol 1) date for CK-559, a sample missing from our collection. On the other hand, neither is a date coeval with that of second-story construction, which is fairly securely dated to 1050 or a little later. The second-story ceiling probably was repaired in or around 1065. Third-story construction could have been no earlier than that of the second floor, although it could be substantially later than that.

Wall repair, or perhaps even third-story construction, occurred in 1104 or later. Our evaluation of the dates from Room 55 does not conflict with Hawley's (1934:Table 1) first-floor building date of 1030+, which is based on a date of 1020 from the now missing CK-559.

Room 56-57. Hawley collected only one sample from this room, and she (Hawley 1934:Protocol 1) attributes it to the third story. Since today the walls of this room do not extend even to second-story ceiling height, a third-story source for this sample is unlikely. It is probable, therefore, that Hawley's third floor equals our second story. Twenty dates were derived from 25 flood logs assigned to Room 56-57 (Bannister 1965:Table VIII-E). All these are attributed to a "Roof," but no indication is given as to what level this ceiling is related. The nature of the room today indicates that the roof would probably be a first-story feature, but this is far from certain. At any rate, it seems clear that the flood logs from Room 56-57, in contrast to those from other rooms, are ceiling beams rather than intramural elements. Very little wood is present in the room today. We sampled a "primary beam" stub in the south wall that probably is a modern addition and an intramural log in the east wall that may be an original feature. Lintels over a blocked doorway in the south wall were not cored because saw-cut ends betrayed them as stabilization elements not relevant to the dating of the room.

Assuming that the "roof" is a single first-story feature and that none of these timbers assigned to it come from any other contexts, a couple of dating possibilities are indicated by the clustering of dates. First, the strong cluster at 1036+-1040 could specify first-story ceiling construction around 1040 with subsequent repair around 1044, 1049, or both. The intramural log date of 1037 falls within the major cluster. Alternatively, the ceiling could have been built in or after 1049 with a large number of reused or stockpiled beams that had been cut between 1036 and 1040. The distribution of dates strongly favors the first alternative, and it seems likely that the 1044 and 1049 dates represent unrecognized intramural elements or first-story ceiling repairs that probably accompanied the construction of the second story. If CK-348 is correctly assigned to the second-story, ceiling construction on that level may have occurred in 1052 or later. Our placement of Room 56-57 is consistent with Hawley's (1934:24, Table I) building date of 1051 for the third floor (our second story).

Room 58. Hawley (1934:Protocol 1) lists only one sample (CK-353) from Room 58; however, five more specimens can be placed in this chamber on the basis of Lassetter's catalog card notations (Appendix B). A seventh sample, CK-544, is assigned to Room 58 on the basis of information in Lassetter (1934). Four of these samples are assigned to the second floor by Lassetter and/or Hawley, two are attributed to the third floor by Lassetter, and one, CK-544, has no floor ascription. The relationship between Lassetter's and Hawley's floor designations and the stories now recognized in Room 58 is unknown. Thirty-eight flood logs are attributed to Room 58, and 19 others are identified as

coming from the wall between Rooms 58 and 59. One of the Room 58 flood log samples (CK-881) duplicates CK-567 from Room 55. An unprovenienced flood log sample (CK-812) is identical to CK-566, one of the beams assigned to the third floor of Room 58 by Lassetter. The only wooden elements now in Room 58, two first-story primary beams, are absent from a postflood photograph of this chamber (Vivian 1948:116) and therefore must be recent replacements. Our sample 110 (CK-1208) from Beam 2 is a duplicate of CK-564 from Room 55. Our core from Beam 1 (CK-1207) does not replicate any earlier samples; therefore, the original location of this log cannot be ascertained.

Evaluation of the dates from Room 58 is hampered by provenience uncertainties. The date from Beam 1, a stabilization element, is irrelevant to the temporal placement of this chamber. Depending on whether Lassetter's and Hawley's second floor is correlated with our first or second story, the near cutting date of 1066+ could relate to construction or repair events connected with either the first or second story. Two "second-story" noncutting dates contribute nothing to the resolution of these possibilities. The "third-floor" samples probably represent reused or stockpiled timbers incorporated into an upper-story roof built no earlier than 1047 as indicated by the flood log dates. Without benefit of story level proveniences, the assessment of the dates from the Room 58 and Room 58/59 flood logs remains speculative. The scattered pre-1030 dates probably represent the reuse of wood salvaged from razed portions of North Block A. A weak cluster at 1033+-1034, which falls in the postulated hiatus between the last North Block A building episode around 1029 and the beginning of North Block B construction around 1039 (Hawley 1934:77; Bannister 1965:148-149), may reflect the use or reuse of timbers stockpiled in advance of initial North Block B construction. The strong cluster at 1037+-1039 undoubtedly represents the use in upper-story walls of timbers cut for first-story North Block B construction. The 1044+-1047 logs probably were cut for initial North Block C construction and were incorporated into the upper-story walls of Room 58 sometime after 1047. Although none of these inferences can be absolutely confirmed, we can be certain that some upper-story wall construction in Room 58 occurred in 1047 or later.

The most probable of several possible building sequences inferable for Room 58 is the following. As is characteristic of all dated North Block B rooms, initial first-story construction of Room 58 occurred around 1040. Higher stories were added later but not before 1047. It is probable that second-story construction occurred in the 1050s here as it did elsewhere in North Block B. Repair of the first- or second-story ceiling in or after 1066 is the latest datable building event in the history of Room 58. This reconstruction is consistent with Hawley's (1934:23, Table I) building date of 1040 for the second floor (our first story), which must be based on the date from CK-353. It must be remembered, however, that other hypotheses invoking large-scale use of salvaged and/or stockpiled elements cannot be categorically eliminated. Such hypotheses involve initial construction around 1047 or even 1066 for any or all stories in the room.

Room 61. Lassetter's specimen card notations assign two samples, CK-535 and CK-540, to Room 61. Unfortunately, two samples carry the former number, one designated 535 and the other 535x. Sample 535 (our CK-535-2) is a one-inch core definitely assigned to the second floor of Room 61 (Lassetter 1934). No provenience is given for 535x (our CK-535-1), a wood section, and we tentatively assign it to Room 61 solely on the basis of the number equivalence. In 1940 O'Bryan cored a beam in a room identified by Betancourt (1979) as Room 61. The 1947 flood displaced 35 logs from the wall between Rooms 60 and 61. At present Room 61 contains two first-story primary beams and lintels associated with three blocked doorways and a blocked ventilator in the first-story and one blocked doorway in the second-story. Photographs taken before and after the flood (Vivian 1948:18-19) show primaries in place. This evidence, coupled with sample duplications, establish that these beams are original features of the room. Our sample 97 (CK-1198) from Beam 1 replicates CK-536-1 and GP-2200, both of which are assigned to Room 61 on the basis of this identity. Sample 98 (CK-1199) from Beam 2 is identical to CK-535-2, an identity that establishes the equivalence of Lassetter's second-floor and our first-story, at least for Room 61. We also sampled the only accessible aperture element that was large enough and solid enough to be cored, a lintel over the eastern blocked first-story doorway in the south wall.

The significance of the comparatively few dates from Room 61 is enhanced by the superior provenience control associated with them. Considering the certain assignment of two 1038 dates to the first-story ceiling, we have good cause to date the construction of this feature to 1038 or shortly thereafter. This placement is reinforced by the 1035+ date from a probable first-story intramural log in the wall between Rooms 61 and 64. The only problem with this rosy reconstruction is the date of 1061 from a primary sized beam (CK-535-1) that also may come from the first story, although this is doubtful because there is no evidence for a third primary beam on this level. Furthermore, as noted above, this sample is only tenuously associated with Room 61. In the unlikely event that CK-535-1 represents a first-story beam of some kind, the date could indicate initial ceiling construction in or after 1061 with two reused primary beams or, more probably, initial construction around 1038 with repair 23 or more years later. Alternatively, this beam could come from an upper story of Room 61 and specify construction or repair above the first story in 1061 or later. Taken all together, the evidence strongly favors initial first-story construction around 1038 with subsequent additions or repairs in 1061 or later.

Twenty-three dates from the flood logs assigned to the Room 60/61 wall (Bannister 1965:143-145, Table VIII-E) exhibit the distribution characteristic of such elements. As is always the case with flood log samples, the lack of story level proveniences precludes anything other than a speculative assessment of the dates. The cluster at 1020-1021 undoubtedly reflects the reuse in a North Block B intramural context of timbers salvaged from demolished North Block A rooms. The 1036+-1041 cluster probably represents elements cut for initial North Block B construction that either were incorporated immediately into the first-story of this wall or were stockpiled and used in an upper-story wall

that probably was built after 1050. The large cluster at 1043-1047 probably is composed of wood cut for initial North Block C construction that was used after 1050 in the upper levels of the wall between Rooms 60 and 61. At the very least, the flood log dates put a lower limit of 1047 on the erection of upper levels of the Room 60/61 wall.

Room 62. At present, the north and south walls of Room 62 contain the weathered remnants of three first-story primary beams and empty sockets that held a fourth primary. Only one of the three extant timbers, Beam 4, is sufficiently well preserved to merit sampling. Unfortunately, a sawed end marks it as a probable modern addition. First-story lintels and a partially exposed intramural log are too rotten, too small, or of undatable species and were not sampled. The 1037+ date from Beam 4 falls within the range of other first-story dates from North Block B, but the questionable status of this timber casts doubt on the relevance of the date to prehistoric building events. Consequently, no date can be inferred for Room 62, although architectural evidence establishes its contemporaneity with nearby North Block B rooms.

Room 63. The only wood currently associated with Room 63 are large lintels over two second-story blocked doorways in the north wall. Despite sawed ends that indicate these lintels to be of recent origin, a core, which failed to date, was taken from the only accessible lintel in the western doorway. About all that can be said concerning Room 63 is that it probably is contemporaneous with nearby North Block B rooms.

Room 64. Provenience uncertainties beset all three samples assigned to this room by Hawley (1934:Protocol 1). CK-531 is duplicated by our sample 80 (CK-1182) from a second-story primary sized beam stub in the north wall of Room 65. This identity raises the possibility that a timber was transferred from Room 64 to Room 65 during stabilization activities or that Hawley mistakenly assigned a sample from Room 65 to 64. On purely impressionistic grounds, we are disposed to accept the authenticity of the prevailing Room 65 association. A note on the specimen card indicates that CK-533 carried a tag, now missing, attributing this sample to Room 60. CK-533 is duplicated by a Gila Pueblo sample (GP-2202), which clearly comes from an exterior room like Room 60 rather than from an interior chamber such as Room 64, and by our sample 101 from a beam in Room 60. These considerations lead us to invoke our rule giving precedence to tag information and to assign CK-533 to Room 60. CK-534-1, which bore a tag attributing it to Room 60 or Room 64, is assigned to the latter on the basis of its identity with our sample 112 from Beam 2 in Room 64. At present there are three first-story primary beams in Room 64, all of which were cored in 1979. As noted above, Beam 2 is Hawley's CK-534-1. Beam 1 had been cored previously, but we could identify no duplicate of our sample 111 (CK-1209) from this timber. The beam does not date, and the older core could have been discarded for that reason. Various lintels associated with Room 64 were not cored because of their small size, unsuitable species, excessive decay, inaccessibility, or obvious modern origin.

The dates remaining after these machinations place first-story construction in Room 64 around 1038, a date consistent with that of first-story construction in other North Block B rooms. If CK-531 really comes from this room, its date, which probably would apply to our third story, specifies upper level construction or repair in or after 1072. Our assessment of the Room 64 dates is consistent with Hawley's building dates of 1038 for the first floor (Hawley 1934:23, Table I) and 1072 for her fourth (probably our third) floor (Hawley 1934:Table II).

Room 68. An undated wood section (CK-580) is tentatively assigned to this room on the basis of a note on the Tree-Ring Laboratory catalog card.

Room 91. One end of a primary sized beam protrudes from the south wall of Room 92 at first-story ceiling height (Voll 1978:141, Figure E.4; 144, Figure E.5). Because the visible end of this timber is stone ax cut, the log must be either a beam that passes through the Room 91-92 wall and supports the first-story ceiling of Room 91, or a beam associated with Room 92 that was cut off inside the room in prehistoric times. Because the former possibility seems more likely, we cored this beam to achieve a tentative date for Room 91. If this log is genuinely associated with Room 91, its date suggests first-story construction in the 1030s, which is consistent with the dating of other North Block B rooms. Other dating possibilities cannot be ruled out, however, due to the lack of comparative dates.

Room 92. All 64 tree-ring samples from Room 92 were recovered in 1964 during excavation by Voll (1978). The samples come from elements of three or four collapsed ceilings scattered throughout the fill. Only 13 samples could be assigned to specific stories with any degree of confidence (Voll 1978:148); the rest could be given the room attribution only. As Voll (1978:148) notes, the provenienced dates can be interpreted as indicating first-story construction in or after 1052, second-story construction in 1067 or later, and third-story building in or after 1070. Voll (1978:148), however, feels that "in view of the homogeneity of architecture, it is most likely that all four stories were built at one time - A.D. 1067 to 1070." A third possibility, based mainly on analogy with first-story dating elsewhere in North Block B, is that the first-story ceiling was built in the 1030s and repaired in or after 1052. All these interpretations are possible given the available evidence from Room 92; however, the first two vary considerably from the placement of other North Block B rooms. Therefore, we favor the third option: first-story construction in the late 1030s, followed by repair and second-story construction in the 1050s, followed by third-story construction in the early 1070s.

Room 106. In 1979, we cored 19 of the 20 first-story ceiling beams in Room 106 and sampled two first-story lintels, one over a

blocked ventilator in the west wall and one in a blocked doorway in the south wall. The dating of the ceiling hinges on the status of Beam 1, which is adjacent to the hatch entry. Beam 1 is unique among the ceiling timbers in exhibiting a slight degree of smoke blackening. This blackening could be due to the beam's proximity to the source of smoke seepage into the room, the entry, or to the prior use of the timber in some other context characterized by exposure to smoke. The absence of smoke-blackening on the walls and other roofing elements near the entry militates against the first possibility, and Beam 1 probably is a reused timber. Three explanations can be advanced to account for the presence of a reused timber in the roof, each of which has different implications for the dating of the ceiling. First, the log is a salvaged timber incorporated into a roof built entirely of reused beams, in which case first-story ceiling construction would postdate 1050 by an unknown number of years. Second, Beam 1 represents a prehistoric repair or modification event in which a log salvaged from another context was incorporated into an existing roof. In this case, initial construction would date to the late 1030s, and the modification would postdate 1050 by an unknown length of time. This dating is similar to that of other North Block B rooms in which first-story ceilings built in the 1030s were altered in the 1050s, often in conjunction with the addition of second stories. It does not seem too farfetched to conjecture that the incorporation of Beam 1 into the ceiling might have accompanied the addition of a roof hatch to replace the doorway in the south wall when the latter entry was rendered nonfunctional by the erection against it of the auxiliary wall of Room 70 in or after 1056. Third, Beam 1 is a repair element added to the roof as part of Park Service efforts to stabilize Room 106 and its unique painted walls. This option would place construction of the roof in the late 1030s with repair more than 900 years later. Of the three possibilities, the first seems least plausible because post-1050 construction entirely of reused beams undoubtedly would have produced a wider variety of dates and would not have yielded the fairly tight cluster of dates in the 1030s that in fact exists. We conclude, therefore, that the first-story ceiling in Room 106 was built in the late 1030s and was modified as few as 20 or as many as 900 years later. If our placement of Room 70 in the 1050s is correct, the 1066 date from a lintel over the south doorway must represent a stabilization element as suggested in Chapter III. In the unlikely event that this lintel is not a stabilization element, the 1066 date indicates that a niche was added to the south wall of Room 106 some 30 years after the chamber was built.

Kiva I, Subfloor. A complex of room and kiva walls exposed by excavations beneath the floors of Kivas G and I is assigned by Lekson (Chapter IV) to North Block B. This section of North Block B was partially razed to make room for North Blocks E and F, which were built on top of the remnants of the older unit. Specimen tags attribute two samples, CK-363 and CK-364, to a "straight wall under Kiva level" in Kiva I. Probably this "straight wall" is wall segment E shown on

Figure II:15. CK-363 is missing from the Chetro Ketl tree-ring collection, although we still have the tag, and CK-364 has too few rings to be dated.

Kiva G-5. Lekson (Chapter IV) believes Kiva G-5, which lies buried beneath the Kiva G Complex of North Block F, to be associated with North Block B. One of the major questions raised by our initial examination of the Chetro Ketl tree-ring collection (Betancourt 1979) concerned the whereabouts of the wood samples from Kiva G-5. Miller (1937:84) describes wooden ceiling elements over niches in this kiva and indicates that four of these timbers were sampled and given the numbers CK-601, 602, 604, and 607. Hawley (1934:Protocol 1) assigns CK-602, 604, and 607 to Talus Unit 1 (CK-601 is not listed, presumably because it did not date). Except for CK-604, all these samples are missing from the Tree-Ring Laboratory's collections and cannot be checked either for dating or for any provenience information that might be attached to them. CK-604, a small piece of charcoal with a tag attributing it to "Mound 20," obviously is not a kiva niche ceiling element. Lacking the specified samples, we appeared to have no way of resolving the discrepancies between Hawley's and Miller's information. Thus, the opportunity to date Kiva G-5 seemed irretrievably lost, until inspection of the tags affixed to the samples turned up what undoubtedly are the missing Kiva G-5 specimens. Two samples, CK-328 and 329 have tags bearing the notation "Great kiva beneath the East Tower Kiva. In doorway at side. Lintel." Given the identity between the "East Tower Kiva" and Kiva G (Table V:3), these samples almost certainly represent two of the niche ceiling elements mentioned by Miller. Three other specimens (CK-330, 333, and 400) have tags attributing them to a "big underground kiva." Hawley's (1934:26) references to "the big kiva...beneath...Kiva G and the rooms surrounding it" and to "the large communal kiva...beneath Kiva G" are suggestively similar to the structure designations on the tags and without doubt refer to Kiva G-5. Her assignment of CK-330 to Kiva H (Hawley 1934:Protocol 1) provides another appellation for Kiva G-5 and identifies the Kiva H that is missing from all the floor plans of Chetro Ketl.

Although far from definitive, the dates from Kiva G-5 are consistent with the stratigraphic position of the kiva and validate the assignment of this structure to a pre-North Block C context. The latest dates fall at the upper terminus of the North Block A temporal range and suggest the possibility that Kiva G-5 was built around 1029 as a component of North Block A rather than as a part of North Block B. Alternatively, the dates could represent elements salvaged from razed portions of North Block A and reused in a structure built in the North Block B period, probably no later than 1040.

North Block B, Summary

Provenience uncertainties connected with the Chetro Ketl tree-ring collections prohibit unambiguous dating of the North Block B complex

and its components. The data support three general dating options each with variants specific to particular rooms or sections of the pueblo. Although an unequivocal choice of one alternative over the others cannot be made on the basis of the data on hand, some arguments can be marshalled in favor of the most likely hypothesis. Each of these options, its ramifications, and its implications for the development of North Block B are developed separately below.

The general dating of North Block B is based on the clustering of dates from this part of Chetro Ketl. Eight major clusters are evident: 1020-1021, 1026, 1028-1030, 1032-1034, 1037-1040, 1042-1047, 1050-1054, and 1065-1067. These clusters distribute differently among the various recognizable element types--primary beams, secondary beams, undifferentiated roof beams, and intramural-aperture elements. Primary beams cluster at 1032-1034, 1038-1039, and 1052-1054. Secondary beam clusters fall at 1039 and 1051-1052. Unclassified roof beams cluster at 1038-1040, 1052-1054, and 1065-1067. Intramural-aperture element date clusters occur at 1020-1021, 1026, 1028-1030, 1037-1040, and 1042-1047. Except for the primary beam cluster at 1032-1034, all the pre-1037 clusters are confined to intramural-aperture elements. The intramural-aperture clusters that predate 1037, along with some isolated intramural-aperture dates in the 900s, are considered to represent timbers salvaged from North Block A and reused in North Block B. The major cluster at 1037-1040, which is composed mainly of intramural-aperture elements and undifferentiated roof beams, represents material cut specifically for first-story construction in North Block B. The cluster at 1042-1047 is made up entirely of intramural-aperture elements, most of which appear to have come from upper-story contexts. As is developed below, these probably are logs, cut in conjunction with first-story construction in North Block C, that were used in the upper stories of North Block B after 1050. The clusters in the 1050s and 1060s, which are composed primarily of roofing materials, represent first-story repairs and upper-story construction and repair.

The first general North Block B dating scheme, Option One, is based on the assumption that all floor levels of each room were built at the same time. Option One exists only because provenience inadequacies prohibit dendrochronological rejection of the controlling assumption. If we knew exactly what ceilings the dated samples came from or what story levels are represented by the intramural logs washed out in the 1947 flood, we could in all probability establish that different floor levels were constructed at different times. Unfortunately, we do not possess this knowledge.

Several room specific variants of Option One involving the dating of construction and repair of particular chambers are dealt with in the individual room discussions. This leaves at least three general versions of Option One to be covered. Even more variants are possible, but we eliminate those involving construction before 1038 on the grounds of too few earlier dates and poor clustering. These earlier dates are considered to represent reused or stockpiled logs. The three acceptable variants of Option One involve the assignment of all construction to one of the date clusters coupled with attempts to explain away the other dates. The first version would date all North Block B

construction to the 1038-1040 interval and assign all later dates to repair events. The second version is that construction occurred in the middle 1040s, that earlier dates represent reused or stockpiled elements, and that later dates apply to repair events. Two considerations permit the rejection of both alternatives. First, the number of intramural timbers dated to the 1040s and 1050s would require an implausible amount of wall remodelling if the rooms had been built around 1040 or 1045. Second, no ceilings can be dated to the middle 1040s; all the logs cut at this time appear to have been used as intramural elements.

The third variant of Option One, which specifies that in most cases the latest date from a room relates most directly to construction and that all earlier dates from the same chamber represent reused or stockpiled elements, cannot be eliminated quite so easily as the first two versions. Given the assumption of a single construction episode for all stories of each room, Variant Three requires that most of the North Block B rooms be dated to the 1050s and 1060s with at least one chamber, Room 64, tenuously assignable to the 1070s. This dating requires that the many dates in the 1020s, 1030s, and 1040s from this part of Chetro Ketl be ascribed to reuse or stockpiling. Support of this version of Option One comes first from our inability, due to inadequate provenience information, to reject the controlling assumption. Second, Voll's (1978) belief that all four stories of Room 92, which contained wood dating from the 1030s into the 1070s, were constructed at one time also supports Variant Three. If Room 92 could have been built around 1070 with a large majority of the roof timbers being reused, so could other North Block B rooms that have one or two dates in the 1050s, 1060s, and 1070s. Rooms whose tree-ring dates are consistent with the third general version of Option One are Rooms 39, 39A, 40, 42(?), 43A, 47, 48, 55, 57, 58, 61, 64, 92, and 106.

Although the third version of Option One cannot be categorically rejected, some strong argument can be marshalled against it. For one thing, it implies an unlikely amount of stockpiling and/or reuse of timbers. Most of the dates from North Block B rooms fall in the 1030s and 1040s, yet the third variant of Option One places construction after 1050, usually on the basis of single late dates from rooms that have many early dates. Though not impossible, this situation seems somewhat improbable. Furthermore, the implication of extremely large-scale stockpiling or reuse requires an explanation of where the stockpilers lived and identification of the sources of large quantities of reused wood. Neither of these tasks is easily accomplished, although the razed structure (North Block A) beneath the extant walls of Chetro Ketl could be identified as the residence of the stockpilers and as the source of the salvaged timbers. In any case, the temporal distribution of the dates is far more suggestive of construction in the 1030s and 1040s, when lots of trees were felled, and subsequent repair and/or rebuilding in the 1050s, 1060s, and 1070s, when fewer trees were cut. The third version of Option One violates the sequential temporal relationship between North Block B and North Block C by making construction of these units essentially contemporaneous. Perhaps the most telling argument against the third variant of Option One is that this scheme generates an unlikely pattern of room dating in which chambers assigned

to different decades alternate with one another along the east-west rows of North Block B rooms. For example, Rooms 39, 39A, 40, 43A, 47, 57, and 106 are assigned to the 1050s, Rooms 48, 55, 58, 61, and possibly 42 are assigned to the 1060s, and Rooms 64 and 92 could be dated to the 1070s. The manifest implausibility of the construction sequence is by itself almost sufficient to compel rejection of the third variant of Option One. Thus, while the third version of the first dating option cannot be unequivocally disproved, it is extremely unlikely and probably does not reflect the true dating of North Block B.

The second and third general dating options are not constrained by the assumption that all floors of a room were built simultaneously. This release from constraint allows more freedom in the evaluation of the dates from individual rooms. At the same time, the lack of a controlling assumption requires more informed guessing as to probable sample proveniences and as to the significance of each date. The correctness of many of these guesses can be argued, but few can be substantiated by concrete evidence. The increased interpretive latitude also gives rise to the wider variety of dating possibilities than does Option One. In short, the application of the dates is less structured, more situational, and probably more closely attuned to reality. Options Two and Three are supported by the data from Rooms 42, 47, 48, 49, 55, 57, 58, 61, 64, 91, 92, and 106, many of which also are consistent with Option One.

Option Two specifies initial construction in North Block B around 1038 to 1040 followed by second- and third-story construction in the 1050s, 1060s, and 1070s. First-story ceiling construction in 11 rooms --Rooms 40, 42, 43A, 47, 48, 55, 57, 58, 61, 64, and 106--can be assigned with varying degrees of confidence to the 1038-1040 interval. In addition, initial construction in Rooms 49, 91, and possibly 92 can be tentatively ascribed to this period. At the east end of North Block B Rooms 39 and 39A have first-story ceilings dated to the middle 1050s. Initial construction of Room 92 at the west end of North Block B also could date in the 1050s, depending on one's assessment of the dates. No second- or third-story ceilings can be unequivocally assigned to the 1030s or 1040s. Of the second-story ceilings that can be dated, seven (Rooms 39-39A, 40, 43A, 47, 48, 55, and 57) were built in the 1050s, and three (Rooms 42, 61, and 92) probably were built in the 1060s. Two third-story ceilings (Rooms 64 and 92) may date to the 1070s.

Reasoning from these placements, the core of North Block B would consist of a block of at least 14 contiguous one-story rooms, extending from Rooms 48 and 50 on the east through Rooms 68 and 102 on the west, that was constructed as a unit around 1040. Rooms 49, 91, and perhaps 92 also could belong to the core unit. In the 1050s three chambers (Rooms 39, 39A, and 41), some of them two or three stories high, may have been appended to the eastern end of the core unit. If Room 92 was not part of the core unit, it could have been tacked on to the western end of the core unit at this time. Second and third stories would have been added to the rooms of the core unit in the 1050s, 1060s, and 1070s. Some of the second-story construction is contemporaneous with

and may have been related to the addition of the three rooms to the eastern end of the core unit in the 1050s. In Option Two, North Block B is not a single structural-temporal unit. Rather it consists of two distinct groups of rooms built 10 to 15 years apart, each group augmented at varying intervals by the construction of additional stories.

Option Two has two major weaknesses. First, it is inconsistent with Voll's (1978) opinion that the construction and roofing of all four stories of Room 92 was a single event, especially if this option can be generalized to North Block B as a whole. Second, it conflicts with Lekson's (Chapter IV) estimate that all of North Block B was built as a unit and that the two northern rows of North Block B rooms were two stories high. Whether these discrepancies are sufficient to justify rejection of Option Two can be determined only from the analysis of architectural data more detailed than those available to us.

Option Three involves the same dating of initial North Block B construction but employs the more detailed chronological evidence for some rooms as a basis for somewhat different dating of events that postdated initial construction. In this version the core unit, built during the 1038-1040 interval, consists of 23 one-story chambers and extends the full length of North Block B from Rooms 39 and 41 on the east through Rooms 91 and 92 on the west. Evidence from Rooms 48, 57, 61, 64, 92, and possibly 42 and 106 indicates repair of existing chambers in the 1050s and 1060s. A number of first-story ceilings were either repaired or replaced, an activity that seems commonly to be contemporaneous with and related to second and sometimes third-story construction in the same or nearby rooms. In this version the first-story roofs (dated to the 1050s in Rooms 39 and 40) are viewed as replacements for older ceilings, and these rooms are considered to be part of the North Block B core unit rather than later additions to it. At this time Rooms 39 and 39A were created by dividing a large room, which had been built around 1040, in two.

Option Three has three principal strengths. First, it preserves the integrity of the North Block B unit as delineated by Lekson. Second, like Option Two, it maintains the sequential relationship between North Block B and North Block C. Third, Option Three takes full advantage of the inferential evidence for first-story ceiling repair in several North Block B chambers.

Four arguments can be raised against Option Three. Like Option Two, Option Three is incompatible with Voll's (1978) hypothesis of simultaneous construction of all four floors of Room 92 and with Lekson's idea that these two rows of North Block B rooms were built as two-story units. Third, Option Three is based largely on inferential assessments of rather obscure provenience information. Option Three is only as secure as our estimates of the probable proveniences of many of the tree-ring samples. Fourth, the date of 1045 from the blocked first-story doorway in Room 39 belies a 1038-1040 construction date for the room and is more compatible with Option Two, which puts construction of Room 39 in the 1050s. The 1045 date can be accommodated to

Option Three if the doorway is considered to be a late addition to the first story of Room 39.

With the exception of the second version of Option One, all the variants of the three general dating options have one thing in common: they specify no construction associated with the strong cluster of dates at 1042-1047. This is so primarily because no North Block B ceilings can be even tentatively dated to the middle or late 1040s. In fact, only five timbers dated to this cluster occur in North Block B roofs, one in Room 57 and two each in Rooms 39 and 92. The ceilings in Rooms 39 and 92 are fairly securely dated to around 1040 or after 1050, while the sample from Room 57 is a flood log that could just as easily come from an intramural context as from a ceiling. As the date list in Appendix B clearly shows, the vast majority of 1042-1047 timbers are either intramural logs washed out in the 1947 flood or elements associated with apertures in the walls. Either a number of logs cut at this time were stockpiled and subequently incorporated into the walls, or timbers from a structure built in the late 1040s were salvaged or reused after 1050. Several lines of evidence favor the first alternative. Reuse seems unlikely because the span of time from 1047 to the 1050s is hardly long enough to encompass the building and demolition of the structures that would have supplied the reused elements. Furthermore, no obvious source of timbers dating to the 1040s exists. By 1040 the subfloor structure (North Block A) had been built over by the North Block B core unit. The 1042-1047 cluster coincides with the inferred first-story dating of North Block C (see below), which suggests that the timbers in question were cut for the construction of North Block C and that some surplus logs later were built into the second- and third-story masonry of the North Block B rooms.

As should be apparent from the foregoing discussions, we consider Option Three to be the most probable of the several possible dating schemes, although it cannot be regarded as irrefutably proved. Having delivered this warning, we offer our view of the developmental chronology of North Block B. North Block B construction was preceded by the demolition of all or part of North Block A, which had been built in the first two decades of the eleventh century (Bannister 1965:148-9). During the 1032-1034 period a number of primary beams were cut and set aside for later use in the first story of North Block B. Most of the trees used in the first-story North Block B construction were felled during the 4-year interval extending from 1037 through 1040. The distribution of dates from individual rooms suggests that some of the 1037-1040 timbers were used immediately after cutting, while others were not used until 1040. This use pattern suggests that the 1037-1040 period may have been characterized by an orderly movement out of North Block A as it was gradually razed, into North Block B as it was erected. By 1041 the core unit of North Block B, consisting of three or four rows of single-story rooms, was in place. In the 1050s and 1060s several first-story ceilings were repaired or replaced, probably in conjunction with the construction of second and third stories above them. Upper-story construction utilized stockpiled logs and reused materials as well as freshly cut wood. Apparently second and third stories were not built simultaneously throughout North Block B.

Rather, the construction of upper stories proceeded in piecemeal fashion over a period of two decades and was finished by the middle 1070s. Some upper-story construction in North Block B probably was related to the building of nearby rooms, particularly those in North Block C to the north. There is meager evidence for upper-story wall or roof repair in the early 1100s, which terminated the dated constructional history of North Block B.

North Block C

North Block C consists of a single row of three-story chambers, extending from Room 43 to beyond Room 94, abutted to the north side of North Block B. Most of these rooms are characterized by a massive one-story double wall built against the exterior wall of North Block B. The southern ends of the first-story primary beams in North Block C were socketed in the auxiliary wall rather than in the adjacent back wall of North Block B. On the basis of architectural similarities, Lekson tentatively assigns Room 70 to North Block C and suggests that Kiva N and some of the rooms adjacent to it were built at the same time as the North Block C rooms along the back of the pueblo.

Room 43. Insofar as we can determine, Hawley and her colleagues collected no wood samples from this room at the extreme eastern end of North Block C. One dated flood log, presumably an intramural element, is attributed to Room 43 (Bannister 1965:Table VIII-E). Most of the wood now in the room probably was placed there after the 1947 flood. Although prestabilization photographs (Vivian and Lancaster 1947:41; Vivian 1948:44) show a pair of primary sized beam stubs in the north wall, the chances are good that both stubs now there are replacements of the originals. Our field sample 42 (CK-1145) from one of these remnants (Beam 1) is a duplicate of CK-158, which Stallings (1930) and Hawley (1934:Protocol 1) assign to Room 44. The obviously spurious nature of Beam 1 casts doubt on the authenticity of its mate, Beam 2, although no other source for the latter is known. Intramural logs in the south wall are inaccessible and in any case probably are modern. Two lintels over a first-story ventilator in the north wall and three lintels in a first-story doorway in the same wall were cored. Lintels in a second-story vent in the north wall are too small to reward sampling.

Only two of the samples from Room 43 dated: Beam 2 (CK-1144) and a flood log (CK-904). Each of the five lintel samples had too few rings to be dated. The flood log probably is a reused or stockpiled timber incorporated into the masonry long after it was cut in 1035. The 1043 date from Beam 2 is consistent with the dates of other North Block C first-story primary beams. This correspondence reveals Beam 2 to be a genuine North Block C primary but does not unequivocally establish its association with Room 43. We are left then with an indication

that first-story ceiling construction occurred in 1043 or later. Analogy with other North Block C rooms suggests that the first story of Room 43 probably was built 2 to 5 years after the primary beam was cut.

Room 44. Provenience problems plague the rather large collection of samples ascribed to this room. Four samples (CK-38 through 41) attributed to Room 43A by Stallings and Hawley are now assigned to Room 44 on the basis of specimen tag information (Table V:3; see the Room 43A discussion for the reasoning behind this transfer). Stallings attributes all these samples to the first floor, while Hawley (1934: Protocol 1) assigns the only dated one (CK-40) to the third floor. Apart from these samples, Stallings ascribes 29 samples from 22 different trees to the second floor of his Room 17, which is equivalent to the present Room 44 (Table V:3). Hawley dated 18 of these samples and attributes all 18 to the third floor of Room 44 (Hawley 1934:Protocol 1). Stallings (1930) assigns two other samples, CK-64 and 65, to the second floor of a "Room 7." Hawley (1934:Protocol 1) assigns CK-65 to the third floor of Room 44 and CK-64 to the second floor of Room 2. Duplication between CK-64 and our sample 54 (CK-1157) from Beam 1 in Room 44 establishes the Room 44 origin of both CK-64 and 65. Stallings' "Room 7" ascription (his Room 7 is equivalent to Hawley's and our Room 2) probably is a typographical error for "Room 17." Hawley's assignment of CK-64 to Room 2 probably resulted from Stallings' error. The duplication between our cores from the two first-story primaries, Beams 1 and 2, and CK-64 and 65 also establishes the equivalence of our first story and Stallings' second floor. It seems probable, therefore, that the other samples attributed to the second floor by Stallings represent our first story, and that in this instance Hawley's third floor is equivalent to what is now recognized as the first story. According to information on Tree-Ring Laboratory catalog cards, four samples, CK-614 through 617, were collected by Hewett from "Room 17" and delivered to the Laboratory by Stallings in 1930. These samples are assigned to this room on the basis of the Room 17 equals Room 44 equation; more detailed provenience information is not available. Five flood logs are ascribed to Room 44 (Bannister 1965:143-145, Table VIII-E). In 1979 we cored the two first-story primary beams now situated in Room 44 and discovered their identity with CK-64 and 65. Preflood photographs (Vivian 1948:47) show two first-story primaries that appear to be our Beams 1 and 2. Either these logs were not dislodged by the flood or they were reset in the proper room after the flood. Lintels associated with three first-story ventilators, two in the north wall and one in the south wall, are too small to core. Two lintels in a partially blocked second-story doorway in the north wall were sampled.

As usual, provenience deficiences complicate the application of the dates to the room and give rise to several dating possibilities. Dates attributed by Stallings to the first and second floors, our first story, range from 1004+ to 1061 with clusters at 1037+-1040, 1047-1048, and 1052-1053. Two of Hewett's samples augment the latest cluster, but we do not know if these specimens represent roof beams or from what story they come. Assuming that all roof beams come from the first story, the first dating option is that the ceiling was built around

1040 and repaired once (around 1061), twice (around 1053 and 1061), or thrice (around 1048, 1053, and 1061). This dating is similar to that inferred for many North Block B rooms. Second, the first story could have been roofed around 1048 with many reused or stockpiled beams and repaired in 1053, 1061, or both. Third, the ceiling could have been constructed around 1053 and repaired around 1061. Finally, the ceiling could have been built in or after 1061 utilizing many reused and/or stockpiled logs. The number of primary sized roof beams (at least five, perhaps six) attributed to Room 44 seems a trifle excessive for a single roof; therefore, it is possible that more than one ceiling is represented in this collection. If so, the later dates should represent upper-story construction. In the absence of any objective way of assigning logs to different stories, any attempt to date different stories would be fatally circular. About all that can be said for certain is that some roof construction or repair occurred at some level in Room 44 in 1061 or later. Four flood log dates contribute little to resolving the problems raised by the roof beam dates because the intramural elements exposed by the flood cannot be assigned to specific stories. Analogy with the situations in other North Block C rooms suggests that the flood log dates in the late 1030s represent reused or stockpiled timbers. Wall construction or repair in 1067 or later is specified by the date from CK-705. The noncutting date from a lintel over the second-story doorway in the north wall indicates only that this doorway postdates 1043.

Considering all the evidence, we believe construction of Room 44 to have begun in the late 1040s (the second dating option outlined above) and to have been completed by 1070. We cannot, however, defend this opinion very vigorously against alternative explanations. Hawley (1934:23, Table 1) gives a building date of 1043 for the second floor (our first story). The reasons for this placement are obscure because no "second floor" dates from Room 44 are listed in Protocol 1. Her building date of 1059 (Hawley 1934:24, Table 1) for the third floor (also our first floor) obviously is based on the date of CK-104 (Hawley 1934:Protocol 1), the latest date from the room. Provenience uncertainties render impossible a realistic assessment of the differences between Hawley's and our dating of Room 44.

Room 45. Neither Stallings nor Hawley lists any samples from this chamber. Three flood logs are attributed to Room 45, and 13 flood logs are assigned to the "east wall" of Rooms 45, 43A, and 49 (Bannister 1965:Table VIII-E). At present the only wooden elements in the room are a first-story primary beam and lintels associated with four first-story apertures; two vents in the south wall and a niche and a blocked doorway in the north wall. We cored the primary, Beam 1, but did not sample the lintels because of their small size. A preflood photograph of the north wall of Room 45 (Vivian and Lancaster 1947:51) shows a saw cut beam stub in the position now occupied by Beam 1. Postflood, prestabilization photos (Vivian 1948:53-54) show no log at this spot. That Beam 1 is a postflood addition to Room 45 is confirmed by the identity between our samples from Beam 1 (field number 58,

CK-1160) and CK-99, which is attributed by both Stallings and Hawley to Room 43A.

Three flood log dates are not much to go by in the dating of a room. They do indicate some wall construction or repair in 1043 or later. Given the frequency with which reused logs occur as intramural elements in Chetro Ketl, the walls of Room 45 could have been built many years after 1043. The flood logs assigned to the Room 45/43A/49 wall are of little help because those associated with Room 45 cannot be segregated from the group as a whole. Hawley (1934) gives no building date for Room 45, and the prudent course would seem to be to follow her lead with the comment that construction probably did not predate 1043.

Room 46. Stallings lists 15 samples from Room 46 and attributes all 15 to the second floor, which probably is equivalent to our first story. Hawley (1934:Protocol 1) dated six of these samples, assigning two of them to the second floor and four to the third. According to information on the catalog cards, CK-618, 619, and 620 were collected by Hewett and were added to the Tree-Ring Laboratory's collection by Stallings in 1930. Three intramural logs dislodged by the 1947 flood are assigned to Room 46 (Bannister 1965:143-145, Table VIII-E). In 1979 we sampled five first-story wooden elements of potential relevance to the dating of Room 46: a primary beam (Beam 1), a lintel from a blocked doorway in the north wall, and three lintels from an aperture in the south wall that opens into Room 48. Beam 2, a primary sized stub in the north wall, is too weathered and too decayed to core. In any case, the absence of Beam 2 from a photograph of the room taken before flood repairs (Vivian 1948:48-49) identifies it as a recent addition to the room. Lintels over a first-story doorway in the west wall were not sampled because of their small size and apparent Park Service origin (Vivian and Lancaster 1947:64).

Our sample 59 (CK-1161) from Beam 1 is a duplicate of our sample 87 from Beam 1 in Room 53 and of CK-149, a one-inch core that Hawley (1934:Protocol 1) assigns to Room 53. A one-inch core has been removed from Beam 1 in Room 46, while no core hole is visible in Room 53's Beam 1, a broken stub in the north wall. A 1947 photograph of Room 53 (Vivian and Lancaster 1947:65) shows a rotted beam spanning the width of the room in the position now occupied by the Beam 1 remnant. Both members of a pair of photos, one taken before repair of the flood damage and one after, of Room 46 (Vivian 1948:48-49) shows what appears to be the present Beam 1 in place. These pictures give rise to a bewildering variety of possible explanations for the correspondence between the beams in Rooms 46 and 53. First, the beam in Room 46 and the beam remnant in Room 53 could be fragments of a single original timber that was divided in two and reused after the 1947 flood. Although a piece broken from a beam originally in Room 46 could have been moved into Room 53, acceptance of Hawley's assignment of CK-149 to Room 53 requires movement from Room 53 to 46. If the latter supposition is correct, the beam depicted in the before repair photo of Room 46 cannot be the same as the one in the after picture, which would have to be the log imported from Room 53. The single log hypothesis explains the

absence of a 1930 sample from the remnant in Room 53, which at that time still would have been part of a single beam. If only one beam existed originally, one end of the Room 53 remnant must match the north end of the beam in Room 46, for the south end of the latter is stone ax cut. Unfortunately, the north end of the Room 46 beam is embedded in masonry and cannot be checked. In any case, the one log hypothesis seems somewhat unlikely. The extant beam in Room 46 spans the entire width of the chamber, and to combine it with the remnant in Room 53 would create a timber too long for either room and longer than any other primary from this part of Chetro Ketl.

Provisional rejection of the single log hypothesis raises the possibility that two primary beams were cut from one tree, which in turn leads to several two beam explanations of the sample duplication. One explanation postulates that two primary beams cut from a single tree were used in two adjacent chambers, Rooms 46 and 53. The probability that the CK-149 core was removed from the beam now in Room 46 militates against this possibility, provided that Hawley's assignment of the sample is correct. Conversely, the possibility that the beam was in Room 46 in 1930 and that CK-149 was mistakenly assigned to Room 53 cannot be rejected. If both beams were used originally in Room 53, the one that occupied the now empty Beam 2 socket could have been moved into Room 46. Such a transferral would have occurred sometime between 1930, when the log was cored in Room 53, and 1948, when it was photographed in Room 46 both before and after flood repairs. Finally, it is remotely possible that we accepted the wrong correlation of field catalog room numbers with the numbers now in use (Table V:3), that the material assigned to Room 53 really belongs in Room 46, that all of Hawley's room proveniences in this part of the pueblo have to be shifted one room to the westward, and that our interpretation of the tree-ring dates is in serious trouble. For reasons developed in detail previously, we feel that Correlation 1 (Table V:3) portrays the correct relationship between Stallings' room numbers and those subsequently adopted by Hawley and the Park Service. Therefore, following Hawley's lead, we assign CK-149 to Room 53 and conclude that the timber in question was removed from Room 53 and introduced into Room 46 sometime after 1930.

With these machinations out of the way, we can turn to the evaluation of the Room 46 dates, minus the date from Beam 1. We are faced with two interpretations depending on whether we use Stallings' ascription of all samples to the second floor (our first story) or Hawley's assignment of some to the second floor and some to the third. If we accept Stallings' placement, we have a first-story ceiling with dates ranging from 1041 to 1063 with minor clusters at 1053 and 1063. This array of dates could indicate first-story ceiling construction in the early 1040s, around 1053, or around 1063. A construction date in the 1040s might necessitate repair around 1053, 1063, or both. A 1053 building date would require attributing the 1040s dates to reuse or stockpiling and the 1063 dates to repair. A 1063 date relegates the timbers dated in the 1040s and 1050s to reused or stockpiled status. Some support for Hawley's otherwise inexplicable assignment of four samples to the third floor is provided by the existence of six primary

sized beams in the collection from Room 46, a number that seems too great for a single ceiling. Using Hawley's proveniences we have initial first-story ceiling construction in the early 1040s with repair around 1053 that utilized reused or stockpiled timbers cut in the early 1040s. The first alternative resembles the inferred dating of other North Block C rooms, while the second probably placed first-story ceiling construction a little late for North Block C, unless it was a replacement for an earlier roof. Construction of Hawley's third floor (our second story) could be placed around 1053 with major repairs around 1063, or in 1063 or later. The number of 1063 dates, three if we include Hawley's (1934:Protocol 1) date for the now missing CK-96, seems excessive for a repair event, and second-story ceiling construction may date to 1063 or later. The three flood logs and Hewett's unprovenienced samples contribute little to the dating of Room 46, although the former do specify some wall construction in 1052 or later. In conclusion, the most likely dating of Room 46 involves first-story construction in the 1040s, with perhaps some roof repair around 1053, followed by second-story construction in 1063 or later. This dating is consistent with Hawley's second floor (our first story) building date of 1043 (Hawley 1934:23, Table I) and third floor (our second story) date of 1063 (Hawley 1934:24, Table I).

Room 53. Stallings lists seven samples from the second floor (our first story) of Room 53. Hawley (1934:Protocol 1) assigns three of these to the second floor and three to the third (our second story). The basis for the provenience change is not apparent. Hawley (1934: Protocol 1) assigns a sample collected by Lassetter in 1932, CK-356, to the second (our first) floor. GP-2205, a sample collected in 1940 for Gila Pueblo by Deric O'Bryan, is a duplicate of CK-356, which validates Betancourt's (1979) placement of the Gila Pueblo specimen in Room 53. Two flood logs are attributed to this chamber (Bannister 1965:143-145, Table VIII-E). At present, wood is scarce in Room 53. Two first-story primary sized beam stubs occupy sockets opposite one another in the north and south walls. The one in the south wall (CK-1189) belongs to Room 47. Our sample 87 from the other stub, Beam 1, is a duplicate of CK-149 and CK-1161 from Beam 1 in Room 46. The career of the latter was chronicled in the discussion of Room 46 and is not repeated here. Suffice it to say that we believe that Beam 1 in Room 46 and Beam 1 in Room 53 originally were first-story beams in Room 53 and that the date from these logs applies to that room. This pair probably was joined by the CK-356, GP-2205 beam to provide Room 53 with three first-story primaries. We also cored two lintels over a partially blocked second-story doorway in the north wall. Lintels associated with various first- and second-story vents and niches are too small to be useful and were not cored. Lintels over first-story doorways in the north and east walls were not sampled because stabilization records (Vivian and Lancaster 1947:64, 67) indicate them to be repair elements.

Once again, the evaluation of the dates from a room depends on whether Stallings' or Hawley's designations are used. This time the task is simplified somewhat by our rejection of Hawley's (1934:Protocol 1) dates for two (CK-150 and CK-152, 155) of the three samples she

assigns to the third floor. One interpretation of the dates using Stallings' proveniences is that the first-story ceiling was built around 1043 and repaired in or after 1047. Alternatively, the dates could indicate first-story ceiling construction in 1047 or later, involving the use of stockpiled primary beams cut in 1042 and 1043. This option seems to be more likely in view of the inferred dating of other North Block C rooms. If we accept Hawley's proveniences, we have first-story ceiling construction around 1043 followed by second-story construction in or after 1047. The flood log date specifies some wall construction in or after 1046, which probably is related to first-story ceiling construction around 1047. In any of these interpretations the roof beam date of 1040 and the second-story lintel dates of 1033 and 1039 are ascribed to the use of timbers probably left over from the construction of North Block B. Our preferred first-story date of 1047 is a few years later than Hawley's (1934:23, Table I) 1043 building date for the second floor. Her third-floor building date of 1065 undoubtedly is based on her date of 1063 for CK-150 (Hawley 1934:Protocol 1), a sample that actually does not date.

Room 54. Apparently no samples were collected from this room in 1930. A note on the Tree-Ring Laboratory catalog card attributes CK-354, one of two samples probably collected by Lassetter in 1932, to the second floor. Hawley dated the other one of these samples, CK-355, and assigned it to the third floor (Hawley 1934:Protocol 1), which probably is equivalent to our second story. Two flood logs are assigned to this chamber (Bannister 1965:143-145, Table VIII-E). Two first-story primary beams are present in Room 54 today, and old photographs (Vivian and Lancaster 1947:68-69; Vivian 1948:7) indicate them to be original features of the room. We cored both these timbers and discovered our sample 91 (CK-1192) from Beam 2 to be a duplicate of CK-354. This sample correspondence confirms the Room 54 provenience of CK-354 and establishes the equivalence of Lassetter's second floor and our first story. A second-story primary beam is inaccessible and could not be cored. In any case it is too weathered to yield a useful date and may be recent origin. We cored lintels in two first-story apertures in the north wall, a blocked doorway and a blocked vent, and in two second-story orifices in the north wall, a doorway and a blocked vent. Most of the lintels associated with Room 54, including those we sampled, are of questionable origin, and the relevance of any dates derived from them is suspect.

Two dating schemes can be inferred directly from the dates from Room 54. First, the primary beam dates could indicate initial first-story ceiling construction around 1043. In this option, the dated first-story lintel probably would specify the addition of a doorway to the north wall in 1051 or later. Alternatively, the first-story ceiling could have been built around 1051 with stockpiled primary beams. A third possibility is suggested by the inferred dating of other North Block C rooms. This is that the first-story ceiling in Room 54 was built during the 1045-1048 interval with stockpiled primaries, and that the first-story north doorway was added to the room in 1051 or later. All three reconstructions are predicated on the acceptance of the

authenticity of the dated lintel. Although we have no concrete evidence that this lintel is not genuinely associated with Room 54, the possibility that it is a flood repair element cannot be entirely ruled out. Even though it is not directly supported by dates actually associated with Room 54, we prefer the third dating option because it is the most compatible with the inferred dating of other North Block C rooms. The first and second options create implausible situations in which first-story construction in Room 54 is respectively either substantially earlier or later than that in the flanking chambers, Rooms 53 and 59. A second-story ceiling date of 1051 or later is indicated by CK-355, although the absence of comparative dates from the same level constrains the reliability of this placement. The correspondence of this date with that of the first-story lintel could indicate the construction of both stories after 1050 or, more probably, alterations to the first story at the time of the addition of a second floor. Hawley's (1934:24, Table I) building date of 1060 for the third floor (our second story) probably is based on the date of CK-355.coupled with her dating of nearby chambers.

Room 59. Four samples collected from Room 59 by Lassetter in 1932 are assigned to the third floor, which probably is our second story. A fifth Lassetter sample, CK-357, is attributed to the second floor (Hawley 1934:Protocol 1), probably our first story. In addition, we assign CK-360 to Room 59 on the basis of its position within the CK-357 through 362 sequence. CK-525, an unprovenienced sample collected before 1934, is assigned to this room on the basis of its identity with our sample 108 (CK-1206) from Beam 1, a first-story primary. In 1940, Deric O'Bryan collected GP-2201, whose identity with our sample 107 from Beam 2 validates Betancourt's (1979) assignment of the Gila Pueblo core to this chamber. One flood log is assigned to Room 59, and 19 others are attributed to the wall between Rooms 58 and 59 (Bannister 1965:143-145, Table VIII-E). Currently, Room 59 contains two first-story primary beams, three primary sized beam stubs at the second-story ceiling level in the north wall, and lintels associated with various first- and second-story apertures in the north and west walls. Photos taken before repair of the 1947 flood damage (Vivian and Lancaster 1947:77; Vivian 1948:4) indicate both first-story primaries to be original features of the room, and both were cored in 1979. The second-story beam stubs are inaccessible and were not sampled in 1979. Saw cut ends on two of these stubs indicate either that these timbers have already been sampled or that they are modern replacement beams. The third remnant is too weathered to provide a useful date. Lintels associated with two ventilators and a blocked doorway in the north wall were not sampled because of their small size, unsuitable species, or dubious origin. Five lintels over a first-story doorway in the west wall were cored, even though a flood tag identifies one of them as a Park Service replacement and casts doubt on the authenticity of the other four. We also cored three lintels over a second-story doorway in the north wall, although the possibility exists that those lintels too are flood repair elements.

Evidence for first-story construction around 1043 provided by Beams 1 and 2 is weakened by later dates from the west doorway and from CK-357. There is a good chance that the west doorway lintels are flood repair elements, and these dates perhaps should be disregarded. The CK-357 date could indicate that the first-story roof was built around 1048 with stockpiled primary beams or that a ceiling built around 1043 was repaired in or after 1048. The former alternative conforms to the inferred dating of other North Block C rooms and therefore seems to be the more likely of the two. Second-story ceiling construction could have occurred around 1060, although the lack of comparative dates prohibits the rejection of the possibility that an earlier second-story ceiling was repaired in or after 1060. Most of the flood logs and the second-story lintels associated with Room 59 probably are reused or stockpiled elements. One intramural beam date specifies some wall construction in 1051 or later, but we have no indication of what story level is represented by this date. In general, our dating of Room 59 does not differ from Hawley's building dates of 1048 for her second (our first) floor (Hawley 1934:23, Table I) and 1060 for her third (our second) floor (Hawley 1934:24, Table I).

Room 60. Stabilization records and photographs taken before repair of the flood damage (Vivian and Lancaster 1947:78-84; Vivian 1948:66) indicate that the three roof beams now in Room 60, two first-story and one second-story primaries, are original features of this chamber. These indications are confirmed by duplications between our 1979 samples and previously collected specimens. Our sample 100 from Beam 2, a first-story primary, is identical to CK-534-2, which was collected from Room 60 in 1934 by Lassetter. Our core 101 from Beam 1, the other first-story primary, is identical to GP-2202, which was collected from Room 60 by O'Bryan in 1940 (Betancourt 1979). GP-2202 and our sample 101 duplicate CK-533, a sample attributed by Hawley (1934: Protocol 1) to Room 64. The identities of these samples coupled with a tag ascribing CK-533 to Room 60 lead us to remove CK-533 from Room 64 and add it to the Room 60 collection. The transferral of CK-533 to Room 60 also accords with the existence of two 1-inch core holes in Beam 1. O'Bryan also sampled a "rafter" over a "shelf" in Room 60. This sample, which is duplicated by an unprovenienced flood log (CK-885), may represent a ceiling element over a large recess in the double wall abutting Room 61. Thirty-five flood logs are ascribed to the wall between Rooms 60 and 61 (Bannister 1965:143-145, Table VIII-E). As noted above, we cored both first-story primary beams in 1979. We did not sample the second-story primary because it was too weathered to produce a useful date. Lintels associated with blocked first- and second-story doorways and ventilators in the north wall were not sampled because of inaccessibility, unsuitable species, small size, and questionable origin. Five sampled lintels in the first-story doorway between Rooms 60 and 59 probably are flood repair elements.

The primary beam dates could specify first-story ceiling construction around 1041, which is several years earlier than the inferred dating of other North Block C rooms. Dates from the "shelf" and from the doorway in the east wall, if the wood from these features is genuinely

associated with initial first-story construction, place that event in 1046 or later, which is consistent with the dating of other North Block C rooms. Alternatively, these dates could relate to alterations of a chamber built around 1041. In addition, there is a good chance that the doorway lintels are modern flood repair elements of no relevance to the dating of prehistoric events. Dates from 23 flood logs associated with Room 60 denote some wall construction in or after 1047. However, the lack of story proveniences combined with the probability that these intramural timbers were stockpiled or reused makes it impossible to relate the dates to specific wall construction episodes. In conclusion, the meager evidence from Room 60 indicates first-story construction in the latter half of the 1040s.

Room 65. For reasons developed in the discussion of Room 64, a sample (CK-531) attributed to that chamber by Hawley (1934:Protocol 1) now is assigned to Room 65. Seven flood logs are ascribed to this chamber as well (Bannister 1965:143-145, Table VIII-E). At present, visible first-story wood is confined to lintels associated with a blocked doorway and two blocked ventilators in the north wall. None of these elements were sampled due to their small size, unsuitable species, or possible Park Service origin. Second-story wood consists of three primary sized beam stubs in the north wall, and lintels over vents in the north and south walls and over doorways in the north and west walls. Despite the possibility that the primary beam remnants are flood repair elements, all three are cored. Duplication between our sample 80 (CK-1182) from Beam 3 and CK-531 justifies the tentative assignment of the latter to this room and indicates that Hawley's fourth floor equals our second story. Alternatively, Beam 3 could be a post-1934 addition to Room 65, although this possibility seems a bit unlikely. Three of the eight lintels in the north doorway are suitable for sampling and were cored. Lintels over the west doorway could not be reached. Third-story wood consists of lintels over an inaccessible doorway in the north wall. Vivian and Lancaster (1947:91) indicate these elements to be late additions to the room.

The noncutting dates from the two primary beams of unquestioned relevance to this room, Beams 1 and 2, signify only that second-story ceiling construction or replacement occurred in 1066 or later. These dates are not incompatible with a ceiling construction or replacement date of 1072 as indicated by the date from Beam 3, if that timber is genuinely associated with this chamber. Alternatively, Beam 3 could be a repair element added to an original or replacement ceiling built in the late 1060s, although this seems unlikely due to the short time span between construction and repair. The flood log dates indicate only that some wall construction or repair somewhere in Room 65 could not have predated 1046. However, these intramural elements probably are reused or stockpiled timbers that could have been cut many years before being incorporated into the masonry. Although there are no first-story dates from Room 65, initial construction of this chamber can be placed in the later 1040s on the basis of analogy with other North Block C rooms with which it is contemporaneous. If the second-story primary beams do not represent the replacement of an earlier roof, second-story

construction may have occurred in the late 1060s or early 1070s, some 20 to 25 years after the room was begun.

Room 101. Hawley (1934:Protocol 1), Bannister (1965:Table VIII-C), and Robinson, Harrill, and Warren (1974:21) list two samples, CK-140 and CK-327, from Room 101. However, Hawley's Room 101 (Hawley 1934:Plate X) is the chamber now numbered 121 (Table V:3) and is not the same as the Room 101 on the current Park Service floor plan (Figure I:2). For this reason and others discussed in the Room 121 section, these samples are no longer ascribed to the chamber currently designated Room 101. This leaves no samples from Room 101 except for cores we removed from two lintels over a second-story doorway in the north wall. Other lintels in this doorway and in other second-story apertures are not suitable for sampling. A second-story primary sized beam stub with a saw cut end is a modern addition to the room (Vivian and Lancaster 1947), and we did not sample it. In any case, this remnant is too badly weathered to produce a cutting date.

The single date contributes little to the temporal placement of Room 101. Analogy with other North Block C rooms suggests that this chamber was begun in the late 1040s with upper-story construction in the 1050s and 1060s. This inferred placement makes the 1037 date far too early for second-story construction and identifies the lintel as a stockpiled or reused element left over perhaps from the construction of North Block B. Hawley's (1934:25, Table I) building date for Room 101 really applies to Room 121 in the East Wing.

Room 93. Fifty-one wooden elements in place in Room 93 have been sampled. Most of the collecting was done in October of 1969 by a party from the Tree-Ring Laboratory consisting of William J. Robinson, Meade F. Kemrer, and Jeffrey S. Dean. At this time, 49 first-story timbers were cored: 3 primary beams, 35 secondary beams, 3 of 4 remaining members of a room-wide platform across the east end of the room, and 8 elements (1 sill and 7 lintels) associated with 2 apertures in the south wall (a large recess and a small niche) and 3 apertures in the north wall (a blocked doorway and 2 ventilators). In 1964 Martin T. Mayer of the Ruins Stabilization Unit sampled a lintel over a second-story doorway in the west wall of Room 93. In 1979 we cored the only accessible lintel in a partially blocked second-story doorway in the north wall. Other second-story doorway and ventilator lintels are small, decayed, inaccessible, nonconiferous, or of possible modern origin and were not cored.

With 44 well controlled dates from 51 in situ wooden elements, Room 93 presents a unique opportunity to investigate the temporal and contextual distribution of tree-ring dates in a single North Block C room. The primary beams could be taken to indicate initial first-ceiling construction as early as 1043 were it not for later dates from timbers built into the masonry of the walls. Like other North Block C chambers, Room 93 has a double wall built against the exterior wall of North Block B, which forms the southern wall of North Block C. Here,

as elsewhere in North Block C, the double wall supports the south ends of the primary beams, which are too short to span the full width of the room. Given this relationship, the emplacement of the primary beams could not have preceded the construction of the double wall. Yet several elements from apertures in the double wall postdate the latest primary beam date of 1043. While it is possible that these apertures are later additions to a wall built around 1043, neither the wall nor the timbers embedded in it convey the impression of remodelling. To the contrary, the double wall and its associated features appear to have been built together as a unit no earlier than 1047. A date of 1045 from the blocked doorway in the north wall supports the other indications of first-story wall construction some years after the cutting of the primary beams. Reasoning from the dates of the primaries and the various timbers embedded in the walls, we have first-story construction in or after 1047 with the ceiling supported by previously cut stockpiled and/or reused primary beams.

Thirty-three dates from first-story secondary beams complicate the temporal placement of Room 93. Ranging from 1037+ to 1052, these dates exhibit only one cluster: 27 fall in the 1050-1052 interval with 19 dated at 1051 and 5 at 1052. With the exception of CK-1072, all the 1051 logs have complete terminal rings, while all the 1052 timbers have incomplete terminal rings. Such a pattern of complete and incomplete terminal rings results from tree-felling near the beginning of the growing season of the later year when some of the trees had begun to grow (the 1052 incomplete trees) and others had not (the 1051 complete trees). Considering the species involved, Douglas fir and ponderosa pine, the tree cutting operation that produced the 1051-1052 cluster probably encompassed a period of a couple of months in the spring of 1052. The tree that produced CK-1072, a Douglas fir with an incomplete terminal ring, was cut early in the spring of 1051 and not during the spring 1052 tree felling event that produced most of the secondary beams used in Room 93.

Two chronological possibilities are indicated by the array of dates from the first story of Room 93. First, the first story could have been built and roofed in the summer of 1052 or shortly thereafter. If this were the case, the secondaries dated prior to 1051, the three primary beams, and the wood incorporated into the walls would have to be reused or stockpiled elements. We have noted previously considerable evidence for the use of salvaged or stockpiled wood in apertures and in intramural contexts. Second, the first story could have been built around 1047 and been almost totally reroofed in the summer of 1052 (Bannister and Robinson 1978:133). The number and even distribution of 1051 of 1052 secondaries throughout the ceiling eliminates the possibility of localized repair. Rather, massive remodelling that involved the replacement of the entire ceiling above the primary beams is indicated. In this reconstruction, the secondaries cut before the spring of 1052 would be stockpiled timbers or wood removed from older structures, some of them perhaps salvaged from the earlier ceiling of this room. Unfortunately, these dating schemes seem equally plausible, and we have no concrete evidence as to which is the more likely. Yet, as is seen in the general discussion of North Block C, the choice of

one or the other of these alternatives has important implications for the chronology of North Block C. As is also indicated in the discussion of general North Block C dating, we favor the second dating alternative.

Two dates are available for the room-wide platform across the east end of Room 93. The platform beam represented by CK-1056 was not produced in the spring 1052 tree cutting episode that produced 23 of the secondary beams. Instead, like the secondary represented by CK-1072, it is a Douglas fir felled in the spring of 1051. CK-1057 clearly represents a beam added to an already existing room sometime after the spring of 1064. The position of this timber and the western extremity of the platform indicates that it could be a late addition made to enlarge an already existing platform just as well as it could be an original component. Chronological placement of the platform depends to a great extent on which of the two dating schemes for the room itself is adopted. If the room was built around 1047, several possibilities exist: 1) the room and the platform were built at the same time, and the latter was repaired or augmented around 1051 and/or 1064; 2) the platform was built in or after 1051 and repaired or enlarged in 1064 or later; 3) the platform was built in or after 1064 with at least one stockpiled or reused timber that had been cut 13 years previously. Two possibilities exist if Room 93 was constructed in 1052: 1) the platform also was built in 1052, using at least one log cut a year earlier, and repaired or enlarged around 1064; 2) the platform was constructed sometime after the spring of 1064 with at least one older log.

No second- or third-story dates are available for Room 93; consequently, we have no direct evidence for the dating of upper-level construction. However, if the first-story ceiling was rebuilt in the summer of 1052, these alterations might have been a response to increased utilization of the first-story rooftop caused by the addition of a second story to the room.

Room 94. The only first-story wooden elements in Room 94 are a primary beam, which we cored in 1979, and the stubs of three secondary beams in the west wall. We did not sample the secondaries because they are heavily weathered and because sawed ends and Park Service records (Vivian and Lancaster 1947:107-108) reveal them to be recent stabilization elements of no relevance to the dating of Room 94. Second-story wood is limited to lintels associated with a doorway and a ventilator in the north wall. Four of these lintels were cored, the others being either too small or of undatable species. The noncutting date from the primary beam indicates only that a first-story ceiling incorporating this timber was built no earlier than 1038. If the lintels over the second-story north doorway are prehistoric features and not recently introduced stabilization elements, the Lintel 4 date specifies a construction or repair event that postdates 1087. Thus, the construction or repair of this doorway could be the latest dated event in the history of North Block C.

Unnumbered Room. In 1979 we cored two lintels over a second-story doorway in the north wall of the second room west of Room 94 along the back wall of Chetro Ketl. The single date indicates only that the doorway probably does not predate 1052, a time consistent with the inferred placement of second-story construction elsewhere in North Block C.

Room 70. Because Room 70 possesses a double wall for the seating of primary beams similar to the double walls in the North Block C rooms along the northern periphery of Chetro Ketl (Figure III:20), Lekson infers that Room 70 might have been part of the North Block C addition. While far from conclusive on this matter, the tree-ring data suggest that Room 70 is not affiliated with North Block C. None of the Room 70 primary beams belong to the set of primaries cut in the 1040-1043 period that is conspicuous in the first-story rooms of North Block C. Furthermore, first-story ceiling construction in Room 70 probably postdates 1055, a placement later than that of North Block C first-story construction, which probably occurred in the late 1040s. For these reasons, Room 70 probably does not belong to North Block C, and we discuss the dating of this chamber in the section on North Block E.

North Block C, Summary

As was the case with North Block B, provenience deficiences prohibit the unequivocal placement of North Block C construction. The analysis of North Block C is plagued in particular by inadequate information relevant to the temporal placement of upper-story construction; consequently, satisfactory dating is primarily limited to the first story in this part of Chetro Ketl. Four general dating options are supported by the data. Although none of these options can be rejected out of hand, the evidence indicates a couple of them to be more plausible than the others. The data also elucidate the temporal relationship between North Block B and North Block C and suggest an explanation of the double wall built to support the south ends of the first-story primary beams in North Block C.

All four general dating options are based on the clustering of dates from North Block C. Four clusters appear to be important: 1008-1010, 1039-1043, 1045-1048, and 1050-1053. Segregation of the dates by type of wooden element reveals each of the three recognizable use types (primary beams, secondary beams, and intramural-aperture elements) to possess a unique pattern of date clusters that generally do not overlap with those of the other two types. Primary beam dates exhibit only one major cluster: 1040-1043. Secondary beam dates cluster at 1009-1010, 1039-1040, 1047-1048, and 1051-1053. The 1051-1053 cluster is due almost entirely to the secondary beam dates from Room 93. Intramural-aperture element dates fall into two groups; one consisting of a cluster at 1008-1009, and one with dates ranging from 1034 through 1052.

Within the latter group, clusters occur at 1039, 1043-1046, and 1051-1052. The only significant correspondence in these distributions occurs between secondary beams and intramural-aperture elements at 1008-1010 and 1051-1052. The first of these secondary-intramural-aperture clusters obviously represents material salvaged from older contexts and reused in North Block C, and it requires no further discussion.

The first general dating option, like the North Block B Option One, is based on the assumption that all three floor levels of each room were built in one operation. Option One has three variants, each of which involves the assignment of all construction to one of the date clusters combined with an attempt to rationalize the other dates. The first version places all North Block C construction in the 1039-1043 interval and considers all later dates to apply to repair events. The second variant dates construction in the 1045-1048 period and assigns earlier dates to reused or stockpiled materials and later dates to repair elements. Neither of these schemes seems terribly plausible. Both require the postulation of an improbable amount of ceiling and wall repair and remodelling to account for most of the secondary beam and intramural-aperture element dates. The third variant of Option One, which specifies that the latest date from a room relates directly to the construction of the room, also can be disputed. This version is belied first of all by the proveniences and clustering of the dates, which are more compatible with other dating options discussed below. Second, in at least one instance (Room 93), the latest date demonstrably applies to a late addition to the room and not to original construction, which confutes the controlling assumption. Finally, as was the case with North Block B, this scheme creates a totally implausible pattern of room dating in which chambers built at different times alternate with one another. For example, the third variant assigns Rooms 43, 45, 53, and 60 to the 1040s, Rooms 54, 59, and 93 to the 1050s, Rooms 44, 46, and 65 to the 1060s, and Room 94 to the 1080s. The continuous nature of the back wall of Chetro Ketl negates these assignments. Although the three versions of Option One cannot be unequivocally refuted, it is our opinion that none of them reflect the true chronology of North Block C.

Options Two, Three, and Four do not involve the assumption of simultaneous construction of all three stories and are, therefore, better equipped to exploit the available provenience data. Option Two places initial first-story ceiling construction at the time when most of the first-story primary beams were cut; that is around 1040-1043. Second- and third-story construction would have followed in the later 1040s, the early 1050s, and the 1060s. This placement of the first story creates the necessity to explain the many intramural-aperture element dates in the late 1040s and the secondary beam dates in the early 1050s. The clear association of many of these dates with the first story requires the postulation of an improbable amount of first-story wall modification and ceiling repair. The convoluted series of events that would result from such an exercise is inherently unlikely, a circumstance that substantially reduces the probability of Option Two. If the provenience relationships in the intact Room 93, which indicate the primaries to have been seated in a double wall built no

earlier than 1047, can be generalized to North Block C as a whole, which exhibits a date clustering pattern identical to that of Room 93, Option Two can be rejected with a fair degree of confidence.

Option Three dates initial first-story construction in North Block C to the 1045-1048 interval, primarily on the basis of the many intramural-aperture element dates that fall in this period, coupled with the evidence from Room 93 that the primary beams were socketed in a wall that cannot predate 1047. This placement makes the first-story primary beams date to the 1040-1043 stockpiled elements that were cut to a predetermined length and set aside for later use. First-story roof beam dates in the early 1050s, most but not all of which come from Room 93, indicate sometimes substantial modification of ceilings built in the late 1040s. This 5 to 7 year interval between original construction and subsequent repair seems improbably short, but strengthening of some first-story ceilings may have been necessitated by the construction of second-story chambers on top of them. Option Three excludes upper-story construction in the late 1040s, relegating this activity to the 1050s and 1060s. Given the contextual and temporal distributions of the dates, about the only point that can be raised in opposition to Option Three is the perhaps improbably short period of time between initial first-story construction and ensuing repair specified by this dating scheme.

Option Four places initial first-story construction around the 1051-1053 period when a large number of secondary beams were cut. Given this dating, first-story primary beams and intramural-aperture elements dated respectively to the early and late 1040s would have to be reused or stockpiled timbers. Option Four requires that in those chambers with second stories dated to the early 1050s (Rooms 46, 54, 59, and 93), the first and second stories were built in a single operation. Second stories may have been added to Rooms 44 and 65 in the 1060s. Although Option Four cannot be absolutely rejected, aspects of the date distributions militate against the placement of initial first-story construction in the 1050s. If the first story of North Block C had been built in the 1050s, we would expect more dates in that decade than actually exist. In fact, Room 93 has the only unequivocal first-story context with any number of 1050s dates. Futhermore, there seem to be more 1040s dates than would be expected if North Block C had been begun in the 1050s. We conclude, therefore, that Option Four probably does not accurately reflect the chronology of North Block C.

For a number of reasons, which neither individually nor collectively are sufficient to support the absolute rejections of all other North Block C dating schemes, we favor the third dating option. Based on Option Three, our estimate of the most likely North Block C building sequence is as follows. During the 1040-1043 interval, after first-story construction in North Block B had been completed, several large trees were felled and cut into primary sized beams, a process that included reducing the beams to a predetermined, standardized length. Whether cut specifically for use in a planned addition to North Block B or just for general construction purposes, these beams ended up in the first-story ceilings of North Block C. Logs accumulated during the

1045-1048 period, along with many stockpiled and/or reused elements, were incorporated into the masonry when the first story of North Block C was raised. By 1048 the first story of North Block C stood complete along the back wall of North Block B, which also rose one story above ground level. Dates from first-story secondary beams indicate that in the early 1050s several North Block C first-story ceilings were modified or repaired, probably in connection with the addition of upper stories to some or all of these chambers. A group of intramural-aperture elements dating to the 1050-1052 interval probably was cut for use in the upper stories. The absence of intramural wood postdating 1052 indicates either that both the second and third stories were erected at this time or that enough logs had been amassed by 1052 to satisfy any subsequent demand for intramural and aperture elements. The latter possibility is supported by the abundance of 1043-1047 dates from intramural-aperture elements incorporated into upper-story North Block B chambers built in the 1050s and 1060s. Scattered roof beam and intramural-aperture element dates in the 1060s from North Block C probably reflect isolated upper-story construction, repair to walls and ceilings built before 1054, or miscellaneous additions such as that to the first-story room-wide platform in Room 93.

Whichever North Block C dating option is selected, this unit clearly postdates North Block B. Adopting the sequence outlined in the preceding paragraph, the following relationships between North Blocks B and C emerge. North Block C, its first story having been completed around 1048, was butted against the back (north) wall of North Block B, which had been finished around 1040. Thus, around 1049 the two room-blocks stood as four or five east-west rows of one-story chambers running from Rooms 39, 41, and 43 on the east to some point west of Rooms 94 and 103. This block of rooms was fronted on the south by a plaza containing an unknown number of kivas. In the early 1050s, many first-story ceilings in North Blocks B and C were repaired or augmented in anticipation of the construction of upper stories. In both areas, second and possibly third stories were added at this time. It is possible that all of North Block C was raised to its full three-story height at this time. On the other hand, there is solid evidence for third and possibly even second-story construction in North Block B as late as the 1060s and 1070s. Building sequences such as these would have created by the middle 1050s a situation in which a back row of rooms (North Block C) standing uniformly to three stories was fronted by at least two rows of rooms (North Block B) rising raggedly to two or three stories. Some or all of the gaps in North Block B were closed by upper-level construction in the 1060s and 1070s. No information is available as to the maximum height of the now buried front row of North Block B. Major construction in both North Blocks B and C probably ceased by the early 1070s. Later dates probably specify minor repair events that lasted at least into the first decade of the twelfth century.

Other relationships among North Blocks A, B and C are revealed by the contextual and temporal distributions of the dates. Reused timbers, presumably salvaged from the razed North Block A structure, are more abundant in North Block B than in North Block C. This situation

is predictable from the assumption that salvageable old material would be used early in the building sequence. Far less expectable is the fact that the North Blocks B and C reused timber dates cluster differently. North Block B has some dates in the later 900s and clusters at 1020-1021 and 1026-1030. All the North Block C reused elements fall at 1008-1010, an interval not represented at all in the North Block B collection. This distribution may signify that a section of North Block A which had been built around 1010 was not demolished until after 1040 when the first story of North Block B had been completed. North Blocks B and C exhibit a similar hiatus between the cutting of first-story primary beams and the actual use of these timbers. North Block B primaries cut in the 1032-1034 interval were used around 1038-1040; North Block C primaries cut in the 1040-1043 period were used around 1045-1048. The 2 to 8 year lag between the manufacture and use of first-story primary beams in both units may reflect the systematic stockpiling and seasoning of these major load-bearing elements, a treatment that seems not to have been applied to secondary beams and intramural-aperture elements. Whether this type of primary beam stockpiling was practiced in second- and third-story contexts is unknown. Considerable exchange of wood between North Blocks B and C is evident. Timbers cut in the 1034-1039 interval, undoubtedly in connection with North Block B construction, show up as intramural-aperture elements in North Block C rooms built in the late 1040s. Similarly, logs cut in the 1045-1048 period for North Block C first-story construction occur as intramural-aperture elements in upper-story features of North Block B built after 1050. This interchange testifies to the existence of a common stockpile of wood and to a substantial amount of long-term cooperation between the builders of North Block B and North Block C.

As noted previously, the builders of North Block C used an unusual technique to support the southern ends of the first-story primary beams. The obvious method would have been to make sockets at appropriate places in the existing north wall of North Block B. Ever devious, the Chaquenos eschewed the obvious and erected against the back wall of North Block B a one-story double wall whose main apparent function is to support the southern ends of the primaries, which do not reach the North Block B wall. Lekson (Chapter IV) implies that this technique was employed to preserve the integrity of the existing exterior wall of North Block B. Yet the inhabitants of Chetro Ketl commonly made much greater modifications to existing walls elsewhere in the pueblo. Furthermore, the aperture in the wall between Rooms 46 and 48 provides concrete evidence for the actual alteration of the North Block B back wall in connection with the construction of North Block C. A second possibility is that the double wall was erected to buttress the exterior wall of North Block B against stresses expected to result from the addition of second and third stories to the rooms of this unit. The archaeological and dendrochronological evidence for the systematic stockpiling of first-story primary beams supports the idea that expediency rather than esthetic or structural considerations accounts for the double wall. Thus, a third possibility is that the builders of North Block C had to erect the double wall because they had inadvertently made the rooms too wide for a set of primary beams that had already been cut to a prescribed length.

North Block D

This unit consists of an indeterminate number of rooms arranged in three rows extending an unknown distance eastward from the eastern terminus of North Blocks B and C. Abutments indicate that at least the second story of North Block D postdates the equivalent floor level of North Blocks B and C. Fill obscures the first story of North Block D; consequently, the relationship of its walls to the first-story level of North Blocks B and C is unknown. Following Hawley (1934:Plate XII), Lekson infers that the third story of North Block C was erected at the same time that the second and third stories of North Block D were built.

Room 107. Three primary sized beam stubs project from the north wall at second-story ceiling height. Old photographs show two beam stubs in the same position, but the remnants now present may be replacements for the originals (Chapter III). Duplication of our sample 23 with GP-2210, which was collected from an in situ roof beam in Room 107 by O'Bryan (1940) establishes that the Gila Pueblo sample was cut from the easternmost of the three beams now there. The two remaining beam remnants are too heavily weathered to produce cutting dates; consequently, we did not core them in 1979. Second-story secondary beams in the east wall and third-story intramural elements in the north and east walls are not suitable for sampling.

The 1045 date from the sill in the blocked first-story doorway in the east wall of Room 39 is potentially relevant to first-story construction in Room 107. Unfortunately, the degree of relevance depends on a variety of poorly controlled factors. One unanswered question is whether the doorway was created to further communication between Rooms 39 and 107 or was blocked to prevent such communication. A second unresolved problem is whether the doorway is an original feature of Room 39, which is dated to the 1038-1040 interval, or is a late addition to it. A third uncontrolled variable is whether the sill date relates to the construction or the blocking of the aperture. Finally, the sill could have been incorporated into the doorway soon after it was cut, or it could be a reused or stockpiled element that was added to the aperture some years after it was cut. A bewildering variety of dating options is generated by the interaction of these factors. Although some of these options can be eliminated because they conflict with the stratigraphic fact that Room 107 postdates Room 39 or with the inferred dating of Room 39, several others cannot be rejected. It would seem best, therefore, not to put too much interpretive weight on a single date of uncertain relevance to the event in question. Suffice it to say that if the doorway and sill have any connection at all with Room 107, the data weakly support placement of first-story construction in Room 107 in 1045 or later. Some second-story construction or repair activity in or after 1053 is specified by the date of GP-2210.

The lack of comparative dates precludes a decision as to whether original construction or repair is indicated by the date, although the former seems more likely.

Room 108. Lintels over a second-story doorway and ventilator in the north wall and over a second-story niche in the south wall are the only elements associated with Room 108. The lintels in the vent and the niche are too small to justify sampling. Six of the seven lintels in the doorway were cored. The remaining lintel is too weathered to yield a useful date, and it was not sampled. There is no evidence to suggest that these lintels are modern replacements; therefore, the dates indicate that the second-story doorway connecting Room 108 and Room 109 probably was built in 1050 or later with at least two lintels that had been cut in connection with first-story construction in North Block C.

Room 109. The only wooden elements in Room 109 are lintels associated with second-story vents in the north and south walls and with the doorway that opens into Room 108. The ventilator lintels were not cored because of their small size and weathered surfaces. Dates from the doorway connecting Room 108 and 109 indicate that the second-story level of the wall between the two rooms probably was erected no earlier than 1050.

Room 110. Wooden elements associated with this chamber are confined to lintels over various second-story apertures in the east and south walls. One of four lintels in a doorway in the east wall was cored. Two of the three remaining lintels are too small to be worth sampling, and one is Populus. This doorway was completely rebuilt by the Park Service (Chapter III). Lintels over a blocked vent in the south wall are too small to date and were not sampled. Despite field identification of six of the seven lintels over a doorway in the south wall as Populus, two of them were cored. Both these samples were confirmed as Populus, and they yielded no dates. The single date from Room 110 comes from a Park Service repair lintel and is irrelevant to the temporal placement of this chamber.

Other North Block D Rooms. Intramural and aperture elements in Room 111, in the room east of Room 110, and in the chamber south of Room 111 were not sampled because they are too small and badly weathered. Secondary beam stubs in the west wall of the room south of Room 111 are inaccessible and could not be cored.

North Block D, Summary

Six relevant dates provide an inadequate basis for resolving the chronological problems connected with this architectural unit. One

matter of interest is the temporal relationship between initial North Block D construction and the developmental sequences of North Blocks B and C. Although the first story of North Block D is thought to post-date the equivalent levels of North Blocks B and C, it is not clear whether the North Block D first story is intermediate in time between the North Block C first story and the North Block D second story, or is contemporaneous with the second story of North Block D (Chapter IV). The 1045 date from the sill of the blocked doorway in the east wall of Room 39 provides weak support for the former alternative; however, lack of wood samples from the first story of North Block D itself prevents a dendrochronological resolution of this problem. Some second-story construction in North Block D probably dates to the early 1050s, and is therefore contemporaneous with upper-story construction in North Blocks B and C. This dating supports Lekson's equation of upper-story construction in North Blocks C and D, although the lack of third-story dates from North Block D precludes dendrochronological confirmation of the idea that the third floors of these units are continuous. There can be little doubt, however, that second-story construction in North Block D was related to contemporaneous first-story alterations and upper-story construction in North Blocks B and C.

North Block E

This unit consists of a block of rooms and kivas abutted to the south side of the middle row of North Block B chambers. North Block E was built over the razed south row of North Block B rooms and over some of the kivas that fronted these rooms. This circumstance should have created a supply of timbers salvaged from the chambers that were demolished to make room for North Block E. Abutments and other mural relationships reveal North Block E to have a complex history revolving around the construction of various kivas and clusters of rooms associated with them. Important chronological problems revealed by Lekson and McKenna's architectural analyses include the relationship of North Block E to other units of Chetro Ketl and the interrelationships among Kivas I and J, the Kiva N complex, an unnumbered kiva that was converted into Rooms 29 and 31, and a row of rooms (33, 33/73, 73 and 88) across the front of the North Block E unit. Despite the probability of a high frequency of reused materials salvaged from the razed North Block B structures, the tree-ring dates should help resolve some of these problems.

Our analysis of the dates from North Block E is organized according to Lekson's reconstruction of the building sequence in this unit. We consider first the Kiva N complex, which is thought to be the earliest component of North Block E. This unit consists of Kiva N, its rectangular enclosure, and Rooms 70 and 89. Second is the Kiva I-J complex consisting of these two circular chambers in their rectangular enclosures and Rooms 71, 71A, 72, and 74. The third unit includes the possible Tower Kiva that was converted into Rooms 29, 30, and 31

and the row of chambers extending west from this structure, Rooms 33, 33/73, 73, and 88.

Kiva N Complex

Room 70 has been sampled on at least three occasions. Lassetter cored three first-story primary beams and a primary sized intramural log in the west wall, probably in 1931. Nine years later O'Bryan recored the same four timbers for Gila Pueblo. In 1979, we sampled these four logs yet again and, in addition, cored a fourth primary beam that previously had not been sampled. Duplication within each set of three cores removed from each of the four sampled timbers (Appendix B) confirms the earlier assignment of these elements to this chamber and establishes their relevance for dating first-story construction in Room 70. The failure of Lassetter and O'Bryan to sample the fourth primary, Beam 2, raises the possibility that this log is a stabilization element introduced into this room after 1940. However, the absence of other indications that it might be spurious leads us to accept its association with this chamber. In 1979 we also sampled a first-story intramural beam in the north wall, which is identified by a sawed end as a modern stabilization element. Four of seven lintels over a first-story doorway near the east end of the south wall were cored, as was a single lintel over a first-story doorway in the middle of the same wall. Other lintels associated with these apertures are too small, weathered, or rotten to repay sampling. Logs associated with a blocked second-story aperture in the east wall are inaccessible. A post supporting the cracked Primary Beam 1 is an obvious modern repair element and was not sampled. A hewn plank of unknown origin was found in Room 70 after the 1947 flood.

First-story construction in Room 70 almost certainly postdates 1051 and probably occurred in 1056 or later. The ambivalence of this statement is due chiefly to the slightly questionable status of Primary Beam 2, which produced the latest date from the room. Furthermore, it is remotely possible that the 1056 date represents the repair of a ceiling built earlier in the decade. Beam 4 probably was left over from the initial construction of North Block C and used several years later in Room 70. Both intramural logs conform to a pattern evident throughout North Blocks B and C for timbers cut in the later 1040s to be used in intramural contexts. The noncutting date of 1037 from the plank found in Room 70 is irrelevant to the temporal placement of the chamber. No dates were derived from any of the aperture elements associated with this room. Dated at 1056 or later, Room 70 postdated by nearly 20 years the initial construction of North Block B to which it is abutted. It also postdates initial North Block C construction by nearly 10 years. Therefore, the construction of Room 70 appears not to be related to that of North Block C despite the use of double walls in both (Chapter IV). Room 70 does appear to be earlier than the other components of the Kiva N Complex and thus to be intermediate in time between the North Block C first-story construction episode and the erection of Kiva N.

Kiva N. All the wood samples associated with this chamber seem to be related to the somewhat enigmatic first-story rather than to the second-story kiva. Hawley and her colleagues apparently collected only two samples from Kiva N (her Kiva K), both probably from first-story ceiling beams. The most intriguing samples of potential relevance to Kiva N were collected by Gordon Vivian in 1948 from a feature 9' below the present ground surface in Room 87. This feature is a low, roofed "passageway" (See Room 87, Chapter II). Vivian inferred this structure to be a possible subterranean entrance into the lower level of Kiva N. Four ceiling planks and two plank shelves from a niche in one of the walls of this feature were sampled. In 1979, we cored four first-story ceiling elements in Kiva N, even though all ten appeared to be recent additions. The six other beam remnants are too weathered and too rotten to produce useful dates, and they were not sampled. Lintels over a large "T" doorway on the west side of the chamber were not cored because of their obvious Park Service origin. A doorway in the north arc of the kiva is aligned with a blocked doorway in a separate wall situated behind that of the kiva. Presumably, this second wall is the south wall of Room 89, and the blocked doorway originally opened into the second story of that room. Lintels over the aperture in the kiva wall are too small and rotten to sample. We did, however, core four of the six lintels associated with the blocked doorway in the second wall.

The dating situation in Kiva N, an unusual and complex structure to begin with, is complicated by wood transferrals made in the last 50 years. Hawley's (1934) Plate III.4 shows three beam remnants in the eastern arc of the kiva that are different from the complete logs (Beams 1, 2, and 3) now in the same positions. Extensive shaping with a metal ax betrays Beam 1's status as a recent replacement. Duplication of our samples 187 (CK-1278), 186 (CK-1277) and 185 (CK-1276) with beams originally assigned by Hawley (1934:Protocol 1) to Room 46 (CK-101), Room 48 (CK-84), and Room 27 (CK-308) identify Beams 2, 3, and 10 respectively as post-1930 additions to Kiva N. In all probability, the heavily weathered, unsampled Beams 4 through 9 also are stabilization elements imported from elsewhere in the pueblo. Conversely, the identity of our sample 194 (CK-1285) from Beam 2 in Room 27 with CK-319, which is attributed to Kiva N (Hawley 1934:Protocol 1), isolates a post-1930 instance of the transfer of a timber out of Kiva N into another chamber. As a result of all this, we are left with 12 samples of potential relevance to the dating of this structure: two probably from first-floor roof beams, four from lintels in the wall behind the north wall of the kiva and six from the buried feature that may have been a subterranean entrance into the kiva.

Only a single noncutting date, probably from a first-story roof beam, is directly associated with Kiva N. That this date of 1100 might be related to repair or remodelling is suggested by the dating of the blocked doorway in the wall behind the kiva wall and of the "passageway" beneath Room 87. The lintel date places construction of the north enclosing wall (the south wall of Room 89) in 1074 or later. This event was followed after an unknown interval by the blocking of

the aperture, which may have been related to the construction of the passageway. The passageway could have been built no earlier than 1079; however, as shown by the range of the plank dates, it could have been constructed considerably later than that. Nevertheless, if Kiva N and its enclosure were built as a unit, the evidence favors first-story construction in the kiva around 1074 with the first-story ceiling modifications following at least 26 years later. Strengthening or replacement of the first-story ceiling could have been necessitated by the construction of the second-story kiva on top of it. Based on the date of CK-319, Hawley (1934:27, Table II) gives a building date of 1099 for Kiva N.

Room 89. Open doorways in the wall between Rooms 70 and 89 indicate the existence below the present fill line of a floor level in Room 89 that communicated with the first-story level of Room 70. Therefore, apart from the lintels over these doorways, all the wood now associated with Room 89 belongs to the second-story level. Three primary beam remnants project from the south wall. Five smaller beam stubs (three in the south wall and two in the north) set below the primaries apparently are all that remain of a room-wide platform (Room 89, Chapter III). Lintels associated with a blocked doorway in the south wall are not visible from Room 89 but can be seen from Kiva N. A lintel over a niche or vent, two secondary sized beam ends, and two intramural elements are visible in the east wall. O'Bryan sampled one of the intramural elements and a loose log. Our sample 130 from one of the intramural beams duplicates GP-2199, which confirms Betancourt's (1979) assignment of this sample and GP-2198 to Room 89. We also cored the westernmost primary beam, Beam 3. Four lintels over the blocked doorway in the south wall were cored from inside Kiva N. Primary Beams 1 and 2 and the five platform beams are too weathered and decayed to yield usable cores. The outermost lintel over the vent or niche in the east wall is too small to repay sampling, and the two secondary sized beams in the same wall are inaccessible.

The absence of dates relevant to the first story precludes a decision as to whether this level of Room 89 is contemporaneous with or later than the first story of Room 70. Unless the blocked doorway in the south wall is a late addition to Room 89, which seems unlikely, the date from one of its lintels places construction of the second-story south wall no earlier than 1074. If Beam 3 is genuinely associated with Room 89, it probably is a salvaged or stockpiled timber used in or after 1074. Since the south wall of Room 89 forms part of the enclosure of Kiva N, it seems probable that equivalent levels of the two chambers were erected at the same time or times. Certainly the alignment of the doorways in the walls between Room 89 and Kiva N testifies to a relationship between the two chambers of sufficient intimacy to imply contemporaneity. Therefore, we infer that both Room 89 and Kiva N were built to two-story height around 1074. Third-story level construction in both chambers could have occurred at the same time as second-story construction or at a later date, perhaps after 1100. The doorway linking Room 89 with Kiva N may have been blocked in connection with the construction of a tunnel entrance into the kiva, an event that postdated 1079.

Summary. On the basis of the few dates available, the Kiva N Complex appears not to be a coherent structural and temporal unit. Room 70 seems to predate the other two chambers, Room 89 and Kiva N, by nearly two decades. This statement must be tempered with the qualifications that we have no good evidence as to the date of the floor levels in Room 89 and Kiva N that correspond to the first story of Room 70. Furthermore, there are too few well controlled dates to permit the unequivocal rejection of the hypothesis that both Kiva N and Room 89 were built after 1099 (Hawley 1934:27, Table II). Despite these problems, the evidence supports the following reconstruction of the development of the Kiva N Complex. Room 70 was appended to the front of North Block B in the middle 1050s, an event that may have been related to the widespread second-story construction throughout North Blocks B and C in the 1050s. Room 70 may have stood alone against the south side of North Block B for nearly 20 years before Room 89 and Kiva N were abutted onto it in the early 1070s. Kiva N and Room 89 probably were raised to the second-story height of the latter chamber around 1074. For a time the present first story of the kiva was connected with the second story of Room 89 by a pair of aligned doorways. Subsequently, this portal was blocked, perhaps when a new entry into the kiva, the subterranean "passageway," was built after 1079. Sometime after 1100 the first-story ceiling of the kiva was repaired or replaced. Given the strong association between first-story ceiling repair and second-story construction throughout North Blocks B and C, it is not unlikely that the repair of Kiva N's first-story ceiling was related to the construction of the second-story kiva. In this reconstruction Kiva N was in existence as early as the middle 1070s, but did not assume the aspect of a tower kiva until the twelfth century. However, it also is possible that the unit was raised to full two-story height in the 1070s and that the 1100 date represents roof repair unrelated to the upper kiva.

Kiva I-J Complex

Kivas I and J are considered together because a common wall indicates they were built as a unit (Chapter IV). In 1930 Stallings sampled five "poles projecting from the bench" of Kiva I. These "poles" probably were components of a pole-and-wattle wainscotting that extended around the circumference of the kiva above and behind the bench (Kiva I, Chapter II). Two, squared, wooden pilaster blocks on the bench of Kiva I have been cored; one by Lassetter in 1931 and one by O'Bryan in 1940. For reasons developed in the discussion of the Kiva G Complex, two charcoal samples (CK-350-2 and CK-350-3) with tags ascribing them to Kiva I are tentatively assigned to Kiva G-1. Lassetter collected seven samples from unspecified proveniences in Kiva J. O'Bryan (1940) removed a section from a lintel in the unnumbered triangular compartment at the northeast corner of the Kiva J enclosure. This lintel may have been associated with the blocked doorway in the south wall of Room 56 and therefore may not be relevant to the dating of the kiva. None of the wood now associated with Kivas I and J and the walls that enclose them is suitable for sampling; beam remnants in the enclosing wall south of Kiva I are too fragmentary; elements

associated with apertures in the triangular compartments at the corners of the kiva enclosures are too small, too rotten, or of modern origin. The pilaster blocks remaining in both kivas are far too weathered and decayed to be worth sampling.

Three of the four Kiva I dates listed by Hawley (1934:Protocol 1) failed to survive our reanalysis of the Chetro Ketl collections. One (CK-169) was rejected because the ring series is too short and complacent for acceptable crossdating. The other three dates were recognized as coming from the same tree and were reduced to a single date. This date indicates that the wainscotting could have been built in 1087 or anytime thereafter. The relevance of this date to the construction of Kiva I depends on whether the wainscotting was an original feature of this structure or a postconstruction addition. The northeast pilaster block was set in place on the bench of Kiva I sometime after 1061. Considering the number of rings that could have been removed during the shaping process, this element could have been emplaced many years after that date. If CK-350-3 belongs in Kiva I rather than in Kiva G, its date signifies that some activity of unknown character took place in the former structure sometime after 1101. Although all the dates from Kiva J are noncutting dates, each falls within one of the prominent Chetro Ketl date clusters. It is tempting to infer from this distribution that dates at 1033, 1039, and 1040 come from timbers salvaged from the portion of North Block B that was razed to make room for North Block E and that the 1043 date represents a timber cut for use in North Block C. No firm conclusions can be drawn from the few dates available for Kivas I and J. Some activity is indicated in the later 1080s (or perhaps even the early 1100s), but whether this relates to initial construction or to subsequent modification cannot be determined. Hawley (1934:27, Table II) gives a building date of 1090 for Kiva I.

Room 71A. Most of the wood in Room 71A is associated with a partially blocked second-story doorway in the south wall. We cored the three large lintels over this aperture. Wooden elements in secondary jambs at the sides of the doorway are either too small to reward sampling or, in the case of a hewn plank, too altered by shaping to produce a useful date. A wooden "sill" associated with this aperture is not socketed in either jamb and was not cored because of its questionable relevance to this room. Small wooden elements visible in the east and west walls are embedded in the masonry and could not be sampled. The two dates from the south doorway probably are much too early for second-story construction in North Block E. As is the case with many aperture elements, these lintels probably are reused or stockpiled timbers cut many years before they were incorporated into this particular doorway. We are left, then, with no dendrochronological indication of the construction date from Room 71A.

Rooms 71, 72, and 74 have produced no tree-ring samples. The only wood now associated with these chambers, a small beam remnant in the south wall of Room 71, is too rotten to be worth sampling.

Summary. Little information on the temporal placement of the Kiva I-J Complex and its components is afforded by the few dates available for this unit. Most of the wood recovered from this complex appears to have been reused, probably after being rescued from demolished parts of North Block B, or stockpiled. Some building or remodelling in the late 1080s is specified by a date from Kiva I, but whether this date can be applied to the initial construction of the kiva or the Kiva I-J Complex as a whole is problematical. A post-1086 date for the Kiva I-J Complex would be consistent with its postulated relationship to the Kiva N Complex (Chapter IV) and to North Block F. A date from a charcoal fragment found in Kiva I specifies some kind of activity in this area of Chetro Ketl in the early twelfth century.

Unnumbered Kiva Complex

Rooms 29, 30, and 31 occupy the space formerly used as a possible tower kiva abutted to the south enclosing wall of the Kiva I-J Complex (Chapter II). A sample (CK-148) collected by Stallings (1930) from an intramural log in the "south wall of Room 87" is assigned by Hawley (1934:Protocol 1) to the present Room 31. Inaccuracies in Stallings' sketch map create considerable confusion as to exact provenience of this sample within Room 31. All things considered, it seems most likely that CK-148 represents a log embedded in the north wall of this chamber, probably at a level above that of the first-story roof. It is remotely possible that the sample was cut from the second-story intramural log presently visible in the north wall (Chapter III). Sample duplication cannot be used to investigate this possibility because we did not core this heavily weathered timber, the only wooden element now associated with these chambers. The single date indicates only that second-story wall construction in Room 31, and the subdivision of the kiva, took place in 1061 or later. Given the frequency of occurrence of reused and stockpiled timbers in intramural contexts, these events could have occurred many years after 1061. Despite the availability of a date from Room 31, Hawley does not offer an estimated building date for this chamber.

Rooms 33, 33/37, and 73. No tree-ring samples are attributed to these rooms. The only wood now associated with these chambers are small lintels over a vent in the south wall of Room 73 and a decayed and fragmentary remnant of a primary beam in the north wall of the same room. Because none of these elements would produce useful dates, we did not sample them in 1979.

Room 88, which had not been sampled prior to 1979, contains a number of wooden elements. All of the six primary beam stubs that protrude from the north wall are too badly weathered to provide useful dates. Our attempt to sample the least eroded of these remnants failed when the core disintegrated due to the log's advanced state of decay.

An inaccessible ceiling level stub in the south wall probably is associated with Room 105. We successfully cored four of eight secondary roof timbers at the west end of Room 88, the other four being too small or too weathered to warrant sampling. Six poles spanning the short axis of the room approximately halfway between floor and ceiling define two room-wide platforms. Two of these poles are too small to be sampled; the other four were cored. Six elements lying on top of and at right angles to the platform poles at the west end of the room are too small to repay sampling. Two doorways in the west wall, one situated directly above the other, provide access to the floor of the room and to the top of the platform. We cored an extremely large lintel associated with the upper doorway and three of the eight lintels over the lower doorway. The remaining lintels are too small or too weathered to be worth sampling.

Only three dates were derived from the 12 samples collected from Room 88. This meager array of dates is of dubious value due to the possibility that the timbers from which the dates come are stabilization elements introduced into the room in 1932 (Chapter II). If their associations with Room 88 are genuine, the dates indicate construction of the lower doorway and the ceiling in the late 1070s. This date may be a little too early given the evidence that Room 88 was formed by the erection of its south wall some time after the construction of its north wall, which is the south wall of the Kiva N enclosure (Chapter II). Three explanations of this apparent anomaly are possible. First, the dates may represent timbers salvaged from earlier, Kiva N related features such as those that now underlie Room 88. Second, the absence from the south wall of sockets for the six primary beams in the north wall raises the possibility that the south wall is a stabilization feature of no relevance to the relative temporal relationship between Kiva N and Room 88. Third, the dates come from stabilization elements unrelated to prehistoric construction events connected with Room 88.

Summary. Dendrochronology contributes little to the explication of the complex developmental chronology of the Unnumbered Kiva Complex. Few dates are available, and many of these are of questionable relevance to prehistoric events. Although the dates seem not to corroborate Lekson's relative dating of this complex within North Block E, they are consistent with evidence from the Kiva N and Kiva I-J Complexes that supports Lekson's placement of North Block E relative to the other North Block construction units.

North Block E, Summary

Although there are too few well controlled tree-ring dates to provide a detailed developmental chronology for North Block E, the dates do support Lekson's characterization of the complexity of the architectural unit and his placement of it between North Blocks D and F. Room

70 probably was appended to the front of North Block B after the completion of the first story of North Block D and nearly 20 years before the rest of North Block E was begun. The first event in the history of North Block E proper probably was the construction in the first half of the 1070s of the Kiva N Complex. Modification of Kiva N's first-story ceiling in or after 1099 may relate to the construction of the second-story ceremonial chamber in the Kiva N cylinder. If so, the second-story Kiva N postdates the adjacent Kiva I-J Complex, which almost certainly was in place no later than 1087. The Unnumbered Kiva Complex is not securely dated. Mural relationships show it to be later than the Kiva N and Kiva I-J Complexes; therefore, it probably postdates 1087. Except for Room 70, North Block E appears to have developed over a period of at least 25 years (1074-1099) through the piecemeal accretion of the three kiva complexes combined with upper-story construction in the Kiva N complex. Probably North Block E was fully developed by 1100, when North Block F was begun.

Room 38. Lekson indicates that Room 38 predates North Block F; however, he is unable to assign it to any of the five earlier North Block units. Placement of this chamber, therefore, would seem to depend on the tree-ring dates. Hawley (1934:Protocol 1) lists two samples from Room 38, one each from the first and second floors, that probably represent roof beams. CK-234, from the second floor, now is missing from the Chetro Ketl collection, and the date derived by Hawley is not included in Appendix B. Two samples, CK-29 and 334, are tentatively assigned to this room on the basis of tag information attributing them to Room 12, which is the equivalent of either Room 38 or Room 23 (Table V:3). At present, wood in Room 38 is confined to lintels associated with orifices in the north and south walls. Dates from four sampled lintels over a doorway in the north wall may be more relevant to Room 39 than to Room 38. We also cored four of six lintels over a large "T" door in the south wall. The two other lintels are of molded concrete, which suggests that all the lintels in the aperture are stabilization elements, an indication that is supported by Vivian (1948: 106-107, 113). Lintels associated with a niche in the south wall are too small to be datable and were not sampled.

Temporal placement of Room 38 depends on architectural stratigraphy within this chamber and on the room's relationship to the fairly well dated Room 39 next door. Architectural features beneath the floor of Room 38 reveal this chamber to have been built over the partially razed walls of earlier rooms (Figure II:4). As a result, the first-story floor of Room 38 is considerably higher than the first-story floor in Room 39. In fact, Room 38's floor lies above the lower of two doorways in the north wall of Room 39. This doorway, which connected Room 39 with the chambers that preceded Room 38, was blocked, probably when these chambers were partly demolished and the area filled to raise the floor of Room 38 above the wall remnants. A higher, open doorway in the same wall opens into the first-story level of Room 38. As indicated in the discussion of Room 39, we believe the upper aperture to be a late addition to the room and consider this doorway to have been built in or after 1054. If the foregoing inferences are correct, Room 38 probably was not constructed before 1054. Given the common occurrence of reused and stockpiled elements in apertures, Room 38 could

postdate 1054 by many years. Hawley's (1934:Protocol 1) unconfirmed cutting date of 1073 for CK-324 may indicate that the second story was built around that year, which would place first-story construction between 1054 and 1073. A date of 1102 from the first floor complicates things. This date could reflect repair of the first-story ceiling either before or after the erection of the second-story. If before, CK-324 would have to represent a reused or stockpiled element. Alternatively, both stories may have been built in or after 1102, in which case all other dates would represent salvaged or stockpiled timbers. Although too little information is available to permit a choice among these possibilities, it seems likely that the 1102 date reflects alterations to Room 38 that accompanied the construction of North Block F. The date from one of the lintels over the southern entrance to Room 38 is irrelevant because of the questionable status of these elements. About all that can be said with certainty is that Room 38 was built no earlier than 1054 and probably no later than 1090, which is the earliest probable beginning date for North Block F construction. This broad placement is of little help in assigning this room to one of the North Block construction units. Hawley (1934:Table III) gives a building date of 1102 for the second floor of Room 38, although the sample that yielded that date is assigned to the first floor (Hawley 1934:Protocol 1).

A 1050s' construction date for Room 38 possesses a certain symmetry with the dating of Room 70. Both these chambers were appended to the front of what remained of North Block B after it had been partially razed, and both seem to fall in hiatuses between major construction episodes. It is tempting to hypothesize that these two rooms were built at about the same time and that both projected out of the newly created front of North Block B until the 1070s when North Block E was begun. If this hypothesis is correct, the southern one or two rows of North Block B rooms would have been demolished by the middle 1050s. An alternative hypothesis that the partial demolition of North Block B progressed gradually from west to east over a period of many years is supported by several bits of evidence: 1) the equivocal dating of Room 38 makes it possible that this chamber was built nearly 50 years after Room 70; 2) North Block E predates North Block F; 3) construction within North Block E proceeded from west to east. Whichever dating alternative is correct, the partial demolition of North Block B was a major event in the architectural history of Chetro Ketl and is comparable in scope to the construction of other North Block units.

North Block F

North Block F, which consists of Kiva G and 12 to 14 associated rooms, was erected in the angle formed by North Block E on the west and the intact portion of North Block B on the north. North Block F overlies razed rooms and kivas that belonged to North Block B. As is the case with North Block E, there is a high potential for the occurrence in North Block F of wood salvaged from the demolished sections of North Block B. Lekson believes North Block F to have been built as a unit

and subsequently modified only slightly, apart from extensive alterations to Kiva G itself.

Kiva G. The Kiva G complex consists of three sequential stages of an elevated kiva set within a rectangular masonry enclosure. Kiva G-3, the earliest stage of the complex, was partially razed to provide a foundation for Kiva G-2, which was built on top of it. Kiva G-1, the latest stage, is a modification of G-2 created by raising the floor level and veneering the bench with masonry. The superposition of one kiva on top of another produced an imposing edifice that looms over the surrounding rooms, but that is not a tower kiva in the strict sense of the term. Portions of five earlier kivas, labelled G-4 through G-8 by the excavators (Miller 1937), underlie the Kiva G Complex. Presumably, these earlier circular chambers, of which G-5 was the most completely exposed, were associated with one or more stages of North Block B.

Confusion surrounds a group of samples, CK-600 through CK-609, ascribed to the Kiva G Complex by Miller (1937) but assigned to Talus Unit 1 by Hawley (1934:Protocol 1). All but two of these specimens, CK-604 and 606, are missing from the Tree-Ring Laboratory's collections (Robinson, Harrill, and Warren 1974:40). Tag information establishes that some of the four samples (CK-601, 602, 604, and 607) attributed to Kiva G-5 by Miller (1937:84) were cataloged under different numbers (see the discussion of Kiva G-5 above). Miller (1937:20) also indicates that the number CK-600 was assigned to a sample from one of three logs used to secure the facing of Kiva G-1 to the wall of Kiva G-2. The provenience muddle regarding CK-600 through CK-609 is aggravated by a sample labelled CK-606 that the laboratory received from Hawley in 1980. The date and the length of the ring series of this CK-606 (Appendix B) establish that it is not the same as the CK-606 attributed by Hawley (1934:Protocol 1) to Talus Unit 1. A tag affixed to our CK-606 bears notation "Chetro Ketl, East Tower Kiva." On the basis of this information, we have removed our CK-606 from Talus Unit 1 and given it an unknown provenience in Kiva G at Chetro Ketl. Provenience uncertainty also characterizes charcoal samples from three different trees cataloged together under the number CK-350. A tag attached to CK-350-1a bears the notation "East Tower Kiva." Tags affixed to CK-350-1c, f, and g; CK-350-2; and CK-350-3 once carried the same legend, which has been erased and replaced by the inscription "Kiva II." Thus, we are confronted with the dilemma of whether these samples belong to Kiva G or to Kiva I, the modern equivalents of Hawley's East Tower Kiva and Kiva II (Table V:3). We are inclined to provisionally assign all these samples to Kiva G on the assumption that the original tag information, having been inscribed closer to the time of collection, is more accurate than the emendations. This tentative assignment raises the intriguing possibility that these samples represent the charcoal found in the firepit of Kiva G-1 (Chapter II). Certainly the species (two of the samples are pinyon) are consistent with the notion that they represent firewood. Wood in a wainscotting above and behind the Kiva G-1 bench and probable roof beams inside Kiva G-1 (Chapter II) apparently were not sampled. The prevailing provenience uncertainties

and sampling deficiencies combine to make the Kiva G Complex far less well dated than it might have been.

Existing tree-ring samples relevant to the Kiva G Complex come from two principal sources; squared pilaster blocks on the Kiva G-1 bench and logs that span the four triangular corner compartments between the curved kiva wall and the walls of the rectangular enclosure. Three pilaster supports and 24 corner logs were sampled by Hawley and her colleagues in the 1930s. In 1940 O'Bryan collected GP-2209 from one of the pilaster blocks previously sampled by Hawley. Two other Gila Pueblo numbers, GP-1396 and GP-2171, represent plots made from published photographs of CK-331. We collected only one sample from Kiva G in 1979, a core from a log in the northwest corner compartment. Although three cores had previously been removed from this log, we were able to match our sample to only one older core, CK-136, which Stallings' field catalog assigns to the same location. At present, three of the four corner compartments are filled with earth; only the southwest compartment remains open. We did not sample the many logs in this compartment because all those visible had already been cored. In any case, most of these timbers are inaccessible. The only reason to sample these elements again would be to determine if the lower ones associated with Kiva G-3 date earlier than the higher ones associated with Kivas G-1 and G-2. This might be a useful project in the future. We did not core any of the wooden pilaster blocks on the Kiva G-1 bench because shaping, weathering, and decay have destroyed the outer rings on all of them.

Because extensive shaping has removed an undeterminable number of exterior rings from the squared wooden pilaster blocks on the Kiva G-1 bench, noncutting dates in the 900s from three of these elements are irrelevant to the dating of the kiva. Two clusters of cutting dates characterize the corner compartment timbers: one of three dates at 1049 and one of six dates at 1098-1100. The latter cluster is augmented by the 1099 date from the unprovenienced log, CK-606, that we transferred from Talus Unit 1 to Kiva G. The 1049 cluster undoubtedly represents reused or stockpiled timbers. The occurrence of 1098-1100 dates in three of the four corner compartments establishes that the Kiva G enclosure was completed no earlier than 1100. A date from a Room 22 ceiling beam socketed in the east wall of the enclosure coupled with the dating of other North Block F chambers indicates that the enclosure may have been built in or after 1103. The fact that the compartment logs are socketed in the enclosure walls, but only loosely seated in shallow recesses created by removing stones from the exterior of the kiva wall (Stallings 1930), indicates that the compartment log dates apply to the enclosure rather than directly to Kiva G and that the kiva predates the enclosure.

Lacking dates from Kiva G itself, we cannot estimate the magnitude of the hiatus between the kiva and the enclosure. However, the interval between the completion of Kiva G-2 and G-1 and the erection of the enclosure probably was brief. Kivas G-2 and G-1 probably were constructed no earlier than the late 1090s. Very shortly thereafter,

probably by 1103 at the latest, the rectangular enclosure, which incorporated reused wooden elements as well as fresh material cut over a 2- or 3-year period, was raised around the kiva. This dating is consistent with Hawley's (1934:29, Table III) estimated building date of 1103 for Kiva G. If the CK-350 charcoal samples really come from the firepit in Kiva G-1, their dates establish a lower limit for the last fire that burned in the kiva. Although this event could not have predated 1112, the virtual certainty that dead wood was used for fuel makes it impossible to estimate how long after 1112 it occurred.

Room 18. Five lintels over a first-story doorway in the south wall are the only wooden elements associated with this room. Even though these lintels appear to be modern stabilization elements (one has been cut with a saw), we cored four of them. The noncutting date derived from one of these samples is of no help in dating this chamber.

Room 20. All four lintels over a first-story doorway in the west wall appear to be modern additions to this room. None of the cores we extracted from three of these elements (the fourth is a piece of milled lumber) could be dated. Consequently, we have no dendrochronological evidence as to the temporal placement of the two chambers, Rooms 20 and 21, joined by this aperture. The lack of dates for these two rooms precludes a dendrochronological resolution of the question as to whether they belong in North Block F or H (Chapter IV).

Room 22. Five decayed remnants of first-story primary beams protrude from the west wall, which is the east wall of the Kiva G enclosure. Stallings cored one of these primaries, probably 22S:5, from inside the southeast corner compartment of the Kiva G enclosure. We did not sample these primaries in 1979 because they are too fragmentary on the Room 22 side of the wall and inaccessible from the Kiva G side. We also declined to core lintels of obvious modern origin over a doorway in the north wall. The single primary beam date, when considered in the context of other North Block F dates, indicates that the first story of Room 22 was not roofed before 1103. Our placement is identical to Hawley's (1934:Table III) building date for the first floor of this room.

Room 27. Hawley sampled several roof beams that she assigns to the second floor of Room 27 (Hawley 1934:Protocol 1). Sample duplication between her collection from Room 27 and ours reveals her second floor to be what is now recognized as the first story. This floor level equation is confirmed by Hawley's (1934:Plate IX.9) photograph of Room 27, mistakenly identified in the caption as Room 24, which shows the first-story ceiling beams and only low remnants of the second-story walls. Plate IX.9 also shows a second-story intramural log being sectioned. The caption identifies this log as the latest dated timber from Chetro Ketl, an element that is assigned to Room 27 in Protocol 1. This correspondence affirms the identification of the chamber in Plate

IX.9 as Room 27. In 1979 we cored seven second-story timbers in Room 27, six ceiling beams and one lintel of modern origin over a doorway in the north wall. Duplication between our core 185 (CK-1276) from Kiva N and Hawley's CK-308 from Room 27 reveals that the timber that produced these samples has been moved from Room 27 to Kiva N since the 1930s. Similarly, the identity of our core 194 (CK-1285) from Room 27 with Hawley's CK-319 from Kiva N specifies the recent transfer of a timber from Kiva N to Room 27. On the other hand, duplication between our sample 193 (CK-1284) and CK-309, and between our 195 (CK-1286) and CK-307 establish that two beams now in Room 27 are still where they were in the 1930s. Two saw cut beam stubs at the east end of the north wall are stabilization elements introduced into this room in 1947 (Vivian and Lancaster 1947:19).

The dates from Room 27 reflect the varied origins of the wooden elements now in the chamber. The two sawed beam stubs are identified as "ringers" by their species and their dates. Given that these dates of 850 are the earliest from Chetro Ketl and that pinyon is the least common species at the site, it would be interesting to know where the Park Service acquired these particular pieces of wood. Three of the dates that are genuinely associated with this room fairly securely place first-story ceiling construction around 1103, a date that is congruent with the placement of other North Block F chambers. Roof beam dates at 1061 and 1077 probably represent reused or stockpiled timbers. The 1080 date from a modern lintel in the north doorway is irrelevant to the original construction of this orifice. Hawley (1934:28, Table III) considers the intramural timber to date repair of the masonry wall in which it is embedded. We see no reason not to treat this element as an original component of the wall and are inclined to place second-story construction of Room 27 in or after 1117. If this placement is correct, the erection of the second story of Room 27 is the latest dated construction event in the history of Chetro Ketl. Our date of 1103 for the first story of Room 27 is consistent with Hawley's (1934: Table III) estimated building date of 1102 for her second floor, which is equivalent to our first. We differ from Hawley in considering the 1117 date to apply to the construction rather than the repair of the second story of Room 27.

Room 28. The only sample from this chamber was collected in 1940 by O'Bryan. At present there are two primary sized beam stubs in the east wall and one in the west wall. All these remnants are embedded too deeply in the masonry to be cored. In any case, all three are too weathered to produce useful dates. The single noncutting date contributes little to the temporal placement of Room 28, which, like the other North Block F chambers, undoubtedly postdates 1100.

Room 35. Hawley collected five samples from this room in 1931. Two of these are attributed to the first floor, three to the second (Hawley 1934:Protocol 1). At present we have no way of knowing how Hawley's floors relate to the stories now recognized in Room 35. Two first-story primary sized beam remnants now socketed in the east wall appear to have been sectioned, probably by Hawley. Both stubs are too weathered to produce useful dates, and we did not core them in 1979.

Two of the Room 35 dates listed by Hawley were changed as a result of our reanalysis of the Chetro Ketl collection. CK-310 is too complacent to be dated, and CK-322 was found to date at 1058 rather than 1068. These changes create a weak cluster at 1058, which consists entirely of samples assigned by Hawley to the first floor. If Hawley's first floor was underneath what is now recognized as the first story, these samples could represent materials associated with the razed part of North Block B that underlies North Block F. On the other hand, if these elements were associated with the present first story, they probably were salvaged from the demolished section of North Block B. In either case, the date from CK-314 indicates that Room 35, like the other dated components of North Block F, was built in the first pentad of the twelfth century. This placement is consistent with Hawley's (1934: Table III) building date of 1103 for the second floor of Room 35.

Room 37. The noncutting date derived from a sample collected by Hawley in 1932 contributes nothing to the temporal placement of this chamber.

North Block F, Summary

Lekson's contention that North Block F is a cohesive structural unit is strongly supported by the tree-ring data. Although few of the North Block F chambers have many dates, the clustering of latest dates from four different features at 1098-1103 places construction of the Kiva G enclosure and surrounding rooms in the first 5 years of the twelfth century. North Block F originated with the construction of Kiva G-3, an event that remains undated; however, it is unlikely that it predates the surrounding rooms by more than a few years. Dates from reused timbers that probably were salvaged from the razed sections of North Block B suggest that the earlier rooms were not demolished until after 1082 and that the Kiva G complex was not begun before 1090. Kiva G-2 must have been in place by 1100 when the enclosure was built around it. The modifications that produced Kiva G-1 could have been made between 1090 and 1103 with most of the construction concentrated in the last 5 years of that period. The addition of a second story to Room 27 in or after 1117 is the latest dated construction event in the history of Chetro Ketl.

North Block G

North Block G consists of two rows of rooms, one each on the south and west sides of North Block E. Few wood samples are available for this unit. Ceiling beam remnants in Rooms 81, 85, 87 and 105 are inaccessible or too badly weathered to produce useful samples. Secondary beam remnants in the east walls of Rooms 85 and 87 probably were introduced into these rooms during the stabilization of Kiva N. Lintels over various apertures in North Block G are too small or too

weathered to be cored or are stabilization elements of no relevance to the construction of the orifices with which they are associated.

Room 87. Wood samples from Room 87 are limited to the planks in the subfloor feature that may have been a passageway into Kiva N. The noncutting date of 1079 from one of these planks establishes a bottom limit for second-story construction in Room 87, which could have postdated 1079 by many years. Support for this limit is provided by the dates of two chambers that predate Room 87: Kiva N, which is dated to the middle 1070s, and Room 104, which may have been built after 1080. Unfortunately, we have no indication of how much later than 1080 this level of Room 87 was constructed.

Room 104. Most of the wooden elements associated with this room are unsuitable for sampling. Two first-story primary beam remnants in the south wall are too fragmentary to yield useful samples. Six first-story secondary beams protruding from the east wall are too small and too weathered to reward sampling. Thirteen poles that span the width of the room to form three room-wide platforms (one of two poles at the east end and one of four poles above one of seven poles at the west end) are too small to be datable. Several lintels are associated with various stages of a blocked and remodelled first-story doorway in the south wall. One of the lintels over the original doorway was cored by O'Bryan in 1940. This sample disintegrated and was discarded by Gila Pueblo. In 1979, we cored a different lintel over the same doorway. Other lintels associated with this aperture are too rotten to be cored. In 1954, the Ruins Stabilization Unit removed two wooden elements, a secondary beam and an intramural beam, from the west wall. A vertical intramural timber in the north wall is too badly decayed to be sampled.

The relevance of the single date from Room 104 is questionable because a saw cut marks this lintel as a stabilization element. The date of 1080 is consistent with the placement of adjacent chambers, which may indicate that the lintel is an original Room 104 element that was modified and reinstalled by the Park Service. If so, the construction of the first story of Room 104 can be placed at sometime after 1080.

North Block G, Summary

A few dates associated with rooms at the northwest extremity of North Block G indicate that it probably postdates 1080 by an unspecifiable number of years. Mural relationships place North Block G after North Block E's Kiva I-J Complex, which almost certainly was in place by 1087. These rather tenuous bits of evidence lead to the inference that North Block G was constructed sometime after 1087. Neither architectural relationships nor tree-ring dates permit the rejection of the possibility that North Block G was completed before North Block F was begun around 1100.

North Block H

This unit consists of single rows of rooms added to the south and west perimeters of North Block G, two chambers (Rooms 24 and 25) appended to the east side of North Block F, and possibly Rooms 20 and 21 on the south side of North Block F. A fragment of charcoal (CK-127) is tentatively assigned to Room 77 on the basis of Stallings' ascription of it to his Room 89, which appears on his sketch map (Figure V:1) to equate with the present Room 77. In 1979, we cored three lintels over a doorway in the wall between Rooms 20 and 21. Because none of these samples dated, dendrochronology can make no direct contribution to the dating of North Block H or to the resolution of the problem of whether Rooms 20 and 21 belong to North Block F or H. Mural relationships establish that North Block H was built after North Block F and therefore postdates 1103.

East Wing A

This unit consists of the first stories of three rows of six rooms each extending from Rooms 113 and 114 on the north to Rooms 121, 122, and 123 on the south. This part of Chetro Ketl has not been excavated, and most of its rooms are filled to first-story ceiling height. Most of the wood now visible in East Wing A is inaccessible, too small, too badly weathered, or too rotten to be sampled. Samples listed by Hawley (1934:Protocol 1) as coming from Rooms 101, 102, and 103 are now assigned to Rooms 121, 119, and 118 respectively (Table V:3) on the basis of the room numbers on her floor plan of Chetro Ketl (Hawley 1934:Plate X). Two samples collected by Judd in 1925 (JPB-143 and 144), attributed respectively to the "northeast corner" and the "middle of the east side" of Chetro Ketl, probably also come from East Wing A, although neither room nor story assignments can be made.

Rooms 113, 114, and 115. O'Bryan removed a section from the primary beam in the second room from the outside at the "southeast" (really the northeast) corner of the site. This description and O'Bryan's sketch map (Figure V:2) seem to specify either Room 113 or 115 as the source of GP-2208. However, none of the wooden elements presently in Room 113 show evidence of having been sawed, and Room 115 currently contains no wood. Four first-story timbers in Room 113, two primary beam stubs in the west wall and two secondary remnants in the south wall, are too deeply embedded in masonry to be sampled. One of two first-story primary beam remnants in the east wall of Room 114 has been sawed. In the absence of other candidates, this log might be the source of GP-2208. Both these beams and first- and second-story secondary beam stubs are too fragmentary to produce useful dates, and none of them were cored in 1979. GP-2208 yielded a noncutting date that provides a weak indication that first-story ceiling construction in one of these rooms may have occurred in 1053 or later.

Rooms 116 and 117. For a variety of reasons, the wooden elements associated with these two chambers were not sampled in 1979. A first-story primary beam stub visible on the inside of the east wall of Room 116 is too weathered to yield a useful date, as is a fragmentary secondary beam in the north wall. Lintels over a pair of second-story vents in the east wall of Room 116 are too small to repay sampling. Two first-story primary beams visible on the outside of the east wall of Rooms 116 and 117 are too deeply embedded to be sampled.

Room 118. We consider the two samples (CK-325 and CK-326) that Hawley (1934:Protocol 1) assigns to Room 103 to come from the chamber now designated Room 118 (Table V:3). Sawed ends identify two of three first-story primary beam remnants in the east wall as the probable sources of Hawley's samples from this room. This probable identity supports the notion that Hawley's second floor corresponds with what is now recognized as the first story in the East Wing. All three primary beam stubs are too deeply embedded in masonry to be sampled at present. We did not core lintels over second-story vents in the east and west walls because these elements are too small to produce datable ring series. The two noncutting dates from the heavily weathered primary beams indicate only that first-story ceiling construction in Room 118 postdates 1007. Hawley's (1934:Table I) building date of 1048+ for the second floor (our first story) of her Room 103 (the present Room 118) probably is based on her dating of nearby chambers.

Room 119. Hawley (1934:Protocol 1) assigns CK-327 to Rooms 101 and 102, which now are designated Rooms 121 and 119 respectively (Table V:3). CK-327 probably was removed from a saw cut beam remnant that protrudes from the south wall just below a row of first-story secondary beam sockets. This stub was not sampled in 1979 because it is too weathered to produce a cutting date. Lintels over two vents in the east wall and one in the west wall are too small to repay sampling. The single noncutting date places first-story construction in this room to sometime after 1034. Hawley's (1934:Table I) building date of 1050 for the second floor (our first floor) of Room 102 (Room 119) probably is based on analogy with her dating of other East Wing chambers.

Room 121. Stallings' sketch map (Figure V:1) clearly indicates that his Room 23, from which CK-140 was collected, is the chamber now designated Room 121. Hawley's (1934:Protocol 1) assignment of CK-140 to Room 101 establishes the identity of this chamber with the current Room 121 and strengthens the equation of her Rooms 102 and 103 with the present Rooms 119 and 118. Following Stallings (1930), we consider CK-140 to come from what is now recognized as the first story, which is equivalent to Hawley's second floor. Currently the only wood associated with Room 121 are lintels over a second-story vent in the east wall that are too small to be sampled. The single cutting date places first-story construction in 1051 or later. Hawley's (1934:25, Table I) building date of 1050 for the second floor (our first story) of Room 101 (Room 121) undoubtedly is based on the date of CK-140.

East Wing A, Summary

The few provenienced dates from East Wing A provide weak support for the idea that this unit was erected in the early 1050s. This placement is supported by the dates from the two Judd samples (JPB-143 and 144) that probably come from somewhere in East Wing A. If this dating is correct, initial East Wing construction would have been contemporaneous with upper-story construction in North Blocks B, C, and D. The lack of first-story dates from North Block D precludes a dendrochronological determination of the temporal relationship between the North Block and the East Wing. Although it is possible that North Block D and East Wing A constitute a single addition to North Blocks B and C, the possibility that the first story of North Block D predates initial construction of the East Wing by a few years cannot at present be ruled out (Chapter IV).

East Wing B

This unit consists of the second story over East Wing A, and both first and second stories of Rooms 1 through 7. No wood samples are available for the second-story level of East Wing A; consequently, the dating analysis is restricted to the block of rooms added to the south end of East Wing A.

Rooms 1 and 4. A complex series of modifications, both prehistoric and modern, has confused the dating situation in this rather aberrant room. Originally, the first story of Rooms 1 and 4 was a single long chamber that, though apparently covered by one continuous ceiling, may have been divided into smaller units by insubstantial, perhaps jacal, partitions (Rooms 1 and 4, Chapter II). On the second-story level, the long room was divided into Rooms 1 and 4 by a masonry wall supported just above the level of the first-story ceiling by three massive logs socketed in the east and west walls. Two intramural beams that also spanned the room were embedded in the cross wall above a doorway that connected Rooms 1 and 4. While the second story still was in use, the long first-story room, along with the first stories of Rooms 2 through 7, was intentionally filled. Two or three huge logs lying on the first-story floor and oriented parallel to the long axis of the room were buried in the earth fill (Hewett 1921b:50). Excavation of these rooms in 1920 left the cross wall suspended in midair (attached only on either end), and in the 1930s Hewett introduced railroad iron and milled lumber into the wall to supplement the original support logs. Further stabilization was accomplished by the Park Service in 1963 when a masonry support pier was constructed beneath the cross wall (Richert and Voll 1964). These repair efforts altered the cross wall considerably. A doorway evident in Hewett's (1921b:50) photograph has disappeared. More to the point, one of the three original support logs is now missing. Furthermore, the present orientations of core holes indicate that the remaining support logs and intramural timbers have been moved since they were sampled in 1930.

Wood samples from the first story in Rooms 1 and 4 include two sections collected by Judd in 1925, samples from primary and secondary beams collected in 1930 by Hawley and Stallings, a core from a "beam" collected by Hawley in 1931, and cores from two primary beams and four of five lintels over a doorway in the south wall that we collected in 1979. Remnants of four additional primary beams in the east wall are too fragmentary to produce useful samples, and the uncored lintel is inaccessible. Judd's sample, JPB-142, which is unaccompanied by provenience information is assigned to this room on the basis of its identity with CK-1 and with our sample 15 from Beam 1, the northernmost of the six primaries. This sample correspondence, the identity between CK-130 and our sample 14 from Beam 4, and Hewett's (1921b:50) photograph of Rooms 1 and 4 authenticate the association of these samples with this chamber. This information also serves to confirm Stallings' (1930) assignment of them to the first story, which is thereby equated with Hawley's (1934:Protocol 1) second floor. Six samples from secondary beams (CK-2 through 7) are attributed to the first story on the strength of Stallings' (1930) statement that these elements rested on Beam 1. Confusion surrounds two additional samples that have a claim to association with Rooms 1 and 4. CK-9 is assigned to Room 4 by both Stallings (1930) and Hawley (1934:Protocol 1); CK-10 is attributed to this room by Stallings, while Hawley places it in Room 8A. Information on the tags affixed to these samples when they were collected attributes them to Stallings' Room 1, which is the present Room 9 (Table V:4). This placement is corroborated by the identity between CK-10 and our sample 1 (CK-1111) from Beam 2 in Room 9. Therefore, in accordance with the field tag information, both these samples are now assigned to Room 9.

Second-story samples from Rooms 1 and 4 include five cores from the cross wall collected in 1930. Stallings' notes indicate that in 1930 the cross wall was supported by three logs rather than just the two now present. Cores removed from the four cross wall logs visible in 1979 duplicate four of the five 1930 cores from the same feature. These correspondences affirm the authenticity of the logs still in the cross wall, although the alignments of the old core holes show these timbers to have been moved around within the wall since 1930. Intramural logs were sampled by Hawley and Stallings in 1930 and by us in 1979. Two of these intramural elements, CK-133 and CK-1117, pass through the west wall to tie the cross wall to the north wall of Room 2. We also cored an obvious modern lintel over the doorway connecting Rooms 1 and 2. One of Hawley's post-1930 samples, CK-369, has no provenience designation other than the room number and floor level.

Temporal placement of the first story of Rooms 1 and 4 is hampered by lack of definitive date clusters. Lintels over the south doorway produced a cluster of three dates at 1036+ to 1039. Other dates from Rooms 1 and 4 and the relationship of the East Wing to the rest of the pueblo make it extremely unlikely that this chamber was built at the same time as the first story of North Block B, the core unit of Chetro Ketl. Therefore, these lintels probably were salvaged from older sections of the site and reused in their present context. Two clusters of two dates each characterize the ceiling timbers. Dates from the

primaries cluster at 1053-1054, those from the secondaries at 1062. Two interpretations of this array are possible: (1) the ceiling was built around 1054 and remodelled around 1062; or (2) it was constructed around 1062 with at least two reused or stockpiled primary beams. Support for the first alternative is provided by the low probability of Beams 1 and 4 being reused or stockpiled elements. These massive primaries give every indication of having been manufactured specifically for this room, a herculean task if anything other than freshly cut timbers were used. Furthermore, the first alternative is consistent with the meager evidence for the dating of second-story construction. Although the second dating option cannot be absolutely rejected, we favor the idea that the first-story ceiling was built around 1054 and remodelled around 1062, probably in connection with the construction of the second story.

Lekson hypothesizes that the second stories of East Wings A and B were built at the same time as the first story of East Wing B: that is around the middle 1050s. However, the limited dendrochronological evidence available supports a date in the early 1060s for the second story of Rooms 1 and 4. In view of the considerable evidence from other sections of Chetro Ketl for the refurbishing of first-story ceilings at the time of second-story construction, it seems likely that the alterations to the first-story ceiling of Rooms 1 and 4 around 1062 were undertaken in connection with the construction of the second story. The noncutting date of 1061 from a second-story intramural timber that penetrates the west wall is consistent with this dating. The cross wall that divides the second story into Rooms 1 and 4 probably was not built before 1103, the latest date from the logs incorporated into this feature. Although not impossible, it is extremely unlikely that the log that produced the 1103 date, which is one of the three support timbers for the wall, is a late addition to the wall. Earlier dates from the cross wall are considered to represent reused or stockpiled elements. A less probable alternative dating scheme is that the cross wall was built when the second story was constructed in the early 1060s. A cutting date of 1063 from one of the cross wall support logs clusters with dates from the first-story ceiling and the second-story west wall that are thought to relate to second-story construction. If the cross wall was built in the 1060s, it must have been shored up in or after 1103 by the addition of a third support log.

Although the filling of the first story may have accompanied the partitioning of the second story, we think it probable that the lower chamber remained open for a time. Had the lower room been filled when the upper room was divided, there would have been no need to support the cross wall with socketed beams. The wall could have been erected directly on the fill as was done elsewhere in Chetro Ketl, particularly in North Block F, which was built over the partially razed and filled front section of North Block B. Furthermore, the improbability of any timbers having been implanted beneath the cross wall after the lower chamber was filled make it virtually certain that the first story was not filled before 1103, the latest date from a cross wall support log. Therefore, depending on whether the cross wall is dated to the early

1060s or to 1103, the filling of the lower room would have taken place around 1103 or at an unknown interval after that date.

We suspect that the huge logs found on the first-story floor are primary beams from the first-story ceiling that were dumped into the room before it was filled. These logs appear to be large enough to match the massive Beams 1 and 4, and it is hard to imagine how any other timbers of this size could have been introduced into this chamber without dismantling all the roofs. If this reasoning is correct, the first-story ceiling must have been dismantled or allowed to fall into disrepair after the second story was partitioned and before the lower chamber was filled. Intentional demolition of the ceiling seems more likely because the discarded logs are aligned perpendicular to the axis of the primary beams, not parallel to it as would be expected had the ceiling collapsed of its own accord.

In view of the arguments presented above, we believe the following sequence of events to have characterized the history of Rooms 1 and 4. The first story was built as one long, narrow chamber around 1054, only a couple years after the completion of East Wing A. Although the second story may have been constructed at this time, it more likely was added around 1062 when at least some of the first-story secondary beams were replaced. In or after 1103, the second story was partitioned into two rooms by a cross wall supported above the first-story ceiling by five large beams socketed in the east and west walls. Subsequently, the first-story ceiling was partially demolished, and the lower chamber was filled with dirt. The most likely alternative to the above reconstruction is that the cross wall was built when the second story was constructed in the early 1060s, and that the cross wall was strengthened by the addition of a fifth log when the lower chamber was filled around 1103. Whichever alternative is correct, Rooms 1 and 4 provide clear evidence of twelfth century construction in the East Wing contemporaneous with the erection of North Block F.

Our chronology for Rooms 1 and 4 differs considerably from Hawley's somewhat perplexing dating of the same units. She assigns a building date of 1063 to the first floor of Room 1 on the basis of four dates (Hawley 1934:Table II) that, although attributed to the first floor (Hawley 1934:Protocol 1), actually come from the second-story cross wall. Her building dates of 1060-1065 (Hawley 1934:28) and 1063 (Hawley 1934:Table II) for the first story of Room 4 appear to be based on six dates (Hawley 1934:Table II). Only five Room 4 dates are listed in Protocol 1, and all five are attributed to the second floor. Only four of these dates are presented in Appendix B because Hawley's date from CK-369 was rejected during our reanalysis of the Chetro Ketl tree-ring collections. Furthermore, it is impossible to equate the Room 4 dates given in Hawley's (1934) Table II with those listed in her Protocol 1. Because of all this confusion, it is not possible to determine why Hawley chose to assign Rooms 1 and 4 to the 1060s rather than to some other decade represented by dates from these chambers.

Room 2. Stallings' (1930) field catalog assigns four samples to Room 7, which, according to his sketch plan, is the present Room 2

(Table V:3). Hawley (1934:Protocol 1) attributes only three of these specimens to Room 2 and assigns the other (CK-65) to Room 44. For reasons presented in the Room 44 discussion, we accept Hawley's change, and, in addition, assign CK-64 to Room 44 as well. These provenience mixups, coupled with the status of the two remaining "Room 2" samples (CK-66 and CK-68) as isolated "East Wing" specimens in a long sequence of North Block samples (Appendix B), lead us to question the assignment of CK-66 and CK-68 to Room 2. It seems possible that these samples really come from the North Block and that their dates are not relevant to Room 2. This possibility cannot be confirmed with the data at hand. Stallings gives no floor designations for CK-66 and CK-68; however, Hawley (1934:Protocol 1) assigns one of them to the first floor and one to the second. The dates of 1039 from the first floor and 1053 from the second conform to the pattern of North Block B, which supports a North Block origin for these samples. A date of 1039 is too early for the first story of East Wing B, and if CK-68 really comes from Room 2, it must represent a reused timber. A 1053 date for second-story construction is not inconceivable, although it contradicts evidence from the east wall (CK-1117) and from Rooms 1 and 4 for a second-story building date in the early 1060s. Given the manifest uncertainties in the tree-ring collection from this chamber, it probably is best to regard Room 2 as undated. Hawley's (1934:28) date of 1060-1065 probably is based on analogy with her dating of other rooms in this section of Chetro Ketl.

Rooms 3, 5, 6, and 7. No samples are available from these components of East Wing B. The only wood now associated with these chambers are lintels and sills in various apertures. None of these elements merit sampling because of small size, obvious recent origin, unsuitable species, and/or inaccessibility. Therefore, we collected no material from these rooms in 1979.

East Wing B, Summary

Too few well controlled dates are available to permit the secure temporal placement of this unit. The most probable dating scheme places first-story construction in the middle 1050s, only a couple of years after the completion of East Wing A. Although second-story construction could have been contemporaneous with first-story construction, it more likely occurred nearly 10 years later in the early 1060s. Forty years later, the second story of Rooms 1 and 4 was partitioned into two smaller rooms. Sometime after this event, the first story of Rooms 1 and 4, and by extension those of the other East Wing B rooms, was intentionally filled, and the second story became the ground floor (Chapter IV). The absence of dates from the second-story rooms over East Block A precludes a dendrochronological determination of the temporal relationship between these rooms and the rest of East Wing B.

East Wings C and D

East Wing C consists of Room 9, a one-story chamber appended to the south end of East Wing B, and the "Moat," two parallel walls that extend in a shallow arc from the East Wing to the West Wing and enclose the south side of the Plaza. Sometime after East Wing C was completed, the floor of the Plaza was raised by the deposition of 4 to 5' of earth fill on top of the original Plaza surface. Subsequently, a row of rooms adjacent to the north side of the Moat was erected on the new Plaza surface. These rooms, which are assigned to East Wing D, overlie Room 9 and the Moat. Because the kivas at the southeast corner of the pueblo appear to have originated from the upper Plaza level, they are tentatively assigned to East Wing D (Chapter IV). We consider East Wings C and D together for two reasons. First, there are too few dates from too few features to permit detailed dating. Second, provenience uncertainties preclude the segregation of East Wing C material from East Wing D material.

Rooms 8, 8A, and 9. Prehistoric alterations, deterioration, and stabilization have created a confusing situation with regard to the features in this part of Chetro Ketl and their designations (Figure II:1). Room 9 is the earliest of these chambers, having been built as part of East Wing C. "Room 8" apparently denotes a space created when the East Wing D rooms were superimposed on Room 9. It is not clear, however, whether this appellation refers to the eastern part of the partitioned Room 9, to the chamber erected over the eastern end of Room 9 (if there was such a chamber), or to both. The designation "8A" does not appear on any map of Chetro Ketl, nor is "Room 8A" described by Hawley. The term may denote a continuation of the Moat that, as a part of East Wing B, bounded the east side of Room 9 or, as a part of East Wing D, was extended over Room 9 (Figure II:1). Architectural evidence for the relationships of the wooden elements to other structural components of these rooms is equally ambiguous. At present, there are four primary beam sockets in the north wall of Room 9. Only three of these have counterparts in the south wall. The absence in the south wall of a mate for the easternmost socket may mean that the ceiling of Room 9 was remodelled when East Wing D was added or that the socket was destroyed or obscured by deterioration or by stabilization work. Two of the four north wall sockets, the westernmost (Beam 1) and the easternmost (Beam 4) are empty. Beam 1 is represented by weathered remnants in the north and south walls. Beam 3 is an intact timber that spans the width of the room. Beams 9, 10, and 11 are secondaries that rest on Beam 3. The west wall of Room 8 appears to have been built around Beam 3 and the secondaries. These relationships, coupled with the absence of a south wall socket for Beam 4, indicate that Room 9 was at least partially reroofed when East Wing D was superimposed on it. It must be remembered, however, that these could be spurious relationships produced by recent stabilization work rather than by prehistoric activity. A passageway or deep recess in the exterior (east) wall had a roof supported by at least four timbers (from west to east, Beams 5 through 8). Beam 5 was a primary sized element now represented by

fragments of rotten wood in the sockets. Beam 6 is a much smaller timber that spans the passageway. Beams 7 and 8 are indicated only by empty sockets. The passageway could belong to either East Wing C or East Wing D.

The architectural ambiguities characteristic of these rooms are compounded by serious problems connected with the tree-ring samples. In 1979, we collected a fragment of wood from Beam 2 and cored Beam 3, which already had three 1-inch holes removed from it. We also cored Beam 10, one of two secondaries that previously had been sampled with a saw. The other secondaries and the wood associated with the passageway are too small and fragmentary to reward sampling. In 1940, O'Bryan collected samples that, according to his field notes (1940) must have come from Beam 5 over the passageway and Beam 3, a Room 9 primary. Stallings' and Hawley's 1930 collection from these rooms is plagued by discrepancies between the specimen tags, the field catalog, and the published record (Table V:4). A major problem is that some of the samples assigned to these rooms by Hawley (1934:Protocol 1) have tags with one of two field designations, Room 1 or Room 6 (Table V:4). "Room 1" is Stallings' designation for these chambers; however, his sketch map has no Room 6 (Figure V:1), and he assigned samples with Room 6 tag attributions to his Room 1. We initially thought that the Room 1-Room 6 distinction might differentiate Room 8 from Room 9, but sample duplications (Appendix B) unequivocally refute this idea. Having failed to derive a general rule for transforming field room designations into the published numbers, we must resort to a sample-by-sample consideration of the evidence to unravel a complicated situation.

Table V:4 reveals a number of discrepancies in the provenience ascriptions of CK-9 and CK-10. Duplication between CK-10 and our sample 1 (CK-1111) from Beam 2 in Room 9 coupled with the clear evidence from the tags and field catalog that CK-9 and CK-10 come from the same place leads us to ascribe both samples to Room 9. CK-9 is duplicated by an unprovenienced sample (JPB-56A) collected by Judd in 1925, a correspondence that prompts us to assign the latter to Room 9. It seems not unreasonable to suppose that two Judd samples (JPB-140 and 141) attributed to the "southeast section" of the site might also come from one or another of these chambers; however, no sample duplication exists to affirm this inference. CK-25 and CK-26 have tags attributing them to "Room 1," the present Room 9 (Table V:4). Hawley (1934:Protocol 1) assigns CK-25 to Kiva A. CK-25, a partial cross section, is a duplicate of our sample 3 (CK-1112) from one of the sawed secondary beams in Room 9. On the basis of this identity, the field tag provenience ascriptions, and the existence of two sawed secondaries in Room 9, we assign both CK-25 and CK-26 to that chamber. CK-27, which has a "Room 6" field tag ascription, is assigned to Rooms 8, 8A, and 9 on the basis of Hawley's (1934:Protocol 1) placement of this sample. CK-30 is attributed to "Room 6" by the tag, and to "Room 1" by Stallings, and to Room 8 by Hawley (Table V:4). It is a duplicate of GP-2211 and of our sample 2 from Beam 3 in Room 9, which validates its assignment to the chamber. The existence of two CK-30 cores (according to a note on the

tag, a second core was taken because the first was presumed lost) and of GP-2211 accounts for the three 1-inch core holes observed in Beam 3 in 1979. Duplication between CK-128 and GP-2212 combined with the field record descriptions of their origins (O'Bryan 1940; Stallings 1930) leaves no doubt that both of these cores were removed from Beam 5, the large log over the passageway in the east wall.

The foregoing provenience clarifications do not appreciably improve the factual basis for dating Rooms 8, 8A, and 9 because we still are unable to determine which dates relate to the East Wing B construction of Room 9 and which to subsequent East Wing D modifications of this chamber. Two dates from what could be original East Wing C contexts, the passageway (Beam 5) and the ceiling of Room 9 (Beam 3), may place initial construction in the early 1060s, at about the same time that the second story was added to East Wing B. An early 1060s placement is consistent with Hawley's (1934:29, Table III) building date of 1061 for Rooms 8 and 8A. If Room 9 was built around 1062, the later dates probably represent modifications performed when East Wing D was superimposed on Room 9. Dates from two primary beams in the western part of Room 9, which probably was reroofed when the room was partitioned, indicate that East Wing D may have been built around 1072. This placement is supported by the dates from the two Judd samples (JPB-140 and 141) that may have come from these chambers. In that case, the 1076 date would represent a repair element added some 4 years after initial East Wing D construction. Alternatively, East Wing D could have been constructed in or after 1076, in which case, the 1069 and 1072 dates would represent reused or stockpiled elements. About all that can be said with certainty is that some construction or remodelling activity took place in this part of Chetro Ketl in or after 1076.

Kiva A. Kiva A is provisionally included in East Wing D because it appears to have been excavated down from the upper Plaza surface that postdates East Wing C (Chapter IV). Fourteen wood samples were collected from this chamber in 1930. Hawley (1934:Protocol 1) ascribes an additional specimen, CK-25, to Kiva A; however, for reasons developed above, we assign this sample to Room 9. Of the three remaining Kiva A samples listed by Hawley, CK-14 and CK-24 replicate one another and reduce to a single date, while the date of CK-13 has been changed from 1070 (Hawley 1934:Protocol 1) to 1058 (Appendix B). Two dates constitute an inadequate foundation for the temporal placement of this structure. Kiva A could have been built as early as 1058 and remodelled around 1070, perhaps when the surface of the Plaza was raised. Alternatively, the 1058 date could represent a reused or stockpiled timber incorporated into a kiva constructed in or after 1070. Either alternative specifies activity in the 1070s that is roughly contemporaneous with construction or remodelling events in Rooms 8, 8A, and 9.

Plaza Room. In the 1920s, Hewett built a miniature railway system to transport backdirt off the site. One set of tracks ran south across the Plaza passing between the Great Kiva and the East Wing. In 1946 or 1947 Gordon Vivian and Al Lancaster removed the embankment that had

supported these tracks and discovered beneath it a small, crude room or a very large firepit, one of a complex of such features in the southeast corner of the Plaza. This particular feature had burned and was packed with charcoal, at least some of which was shipped to Hawley in January of 1947. In some mysterious fashion, three charcoal fragments from Vivian's shipment to Hawley were included in a collection of material from the Cebolleta Mesa area submitted to the Tree-Ring Laboratory by Ed Dittert in 1952. Although Vivian was hopeful that this charcoal would provide dates for the "very latest" occupation of Chetro Ketl, neither Hawley nor we were able to date these small fragments of carbonized pinyon wood.

East Wings C and D, Summary

Inadequate provenience control and an insufficient number of dates inhibit the precise dating of these units. One interpretation of the dates from Rooms 8, 8A, and 9 places East Wing C construction in the early 1060s. Alternatively, East Wing C could have been built in the middle 1070s. Based on the dates from Rooms 8, 8A and 9 and from Kiva A, it seems probable that East Wing D dates in the middle to late 1070s. This dating helps place temporal limits on the raising of the Plaza surface, an event that postdates East Wing C and predates East Wing D. Therefore, the Plaza surface probably was elevated no later than the middle 1070s. If correct, this dating confutes Lekson's idea that the filling of the first story of East Wing B accompanied the raising of the Plaza floor. Instead, the elevation of the Plaza probably predated the filling of East Wing B by 30 years or more.

Imprecise Proveniences

Forty-eight of 60 imprecisely provenienced samples (Appendix B) yielded dates. Among the most interesting of these are nine samples (GP-2437 through GP-2445) received by Gila Pueblo from the School of American Research in 1940, apparently sometime after O'Bryan made his 1940 collection at Chetro Ketl. A note on the GP-2437 catalog card attributes these specimens to "deep excavations in the northern part of the site," which probably means that they come from somewhere in the North Block. The four dates at 1033 to 1034+ lie within a date cluster inferred to represent the stockpiling of logs for initial first-story North Block B construction. Two dates at 1045 fall within the range of material used in the first story of North Block C and in the upper-story walls of North Blocks B and C. Two other characteristics of these samples are remarkable. First, they include an uncommonly high proportion (67%) of Douglas fir and spruce-fir compared to the usual predominance of ponderosa pine. Second, these samples are not duplicated by any other specimens from Chetro Ketl, including those collected by Hawley and her colleagues, those from logs dislodged by the 1947 flood, or those we collected in 1979. The fate of the timbers from which these samples were removed is unknown.

Forty-six samples represent flood logs from the North Block that could not be assigned to specific rooms or walls. The distribution of the 38 dates derived from these specimens, which range from 1006+ to 1051 and form three prominent clusters, does not differ from the dating pattern exhibited by the rest of the flood logs. A cluster at 1028 undoubtedly represents material salvaged from demolished portions of North Block A and reused in North Blocks B and C. A major cluster of 1036+ to 1040 identifies timbers cut for initial North Block B construction that were used for that purpose or for upper-story construction in North Blocks B and C after 1050. A cluster at 1045 to 1047 probably represents material cut for initial North Block C construction that was used in that context or in the upper-story walls of North Blocks B and C after 1050. Two dates in the early 1050s probably specify logs cut for upper-story construction in North Blocks B and C.

The specific significance of eight JPB samples collected by Judd from the east and south portions of Chetro Ketl in 1925 is discussed in the sections on the various units of the East Wing. In general, the five dates derived from these specimens are consistent with the chronological indications provided by East Wing dates with better provenience ascriptions. Thus, these dates reinforce the placement of first-story construction in East Wings A and B in the 1050s and the dating of some activity in East Wings C and D to the 1070s.

Unknown Provenience

Only 29 samples can be assigned no provenience whatsoever (Appendix B). Three of these (CK-A-10, 11 and 12) are thought to have been collected by Paul Reiter in the early 1930s (Bannister 1965:139). CK-961 was sent to the Tree-Ring Laboratory in 1957 by Gordon Vivian who thought that it had been collected from Chetro Ketl around 1948 by Ray Rixey. A one-inch core has been removed from this large chunk of juniper, probably a kiva pilaster; however, we are unable to match CK-961 with any Chetro Ketl juniper core in our possession. The 25 other unprovenienced samples were collected by Hawley and her colleagues in the 1030s. There are no surprises in the 16 dates from the 29 samples of unknown origin. These dates range from 1005+ to 1064, with only one important cluster, that at 1049 to 1052. This cluster could represent first-story construction somewhere in the East Wing, upper-story activity in North Block B, C, or D or in East Wing A or B, or any combination of these events.

Date Clustering

The foregoing exhaustive (if not exhausting) room-by-room analysis of the tree-ring dates from Chetro Ketl explicates the temporal placement of individual chambers and structural units within the pueblo.

Considering all of the dates together, independently of their intrasite proveniences, provides information on the timing of tree cutting activities rather than the chronology of construction events. The temporal distribution of the cutting dates (Figure V:3) has several implications for the tree felling behavior of the builders of the pueblo. The absence of large gaps in the sequence of cutting dates between 1018 and 1077 indicates that tree cutting was virtually an annual activity during that 60-year interval in the history of Chetro Ketl. This pattern of continued tree cutting probably reflects a low but fairly constant demand for wood for repairs and piecemeal additions between episodes of large-scale tree felling for major construction operations. The apparent decline in tree cutting activity after 1054 probably is due to three factors: 1) the increasing reuse of wood salvaged from vacated parts of the pueblo; 2) the lack, due to poor preservation, of wood samples from the upper stories where logs cut late in the history of the site probably were most abundant; and 3) the relatively small number of samples from structural units that postdate North Blocks B and C.

Several date clusters (Figure V:3) specify episodes of major tree cutting activity. Clusters at 1008-1010, 1020-1021, 1026, and 1028-1030 represent wood cut for North Block A that was redistributed throughout North Blocks B and C after the earlier unit was razed. Other clusters identify tree cutting activity related to construction events in the history of the extant site. Clusters at 1033-1034 and at 1043 are inferred to represent material stockpiled for the first-story construction of North Blocks B and C respectively. Clusters at 1037-1040 and 1045-1047 come from wood cut in conjunction with initial construction in North Blocks B and C respectively. A prominent cluster at 1049-1051 represents material scattered widely throughout Chetro Ketl. Much of this wood was used to refurbish first-story ceilings in North Blocks B and C preparatory to the addition of upper stories. Other elements cut at this time were incorporated into the upper-story ceilings of North Blocks B, C and D and were utilized in the initial construction of East Wings A and B. Dates from weak clusters at 1061-1067 and 1069-1070 are scattered throughout the upper stories of North Blocks B and C and East Wings A and B. A minor cluster at 1074-1077 represents isolated dates from the upper stories of North Blocks B and C, from North Block E, and from the East Wing. A well defined cluster at 1098-1104 is related almost entirely to the construction of North Block F.

Given auspicious circumstances it sometimes is possible to recognize episodes of tree felling activity. Four such episodes can be identified with some confidence at Chetro Ketl. The distribution of complete and incomplete terminal rings (Figure V:3) indicates that the clusters at 1038-1039, 1045-1046, and 1051-1052 were produced by tree cutting at the beginnings of the growing seasons in the springs of 1039, 1046, and 1052 respectively, when some of the trees (those with incomplete terminal rings dating the later year of each cluster) had started to grow and others (those with complete terminal rings dating to the earlier year) had not. These indications are supported by the terminal ring dates from the secondary beams in Room 93 that date to

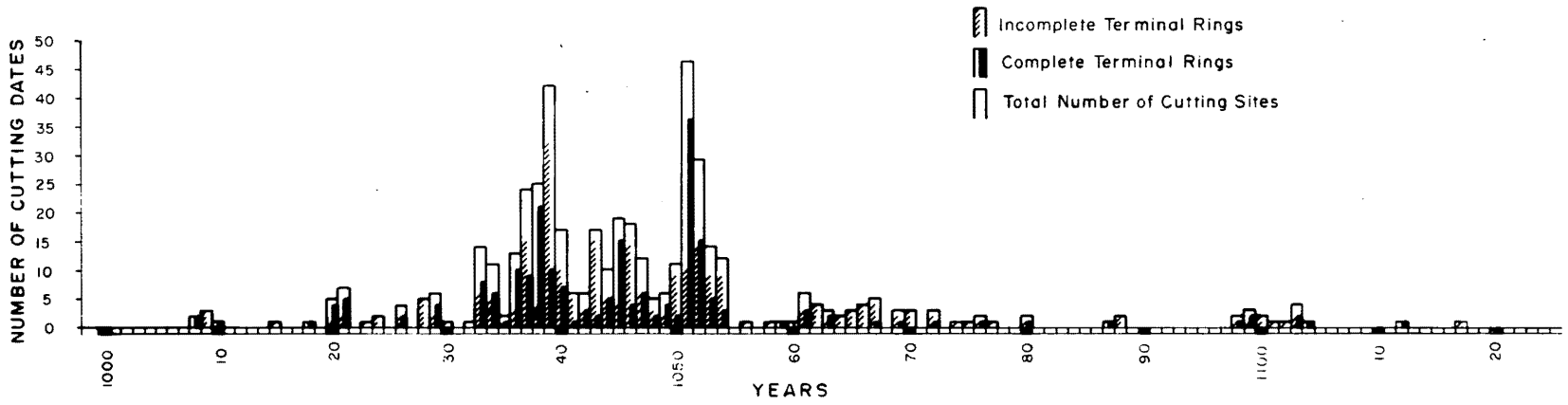


Figure V:3. Temporal distribution of post-1000 cutting dates from Chetro Ketl.

1051 and 1052 (Appendix B). The juxtaposition of these timbers in a single ceiling strengthens the probability that they were cut in one operation in the spring of 1052. The fourth recognizable tree felling episode occurred during the growing season (late spring and summer) of 1043, somewhat later in the year than the tree cutting activities of 1039, 1046, and 1052. Apart from these four fairly specific events, tree felling at Chetro Ketl seems to have been a nearly continuous activity pursued at a low level of intensity even during the intervals between major construction projects.

Nonchronological Analyses

Archaeological tree-ring collections, especially those as extensive as the one from Chetro Ketl, contain considerable information on the wood use behavior of the inhabitants of the sites from which the wood was recovered (Dean 1969:8-9, 1978; Robinson 1967). Such information is derived by treating the tree-ring collections as samples of populations of wooden artifacts and subjecting them to standard kinds of archaeological analyses. Recognizable wood use practices include the differential use of species for various purposes, wood modification tools and techniques, the scheduling of tree cutting activity, the stockpiling of timbers, the reuse of material salvaged from older contexts, the use of dead wood, the repair and replacement of wooden features, and many others. The derivation of such information is regulated by situational factors such as the number of samples, the degree of preservation of the site and of the wood, the quality of the provenience control on the specimens, the nature of the sample relative to the total population of wooden artifacts that were used in the site, and others. As a result, the opportunities for this type of analysis vary considerably from site to site.

As is generally true in archaeological research, sampling is the most critical factor in the effort to extract behavioral information from archaeological tree-ring collections. In some instances--as at Betatakin and Kiet Siel where most of the original timbers are still in situ and accessible (Dean 1969)--the original population of wooden structural elements can be fairly accurately characterized, and sampling bias can be satisfactorily controlled by collecting a specimen from every suitable timber present in the site. Unfortunately, this is not the case at Chetro Ketl where the wood in the unexcavated third of the site is inaccessible, where upper-story wood has suffered a higher rate of attrition than first-story wood, and where postoccupational natural processes (erosion, decay, the 1947 flood) and human activities (excavation, tree-ring sampling, reconstruction, stabilization) have altered surviving wooden elements and their distribution throughout the site. These and other uncontrolled factors make it impossible to determine the nature of the sample relative to the original population of wooden structural elements in the pueblo. Our estimate of approximately 26,000 trees cut for use in Chetro Ketl, which is developed

below, exposes the precarious nature of the paltry sample of 863 trees in the tree-ring collection and specifies the magnitude of the sampling problem at this site. Nevertheless, there can be little doubt that Chetro Ketl is better off in this regard than most other prehistoric Southwestern archaeological sites. The 863 tree-ring specimens probably reliably represent the wooden elements used in the first story of those parts of Chetro Ketl that have been excavated. With these limitations in mind, it is possible to make some fairly accurate inferences about the wood use behavior of the inhabitants of Chetro Ketl.

Number of Trees Cut for Use in Chetro Ketl

In an optimistic (or foolhardy) moment we set out to estimate the total number of trees that were felled for construction at Chetro Ketl. Table V:5 presents the convoluted calculations employed in this effort. Our goal is to achieve a conservative projection that does not exceed the actual number of trees involved; therefore, we make a conscious effort to underestimate each category. The most recent floor plan of Chetro Ketl (Figure I:2), which is based on aerial photogrammetry, is used in this exercise. We divide the domestic rooms into three categories. "Large rooms" are the large, rectangular chambers that form the bulk of the site. These rooms are considered to have, on the average, 3 primary and 40 secondary beams. "Small rooms" are the less numerous, squarish rooms that are about one-half to two-thirds the size of "large rooms." These chambers are assumed to average 1 primary and 30 secondaries each. "Moat rooms" are long, narrow chambers such as those in the arc of rooms enclosing the Plaza and such as Room 106 in the main roomblock. We consider these Moat chambers to have been roofed in a manner similar to Room 106 and to average 20 small primaries and no secondaries each. Multiplying the number of rooms by the number of stories (one to four) for each category yields a total of 452 roofs for the 198 room spaces indicated on Figure I:2.

The number of primary and secondary beams used in the individual roofs is calculated by multiplying the assumed average number of such elements for each kind of room. For the 413 roofs in the large and small rooms, these manipulations yield an estimated 1,017 primary beams and 15,410 secondary beams. In view of the constructional histories of these rooms, we incorporate replacement factors of 25 percent for primary beams and 50 percent for secondary beams in the 163 first-story roofs in the main roomblock. We ignore element replacement in upper-story roofs because there is no empirical basis for establishing a replacement rate in the upper stories. First-story replacement brings the total for these rooms to 1,119 primaries and 18,470 secondaries. Replacement is not incorporated into the Moat room calculations because most of these are late, one-story chambers whose roofs probably required little or no remodelling. The estimated 780 small primary beams in 39 Moat room roofs brings the total projection for domestic

Table V:5 Calculation of the number of trees used in the construction and maintenance of Chetro Ketl

	ROOMS AND ROOFS						ROOF BEAMS		
	One Story	Two Story	Three Story	Four Story	Total Rooms	Total Roofs	Primary	Secondary	TOTAL ELEMENTS
"LARGE ROOMS"	6	60	52	5	123				
Number Roofs	6	120	156	20		302			
3 Primaries	18	360	468	60			906		
40 Secondaries	240	4800	6240	800				12080	12986
"SMALL ROOMS"	3	10	20	7	40				
Number Roofs	3	20	60	28		111			
1 Primary	3	20	60	28			111		
30 Secondaries	90	600	1800	840				3330	3441
FIRST-STORY REPLACEMENT					[163]	[163]			
25% Primaries							102		
50% Secondaries								3060	3162
"MOAT ROOMS"	32	2	1	0	35				
Number Roofs	32	4	3	0		39			
20 Rm. 106 Primaries	640	80	60	0			780		780
SUBTOTAL					198	452	1899	18470	20369
Less 10% Replication							-190	-1847	-2037
							1709	16623	18332
Less 10% Reuse							-171	-1662	-1833
TOTAL ROOM ROOFS						452	1538	14961	16499

	APERTURES AND ELEMENTS							
	1st Story	2nd Story	3rd Story	4th Story	"Moat"	Total	Aperture Elements	
APERTURES	75	114	9	0	21	219		
5 elements each	375	570	45	0	105		1095	
x 2					-		2190	2190
TOTAL DOMESTIC ROOM ELEMENTS								18689
KIVAS							ROOF ELEMENTS	
22 Kivas (350 logs/roof)							7700	
Less 25% reuse							-1925	
Total Kivas							5775	
Court Kiva (500) and Great Kiva (750)							1250	
TOTAL KIVAS							7025	7025
TOTAL TREES								25714

rooms to 20,369 primary and secondary beams. Because the Chetro Ketl tree-ring collection of 960 specimens contains 97 replicate samples, we subtract 10 percent from the domestic room total to adjust the estimate for the fabrication of multiple roof timbers from single trees. In terms of actual examples of the replication of roofing elements, this figure is much too high; however, it is consistent with our effort to underestimate the number of trees involved. Finally, we subtract an additional 10 percent to compensate for the reuse of timbers in other roofs. Due to the lack of data on which to base an estimate, our projections do not include trees cut to produce tertiary roofing material such as twigs, small branches, and boards. These calculations produce an estimated total of 16,499 individual trees in the ceilings of domestic rooms in Chetro Ketl.

Projecting the number of trees used in the apertures of Chetro Ketl is extraordinarily difficult. We attempt such an estimation by multiplying the number of apertures by a totally fictitious average number of elements per orifice. Because of the thickness of the walls, most apertures in Chetro Ketl, no matter how small, have more than 10 wooden elements associated with them. For two reasons, however, we use the smaller figure of five as our multiplier. First, branches from trees that produced larger elements, such as ceiling beams, could have been used as aperture elements. Second, apertures in general, and especially vents and niches, are sufficiently small that a single pole could have produced several lintels. Observed instances of such replication are rare, even among elements from a single orifice; however, our sample of aperture elements is poor. Multiplying the 219 visible apertures by five yields an estimate of 1,095 aperture elements, which is doubled because it is probable that the number of buried apertures equals the number of exposed orifices. Adding the estimated 2,190 aperture elements brings the number of trees used in domestic construction to 18,689. This figure does not include intramural logs, many of which are reused roofing timbers, elements such as platform poles and boards, or any of the timbers associated with North Block A or with the portion of North Block B that lies beneath North Blocks E-G.

Although there can be little doubt that a large number of trees were cut for kiva and great kiva construction, estimating the actual number is made impossible by the lack of data on kiva roofs. Assuming that cribbed roofs were the norm in Chetro Ketl kivas, we base our estimates for ordinary kivas on Judd's (1964:180, Plates 56 and 57) count of 350 cribbed roofing logs in Kiva L at Pueblo Bonito, not a large kiva by Pueblo Bonito or Chetro Ketl standards. The relatively small size of our standard (Kiva L) is balanced by the possibility that some Chetro Ketl kivas did not have cribbed roofs. The modest number of samples (14) that Hawley saved from Kiva A (Appendix B) may indicate that this structure, and perhaps other small kivas, had flat roofs. At least 22 kivas were built during the occupation of Chetro Ketl. Using Judd's figure of 350 as an average, the roofing of kivas at Chetro Ketl would have consumed 7,700 trees. Because of the probability of considerable reuse of kiva roofing material--especially in the area of North Block D where several kivas were purposefully abandoned, filled in and built over--25 percent is subtracted from this figure to yield an

estimate of 5,775 timbers. Although both the "Court Kiva" and the Great Kiva in the Plaza are larger than ordinary kivas, they probably had flat rather than cribbed roofs (Vivian and Reiter 1960:36, 42, 46, 49). Therefore, these structures required proportionately fewer roof timbers than did the smaller cribbed kivas. However, because each of the Plaza kivas apparently was reroofed at least once (Vivian and Reiter 1960:36, 49), we feel that estimates of 500 trees for the Court Kiva and 750 for the Great Kiva are not out of line. Based on these projections, we get an estimated grand total of 7,075 trees for kiva and great kiva construction at Chetro Ketl. This figure does not include elements used in pole-and-wattle wainscottings in at least two of the kivas or pilaster blocks. Furthermore, the estimate does not include the elements that would have been necessary for roofing and fitting a second great kiva if one exists in the unexcavated western half of the Plaza.

Our estimated total of 25,714 trees utilized in the construction and maintenance of Chetro Ketl is more than five times Vivian and Mathews' (1965:111) projection of 5,000 trees for the same site. This disparity is due in part to Vivian and Mathews' much too low estimate of only 15 timbers per roof, to their failure to recognize the importance of replacement, and to their neglect of aperture elements and kiva construction. Our estimate is a conservative one that undoubtedly falls short of the mark. Rounding it up to 26,000 trees probably does not do violence to the truth. Although this seems an outlandish number, it amounts to an average of only 208 trees cut per year during the approximately 125-year occupation of the pueblo. Of course, trees were not cut at a steady rate throughout the history of Chetro Ketl. We can use the proportion of cutting dates per decade derived from Figure V:3 to roughly estimate the number of trees cut during the 980-1120 interval and the average number of trees felled per year during each decade (Table V:6). This exercise reveals that the heaviest cutting took place between 1030 and 1060 when 20,202 trees, or 77.9 percent of the total, was felled. In certain relatively short periods, tree cutting was even more concentrated, for the annual distribution of dates (Figure V:3) indicates that 19.7 percent of the total, or 5,122 trees, was felled in the 1037-1039 interval and that 15.8 percent, or 4,108 trees, was cut in 1051 and 1052. The actual numbers produced by these manipulations should not be taken literally because, as discussed previously, the sample of dates probably is skewed toward the early end of the range. These estimates do show, however, that tremendous quantities of trees were felled and processed for use in Chetro Ketl during very short time intervals. Such concentrated effort bespeaks an almost unimaginable expenditure of human energy.

Our estimate of around 26,000 trees expended in the construction and maintenance of Chetro Ketl has staggering implications for the number of trees used in all the largest sites in and around Chaco Canyon and for the amount of tree cutting activity involved. Five such sites may have required more than 25,000 trees each: Chetro Ketl, Pueblo Bonito, Penasco Blanco, Pueblo Pintado, and Kin Bineola. Five others --Pueblo Alto, Una Vida, Pueblo del Arroyo, Hungo Pavi, and Wijiji-- needed fewer, say 15,000 trees each. Using these projections yields minimal estimate of 200,000 trees for 10 sites alone, a figure that is

Table V:6 Temporal distribution of dates by decades and estimated number of trees felled per decade and per year within decades at Chetro Ketl

DECADE	Number of Dates	Proportion of Dates	Projected Number of Trees Cut	Average Number of Trees Cut Per Year
980-989	1	.002	52	5
990-999	3	.006	156	16
1000-1009	5	.011	286	29
1010-1019	3	.006	156	16
1020-1029	30	.064	1664	166
1030-1039	133	.285	7410	741
1040-1049	116	.248	6448	645
1050-1059	114	.244	6344	634
1060-1069	31	.066	1716	172
1070-1079	10	.021	546	55
1080-1089	5	.011	286	29
1090-1099	5	.011	286	29
1100-1109	9	.019	494	49
1110-1119	2	.004	104	10
TOTALS	467	.998	25948	

twice Vivian and Mathews' (1965:111) estimate of 100,000 trees. The cutting of 200,000 trees for construction must have had a tremendous impact on whatever forests were being harvested. In addition, procurement of the tons of firewood that must have been consumed in the large Chaco pueblos would have had major environmental consequences. Mercifully, we decline to bring up the number of trees that went into the construction, maintenance, and heating of the hundreds of smaller sites that were occupied contemporaneously with the larger towns.

Species

Six different kinds of tree can be identified in the 845 samples physically present in the Chetro Ketl collection (Table V:7): ponderosa pine, spruce-fir, Douglas fir, cottonwood or aspen, pinyon, and juniper. The three unclassified specimens include one unidentified nonconiferous sample and two possible ponderosa pine samples. Eighteen numbered samples are missing from the collection and are omitted from the species counts and calculations. The proportion of each species represented in the collection is used as a basis for projecting the number of trees of each species cut for use in the construction and maintenance of Chetro Ketl (Table V:7).

Our projections indicate that more than 16,000 ponderosa pine trees were used in Chetro Ketl (Table V:7). The current conspicuous dearth of ponderosa pines in the vicinity of Chaco Canyon has stimulated considerable speculation as to the sources of the vast number of pine timbers used in Chetro Ketl and other Chacoan sites. Douglass (1935:45-47), Judd (1964:17-18), Hawley (1934:65-70), and others have postulated the existence in the tenth and eleventh centuries on the uplands flanking Chaco Canyon of a ponderosa pine forest that was all but totally destroyed by the prodigious tree harvesting necessary for large-scale construction. That such a pine forest existed now seems unlikely (Betancourt and VanDevender 1981; Hall 1977: 1609); however, the presence in the twentieth century of a few pine trees in Chaco Canyon (Douglass 1935:45-7; Judd 1964:17-18; Vivian and Mathews 1965:7, Figure 6) suggests that some pines may have been locally available for use in the large towns. Even granting the presence of some pines in and around Chaco Canyon and an elevational depression of the lower ponderosa pine forest border on the mountain masses flanking the Chaco basin (Robinson 1967:67-71), the harvesting of trees for Chacoan construction must have decimated ponderosa pine stands and forests for many miles in every direction from Chaco Canyon.

With an estimated total usage of nearly 6,000 trees (Table V:7), spruce-fir is the second most abundant class at Chetro Ketl. In the absence of major environmental changes in the last millennium, most of the examples of these high elevation species must have come from the mountain ranges on the margins of the Chaco basin: Mt. Taylor, the Lukachukais, perhaps even the La Platas or San Juans. Whatever the

Table V:7 Species distributions and estimated number of trees per species cut at Chetro Ketl

	SPECIES							MISSING	TOTALS
	PP	SF	DF	Pop	PNN	JUN	Unk		
NUMBER OF SAMPLES	525	193	69	29	15	11	3	[18*]	845
PERCENT OF TOTAL	62.1	22.8	8.2	3.4	1.8	1.3	0.4		100.0
ESTIMATED NUMBER OF TREES USED IN CHETRO KETL	16146	5928	2132	884	468	338	104		26000

*Not included in total or in calculations.

PP Ponderosa Pine (Pinus ponderosa)
SF Spruce-fir (Abies concolor or Picea spp.)
DF Douglas fir (Pseudotsuga menziesii)
Pop Cottonwood or Aspen (Populus)
PNN Pinyon (Pinus edulis)
JUN Juniper (Juniperus)
Unk Unknown

implications of large-scale ponderosa pine harvesting, the abundance of spruce-fir in Chetro Ketl almost certainly entails the transportation of timbers over distances of more than 50 kilometers.

Somewhat paradoxically, the use of an estimated 2,132 Douglas fir trees in Chetro Ketl (Table V:7) is less anomalous than the occurrences of large numbers of ponderosa pine and spruce-fir trees. Today, Douglas firs are the nearest large trees to almost any unforested locus on the Colorado Plateau because this species commonly grows in canyon habitats well below the elevation of the lower ponderosa forest border. In fact, Douglas firs currently grow in sheltered canyons and rincons in Chacra Mesa not far from Chaco Canyon. The distribution of Douglas firs suggests that the preponderance of ponderosa pine in Chetro Ketl reflects either a preference for pine or the exhaustion of nearby sources of Douglas firs. As is discussed below, the chronology of the felling of the large tree species favors the first alternative.

The small number of trees estimated for Populus, pinyon, and juniper (Table V:7) probably could have been procured fairly close to Chaco Canyon, at least until the local supply was depleted by overexploitation of the resource. Cottonwood trees may have grown in small numbers along the wash in Chaco Canyon, as they do today. Large-scale harvesting would have rapidly depleted a local cottonwood population unless, as seems likely given the potential size of the cottonwood trees, branches rather than whole trees were used. If the Populus timbers are aspen rather than cottonwood, they most probably were procured outside the canyon, although the present existence of a small aspen grove in the upper part of the canyon (Vivian and Mathews 1965:7) implies that some may have come from closer to home. Most aspens, however, probably were accumulated in connection with the harvesting of canyon growing Douglas firs or high elevation spruce-firs. If ever there was a genuine forest on the mesas flanking Chaco Canyon, it would have been a pinyon-juniper "pygmy forest" that provided a few building elements but mainly firewood (Table V:11). If such a forest existed, it may have been wiped out by excessive exploitation for building material prior to 900 and for fuel after that date (Betancourt and Van Devender 1981).

It seems probable that the builders of Chetro Ketl would have utilized elements of the tree species represented in the collection differentially to take advantage of their inherent properties. Indeed, species do seem to vary systematically with use category. The relationships between species and function are elucidated by a series of statistical tests. Since only 6 of 9 species classes and only 6 of 12 use categories are represented by large numbers of samples (see "Wood Use" below and Table V:11), the data are collapsed into a more appropriate form. Poorly represented groups and irrelevant use/species categories are omitted, and trashmound charcoal is combined with charcoal from hearths in the pueblo to form a "firewood" class. These operations produce the data array in Table V:8. A Chi-square analysis at the 0.01 level of significance tests the null hypothesis that species and use category are independent of one another. Rejection of the null

Table V:8 Chi-square analysis of species distribution among the major use categories at Chetro Ketl. Expected frequencies are in parentheses

USE CATEGORY	SPECIES						TOTALS
	PP	SF	DF	Pop	PNN	JUN	
Primary Beams	66 (40.6)	12 (14.1)	1 (3.9)	0 (2.8)	0 (15.3)	0 (2.3)	79
Secondary Beams	96 (73.0)	28 (25.3)	9 (7.0)	7 (5.0)	2 (27.5)	0 (4.2)	142
Unclassified Roof Beams	72 (62.7)	32 (21.8)	7 (6.0)	11 (4.3)	0 (23.6)	0 (3.6)	122
Intramural Logs	31 (20.6)	6 (7.1)	2 (2.0)	0 (1.4)	1 (7.8)	0 (1.2)	40
Aperture Elements	43 (54.0)	35 (18.7)	12 (5.2)	5 (3.7)	4 (20.4)	6 (3.1)	105
Firewwood	26 (83.2)	3 (28.9)	1 (8.0)	0 (5.7)	119 (31.4)	13 (4.7)	162
TOTALS	334	116	32	23	126	19	650

$X^2 = 508.9$

$p \leq 0.01_{(df=25)} = X^2$ of 44.314

$\therefore$ Reject H_o

hypothesis (Table V:8) supports the existence of a nonrandom relationship between species and function.

The validity of the foregoing test is diminished by the number of cells with expected frequencies equal to or less than five (13 of the 36 cells). This deficiency can be rectified through further compression of the data achieved by combining the three ceiling element categories into a single roof beam class and by deleting the Populus and juniper classes, which are poorly represented in the collection. Before this can be done, however, the lumping of the ceiling beam data into a single category must be shown to be an appropriate procedure. This objective is accomplished by a Chi-square test at the 0.01 level of the null hypothesis of no relationship between the roof beam subtypes and the three abundant classes, ponderosa pine, spruce-fir, and Douglas fir. Failure to reject the independence hypothesis (Table V:9) legitimizes the combining of the roof beam species frequencies into a single category. Only 2 of the 16 cells in the resulting data array (Table V:10) exhibit expected frequencies less than or equal to five, and a Chi-square analysis is appropriate. Rejection at the 0.01 level of the null hypothesis of independence between functions and species (Table V:10) affirms the existence of a nonrandom relationship between these variables in the Chetro Ketl wood collection.

Species distributions within each use category elucidate the nature of the demonstrated relationship between function and species (Table V:10). Ponderosa pine occurs as roof beams and intramural logs more frequently than expected, and as aperture elements and fuel less frequently than expected. Spruce-fir is more abundant than expected as roof beams and especially as aperture elements, and is far less frequent than expected as firewood. Douglas fir is overrepresented in the aperture element class and underrepresented in the firewood category. Pinyon is far less frequent in all categories except the firewood class where it greatly exceeds the expected frequency. Although the relationships among the species and ceiling beam subtypes are not statistically significant, the distributions (Table V:9) are suggestive. Ponderosa pine is overrepresented in the primary beam class and underrepresented in the unclassified category, while spruce-fir and Douglas fir exhibit just the opposite tendency.

Although examples of all the abundant species occur in all major use categories, it seems clear that the builders of Chetro Ketl utilized the different species available to them for specific purposes. Ponderosa pine was favored for ceiling elements, especially primary beams, and for intramural logs. Spruce-fir was favored for nonprimary ceiling beams and for aperture elements. Douglas fir was favored for secondary ceiling beams and for aperture elements. Pinyon was used almost exclusively for fuel. Of the less abundant species, juniper, except for its more frequent occurrence in apertures, conforms closely to the pinyon pattern (Table V:8). Populus is restricted to ceilings and apertures (Table V:8). Possible reasons for these differential distributions are easy to devise but difficult to prove. Undoubtedly, the physical properties of the different species played a part in their differential utilization, especially in regard to the dichotomy between

Table V:9 Chi-square analysis of major species distributions among the three roof beam classes at Chetro Ketl. Expected frequencies are in parentheses

USE CATEGORY	S P E C I E S			TOTALS
	PP	SF	DF	
Primary Beams	66 (57.2)	12 (17.6)	1 (4.2)	79
Secondary Beams	96 (96.4)	28 (29.6)	9 (7.0)	133
Unclassified Roof Beams	72 (80.4)	32 (24.7)	7 (5.8)	111
TOTALS	234	72	17	323

$X^2 = 9.7$

$p \leq 0.01_{(df=4)} = X^2$ of 13.277

$\therefore$ Do not reject H_o

Table V:10 Chi-square analysis of the distribution of four species among four major use categories at Chetro Ketl. Expected frequencies are in parentheses

USE CATEGORY	SPECIES				TOTALS
	PP	SF	DF	PNN	
Roof Beams	234 (178.5)	72 (62.0)	17 (17.1)	2 (67.4)	325
Intramural Logs	31 (22.0)	6 (7.6)	2 (2.1)	1 (8.3)	40
Aperture Elements	43 (51.6)	35 (17.9)	12 (5.0)	4 (19.5)	94
Firewood	26 (81.8)	3 (28.4)	1 (7.8)	119 (30.9)	149
TOTALS	334	116	32	126	608

$X^2 = 450.6$

$p \leq 0.01_{(df=9)} = 21.666$

$\therefore$ Reject H_o

the structural use of species that produce long, straight logs (ponderosa pine, spruce-fir, Douglas fir) and the use of pinyon, and to a lesser extent of juniper, for fuel. In this regard, much of the ponderosa pine charcoal (nearly all of which comes from the trash mound) probably represents either material removed from burned structures or "worn out" structural wood that was recycled into the hearths of the pueblo, rather than wood gathered specifically for fuel.

Differential use of the three major construction species (pine, spruce-fir, Douglas fir) could be due to the inherent structural qualities of the wood or to more mundane considerations such as the size ranges of accessible trees of the relevant species.

Beam radius also varies systematically with species. Although beam diameter probably provides a slightly better estimate of timber size, the use of beam radius substantially increases the sample size by permitting the inclusion of specimens that represent less than a full cross section. The radial measurements (Appendix B) are achieved in two ways. Beam diameters measured in the field with a foresters' caliper and the diameters of complete or nearly complete cross sections are halved to produce radius values. Radii of lesser samples--partial sections, fragments, and cores--are directly measured as the distance from pith to circumference. When the pith is off center, this technique yields a poor estimate of beam size. That this problem is negligible at Chetro Ketl is shown by the fact that no substantial differences in radial estimates arise in instances--as in the case of a core from a measured log--in which we are able to check radial against diameter measurements. Blanks in the radius column in Appendix B reflect the fact that samples that lack a pith or a true outside are not measured.

The distribution of timber size among the species classes is illustrated in Figure V:4. Because of the bimodal distribution of the two most abundant groups, ponderosa pine and spruce-fir, descriptive statistics are not calculated for any of the species. In general, the curves in Figure V:4 reflect the uses to which the species were put. The near identity in form between the ponderosa pine distribution (Figure V:4A) and that of all the measured samples combined (Figure V:6A) is consistent with the use of pine timbers for the full range of structural functions. The spruce-fir size distribution (Figure V:4B) is the result of the use of this species for a wide range of purposes with an emphasis on aperture and small roofing elements. Douglas fir (Figure V:4C) and Populus (Figure V:4D) size distributions reflect the predominant use of these species as aperture elements and small ceiling beams. There are too few pinyons and junipers in the collection to establish any sort of size pattern for either species (Figures V:4E and V:4F).

Figure V:5 represents the distribution of dates by decade for the three most abundant datable species: ponderosa pine, spruce-fir, and Douglas fir. There are too few pinyon and juniper dates to repay the inclusion of these species on the graph. A marked difference exists between the chronology of ponderosa pine cutting and the chronologies of spruce-fir and Douglas fir felling. Pine trees were harvested in all

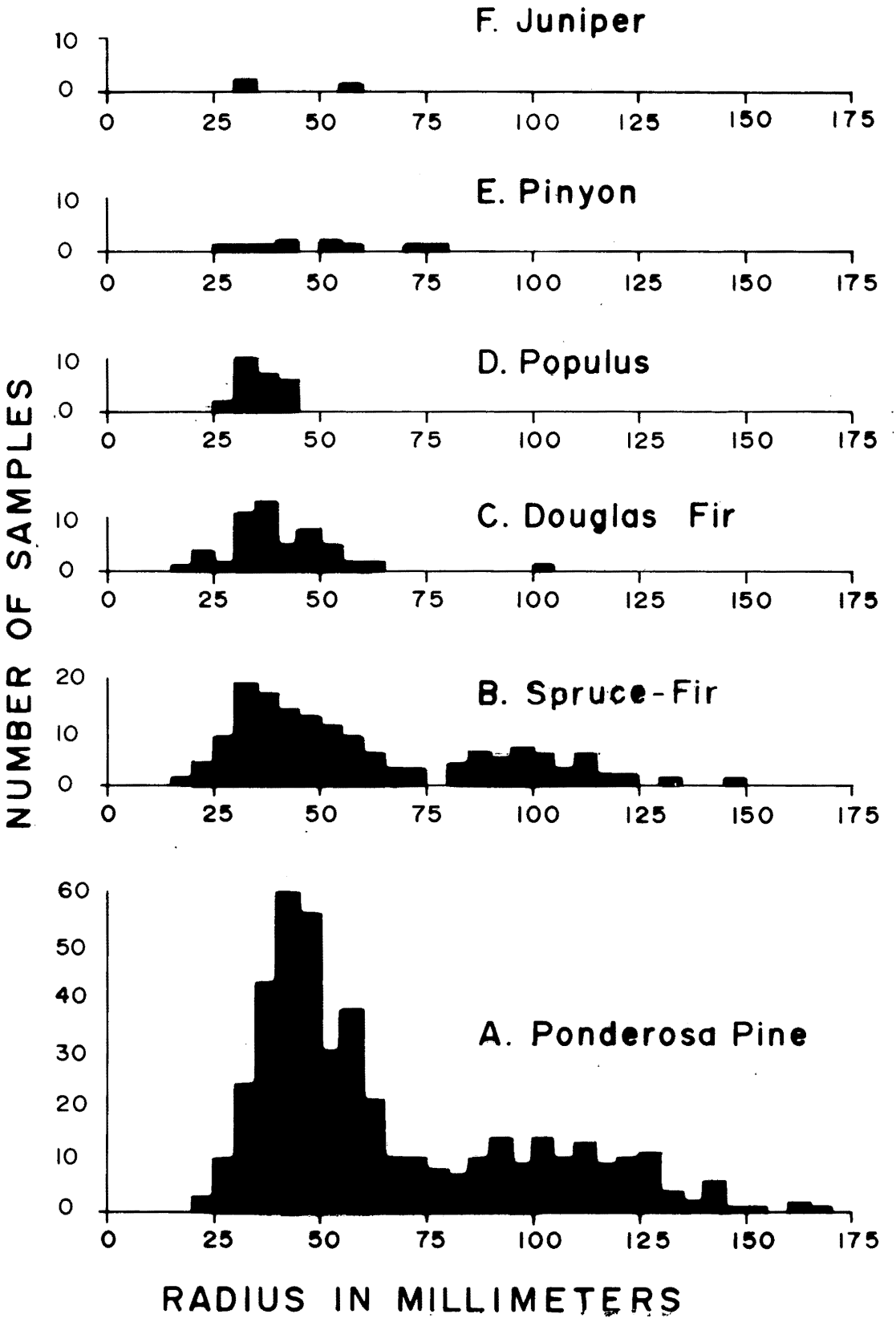


Figure V:4. Distribution of beam radii within six species categories.

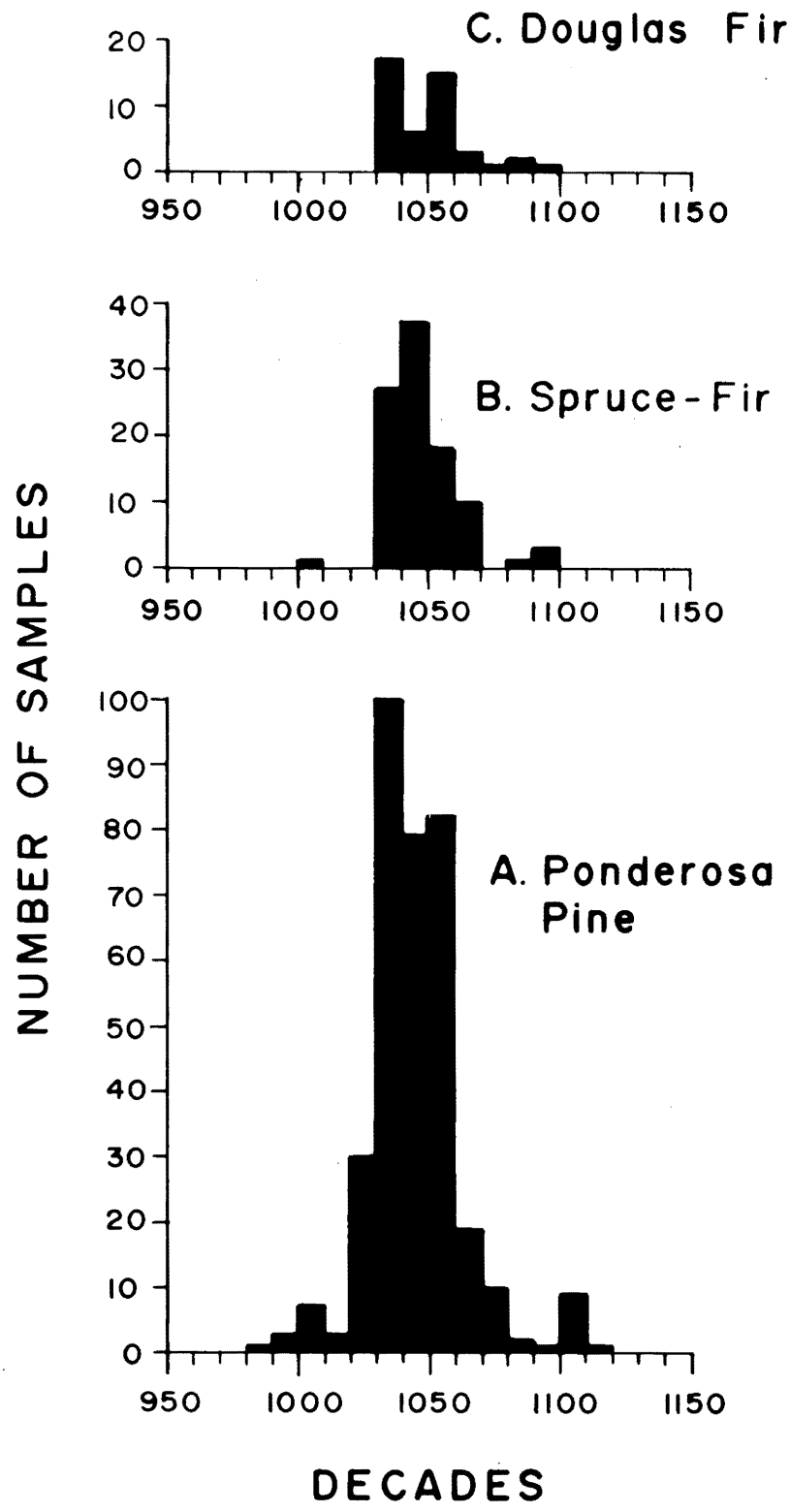


Figure V:5. Cutting dates by decade for Ponderosa Pine, Spruce-Fir, and Douglas Fir.

decades from 980 through 1120, with the bulk of the cutting occurring in the 1030-1060 period. With but one exception, no spruce-firs or Douglas firs were felled prior to 1030, while peak cutting activity for both, like that of pine, took place in the 1030-1060 interval. The lack of pre-1030 dates for spruce-fir and Douglas fir could signify one of two things. Either no trees of these species were cut for North Block A construction, or such trees that were cut for use in North Block A were not reused in North Blocks B and C. Since there is no apparent reason not to reuse the spruce-fir and Douglas fir beams along with the pine timbers, the former alternative seems the more likely. Thus, North Block A construction timbers probably were primarily pine (and juniper as revealed by the sub-floor excavations in Room 92), and large-scale utilization of spruce-fir and Douglas fir began with North Block B construction in the 1030s. The early emphasis on ponderosa pine may indicate a preference for this species over more readily accessible Douglas firs or the exploitation of the last remaining local pine stands before resorting to more distant and varied sources. Given the amount of pine harvesting accomplished in connection with other Bonito Phase sites in the tenth century, it seems unlikely that any pines would have been available locally after 1000. Thus, the temporal patterning of tree felling activity at Chetro Ketl probably represents an early preference for pine that gave way to expediency in the face of the demands of major construction after 1030.

Wood Use

Twelve wood use categories are represented in the Chetro Ketl tree-ring sample collection (Table V:11): primary ceiling beams, secondary ceiling beams, unclassified ceiling beams, intramural logs, aperture elements (lintels and sills), masonry interties such as the cross logs in the corner compartments of the Kiva G enclosure, kiva pilaster supports, kiva wainscotting elements, room-wide platform poles, shaped boards, masonry wall support logs, and firewood. Samples are ascribed to these use categories on the basis of field observations. In making these determinations we accept the functional assignments made by Hawley, Stallings, Lassetter, and O'Bryan on the assumption that their designations are based on direct observation rather than on other criteria such as timber size. Samples that could not be assigned a function on the basis of direct observation are included in the unknown category. Charcoal fragments recovered from the trash mound are added to Table V:11 on the assumption that they were removed from the hearths of the pueblo. However, the trash mound specimens are omitted from the totals because they are not part of the sample from the pueblo itself. Only five of the use categories (six, if the trash mound material is included and lumped with the firewood specimens) are represented by large numbers of samples (Table V:11). Conspicuous by their absence are roof support posts and jacal wall members, elements that are abundant in other Anasazi sites.

Table V:11 Distribution of species among use categories at Chetro Ketl

USE CATEGORY	SPECIES									TOTAL
	PP	SF	DF	Pop	PNN	JUN	NON CON	PP?	Missing	
Primary Beam	66	12	1	0	0	0	0	0	1	80
Secondary Beam	96	28	9	7	2	0	0	0	2	144
Unclassified Beam	72	32	7	11	0	0	0	0	2	124
Intramural Log	31	6	2	0	1	0	0	1	1	42
Aperture Element	43	35	12	5	4	6	0	0	1	106
Intertie	9	14	0	0	0	0	0	0	0	23
Pilaster Support	5	0	0	0	0	1	0	0	0	6
Wainscotting	0	3	0	0	0	0	0	0	0	3
Shelf Pole	4	2	4	0	0	0	0	0	0	10
Board	9	0	0	0	0	1	0	0	0	10
Masonry Support	3	0	0	0	0	0	0	0	0	3
Firewood	1	0	0	0	5	0	0	0	0	6
Trash*	25*	3*	1*	0*	114*	13*	1*	1*	19*	177*
Unknown	186	61	34	6	3	3	1	1	11	306
Total	525	193	69	29	15	11	1	2	18	863

*Not included in Totals.

Estimation of population parameters of each use category is not appropriate because the sample is unrepresentative due to the large number of unknown and unclassifiable elements. Three attributes of the Chetro Ketl wood collection--species (Table V:11), radius, and date of cutting--distribute differentially among the use categories. The systematic utilization of different species for different purposes is established above (Tables V:8, V:9, and V:10). Whether size and cutting chronology also are related to function remains to be determined.

Figure V:6A illustrates the radius distribution of all measured samples from Chetro Ketl, including those that cannot be assigned to a use category. Figure V:6B-E illustrates the distribution of radii within four use categories: primary beams, secondary beams, lintels, and the "primary beams" in Room 106. The Room 106 beams are segregated from the others because they appear to be secondary size timbers used as primaries in this abnormally narrow chamber. Table V:12 lists the statistical attributes of beam size within each category. Statistics were not calculated for the pooled sample of all measured timbers because of the bimodal, non-normal distribution of radii in this group (Figure V:6A). Radii within three of the four use categories are normally distributed. The striking departure from normality of the lintel class probably is due to the fact that small lintels were neither sampled nor measured. Thus, probably only half of the lintel size distribution is represented in the sample of measured radii. On the assumption that lintel radii, like those of the other use categories, are in reality normally distributed, we create an "adjusted lintel" category (Table V:12). This is accomplished by duplicating the right half of the distribution to the left of the maximal size interval as indicated by the dashed lines in Figure V:6A and D. In addition, the lintel with a primary beam class radius of 125 mm is deleted from the "adjusted lintel" category. This element is an obvious outlier in terms of the distribution of lintel radii (Figure V:6D), of its context in the "passageway" in the west wall of Room 8A, and of its size relationship to the other, much smaller, lintels over the passageway.

A series of t tests for differences of means in samples of unequal variance (Blalock 1960:175-6) confirms the visual indications (Figure V:6) that the four use categories are characterized by different mean radii (Table V:13). In each test the null hypothesis is: the mean radius of one use category is larger than that of the one to which it is being compared. Because of this, one-tailed tests are appropriate. A 0.01 level of significance is adopted for rejection of the null hypothesis. That primary beam mean radius differs significantly from those of the other use categories is not surprising, for the total range of primary beam radii barely overlaps the range of any other category (Figure V:6). Somewhat more intriguing is the fact that the Room 106 primaries appear to represent a genuine use category different from the other three categories. It thus appears that the Room 106 timbers are not secondaries used as primaries, but rather are a set of beams cut especially for this particular room or for a class of rooms with the general configuration of Room 106. This circumstance enhances the relevance of the dates to the temporal placement of Room 106. Secondary beams do not differ significantly in size from lintels at the 0.01

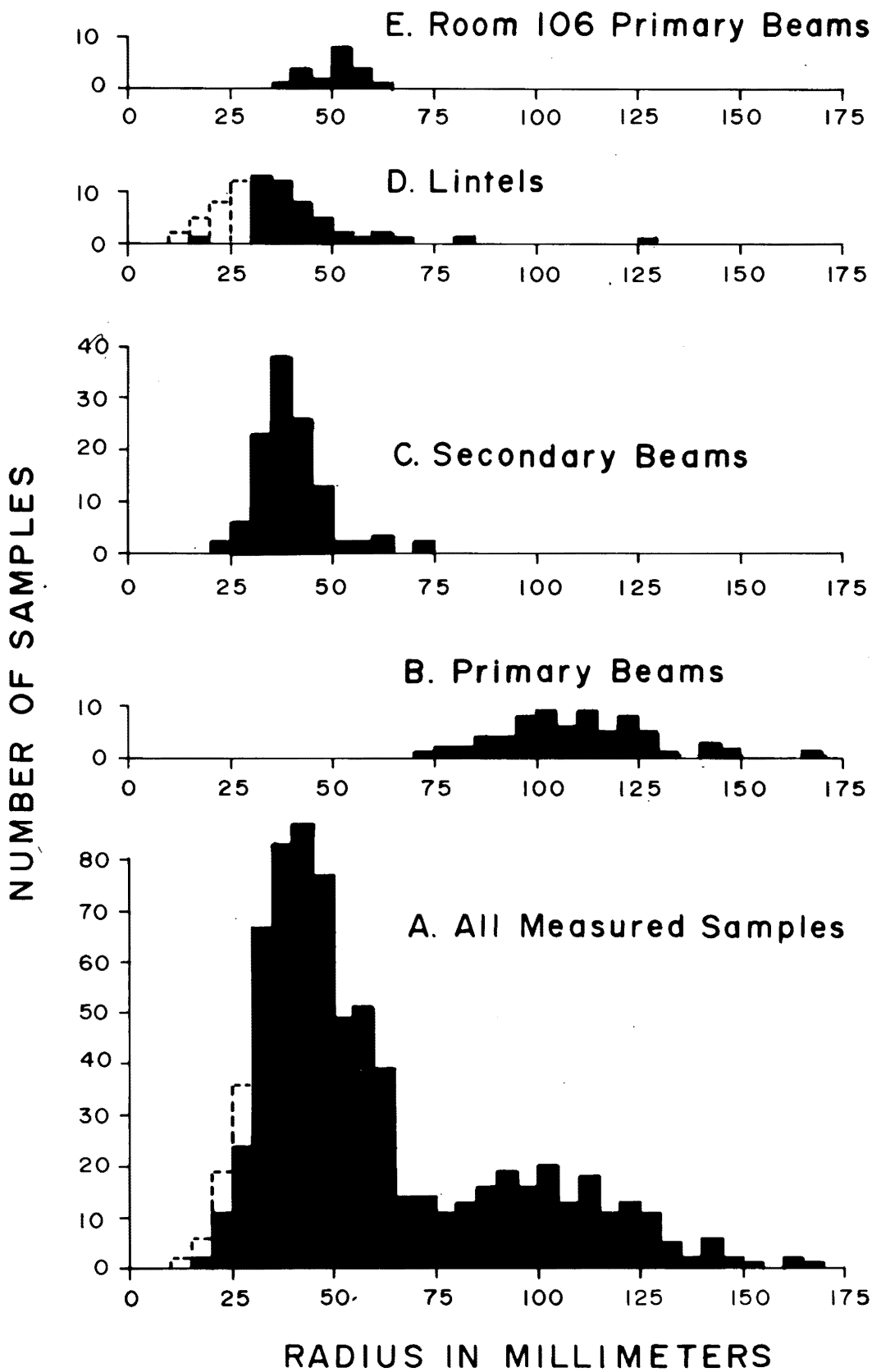


Figure V:6. Distribution of beam radii within use categories.

Table V:12 Descriptive statistics of sample radii within major use categories at Chetro Ketl

USE CATEGORY	DESCRIPTIVE STATISTICS			
	n	$\bar{X}$	s.d.	$s.d.^2$
Primary Beams	69	109.4	18.4	339.2
Secondary Beams	116	39.2	8.3	69.3
Room 106 Primaries	20	50.0	6.7	44.3
Lintels	47	42.3	16.6	277.0
Adjusted Lintels	72	34.9	12.9	166.2

Table V:13 Statistical evaluation of mean radii of major use categories at Chetro Ketl

TEST	TEST STATISTICS			RESULT	CONCLUSION
	df[a]	One-tailed critical t at 0.01 level of significance	t[b]		
Primary Beams vs Secondary Beams	85	2.38	29.70	Reject H_o of same population	PB ≠ SV
Primary Beams vs Room 106 Primaries	86	2.38	21.95	Reject H_o of same population	PB ≠ R106B
Primary Beams vs Lintels	107	2.36	20.22	Reject H_o of same population	PB ≠ L
Room 106 Primaries vs Secondary Beams	31	2.45	6.30	Reject H_o of same population	R106B ≠ SB
Room 106 Primaries vs Lintels	66	2.39	2.66	Reject H_o of same population	R106B ≠ L
Secondary Beams vs Lintels	55	2.40	1.20	Accept H_o of same population	B = L
Secondary Beams vs Adjusted Lintels	76	2.38	2.51	Reject H_o of same population	SB ≠ AL

a. Calculated using Blalock's (1960:176) Equation 13.6

b. Calculated using Blalock's (1960:173) Equation 13.1

level (Table V:13), although the difference is significant at the 0.025 level. However, when lintels are "adjusted" for the missing part of the normal distribution, the difference between them and secondaries is significant at the 0.01 level. "Adjusted lintels" are not compared with primary beams and with the Room 106 timbers because the adjustment could only increase already significant values of t. The statistical tests strongly support the idea that the builders of Chetro Ketl selected different sized logs for at least four structural functions. In addition, the tests support the validity of the Room 106 primaries as a separate use category.

Several aspects of the size distributions within each category are informative. Primary beams exhibit a much wider range of size variability than the other categories (Table V:12, Figure V:6). Apart from the fact that the larger mean radius of primary beams allows greater deviation from the mean, the higher variance in this use category probably accurately reflects the greater variability of context in which primary beams occur as compared to the other types of timber. Primary beam size must conform to the dimensions of the space to be roofed and to the load to be carried by the roof. Secondary beam adjustments to these room size and load requirements generally are made in the number rather than in the size of the elements. This circumstance is reflected both by the small variance in secondary beam radii (Table V:12) and by the greater number of secondary (and secondary sized) beams in the collection (Figure V:6). The Room 106 primaries exhibit the smallest variance of the four use categories, probably as a result of their being cut more or less as a matched set for a specific purpose. The wide range exhibited by lintel radii is due in large measure to the presence of a single outlier with a radius of 125 mm. Elimination of this specimen in the "adjusted lintel" category reduces the variance substantially (Table V:12), although it remains second only to that of primary beams.

The distribution of the radii of all measurable samples regardless of functional ascription (Figure V:6A) naturally represents a composite of the radii assigned to each use category. The total sample distribution gives no indication of a beam size component that is not represented in the four defined use categories. It does suggest, however, that beams of the size of the Room 106 primaries are underrepresented in the use category sample. If the functions of more of the Room 106 primary size elements were known, the secondary beam and Room 106 primary use categories might collapse into a single class, or more samples might fall into a discrete Room 106 primary size category. The only other observable difference between the use category and the total distributions is that the mean radius of identifiable primary beams is slightly greater than that of the general class of primary sized timbers. This minor difference probably is due to the vagaries of preservation and of the archaeological sampling of the ruin. Perhaps the most striking aspects of the total measured sample distribution are its bimodality and the numerical preponderance of smaller over larger timbers. The greater number of smaller timbers reflects the wider variety of uses to which small elements were put and the low ratio of primary to secondary beams in the ceilings.

In general configuration, the distribution of beam sizes from Chetro Ketl is remarkably similar to that from the Hopi village of Walpi (Ahlstrom, Dean, and Robinson 1978:24, Figure 5). More specific correspondences characterize these two collections as well. In both cases, the demarkation between the essentially nonoverlapping ranges of primary and secondary beam radii from both sites is virtually identical. The only major size difference between the two collections is that Walpi primary beams tend to be smaller than their Chetro Ketl counterparts, probably because these beams were used to span larger room spaces at Chetro Ketl. These striking similarities in beam size distributions from two disparate sites undoubtedly result from constraints that are inherent in pueblo architecture and that prevail independently of time and space.

A couple of interesting relationships emerge when the numbers of cutting dates per decade within each use category are graphed (Figure V:7). The total sample maximum in the 1050 decade (Figure V:7A) is due in part to the large number of dated secondary beams in the complete roofs of Rooms 39 and 93. However, the bimodal form of the total sample distribution (Figure V:7A) undoubtedly also reflects, in part, differential patterning in primary and secondary beam dates. The primary beam mode falls in the 1030 decade (Figure V:7B), while that of the secondaries falls in the 1050s (Figure V:7C). Two factors probably are responsible for this pattern. Many primaries cut in the 1030s for first-story construction in North Block B either were left in these ceilings or were reused in subsequent construction. In contrast, most secondaries cut for the first-story ceilings were discarded and replaced with freshly cut timbers when these roofs were rebuilt in the 1050s to accommodate upper stories. The 1050s' cluster reflects the large-scale cutting of new secondaries for use in the remodelled first-story ceilings and in the roofs of newly built upper-story rooms in the North Block. The cutting of lintels (Figure V:7E) and of intramural elements (Figure V:7F) seems to have been concentrated in the 1030s and 1040s, although these distributions could be artifacts of the small sample sizes.

Some sampling problems inherent in the use of only 275 timbers with firm functional ascriptions (Figure V:7) are obviated by considering the percentage distribution of cutting dates per decade within radius classes representative of various element types (Figure V:8). Small components the size of aperture elements and secondary beams (radii <50 mm) are more abundant in the 1030s and 1040s (Figure V:8B) than are recognizable secondary beams (Figure V:7C). This difference probably reflects the replacement in the 1050s of many original secondaries with freshly cut timbers. Most older secondaries that were reused were washed out in the 1947 flood and could not be assigned to specific use categories, thus skewing the temporal distribution of identifiable secondary beams. The majority of timbers that fall in the size range of the Room 106 primary beam category (50-59 mm) were cut in the 1030s and 1040s (Figure V:8C), a distribution of unknown significance. Primary beam sized timbers (radii >60mm) are less concentrated in the early end of the time range (Figure V:8D,E) than are recognizable primaries (Figure V:7B). This difference probably is due to the

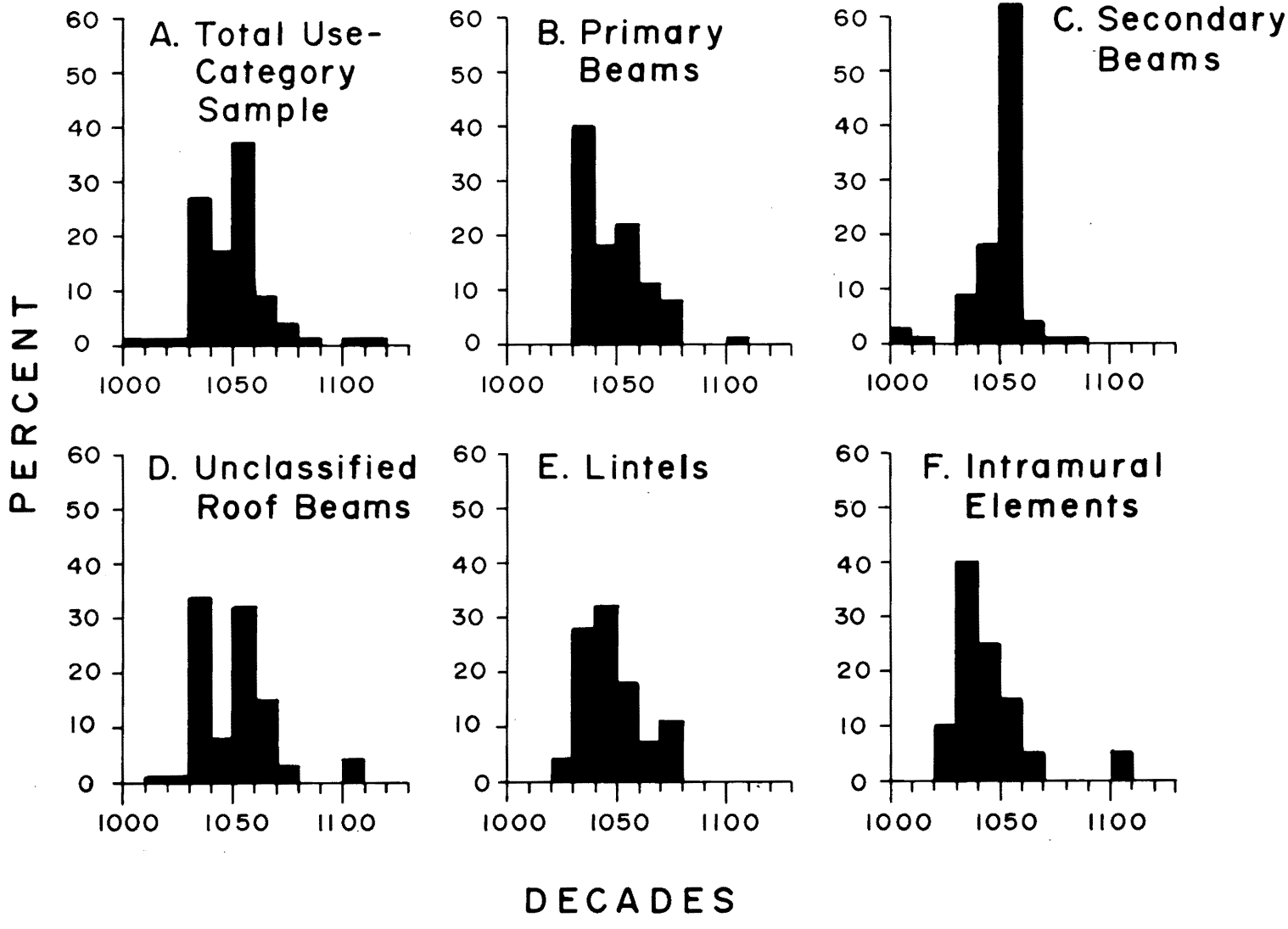


Figure V:7. Percentage distribution of cutting dates per decade within use catagories.

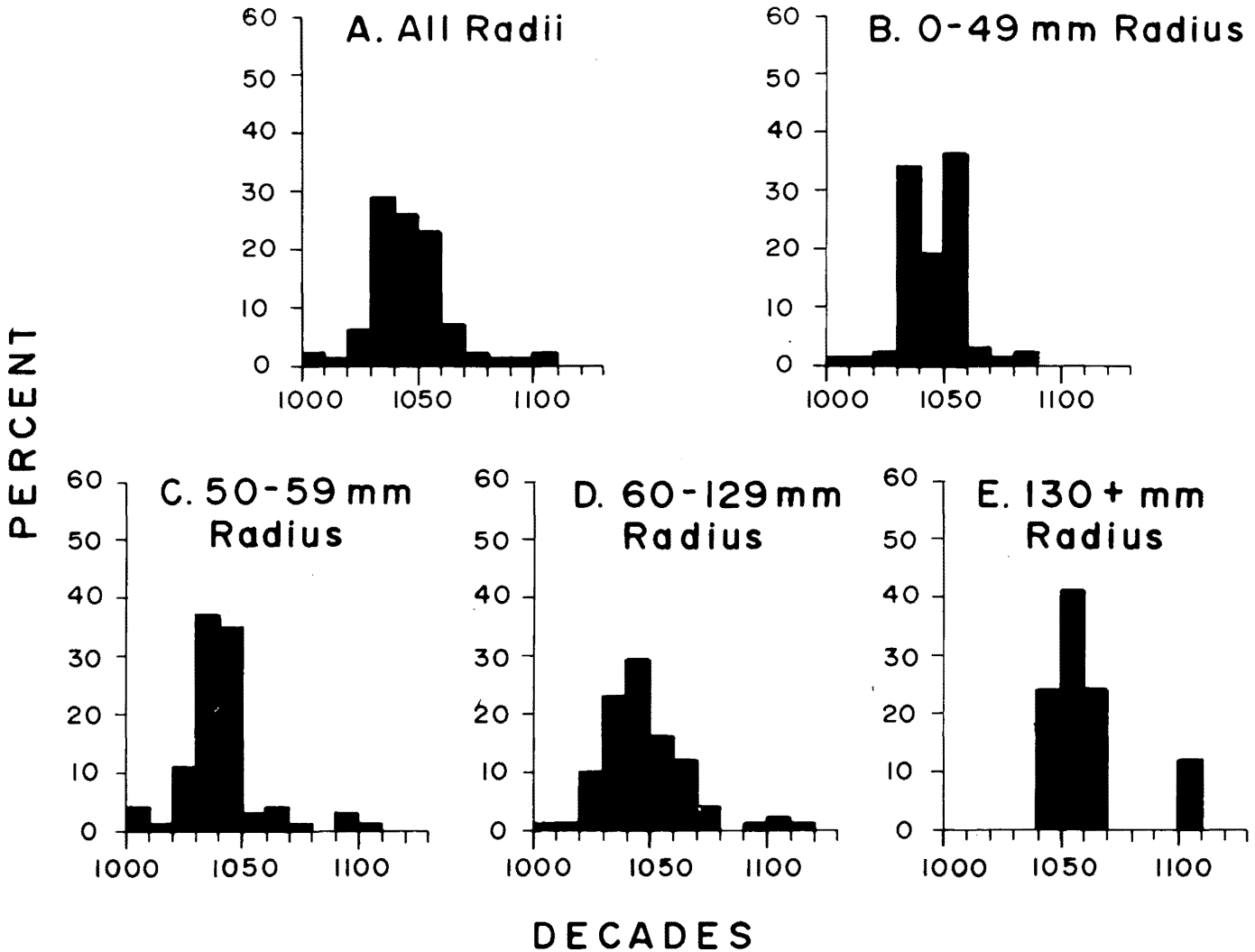


Figure V:8. Percentage distributions of cutting dates per decade within size classes.

presence of original primaries in well preserved first-story rooms combined with the flood origin of the large number of primary sized logs in the upper floors of North Blocks B and C. The tendency for especially large timbers to date late (Figure 8E) is not readily explainable. Comparison of Figures V:7 and V:8 reveals that many differences in temporal patterning among the various use categories (Figure V:7) arise from specific aspects of the constructional history of Chetro Ketl and from events in the recent history of the site. The temporal distribution of timbers within size classes (Figure V:8) supports the conclusion that individual wood procurement events generally involved the production of a full range of wooden elements rather than of a particular kind of element.

Large, well controlled tree-ring sample collections commonly provide a basis for inferring certain wood use practices (Robinson 1967). Among these are the utilization of wood from dead rather than living trees, the stockpiling of timbers for future use, the reuse in new construction of wood salvaged from older structures, and the use of newly cut material to repair or remodel existing structures. Many of these practices are evident in the data derived from the Chetro Ketl collection. Conspicuous by its absence, however, is the large-scale structural use of dead wood, a practice commonly observed at other Anasazi sites (Dean 1969:144). This situation probably reflects the refined architectural standards of the Chacoan builders who concentrated on freshly cut timbers as being easier to work with the stone tools available.

Despite what might be expected in view of the degree of advance planning that obviously went into the construction of Chetro Ketl, the stockpiling of logs for future use seems to have been a relatively minor practice. As indicated in the discussion of date clustering, only two episodes of stockpiling, both fairly short term, are in evidence. A group of beams cut in 1033-1034 probably represents wood stockpiled for the initial construction of North Block B between 1037 and 1040. Similarly, timbers cut in 1043 apparently were briefly stockpiled for the initial construction of North Block C in 1045-1047. The current analysis indicates that the distribution of dates from Room 56-57 that Bannister (1965:151) considered to reflect stockpiling actually conforms to the common North Block B dating pattern indicative of initial construction in the late 1030s and subsequent repair or remodelling around 1050. Thus, stockpiling at Chetro Ketl seems to have been confined to fairly short-term efforts occasioned by the initial construction of North Blocks B and C. However, the occurrence of other, similar stockpiling events may be obscured by the paucity of samples related to initial construction in other components of the North Block or in the East Wing.

Abundant evidence exists for the use of freshly cut wood in repair and remodelling activities at Chetro Ketl. First-story ceilings in both North Blocks B and C were repaired or extensively rebuilt around 1050, just prior to the construction of upper-story chambers atop the first-story rooms. Undoubtedly, these renovations were undertaken to make the first-story roofs strong enough to support the activities that

were to be carried out in the rooms above them. Replacement of original timbers in the first-story ceilings with freshly cut beams created a large supply of old beams, many of which were suitable for future use. Most salvageable timbers of this sort were incorporated as intramural logs into the walls of upper-story chambers added after 1050. Others were reused in other structural contexts, and some undoubtedly ended up as firewood. As a consequence of the length of occupation of the site and of the extensive roof repair carried on there, reuse of wood salvaged from wholly or partially dismantled ceilings was a major component of wood use behavior at Chetro Ketl.

Tree Felling and Wood Modification

Chacoan builders subjected their structural timbers to a greater degree of secondary modification than did other Anasazi groups, a practice that obliterated much of the evidence diagnostic of primary wood modification tools and techniques. Nevertheless, characteristic marks on many of the Chetro Ketl logs (Appendix B) indicate that the ground stone ax was the principal element used in primary wood modification. The stone ax was the only practical tool available for felling the tens of thousands of trees used in Chetro Ketl. This implement also was utilized for limb removal, a process that undoubtedly occurred in the field before the logs were transported, usually over great distances, to Chaco Canyon. Length reduction, too, was accomplished with stone axes. Marks on beam ends from Pueblo Bonito show that logs were circumferentially scored with stone cutting tools to mark where they should be cut to produce beams of desired lengths. There is little reason to doubt that this technique was employed at Chetro Ketl as well. Reduction of logs to predetermined lengths could have occurred at the felling locations or at the pueblo; however, length reduction in the field probably would have facilitated transport of the beams to the pueblo.

Unlike some other Anasazi populations, the Chaocans removed the bark from wooden structural elements. How this was accomplished is something of a mystery, for debarking left no marks on the exterior surfaces of the timbers. Bark is more easily removed from wood cut during the growing season when the cambium is active. As is shown below, however, Chetro Ketl tree cutting was not confined to the growing season to facilitate manual removal of the bark. The virtual absence of beetle larvae galleries from Chetro Ketl wood indicates that the bark was removed soon after the trees were felled. Thus, debarking was not aided by letting freshly cut timbers lie around for a time until the bark was loosened by seasoning or by the cambial tunneling of beetle larvae as may have been the practice at Mesa Verde (Graham 1965). The evidence for prompt debarking coupled with the absence of bark residue at Chetro Ketl indicates that peeling, like limb removal and length reduction, probably was accomplished in the forest immediately after the trees were felled. The lack of transportation scars on the surfaces of Chetro Ketl timbers reveals that the peeled logs were

transported to the pueblo by some means that precluded rough contact with the ground. The logs must have been carried rather than dragged or rolled.

Secondary wood modification probably occurred in the pueblo, often after the elements were in place in their structural contexts. Commonly, the protruding ends of primary beams were abraded flat to lie flush with the faces of the walls in which they were embedded. Similarly, limb stubs on primary beams often were abraded down flush with the surface of the timber. Both these practices destroy ax marks left by the felling, length reduction, and branch removal operations. As shown by the stone ax cut ends of secondary beams in chambers for which beam end data are available, principally Room 39, these elements rarely were modified by abrasion, presumably because they did not penetrate the masonry to mar the smooth exterior face of the wall. It is doubtful that aperture elements, whose ends are buried in masonry, were abraded. Shaping of wood usually involved the production of flat sided "boards" that most commonly were used as shelves or for roofing small passageways such as ventilator tunnels. Tool marks reveal that such elements were fashioned by a two-stage process of initial reduction with stone axes followed by abrasion to produce smooth and fairly flat sides.

Seasonal patterning of tree felling activities can be inferred from the distribution of incomplete and complete terminal rings in a collection. An incomplete terminal ring indicates that the tree was cut during its period of annual growth. The growing seasons of the species represented at Chetro Ketl vary considerably, although they all fall between February and October. A complete terminal ring denotes cutting between the end of one growing season and the beginning of the next. As indicated above in the discussion of date clustering, a tree felling episode can be assigned to a particular season on the basis of the distribution of incomplete and complete terminal rings within the date cluster that defines the episode. On this basis, identifiable tree cutting events are assigned to the springs of 1039, 1046, and 1052 and to the late spring or early summer of 1043. Apart from the placement of individual tree cutting episodes such as these, seasonal aspects of tree felling in general are revealed by terminal ring distributions within the collection as a whole.

The overall patterning of tree cutting activities is best revealed by the distribution of terminal rings among species with known growing seasons. In the case of Chetro Ketl, only ponderosa pine, spruce-fir, and Douglas fir fulfill this criterion and possess enough examples to make statistical analysis meaningful. A Chi-square goodness of fit test is used to evaluate the null hypothesis that tree felling occurred randomly throughout the year. Expected frequencies are derived on the basis of estimated growing season lengths for these species. Ponderosa pine usually has a 4-month growing season, while both spruce-fir and Douglas fir have 2-month periods of radial growth. Increasing these values to 6 and 3 months respectively, a procedure that decreases the probability of getting statistically significant results, minimizes the possibility of affirming spuriously significant relationships. Thus,

half the ponderosa samples and a quarter of the spruce-fir and Douglas fir specimens should exhibit incomplete terminal rings if trees were cut randomly throughout the year. The Chi-square test (Table V:14) requires rejection of the hypothesis, indicating that tree felling activities were seasonally structured. Given the maximal growing season of these species--March through May for spruce-fir and Douglas fir and May through September for pine--the observed terminal ring pattern probably denotes the concentration of tree cutting in the spring and early summer. This result is consistent with the date cluster evidence given above that the four individual tree felling episodes recognizable at Chetro Ketl occurred in the spring or early summer. The Chetro Ketl pattern of spring-early summer tree felling contrasts with the late summer tree cutting inferred for Betatakin in Tsegi Canyon (Dean 1969:77-79).

Comparison of the terminal ring distributions among use-categories reveals whether the cutting of timbers for specific purposes was seasonally patterned. Subclassification by species would have reduced expected frequencies in some cells below acceptable levels; therefore, the season specific growth information inherent in the species breakdown is not available for this analysis. Rather, a simple Chi-square contingency procedure is employed to test the null hypothesis of no relationship between use category and terminal ring condition (Table V:15). Failure to reject the hypothesis indicates that there was no seasonal differentiation in the cutting of wood for these elements. Therefore, the procurement of wood for primary beams, secondaries, intramural logs, and aperture elements followed the spring-early summer cutting pattern that characterizes the Chetro Ketl collection as a whole.

The possibility that the seasonal patterning of tree felling changed during the occupation of Chetro Ketl is evaluated through the analysis of the distribution of terminal rings among four time periods defined on the basis of the constructional history of the site and of the clustering of tree-ring dates. Once again, species data do not enter the analysis, and a Chi-square contingency procedure is used to test the null hypothesis of no relationship between terminal ring condition and time period (Table V:16). Failure to reject the hypothesis signifies that there are no temporal differences in the seasonal patterning of tree cutting activities. As a result, the spring-early summer tree felling season probably prevailed thoughout the history of Chetro Ketl.

Synthesis

Combining the results of the foregoing chronological and nonchronological analysis produces an integrated reconstruction of the growth of Chetro Ketl and of the wood use behavior of its inhabitants. The following synthesis presents what we consider to be the most probable sequence of events in the history of the pueblo given the available

Table V:14 Chi-square analysis of the distribution of complete and incomplete terminal rings among three tree species at Chetro Ketl. Expected frequencies are in parentheses

TERMINAL RINGS	SPECIES			TOTALS
	PP	SF	DF	
Complete	157 (163.5)	38 (64.5)	25 (34.5)	220
Incomplete	170 (163.5)	48 (21.5)	21 (11.5)	239
Totals	327	86	46	459

$X^2 = 54.7$

$p \leq 0.01_{df=2)} = 9.210$

$\therefore$ Reject H_o

Table V:15 Chi-square analysis of the distribution of complete and incomplete terminal rings among four use categories at Chetro Ketl. Expected frequencies are in parentheses

TERMINAL RINGS	USE-CATEGORY				TOTALS
	Primary Beams	Secondary Beams	Intramural Logs	Aperture Elements	
Complete	31 (32.0)	45 (40.5)	10 (9.9)	10 (13.6)	96
Incomplete	37 (36.0)	41 (45.5)	11 (11.1)	19 (15.4)	108
Totals	68	86	21	29	204

$X^2 = 2.7$

$p \leq 0.01_{(df=3)} = 11.341$

$\therefore$ Do not reject H_o

Table V:16 Chi-square analysis of the distribution of complete and incomplete terminal rings among four time periods at Chetro Ketl. Expected frequencies are in parentheses

TERMINAL RINGS	TIME PERIODS				TOTALS
	1000-1029	1030-1049	1050-1059	1060-1109	
Complete	19 (18.5)	118 (121.8)	68 (56.4)	21 (29.4)	226
Incomplete	20 (20.5)	139 (135.2)	51 (62.6)	41 (32.6)	251
Totals	39	257	119	62	477

$X^2 = 9.5$

$p \leq 0.01_{(df=3)} = 11.341$

$\therefore$ Do not reject H_o

dendrochronological and archaeological data. That this particular reconstruction, while to us the most probable, is not the only one possible is indicated by the many ambiguities in the data and by the alternative dating schemes that are thoroughly developed in preceding sections of this report. For the sake of clarity and brevity, other possible assessments of the data are not repeated here. The absence of such alternatives and of the usual qualifying phrases should not be taken as evidence that we are unaware of these uncertainties. Arguments supporting synthesis presented below are fully developed in preceding sections of this report.

North Block A, the oldest identified structural unit at the site, is a pueblo of unknown size that lies buried beneath the structure now called Chetro Ketl. The older pueblo was built in a series of at least four construction episodes--dated at 1008-1010, 1020-1021, 1026, and 1028-1030--in the first three decades of the eleventh century. In 1032-1034, the residents of this pueblo manufactured a number of primary sized beams and stockpiled them for future use. Less than 10 years after the completion of North Block A, it was partially razed and filled to provide a foundation for Chetro Ketl proper, which was begun in the 1037-1040 interval with initial first-story construction of North Block B. Reusable beams salvaged from demolished portions of North Block A were added to the stockpile of timbers accumulated in 1032-1034. The latter were employed in the ceilings of North Block B, while most of the salvaged North Block A beams were used in intramural contexts. Demolition of North Block A was a gradual process that was not completed until after the first story of North Block B was finished. North Block A undoubtedly served as a residence for the builders of North Block B, and for this reason was not completely razed until the latter unit was habitable.

First-story construction in North Block B was carried out during the 1037-1040 interval at which time most of the stockpiled primary beams cut in 1032-1034 and many of the logs salvaged from North Block A were utilized. By 1041, the core unit of North Block B, consisting of three or four rows of one-story rooms, was in place, probably standing alongside remaining units of North Block A that had not yet been razed. In a noteworthy repetition of earlier behavior, the builders accumulated a second stockpile of beams, which were cut in the 10401043 interval. Timbers salvaged from the demolition of the remaining portion of North Block A were added to this stockpile, and many of these elements were incorporated in the first-story roofs and walls of North Block C during the 1045-1048 period. By 1049, North Block A probably had been totally demolished, and North Blocks B and C stood together as a unit of four or five rows of single-story rooms facing south onto a plaza containing an unknown number of kivas. At this time also, the first story of North Block D may have been abutted to the east end of North Block B-C unit. Certainly, it was in place by the early 1050s when second-story rooms were added to it.

Major alteration and expansion of the pueblo occurred in the early 1050s. In anticipation of adding upper stories to the existing rooms of North Blocks B and C, the roofs of many of the first-story chambers

were repaired or extensively remodelled, processes that introduced many post-1050 beams, principally secondaries, into these ceilings. Second- and third-story rooms were constructed throughout North Blocks A, B, C, and D at this time. While the back row of chambers may have been raised to a uniform height of at least three stories, it is clear that such was not the case in North Block B where the upper stories were added in piecemeal fashion. It is likely that at least the first story, and perhaps more of East Wing A, was appended to the northeast corner of Chetro Ketl contemporaneously with upper-story construction in North Blocks B, C and D. Shortly afterward, in the middle 1050s, the first story of East Wing B was abutted to East Wing A. The 1050-1055 interval was one of the most substantial building periods in the history of Chetro Ketl, although construction was scattered thoughout a wide area rather than concentrated within single blocks of contiguous rooms.

At the time the early 1050s' building boom was in progress, demolition of the front row of North Block B rooms may have begun in preparation for the construction of rooms and kivas along the north side of the Plaza. Two chambers built at this time, Rooms 38 and 70, are abutted to the front of the middle row of North Block B rooms and overlie razed remnants of the front row of North Block B rooms. Thus, part of North Block B had been demolished by this time, some 20 years before additional major construction in this section of the pueblo.

Sporadic addition of upper-story rooms continued in North Blocks B, C, and D and in East Wings A and B from the 1050s into the 1080s. By the early 1080s the aforementioned architectural units probably rose to their maximum heights in a solid mass of rooms, which were perhaps stepped down from the high back wall to the Plaza on the south. Major additions during these years included East Wing C in the 1060s and East Wing D in the middle 1070s. Subsequently, most activity in all these areas probably involved repairs undertaken as needed, a process that continued into the early years of the twelfth century. The construction of several kivas and associated rooms atop the partially razed front row rooms of North Block B in the south central part of the pueblo postdated 1070. North Block E began in the early 1070s with the construction of the Kiva N Complex. This was followed by the addition of the massive Kiva I-J Complex with its two large kivas enclosed in a rectangular block of rooms, which was completed around 1087. The subsequent addition of the Unnumbered Kiva Complex to the front of the I-J block is not well dated, though it must postdate 1087. North Block G, including perhaps the Colonnade, was added to the south and west sides of North Block E sometime after 1087, perhaps in connection with modifications to Kiva N that were effected around 1099.

The latest identifiable large-scale construction at Chetro Ketl was associated with North Blocks F and H. Later versions of Kiva G, their rectangular masonry enclosure, and surrounding rooms were appended to the pueblo between 1090 and 1103, probably toward the end of that interval. The addition of a second story to Room 27 in or after 1117 is the latest dated construction event at Chetro Ketl. Abutments show that North Block H was built after North Block F and therefore

postdates 1103. Construction of this set of rooms along the south and west sides of the North Block may have been related to the closing of the spaces between the pillars of the Colonnade. Apart from the construction activity in North Blocks F and H, most early twelfth century building was confined to repair and maintenance work throughout all areas of the pueblo. Especially extensive renovations, involving the intentional filling of the first story and modifications of the second story, were undertaken in East Wing B around 1103.

A number of important constructional events at Chetro Ketl cannot be dendrochronologically dated due to a lack of associated tree-ring dates. Very little can be said about the origins and development of the Plaza. One event in the history of that feature, the raising of the Plaza floor through the deposition of a layer of dirt, can be inferentially dated to the middle 1070s on the basis of its relationship to dated rooms in East Wing C. Enclosure of the Plaza by the Moat and associated rooms can be placed sometime after the middle 1070s on the basis of architectural relationships. This inferred dating suggests that the raising of the Plaza floor and enclosure of the Plaza may have been related to one another. Other features associated with the Plaza --such as the Great Kiva, Court Kiva, and various rooms and firepits-- lack datable tree-ring samples and cannot be temporally related to the other components of the ruin. Chetro Ketl's most famous feature, the Colonnade along the front of the North Block, cannot be dated with precision, although architectural relationships suggest that it postdates 1087 and may be as late as 1099. A total lack of samples from relevant proveniences precludes the temporal placement of features in the as yet unexcavated west end of the North Block and the West Wing.

A major event that can be only poorly dated dendrochronologically is the abandonment of Chetro Ketl. No trees were cut for use after 1117. This does not signify, however, that the pueblo was abandoned shortly after this date, for the quantities of reusable timbers in walls and roofs and perhaps in stockpiles could have satisfied the inhabitants' demand for structural elements and fuel, especially if rooms were being vacated as the population dwindled. A date from a piece of firewood establishes that the last fire in Kiva G occurred sometime after 1112. However, the probability of a substantial hiatus between the natural death or felling of this tree and its use as fuel renders equivocal the pertinence of the date to the temporal placement of the fire in which it was consumed. Thus, although the tree-ring dates demonstrate that the Chetro Ketl site locus was occupied for a minimum of 110 years (1008-1117), they reveal little or nothing about the chronology of its abandonment, a process that probably was completed in the twelfth century. Other archaeological or chronometric evidence will have to supply a more precise date for the final abandonment of this large pueblo.

Conclusions

The current review of Chetro Ketl dendrochronology was structured by several major objectives. Given the foregoing analyses, it is now possible to assess the degree to which the research has achieved its stated goals. A principal objective was to bring greater order to a tree-ring sample collection afflicted by incomplete and often contradictory provenience data. Exhaustive review of existing field collection records, the collection and analysis of more than 200 new samples from the site, and the meticulous comparison of samples and ring records substantially reduced the ambiguity that plagued the Chetro Ketl tree-ring sample collection. The residue of only 16 dated samples with no intrasite provenience ascriptions whatever testifies to the success of this aspect of the research.

A second goal was to utilize a detailed room-by-room analysis of the tree-ring data within specific archaeological contexts to produce an integrative synthesis of the chronological development of the pueblo. This chronological analysis also was expected to provide an independent test of Chapter IV, based on architectural data and relationships, of the physical structure and sequential growth of the site. Detailed consideration of the dates and their specific proveniences produced just such a site chronology that placed the development of the extant ruin between 1037 and 1117 and revealed a complex series of construction, repair, renovation, and demolition episodes within the 80-year span. The dated history of Chetro Ketl confirms to a remarkable degree the sequence presented in Chapter IV. In general, the tree-ring dates confirm that discrete structural units were begun in the order specified by Lekson. Subsequent building, demolition, and renovation activities in these units, however, were far more complex than that suggested by the basic sequence in which the units were appended to one another. Thus, the fundamental chronological goals of the Chetro Ketl study were attained in a measure well beyond what might have been anticipated at the outset of the project.

Secondary objectives of the research included answering specific questions about the developmental history of Chetro Ketl that were raised by earlier research at the site. One of these was whether the 945-1030 dates represented an earlier structure that had been totally dismantled, as suggested by Hawley and Bannister, or whether a portion of the extant structure could now be identified as originating prior to 1030. The distribution of pre-1030 logs and the presence of the partially razed North Block A beneath the main pueblo confirms the existence on the site locus of an earlier unit that had been built between 1008 and 1030 and demolished by 1037 to make room for North Blocks B and C. A related question as to the date of initial construction of the extant ruin was conclusively answered by the placement of first-story building in North Block B in the 1037-1040 interval. Similarly, a large number of discrete construction, remodelling, repair, and demolition events were delineated and dated by the analysis of the tree-ring and architectural data. One of the few such events that could not be precisely dated was the abandonment of the pueblo, which occurred sometime after the last construction date of 1117.

Another research objective was the investigation of wood use behavior of the residents of Chetro Ketl. Among the wood use practices identified were a tendency to cut trees in the spring and early summer; the use of stone axes, cutting implements, and abraders in tree felling and wood working; the differential use of tree species for various structural and nonstructural purposes; the large-scale reuse of timbers salvaged from older contexts; the limited stockpiling of beams for future use; and the large-scale replacement of roof elements with freshly cut timbers. The recognition of such a wide variety of wood use practices far exceeded original expectations and was one of the unanticipated bonuses of the research.

Finally, we hoped that the dendrochronological-archaeological analyses would shed some light on the impact of modern stabilization and repair activities on the dating potential of Chetro Ketl in particular and of archaeological sites in general. Comparison of the original and present locations of logs in the pueblo demonstrated that recent stabilization work had extensively relocated beams, and probably other materials, throughout the ruin. Had original field records on samples collected before major stabilization efforts not been available, it would have been impossible to determine the original loci of extant timbers and therefore to derive an accurate, comprehensive site chronology. A related phenomenon is the disappearance from the site of most of the logs sampled prior to 1940, either through discard by archaeologists or through weathering and decay. Again, only the availability of adequate field records allowed the early sample collections to be used in dating the components of the site. The Chetro Ketl situation emphasizes the importance of the immediate collection of tree-ring samples and the thorough documentation of such samples. Post-excavation natural and behavioral processes inevitably alter the site enough to adversely affect the relevance of tree-ring dates to prehistoric events. Thus, no matter how well preserved the site, neither collection nor documentation of tree-ring samples can be safely postponed if adequate dating is to be achieved.

In general, it can be concluded that, despite somewhat inauspicious initial conditions and the monumental amount of work entailed, the restudy of Chetro Ketl dendrochronology has proved worthwhile. Much more than before is now known about the developmental chronology of this major Chacoan site and of the architectural and wood use behavior of its inhabitants. At the same time, this study has raised a number of interesting problems that cannot be resolved with the data in hand. Only a few of the more important implications of the analysis are mentioned here.

Despite the evidently predetermined layout of the pueblo and the abundant evidence for the advance planning of construction, the Chetro Ketl "master plan" was not achieved quickly. Rather, it was realized gradually over a period of at least 80 years through the intermittent accretion and removal of various kinds of architectural units. It would be interesting to know how this not inconsiderable, long-range feat was accomplished, if indeed there was a preconceived target plan. How was such a plan represented, and how was the representation

conserved for 80 years? What sociocultural processes maintained for at least three human generations the drive toward fulfillment of a preconceived pueblo plan? Or was Chetro Ketl's final configuration a result not of adherence to a master plan but rather of normal accretion regulated by a general conception of a "proper" Chacoan pueblo? Perhaps the operation of such a process at different sites is responsible for the wide variety of specific site layouts that occur within the distinctive general pattern of Chacoan pueblos.

The tree cutting and constructional histories of Chetro Ketl have certain implications for hypotheses concerning the nature of Chacoan community and local organizations. Trees for use in Chetro Ketl were felled with great regularity throughout the 110+ year span of occupation at the site locus (Figure V:3). The fact that the tree-ring sample probably is skewed toward the early end of the time range, due to the probable concentration of later wood in contexts highly susceptible to postoccupational destruction, strengthens the likelihood of regular tree felling during the later years of the site's occupation. Furthermore, nearly continual construction, repair, and modification activity characterized the architectural history of the pueblo; some work was in progress almost all the time. This level of intensity of building activity offers little support, at least as far as Chetro Ketl is concerned, for hypotheses that have the Chaco Canyon towns occupied only sporadically or at regular but brief intervals by a population that most of the time resided elsewhere. Rather, this pattern would seem more typical of a permanent residential occupation of the pueblo in which the routine wear and tear of daily use coupled with population growth required frequent additions and alterations to the structure.

The spring-early summer seasonal patterning of tree felling activities at Chetro Ketl differs considerably from the late summer-early fall cutting pattern that appears to characterize most prehistoric puebloan groups (Robinson 1967:73-88). Obviously, general Chetro Ketl wood procurement practice involved large groups of workers cooperating to fell, shape, and transport large quantities of logs in fairly brief but intense flurries of activity. Why much of this activity occurred at a time of year when attention should have been directed toward preparing fields and planting crops requires explanation. Unfortunately, we can offer only a couple of unfounded speculations that possibly can be tested archaeologically. Perhaps Chetro Ketl's population was sufficiently large and organized such that separate work forces could be concurrently maintained for various tasks such as tree cutting and construction on the one hand, and farming on the other. Or perhaps Chacoan society as a whole consisted of entire communities that specialized in different activities such as wood procurement, construction, farming, and so on. Some organizational arrangements must have freed a substantial number of individuals from agricultural reponsibilities and allowed them to repair to the forests to procure structural wood during the field preparation and planting season.

Finally, it is interesting that Chetro Ketl's famous Colonnade, so often cited as evidence of Mexican influence in Chaco Canyon, clearly was a late addition to the site. Dating sometime after 1087, this

feature postdates the founding of Chetro Ketl proper by at least 50 years. Even in the unlikely event that the Colonnade really is of Mexican inspiration, its temporal relationship to the rest of the site casts doubt on the idea that Mexican architects or standards were responsible for the overall layout of Chetro Ketl or for the construction of the pueblo. Generally, "Mexican connection" arguments imply that a site, such as Chetro Ketl, was built in one planned and directed operation that included the stamp of Mexican affiliation, in this case the Colonnade. Clearly, such was not the case at Chetro Ketl, which grew by accretion over a period of 80 years and which only received its putative symbol of Mexican affiliation after at least 50 years of existence. Whatever the Mexican influence at Chetro Ketl, if any, it apparently was not responsible for the origin, development, and general configuration of the pueblo.

Clearly, Chetro Ketl has much more to tell archaeologists than it has yet revealed. Future archaeological and dendrochronological work in unexcavated areas of the site undoubtedly would contribute substantially to resolving many of the problems outlined above and thereby enhance knowledge of this site in particular and of the Chaco phenomenon in general. Thus, Chetro Ketl stands not only as an expression of the Chacoan pattern but also as a potential source of additional information to help understand the apex of Anasazi achievement that flowered in so inhospitable a setting as Chaco Canyon.

CHAPTER VI

CONSTRUCTION HISTORY OF CHETRO KETL

Stephen H. Lekson

This chapter reconciles the preliminary building sequence (North Blocks A-H and East Wings A-D, Chapter IV) with the dendrochronology (Chapter V), through the formulation of a second series of building stages (Stages I-XV). While the preliminary building stages (Chapter IV) were simply construction units, the second series groups similarly dated construction (dendrochronologic or estimated) at various parts of the site.

I extend what we know (or think we know) about the excavated areas of Chetro Ketl to the unexcavated third of the site. Stages I-XV include all construction at Chetro Ketl, visible or projected. This requires occasional forays beyond the available architectural and dendrochronological data (see especially Stages VA and X). Thus, this chapter should be seen as a "best guess" at the construction history of Chetro Ketl. Rather than pretend to the precision of Chapter V, the construction history will be discussed in terms of half-decade increments (e.g., 1010, 1015, 1020 etc).

In addition to presenting the construction history of Chetro Ketl, this section also briefly discusses what was being constructed. Among other things, this includes doorway patterns, room sizes, and floor features. It should be clear from Chapter II that relative dating of most floor features is impossible. Probably few of the features discussed here were built during the construction stage to which they are assigned for description. Perhaps floor features can be considered "last use" features of particular rooms, but the synchronous pattern of floor features within each construction stage is now impossible to determine.

Stage I (1010-1030)

Stage I is the incompletely known earlier building under the presently visible North Block of Chetro Ketl. Stage I appears to have been a long, rectangular structure, underlying much of later Stage II.

Only the western third of one room (below Room 92) is currently exposed. This Stage I room was evidently open during the construction of Room 92. The wall of Room 92 is slightly offset over the wall of the Stage I room; the superimposed wall required a rough foundation which was veneered onto the Stage I wall. The Stage I room was later filled in, and the roof level of Type II Stage I became the ground floor of Stage II. The foundation was plastered, which suggests that the Stage I room continued in use for some time after Stage II construction.

Only one date (963vv) is directly associated with Stage I building; clusters of dates from 1008 to about 1030 from beams used in later building may also be attributed to Stage I.

The dendrochronology of Kiva G-5 (Chapter V) suggests that it may have been associated with Stage I; however, the difference in elevation between the top of the Kiva G-5 walls and the ground floor level of Stage I indicates a slightly later date for this circular room (i.e., Stage II).

If Chetro Ketl Stage I dates to the early 1000s, it may represent an important point on a progression of Chacoan building forms from curved to rectangular ground plans. The earlier Chacoan buildings (e.g., "Old Bonito," Judd 1964) are arcs of rows of large rooms, each backed by paired smaller rooms. This ground plan typifies building up to the later 900s. The next large-scale building period, in the later 1030s and early 1040s, maintains the same pattern and sizes of rooms, but in effect straightens the old arcuate ground plan into an elongated rectangle. If Stage I parallels the rectangular alignments of Chetro Ketl Stage II (as suggested in Chapter II), it is perhaps an early example of the rectangular form. Only a similarly obscured construction at Hungo Pavi (ca. 1000 to 1010) might be earlier.

Stage II (1035-1040)

Stage II (Figure VI:1) consists of at least two rows of single-story rooms, extending over 60 m west from Rooms 39 and 41. Only two rows of rooms are currently visible, but another plaza-facing row probably was present. Kiva G-5, and its fellow beneath later Kiva I, indicate a row of large subterranean circular rooms along the front of Stage II. This row of kivas would have been at some distance from the presently visible Stage II rooms. The space between the visible rooms and the kivas was probably filled with work areas, ramadas or, as suggested in Chapter IV, a row of plaza-facing rooms.

Subsequent building greatly altered many of the exposed rooms of Stage II. Rooms of the remaining front row (Rooms 39 to 68) were subdivided and modified. At the east end of this row (Rooms 39, 39A, 40, 49 and 50), it is difficult to determine whether cross walls are original or later introductions. Doors are centered between cross walls (which is not the case in Room 56-57); it appears that these rooms were in fact designed as small rooms. These small square rooms, along with Room 41 (a similar room in the rear row), form the east end of Stage II. Mean floor area is 11.56 m^2 (sd=2.98 m^2, N=6).

Some of the other Stage II rooms were also later subdivided, but when later cross walls are eliminated, the larger front row rooms average

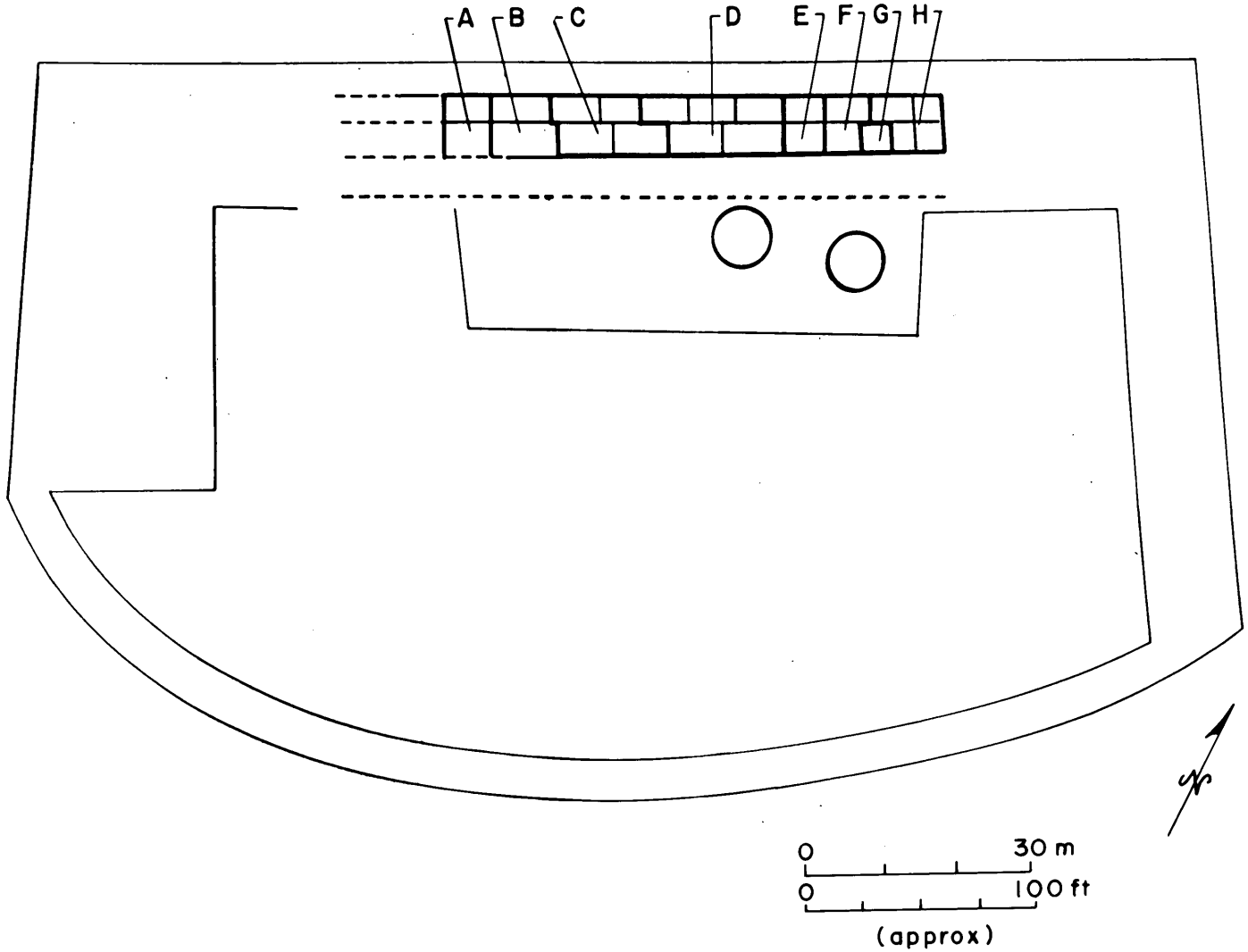


Figure VI:1. Stage II.

22.95 m^2 (sd=0.66 m^2, N=5); rear row rooms (excluding Room 41) average about half that, 12.00 m^2 (sd=1.45 m^2, N=10). The size difference between front and rear row rooms is a difference of both length and width.

Stage II has, of course, undergone extensive later modification, but at least six and perhaps seven discrete room suites can be defined from doorway patterns (Figure VI:1). Each consists of one or two large front row rooms and from one to three smaller rear row rooms (with the exception of Room 40, which seems to have been an island, entire of itself). Connections within the posited plaza-facing row are, of course, unknown.

Four suites (Figure VI:1 A, B, E and F) consist of two rooms each: one front and one rear row room of about equal floor area; in two of these (Figure VI:1 A and E) the front and rear rooms are the same size, with the rear room containing room-wide platforms. A fifth suite (Figure VI:1 H) consists of one large front row room (later subdivided into two smaller rooms) and two smaller rear row rooms. The two largest Stage II suites (Figure VI:1 C and D) have pairs of relatively large front row rooms, with two and three rear row rooms behind each pair of large front rooms (one rear row room in D was later subdivided into two smaller rooms).

Within the front row, as already noted, there are formal differences between small square rooms (39, 39A, 40, 49, 50) at the east end of the front row, and the larger rooms to the west (beginning with Rooms 51, 56-57, etc.). There are several other differences (in addition to size) between these two classes of rooms.

While primary roof beams in the larger rooms are perpendicular to the plaza, primary beams in smaller rooms run parallel. In both cases, primary beams span the short axis of the room.

Doors in the front walls of the larger rooms were very tall and broad (only the tops of these doors are visible above room fill). The small, square rooms each have two doors in front walls: the first, and presumably the original, is a short rectangular raised-sill door, centered in the wall between cross walls, and between floor and ceiling. The second door is considerably higher (the lintels were just below the ceiling level) and offset towards one cross wall. These doors were all later blocked.

Presumably the second, larger doors in the smaller rooms postdate the first (e.g., the upper door in Room 39 dates to about 1054 while the room itself dates about 1035-1040). This sequence of doors may demonstrate modification of the rooms to allow access to a higher level to the front --the older Stage II rooms having become partially subterranean through the accumulation of plaza or construction surfaces. (This situation is also encountered in Old Bonito.) The apparently tall doors in the larger rooms might be later, higher remodelling (like those added to the small, square rooms) rather than unusually tall original doors; however, their great breadth remains distinctive.

It is likely that the smaller, raised-sill doors of the small square rooms opened into the existing plaza-facing row; this row was razed and

for some length of time prior to Stage VIA (see below), the currently visible front rooms of Stage II may have opened directly onto a plaza--hence the larger doors opening onto a suface considerably higher than room ground floor level.

Paired vents (one vent in each upper corner of a wall) are known from the rear walls of a few rear row rooms; however, in the front row, only the rear wall of Room 50 is definitely equipped with paired vents. Probably none of the plaza-facing walls of the front row had vents.

Along the entire rear wall of Stage II, there is only one doorway (Room 47-52). In my opinion, this door is an artifact of postflood stabilization. Very likely, the rear wall of Stage II was penetrated only by vents, as indicated above, and an odd "window" in Room 48. This 60-cm square opening was constructed like a large vent. Its function must have been related to the room-wide platform in the east end of Room 48, since the feature is centered directly above the platform's surface. One other rear row room (92) had room-wide platforms, in both east and west ends, but no "windows."

One remarkable door not yet mentioned goes diagonally from front row Room 39A to rear row Room 41. This corner door seems to have been original, and if so it is the earliest corner door known at Chaco.

Almost nothing is known of Stage II floor features. In a few rooms with relatively complete notes, none are mentioned.

Most of Stage II is built of masonry remarkably similar to masonry used in initial construction at Pueblo Alto (1020-1040). The configuration of suites, as far as it is known, also resembles contemporaneous construction at Pueblo Alto, and recalls earlier building at Pueblo Bonito, Penasco Blanco and Una Vida (Lekson 1981).

Stage III (1045-1050)

About 10 years after the initial construction of Stage II, a single row of one-story rooms was added to the rear of the existing building (Figure VI:2). The structure of this addition is rather unusual. Instead of seating the new primary beams in the parapet of the older rear wall, the addition was built as an independent unit, with two long walls. One formed the new rear wall of the building, and the other was built directly alongside the older rear wall, creating a double wall between Stages II and III. Much of this double wall fell during the 1947 flood, but it originally ran the entire length of Stage III construction. In most--and probably all--Stage III rooms, the double wall included a large rectangular void or niche (about 1.60 m wide by 1.00 m tall and 0.95 m deep), centered between the cross walls and about 70 cm above the floor. The sides and floor of the niche were evenly finished, and the top was supported by large beams, like the lintels of a very large door. The exterior face of the older Stage II wall formed the rear of the niche. In

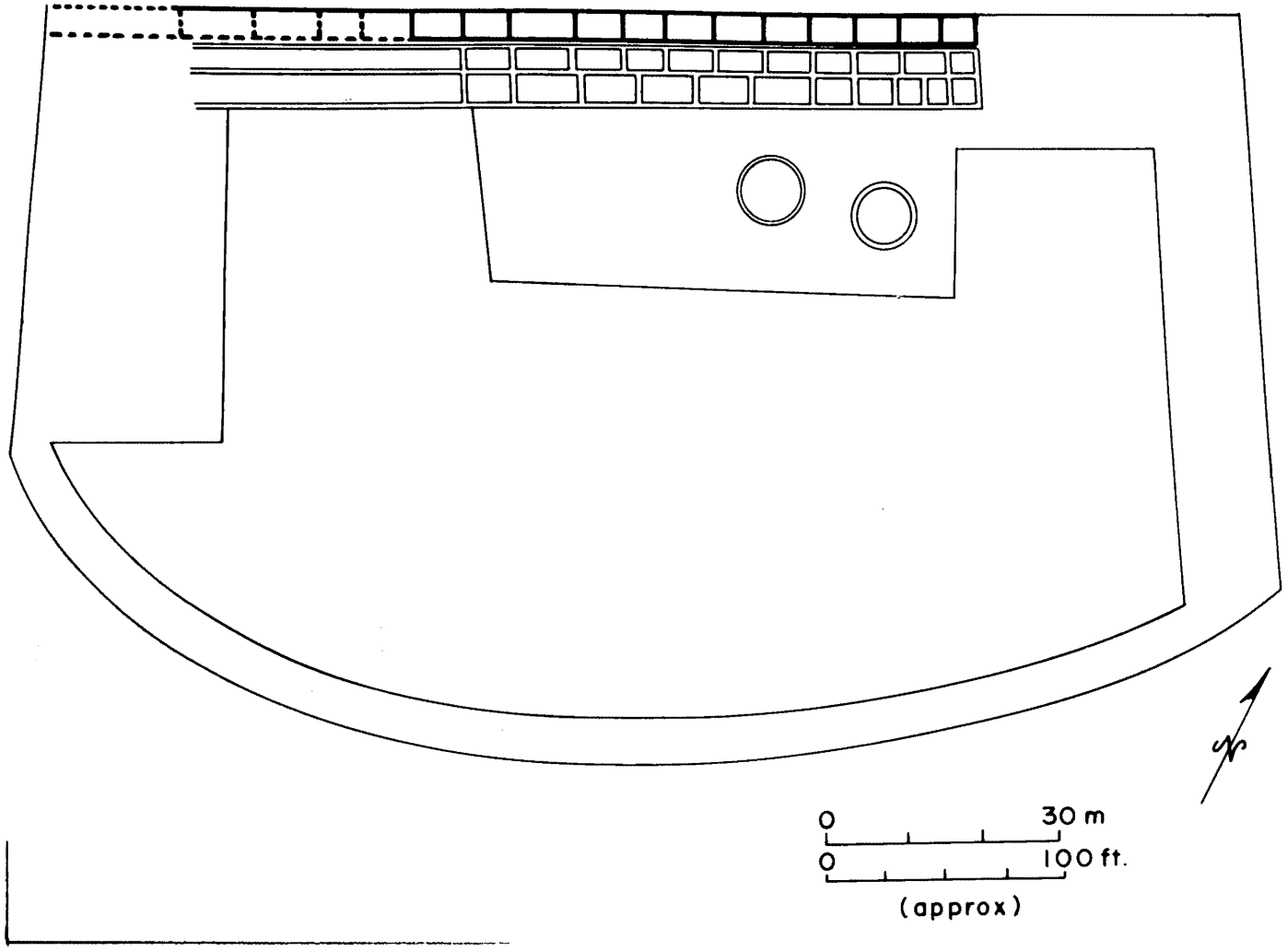


Figure VI:2. Stage III.

at least three (and perhaps all) rooms, a second equally distinctive feature accompanied the large niche. This was a second rectangular void at the west end of the double wall, serving as a shaft for vertical access from the ground floor to the roof level.

What was the function of the double wall? At least four explanations have been offered:

1. The wall provided lateral support to the rear wall of Stage II.
2. The wall increased support for upper-story building.
3. The wall supported Stage III primary beams, either:
   a. Because Stage II was already two stories tall, and lacked a parapet in which to seat new beams.
   b. Because beams stockpiled for Stage III construction were too short for the designed span (Chapter V).
4. The double wall allowed the construction of the large niche and access shaft.

These suggestions are not mutually exclusive, but they will be discussed individually in the order presented.

Lateral support for the rear wall of Stage II seems reasonable in light of similar construction at Pueblo Bonito, Kin Bineola and elsewhere; however, the rear wall of Chetro Ketl Stage II shows no evidence of uneven settling or movement.

The second argument, increased support for future upper-story building, suggests long-term planning--the second story over Stages II and III was built 5 to 10 years after Stage III. Two arguments can be made against this interpretation. First, the rear wall of Stage III, which would also have been planned to support any upper-story building, is a wall of normal width. Second, when the second story was added over the double wall, it was built over the original Stage II rear wall, rather than the thicker Stage III double wall.

The sequence of upper-story construction also suggests that the double wall was not an alternative to punching beam sockets in an existing two-story wall, since the wall was evidently <u>not</u> two stories when Stage III was built.

This leaves the last two suggestions, which I feel are the most likely: either the wall represents a compromise between a selected span and available beams, or the wall was designed to allow construction of the large niche and vertical shaft features, or both.

The large niches, the vertical shaft, and of course the double wall itself are very unusual features. The double wall technique is seen infrequently at other Chacoan sites. The intramural shaft is even more rare (Kin Kletso, Room 55; Pueblo del Arroyo, Room 51). But the large niches are probably unique to Chetro Ketl Stage III. The occurrence of this distinctive feature in every Stage III room is a strong argument for centralized design.

One room (93) of this series also had a room-wide platform. The few preflood photos that remain do not show room-wide platforms in other Stage III rooms; but the double wall in at least one room (number unknown) had a trio of smaller niches east of the distinctive large niche.

Rooms in Stage III are very uniform in size (mean=11.23 m^2, sd=1.81 m^2, N=12), and fairly close to the average size of rear row rooms of Stage II. The double wall covers any major openings in the Stage II rear wall (e.g., the "window" in Room 48, and the door, if real, in Room 47-52), although some, and perhaps all, vents present in the Stage II rear wall were continued through the Stage III double wall. All Stage III rooms had small raised-sill doors and paired vents in their rear walls, and lateral doors through most--probably all--cross walls. The doors in the Stage III rear wall were all subsequently blocked.

These interconnected rooms form a suite, but clearly do not represent the same kind of unit as the two to five-room Stage II suites. Stage II closely parallels the first addition to Old Bonito (Judd 1964:Figure 4), which was built about 20 years earlier. In both cases, a row of interconnected, formally identical "storage" rooms was added to the rear of a series of three- to five-room suites. Both added rows connect laterally, but do not have doors cut through to the older suites.

Stage IV (1050-1055)

In the early 1050s, second stories (Stage IVA) were added over existing Stage II and III rooms (Figure VI:3). The second story extended east, at least in the rear two rows of rooms, as part of a three-room deep addition (Stage IVB) to the east end of Stages II and III. There is a legendary change in the masonry type (admired on every Chetro Ketl tour) between the second stories of Stages IVA and IVB. Despite this evident break (greatly enhanced by modern repairs) the second stories of both date to 1050-1055.

While the second story of Stage IVB is dated to 1050-1055, the dating of the first story below it is problematic. Since this first-story construction abuts Stage III (1045-1050), the first and second stories of Stage IVB must be essentially contemporaneous. However, it must be noted that the east door of Stage II Room 39, which opens into the front row of Stage IVB, may date to 1045. While this date at least supports the separation of Stage IVB from Stage II, it also could support an earlier date for the first story of Stage IVB. While no conclusive argument can be made for either dating, I have assumed that first and second stories are contemporaneous to allow articulation of the first stories of the North Block (Stage IVB) and East Wing (Stage IVC).

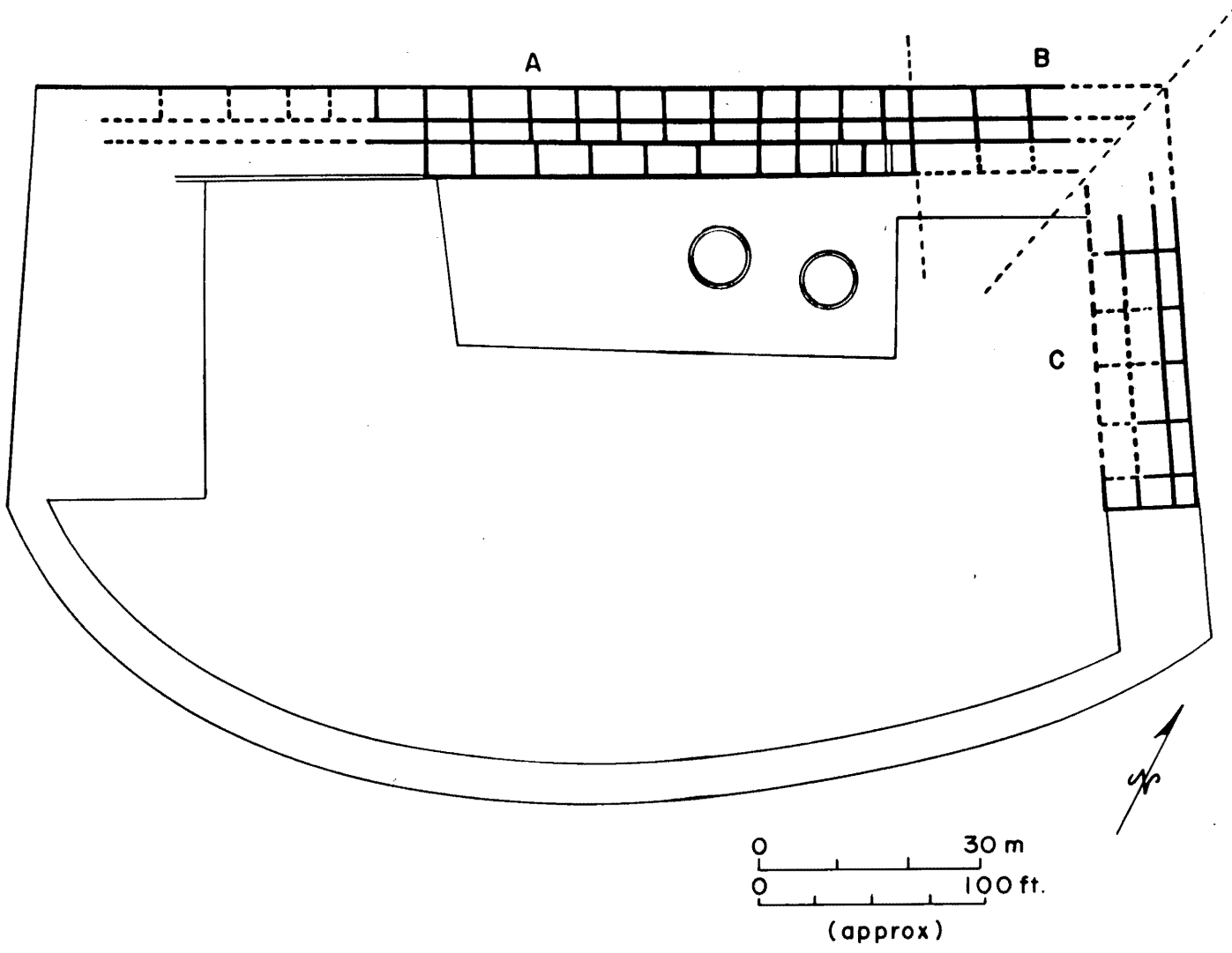


Figure VI:3. Stage IV.

Stage IVA

Many ceilings in Stage II and III rooms were substantially strengthened with new beams in the early 1050s, probably in preparation for Stage IVA construction. Modification and repair may have anticipated higher live loads on the first-story roofs which were to become second-story floors. At about the same time, several rooms in the front row of the existing building were subdivided. Cross walls of smaller rooms in the older ground floor rooms were not continued into the new second story; notably first-story Rooms 39 and 39A became a single larger room on the second story, a situation also likely over Rooms 49 and 50. In the front row of Stage IVA, then, mean size is about the same as the Stage II front row rooms--22.82 m^2 (sd=0.62 m^2, N=6), while second- and third-row room sizes remained almost identical to those of the earlier rooms on the first story--i.e., 11 to 12 m^2.

All rooms probably had a single raised-sill door and paired vents in each rear wall, but lack of alignment of cross walls from the first to the second row necessitated off-center doors (and occasionally multiple doors) in the wall between them (e.g., the rear walls of Rooms 56-57 and 60). The second-story plaza-facing walls (i.e., those in the front wall of the front row) apparently had large, multiple doors in each wall, including at least one "T" door (Room 62).

The rear row of rooms interconnect laterally, while the middle row rooms do not. Only two pairs of front row rooms are laterally connected (Rooms 62 and 63, and Rooms 51 and 56-57), both with unusually broad doors (of which only the blocked lower portions remain).

There were two corner doors in Stage IVA. The first may have opened to the exterior from the southeast corner of Room 56-57, and the second was an internal door between second row Room 47-52 and rear row Room 46.

The only floor features reported from Stage IVA were in Room 39. The first story of Room 39 had been filled, perhaps intentionally, with trash, and thus the floor of the second story was intact when excavated. The second-story floor of Room 39 had been rebuilt three times. On the first and last floor, there were corner firepits, while the middle floor had a central firepit.

Stage IVB

Stage IVB includes most of the northeast corner of Chetro Ketl. Only a few rooms are visible here, most having been badly reduced prior to any archaeological research and then further obscured by an extensive backdirt embankment created during the excavation of the North Block. Only a few rooms in the rear row on the second-story level are visible; first-story rooms are entirely buried. The rooms appear to be uniformly large--almost twice as large as rooms of the same rows in Stage IVA (mean=19.68 m^2,

sd=1.93 m^2, N=4). With the exception of the rear wall of the building, which has only paired vents, every wall parallel to the plaza has a raised-sill door and paired vents. Cross walls also have lateral doors, but no vents. No other wall features, and of course no floor features, are known from Stage IVB.

Stage IVC

Stage IVC is the ground floor of the northern two-thirds of the East Wing. Only the uppermost portions of some walls are visible--Rooms 114, 116, 118 and 119). Stage IVC was presumably three rooms deep, and one story tall. There is a suggestion of decreasing room size from front to rear. Rear row rooms average 16.47 m^2 (sd=1.24 m^2, N=4), about 40% smaller than the single measurable middle row room (Room 115, 25.94 m^2).

The masonry of Stage IVC is a form of Type II, more like that of Stage IVA than that of IVB, with which Stage IVC presumably articulates in the northeast corner of the building.

Stage V (1050?-1075?)

Stage VA

The plaza-enclosing arc at Chetro Ketl is unusual in that it seems to curve around the West Wing and terminate at the west end of the North Block (Figure I:2). This suggests that at some point, Chetro Ketl may have been "L" shaped, much like Una Vida or Pueblo Pintado. If so, the West Wing superimposed on the plaza-enclosing arc was probably relatively late.

However, other lines of argument may indicate that the two wings were more or less contemporaneous. In its final (post-1130?) form, Chetro Ketl was marked by the asymmetry of its two wings, the East Wing being about 14.5 m longer than the West. But the East Wing as it appeared in the mid-1050s (i.e., Stage IVC) was almost exactly the same length as the West, which suggests that the West Wing paralleled the East in construction. The West Wing lacks dendrodates, and with the exception of one of two elevated circular rooms and an odd corner here and there, is completely reduced. I suspect that most of the West Wing was built at the same time as Stage IVC, and I have postulated that this construction (Stage VA) was similar in form to the earliest East Wing: that is, three rooms deep and about six rooms long (Figure VI:4). The West Wing was evidently two stories tall, but, like the earliest portions of the North Block and the East Wing, the rising plaza level eventually made the second story the ground

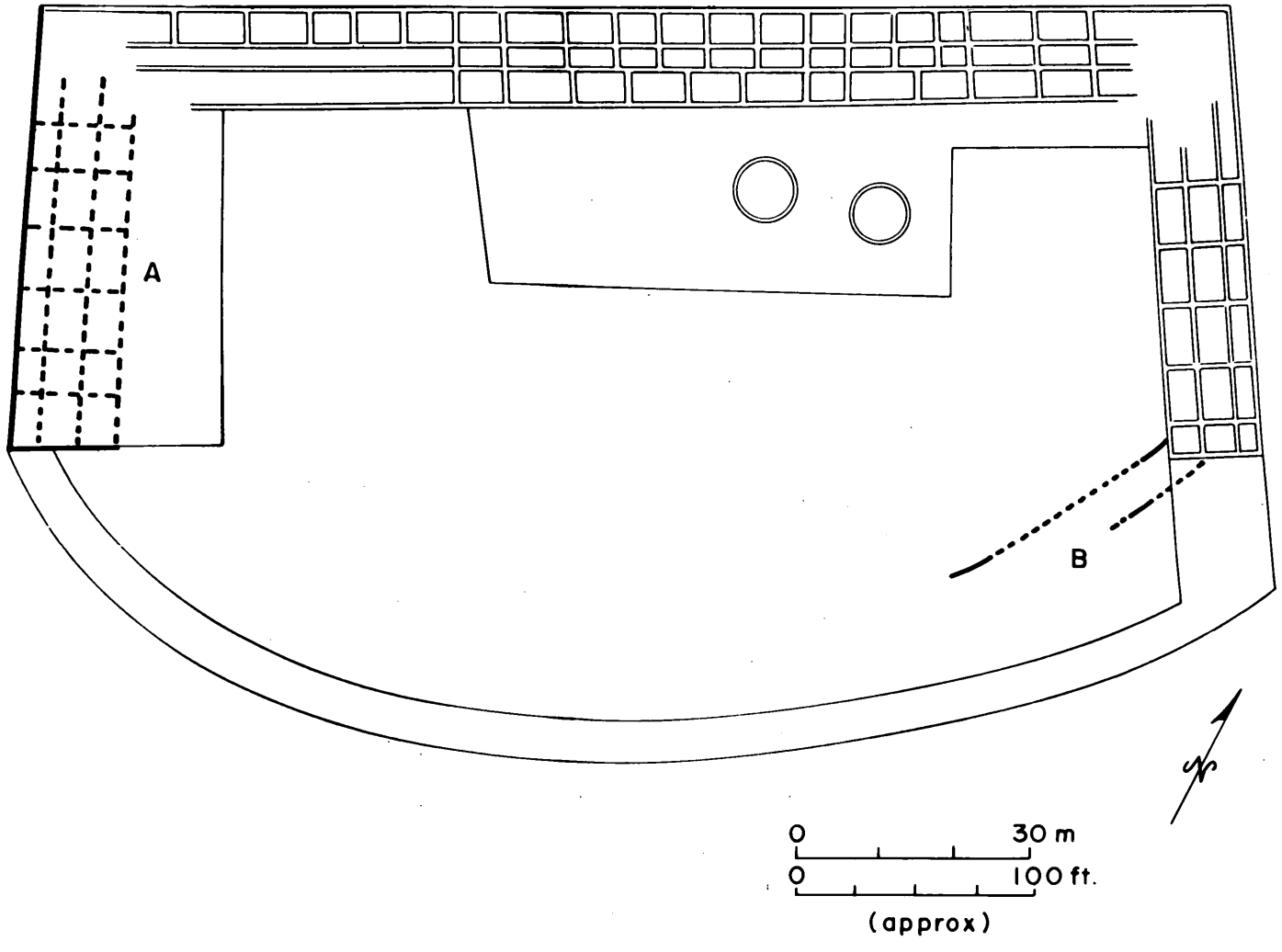


Figure VI:4. Stage V.

story. Extending the East Wing-West Wing analogy to the construction of stories, the first story may have been built in the early 1050s and the second in the 1060s or early 1070s.

Stage VB

A pair of razed walls, running southwest from Room 123 and Kiva C, and beneath the Great Kiva (Figures I:2, VI:4), suggest an arc of plaza-enclosing rooms running from Stage IVC to the southeast corner of the West Wing, both of which may date to the early 1050s. The depth of the razed walls, relative both to each other and to Room 123 and Kiva C, is unknown; the walls are about 4 m below the present plaza surface. If these segments do represent a continuous arc, the fact is of considerable significance to the dating of the Great Kiva, which must then postdate that arc. Similar parallel plaza-enclosing walls at Pueblo Bonito date about 1045-1060.

Stage VI (1050-1060)

Stage VIA

Stage VIA consists of a line of large single-story rooms either added to, or more likely replacing a razed plaza-facing row of Stage II, and perhaps a second line of very narrow rooms running along the front of the large rooms (Figure VI:5). The pattern is best illustrated by Rooms 70, 89 and 104. Room 70 is a large rectangular room added to the front of the first story of Stage II with a double wall (very much like that employed in Stage III). There are at least two doors in the front wall of Room 70, opening into Room 89. Room 89 is a very narrow room which faces the plaza. The first story of neither Room 70 nor 89 is currently exposed, but perhaps the open first story of Room 104, a narrow room west of Room 89, is representative. Room 104 has a large, much modified door opening into the plaza, and room-wide platforms at both ends. It is impossible to say if room-wide platforms were standard features in Stage VIA plaza-facing rooms, and in fact these features in Room 104 may be later introductions paralleling those in nearby, but later, upper stories of Rooms 88 and 89.

Stage VIA probably includes Rooms 69 and 104, and Rooms 70 and 89. Evidence for the continuation of Stage VIA to the east may be found in the razed walls beneath Kiva I and Kiva G (Constructions G-3-1a and G-3-1d, Miller 1934), and Rooms 25 and 38. The bases of these razed walls are at depth comparable to that of the floor of Room 104, and beneath Kiva G-3 they also show the large room/narrow room pattern. This pattern may characterize much of Stage VIA.

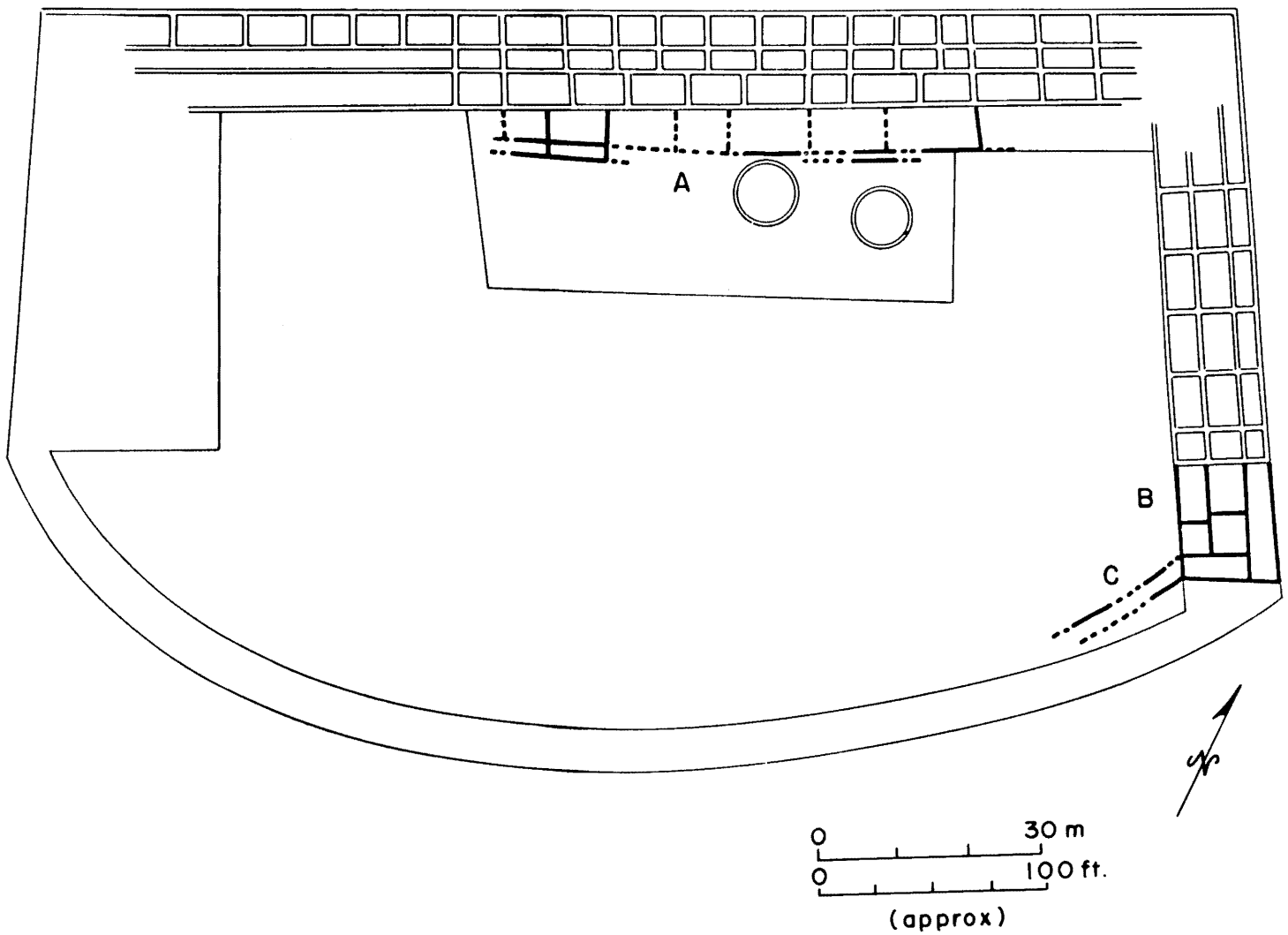


Figure VI:5. Stage VI.

Room 70 is about 26.6 m^2 in floor area, larger than the Stage II rooms behind it; and the projected rooms to the east of it are larger still. The front row rooms of Stage IVA seem to be equal in width to the larger rooms behind, but only about one-third as deep.

Stage VIB

Stage VIB (Figure VI:5) is a single-story extension of the East Wing (Stage IVC), that consists of a block of four square rooms (Rooms 5, 6, 7 and a fourth under later Kiva C), and two extremely long, narrow rooms to the rear and to the south of this block (Rooms 1-4 and 2-3). The small square rooms measure about 4 m x 4 m (mean area=15.71 m^2, sd=3.45 m^2, N=3). The long, narrow rooms (Rooms 1-4 and 2-3) are each about 3 m wide, and three to four times longer than they are wide.

The only portion of Stage VIB presently exposed is the first story of Room 1-4. A single door is located at the south end of this room, originally opening to the valley floor outside the plaza. Apparently no doors connected Room 1-4 with Rooms 2-3 and 5. Beyond this, we know nothing of wall or floor features from Stage VIB.

Stage VIC

Stage VIC (Figure VI:5) is limited to a pair of razed walls running southwest from Stage VIB, partially buried beneath later Kiva A. The depth of Kiva A places Stage VIC on about the same level as the floor of Stage VIB. The walls are probably the remnants of an early plaza-enclosing arc.

Stage VII (1060-1070)

Between 1060-1070 (and probably in the first 5 years of that span) third-story rooms were added to the two rear rows of the North Block (Stage VIIA), and second-story rooms were added over the rear rows of the East Wing (Stage VIIB). These rooms naturally continued the form of the lower stories, with a slight increase in floor area reflecting a slight decrease in wall width (Figure VI:6).

Stage VIIA

Very little remains standing of the third story over earlier Stage IVA in the North Block; most was lost in the 1947 flood. The exterior (rear) wall probably included paired vents and a raised-sill door for each

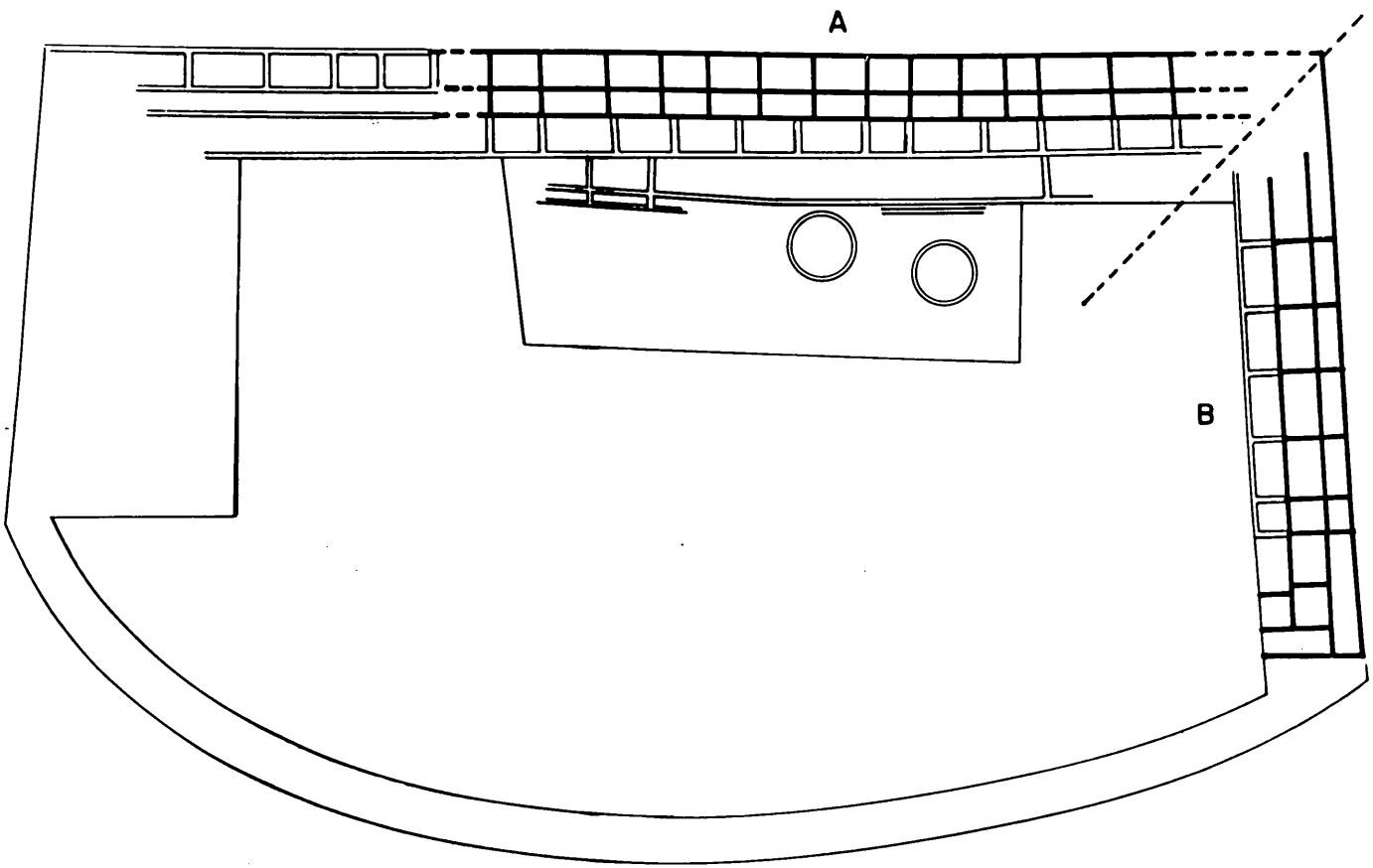


Figure VI:6. Stage VII.

room, doors which opened onto a long balcony along the second-story ceiling level of the rear wall. The third story over North Block Stage IVB collapsed prior to the 1947 flood, but it appears in photographs taken by the Mindeleffs and Pepper in the 1880s. These early photos and the small amount of remaining wall show no doors in the rear (exterior) wall over Stage IVB; however, interior walls parallel to the plaza had raised-sill doors and paired vents. Remaining cross walls also have raised-sill doors. Both of the rear row rooms for which there are data (Rooms 109 and 110) had room-wide platforms.

Stage VIIB

Stage VIIB includes two rows of rooms built on the second-story level, over the middle and rear rows of the East Wing. What remains is largely the rear, exterior wall. This wall shows paired vents, but no doors, in each room. Rear row rooms had doors in plaza-facing walls, and none in lateral walls. Few cross walls of the middle row are visible, but those few had lateral doors. Nothing is known of doors in plaza-facing walls of this row.

Stage VIIB building is both more visible and more complex over Stage VIB at the south end of the East Wing. The excavators believed that the older first story, Stage VIB, was intentionally filled prior to or during VIIB construction, but Dean (Chapter V) disputes this.

Except for the rear, exterior wall, doors occur in all walls parallel to the plaza, but in no walls perpendicular to the plaza. Rooms 5, 6 and 2-3 have numerous wall niches, but these may date to later modifications of the area that include the subdivision of Rooms 1-4 and 2-3 and the introduction of Kiva C (Stage XIVC).

Stage VIII (1070-1075)

Stage VIIIA

Stage VIIIA (Figure VI:7) is a poorly known modification of the plaza-facing rooms of the North Block (Stage VIA) that took place about 1070-1075. The dendrochronology of the only two dated units, the Kiva N complex and Room 38 is less definite than could be wished (Chapter V). In the Kiva N complex, equivalent stories of Room 89 (second story) and Kiva N (first story) were probably built about this time, as was the second story of Room 70. Room 38 is dated between 1054 and 1090. In this case, I accept Hawley's unconfirmed date of 1073 (Chapter V). This date is listed as coming from the second story; since Room 38 is but a single story, the date must come from the first.

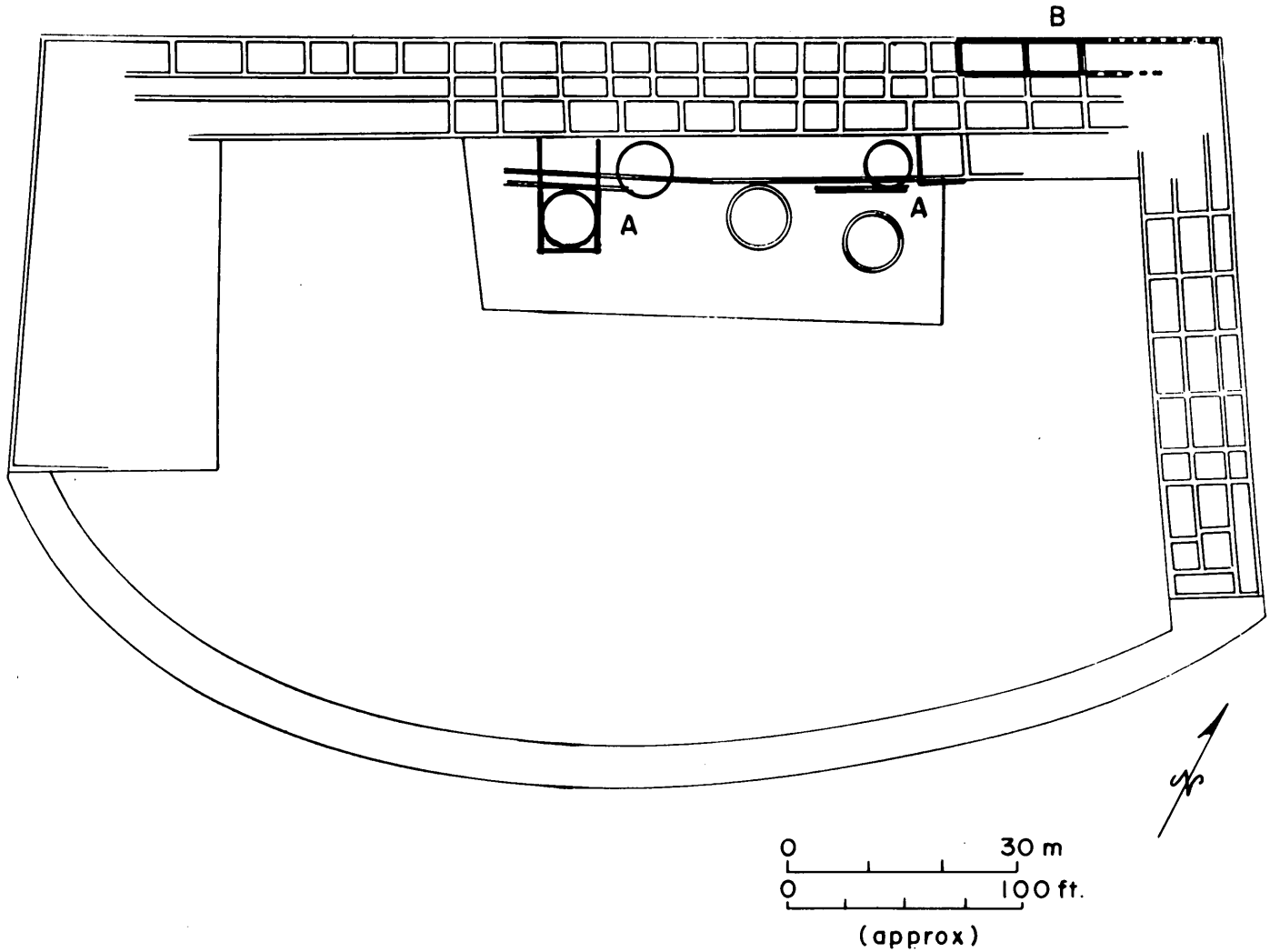


Figure VI:7. Stage VIII.

Kiva N began as a small elevated circular room; in Stage XIII, a second story was added to Kiva N and it became one of less than half-a-dozen Chacoan Tower Kivas. As built in Stage VIIIA, Kiva N had a large "T" door to the exterior (west), and a smaller door north into Room 89. A partition wall apparently ran a short distance in from the "T" door, but other features are not known. A large (1.25 m diam.) and mysterious solid masonry column stands against the wall in the southeast quarter of Kiva N, but this is very likely a later addition, perhaps part of the metamorphosis from circular room to Tower Kiva.

Room 38 is a square room with at least two floors. The lower had a central firepit and possibly a vent running below the large "T" door through south wall, and the upper floor had both central and corner firepits.

Stage VIIIA may have consisted of only isolated construction, such as Kiva N and Room 38; but I believe that much (subsequently obscured) construction between these two units may also date to this span. Two elevated kivas (the razed remains of Kiva G-8 and the unnumbered circular room preserved in a short arc in the west wall of Room 72) on about the same level as Room 38 and Kiva N, were probably part of this construction. Both of these kivas were about the same diameter as Kiva N. Most of the area probably occupied by Stage VIIIA was not excavated to sufficient depth to expose existing remains.

Stage VIIIB

Around 1075 a fourth story was added over the rear row of rooms in the northeast corner of the building (Stage IVB). There is no evidence that this fourth story continued west beyond Room 109. The rooms of Stage VIIIB collapsed relatively recently (see Stage IVB). Only paired vents in walls parallel to the plaza are evident in early photographs of Stage VIIIB. Nothing is known about floor or other wall features.

Dating is largely conjectural. Stage IVB, upon which Stage VIIIB was built, was dated to 1060-1070, providing an approximate earliest date. Since there is little evidence of any major construction after 1075 in the main room blocks, I have assumed that Stage VIIIB was built prior to 1075. A likely span, then, is 1070-1075.

Stage IX (1075-1085)

Stage IXA

Stage IXA (Figure VI:8) is a one-story room (Room 8-9) added to the south end of the East Wing, on the same level as VIB. This construction

evidently took place between 1075-1085, but subsequent modifications of the room (particularly the addition of Stages IXB and XIVB) and heavy stabilization have confused both architecture and dendrochronology.

Stage IXB

The "Moat," two parallel walls about 0.6 m apart and standing up to 2 m tall, runs from East Wing to West across the front of the plaza (Figure VI:8). The walls were finished on both interior and exterior faces, and the narrow passage between had a well plastered floor. This floor, plus a vent in the wall opposite Room 135, suggests that the Moat was roofed. There were no cross walls.

Stage X (1075-1115?)

Stage XA

Probably after 1075, two elevated kivas and several plaza-facing rectangular rooms were added to the West Wing (Figure VI:8). If this construction was analogous to similar construction in the North Block, the kivas date to about 1080-1090, and the rectangular rooms to 1080-1105.

The kivas were constructed on the second story of the existing West Wing (Stage VA). At the time of Stage X construction, the floor of the old second story was probably at plaza level. Other construction in Stage X was probably on the same level as the kivas--i.e., on the present plaza level.

Stage XB

The dendrochronology of the trash mound suggests deposition from about 1075 (1071v, CK-407) to sometime after 1110 (1110vv, CK-410). This range of dates is compatible with the ceramic content of the mound (Windes 1980).

Stage XI (1080-1090)

Kivas I and J and the rooms immediately around them (Figure VI:8) probably date about 1080-1090. Plaza-facing rooms (e.g., Rooms 29, 30, 31, 33 and 88) may be slightly later in time; these I have called Stage

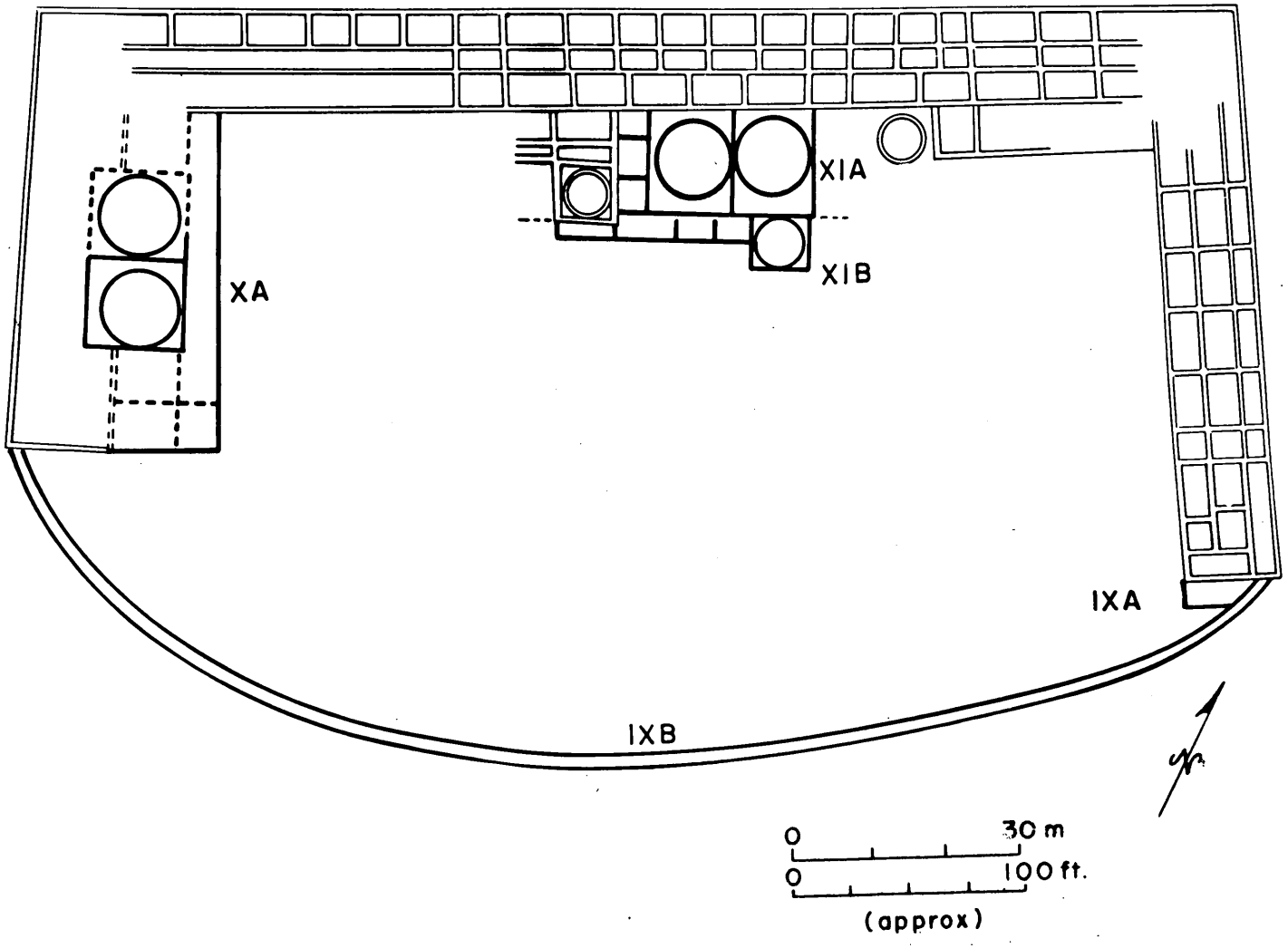


Figure VI:8. Stages IX, X and XI.

XIB, while Kivas I and J and the three rooms (71, 72, 74) separating Kiva J from the Kiva N complex are Stage XIA.

Stage XIA

Kivas I and J and their square enclosures were built at one time. Rooms 71, 72 and 74, to the west, were probably built at the same time. These rooms were most likely single story, as were the two kivas, but the ground or plaza level on which they were built corresponds to the second-story construction of earlier building in the North Block. (The three square rooms were eventually two stories in height, but the additional story was probably added along with the second story of the Kiva N complex, Stage XIIIB). Rooms 71, 72 and 74 average about 10.89 m^2 in area (sd=2.46 m^2, N=3). Only Room 71 was excavated; it is subdivided by a north-south wall into two very small, narrow rooms. The western of the two has a very small but elaborate door in its south wall which leads into an odd, narrow passage along the west side of Room 72, the ground floor of which was partially filled with the remains of earlier construction (see Stage VIIIA). Lateral communication from Room 71 through 71A into the second story of earlier Room 70 was possible through raised-sill doors. To the rear, Room 71 connected with older Room 62 through an existing "T" door, which was subsequently blocked.

Kivas I and J were fairly typical Chacoan kivas. Both overlie earlier constructions. The southwest corner of the Kiva J enclosure was converted into a small room behind Room 73, and this room, like Room 73, is probably part of Stage XIB construction.

Stage XIB

The line of rooms along the plaza-facing walls of Kivas I and J may be slightly later than those two kivas, but in view of subsequent building (Stage XII), Stage XIB cannot have been very much later than Stage XIA. Rooms 33, 33/73 and 73 are single-story rooms; 33 and 33/73 are each about 10.30 m^2 in area but 73 is 60% larger (16.56 m^2). Each of these rooms has a large door centered in the plaza-facing wall, definitely a "T" door in Room 33/73 and very likely "T" doors in the other two rooms. As noted above, Room 73, the largest of the three, also connects with the small room in the southwest corner of Kiva J.

Rooms east and west of these three are fairly different in form. Room 88, to the west, can be seen as a later addition to the Kiva N complex, mirroring Room 89 in size, shape, and perhaps function. Room 88 is a long, very narrow room, divided (perhaps during Stage XIV) into upper and lower compartments (each a little over 1 m tall) by a secondary ceiling or continuous room-wide platform. Each of these long, low compartments has a separate door from Room 85. The lower compartment was

subdivided by a thin cross wall, with its own door. Access into the far reaches of these compartments must have been on hands and knees.

Rooms 29 through 31 are a second distinct unit that apparently began as a small kiva (5.50 m diameter). This kiva may originally have been two stories in height, making it a Tower Kiva. The upper story was later razed and converted into three rectangular rooms by building a foundation wall across the south half of the circular room and filling in the first story (Stage XIIIC).

Stage XII (1090-1095)

About 1090-1095, a major addition was made to the existing North Block: this was the Kiva G complex (Figures II:13, VI:9). The Kiva G complex was constructed over filled Kiva G-5 and the remains of other earlier kivas and rectangular rooms.

As first built, Stage XII consisted of a single-story block of rectangular rooms surrounding the rectangular enclosure of Kiva G-3. This is very similar to Stage XI Kivas I and J, and in fact differences between Stages XIA and XII are minor: Kiva G-3 is slightly smaller than Kivas I and J; the floor level of Stage XII is slightly higher than that of Stage XI (the floor of Kiva G-3 is about on the level of the benches of Kivas I and J); and the masonry of the Kiva G complex is of a "McElmo" type (Figure A:3).

The rooms surrounding Kiva G-3 are one deep on the north, east and west sides, and two deep on the south. Rooms 36 and 37, on the north, originally were a single, very long, narrow room. We know nothing about Room 36-37 beyond its size and shape, and the fact that it connects with the Stage II rooms located to its rear. It is possible that it functioned either as dead space or as "buttressing"--familiar around Chacoan kivas --but it may have been similar to Rooms 88, 89 or 104 (see Stages VIA and XIB).

Rooms 28 and 35, separating Stage XII from Stage XI to the west, were built around a blocky masonry buttress for Kiva I (Figure II:13). Room 35, the northern of these two rooms, had a set of mealing bins, a possible room-wide platform, and a very high door to the roof terrace level of Kiva I (comparable to Room 55 at Pueblo del Arroyo). Other doors in Rooms 28 and 35 open into the rooms south of Kiva G-3.

Rooms east of Kiva G-3 were squeezed between the G-3 enclosure and the remnants of Stage VIIIA (i.e., Room 38). Room 23 connects by way of a raised-sill door to plaza-facing Room 22, which has a single exit, a "T" door into the plaza.

Four of the rooms south of Kiva G-3 form two non-communicating suites: first, Rooms 16 and 18, and second, Rooms 17 and 19. These rooms are similar in shape and size (about 15 m^2), and have doors in all

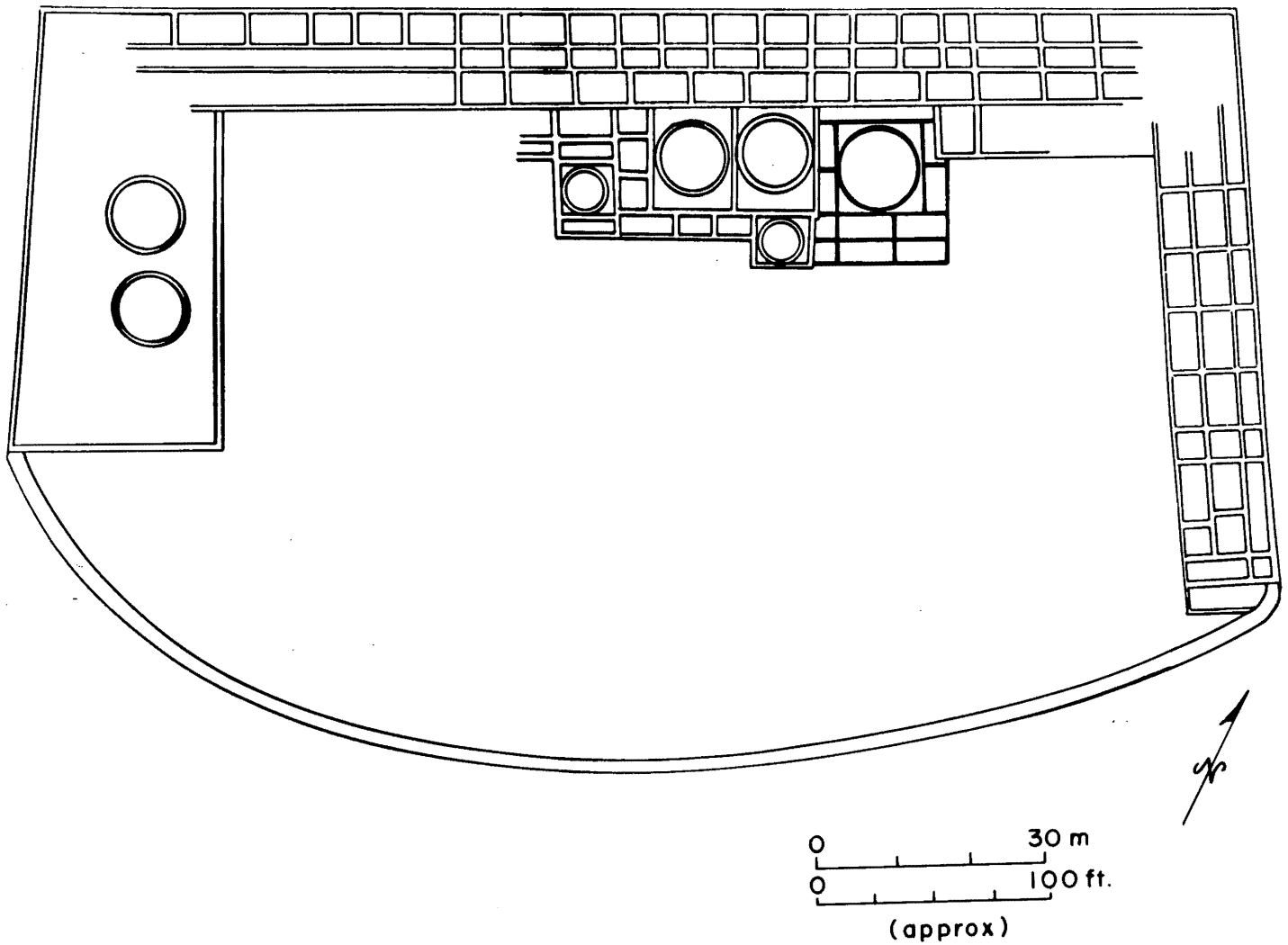


Figure VI:9. Stage XII.

plaza-facing walls. Strangely, all these doors seem to be of the raised-sill type--usually used for interior doors. All four of these rooms are featureless, except for a room-wide platform in the west end of Room 18--probably a later addition.

In the southwest corner of Stage XII are two small (about 9.5 m^2) square rooms (Rooms 26 and 27), connecting the four rooms just described with the two rooms west of Kiva G-3 (Rooms 28 and 35). The plaza-facing room of this pair (Room 26) may or may not have had a door into the plaza; if so, it was of the raised-sill type, while the rear door of Room 26, opening into Room 35, is full length. Room 27 has a corner firepit and slab-lined cist.

The average floor area of Stage XII rooms is 13.04 m^2 (sd=2.76 m^2, N=10--excluding Room 36/37). Rooms with doors into the plaza are generally larger than those without doors.

Stage XIII (1095-1105)

A series of second-story additions were made over the plaza-facing rooms of the North Block (Figure VI:10). These consist of XIIIA, second-story construction over the Kiva G complex; XIIIB, upper-story construction over the Kiva N complex; and XIIIC, second-story building over the plaza-facing rooms between Kivas G and N. This building created a large terrace over the roofs of Kivas I and J that was surrounded by second- and third-story rooms.

Stage XIIIA

Construction of Kivas G-1 and G-2 over Kiva G-3 occurred about 1095-1105. These circular rooms were built over the relatively intact walls of the earlier Kiva G-3, raising the later kivas to the second-story level. Presumably the second stories over Rooms 16, 17, 22 and 23 were also built at this time. There is no evidence for a second story over Rooms 28 and 35, but a second story probably was built over Room 36/37. Where data exist, wall and floor features are absent.

Stage XIIIB

This stage consists of the second story of Kiva N and the third story of Room 89. Dean (Chapter V) dates this construction to the early 1100s.

The addition of a second story over Kiva N created a Tower Kiva. Floor features of the second-story room are unknown, but a bench remains

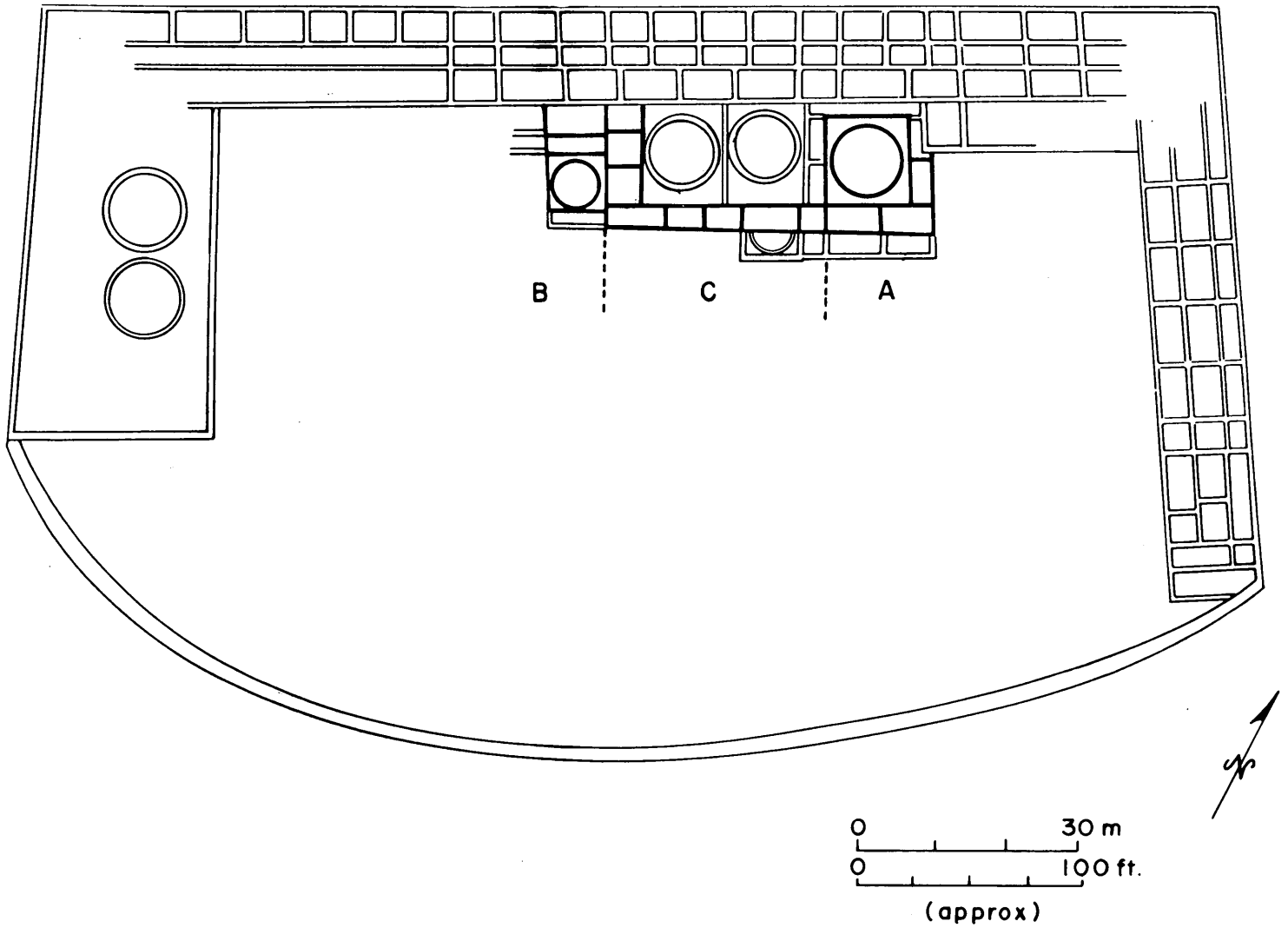


Figure VI:10. Stage XIII.

with a recess to the east, with a door (perhaps "T") opening through Room 74 onto the Kiva I and J terrace.

Stage XIIIC

Rooms 31, 33 and 71-73 probably acquired their second stories at this time. Walls are very reduced, but at least one room (Room 31) had a door opening onto the Kiva I and J terrace, while other rooms have lateral doors (e.g., Room 31 into Room 27, Room 72 into Room 74). The second story of Room 31, preserved over the filled first story (see Stage XIB), had a central firepit. Other floor and wall features are not known.

Stage XIV (1105+)

Stage XIV is a series of very late constructions added to the plaza-facing walls of the existing building (Figure VI:11). The ground floor level of Stage XIV and the last plaza surface are on the second-story level of earlier North Block and East Wing building. None of this construction can be dated directly by dendrochronology.

Stage XIVA

A row of single-story rooms added around the west and south sides of the central North Block were abutted onto Stages VIII and XI. Along the west plaza-facing wall of the Kiva N complex, Stage XIVA consists of at least two and perhaps three large square rooms (Rooms 85, 87 and a similar room over Rooms 69 and 104), all about 18 m^2 in area.

Both Rooms 85 and 87 have doors into the plaza, but there is no door between the two. Room 87 has multiple doors north into the postulated room over Room 69/104. Both Rooms 85 and 87 have doors to the rear: Room 85, double doors into the upper and lower portions of Room 88; and Room 87, the "T" door into the first story of Kiva N (partially blocked by the wall between Rooms 85 and 87), and a second door into Room 104. In addition, Room 85 has a raised-sill door into the Colonnade (described below), but this was probably a later addition. Rooms 85 and 87 both had unusual floor features. Room 87 had a firepit and deflector complex, while Room 85 had a series of bins and firepits, and several small wall niches.

Possible suites incorporate rooms built during earlier stages. The two suites in this stage are nearly identical, each consisting of the large square room (e.g., Rooms 85 and 87) with elaborate firepits and bins, each connected to an interior, long, narrow room with multiple room-wide platforms (e.g., Rooms 88 and 104). This pattern is not particularly common at other Chacoan sites. Suites in contemporary Chacoan

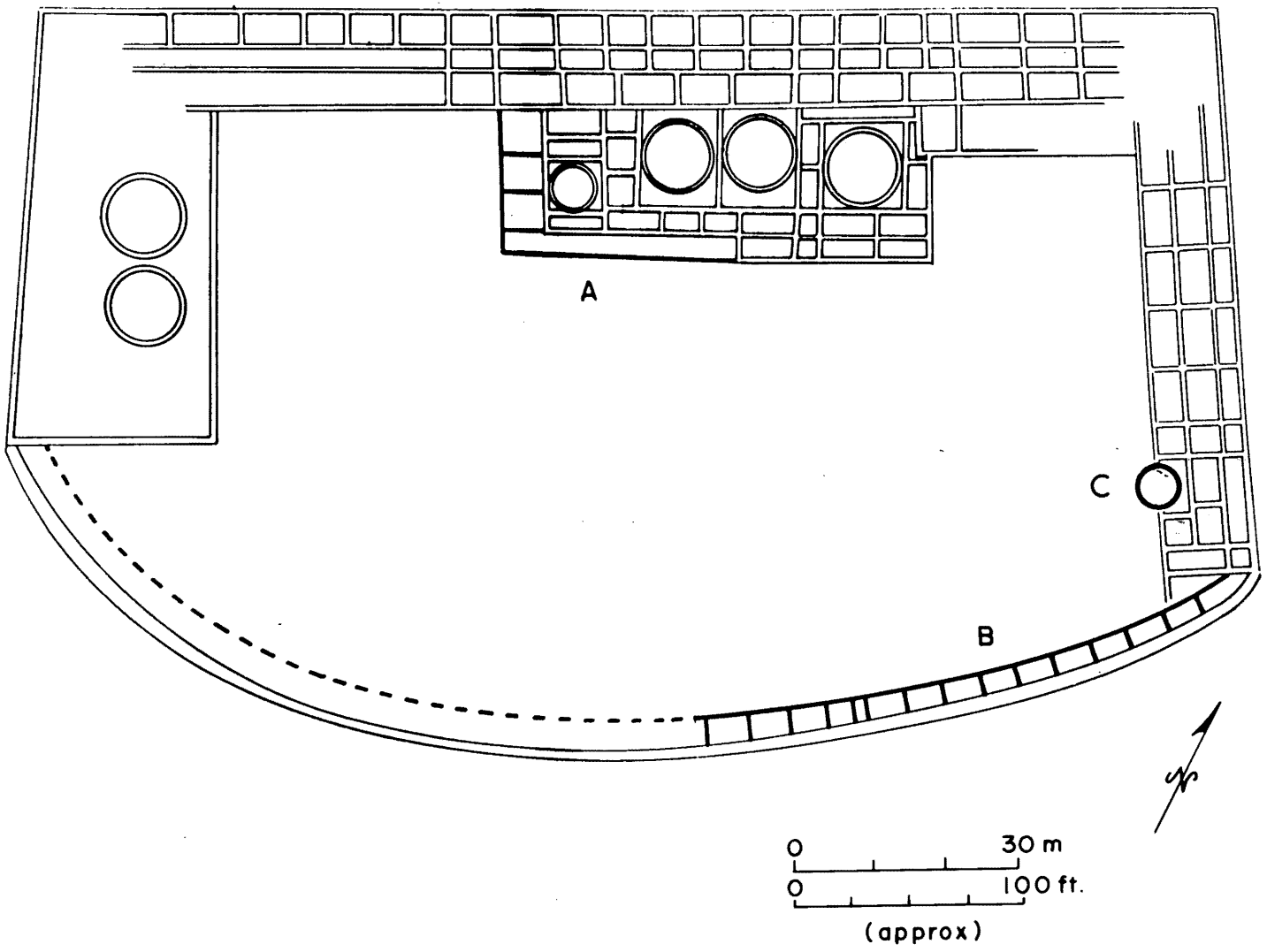


Figure VI:11. Stage XIV.

building (Pueblo del Arroyo, parts of Pueblo Bonito, Aztec and Salmon Ruins) more often consist of four or more square to rectangular rooms connected perpendicularly to the plaza.

The Colonnade (Rooms 75, 77, 78 and 80) was apparently constructed as part of Stage XIVA. The Colonnade consists of at least 13 square masonry columns, spaced about 1.3 m apart, forming the plaza-facing wall of a long narrow room. The Colonnade was not intended to facilitate access from plaza to interior, since the columns are built on a low, stub wall about 0.80 m tall. The spaces between columns were subsequently blocked, and the long narrow room behind them subdivided into several smaller rooms. While it is impossible to date these modifications, they probably occurred long after Stage XIVA.

Stage XIVB

The arc of single-story rooms along the interior of Stage IXB was built on the upper plaza surface level. The rooms were built over the early parallel walls of the Moat. Each room had a door towards the plaza; not enough of the exterior (rear) walls remain to determine if these, too, had doors. At least four of these rooms, and probably more, had firepits and bins. The rooms average about 11.61 m^2 in area (sd=2.62 m^2, N=11).

Stage XV (1105+)

Stage XVA

A row of irregular and poorly constructed rooms was added to the front of the Colonnade, perhaps when the spaces between the columns were filled (Figure VI:12). Other obviously late construction in this area (Rooms 24 and 25) is also included in Stage XV, as are similar constructions in the southeast plaza. Obviously, the contemporaneity of these structures is conjectural, but all clearly date later than 1105.

Rooms 20 and 21 are considered part of Stage XV, since they probably postdate Stage XII behind them, but they are much more substantially built than other Stage XV rooms. Rooms 20 and 21 are almost exactly the same size and proportions of the rooms behind them. Both rooms have doors in their east walls, but neither have doors in their south (plaza-facing) walls. Room 20 has a firepit.

Stage XVB

Some of the late construction in the southeast plaza has also been included in this stage (Figure VI:12). Although exact contemporaneity

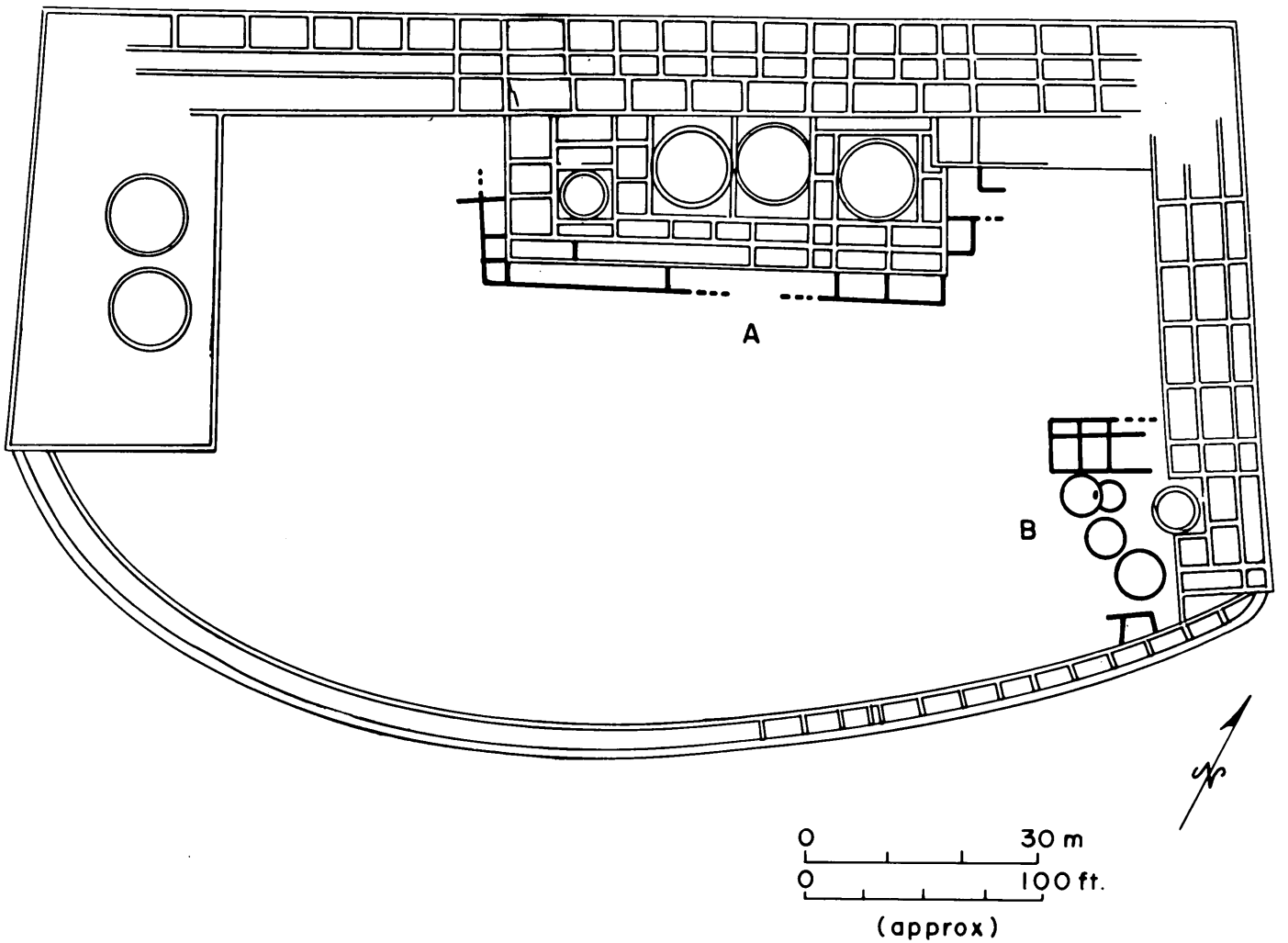


Figure VI:12. Stage XV.

cannot be demonstrated, Stage XVB construction all seems to be associated with the uppermost plaza surface. Little is known about this maze of subterranean kivas and plaza features. It is likely that Kiva F was the earliest of the group, and may in fact date as early as Stage VIIB.

Tree-rings Versus Architecture

Table VI.1 shows the percentages of rooms, roofed area and wall built by decade, compared to tree-ring dates (from Table V:6). As measured by architecture, 35-40% of Chetro Ketl was constructed after 1070; however, less than 7% of the tree-ring dates postdate 1070. The problems of differential preservation of wood have been discussed in Chapter V; there is a serious bias in the tree-ring record against later construction. On the other hand, evidence of earlier construction is preserved only in reused beams. Almost 9% of the tree-ring dates refer to early construction, which is no longer visible at the ruin.

This bias colors our perception of Chaco: based on tree-ring dates alone, 1030 to 1070 appears to have been the Chacoan "building boom." I have argued elsewhere (Lekson 1981) that in fact the heaviest investment of architectural labor, canyon-wide, occurred between 1075 to 1115. While this may not have been the case at Chetro Ketl, Table VI:1 demonstrates that later construction was considerably more extensive than indicated by the tree-ring record alone.

Concluding Remarks

This study enlarges upon, but in general confirms, conclusions reached by Hawley (1934) some 50 years ago. This comes as no surprise; we had no reason to doubt her conclusions when we began. But confusion in the archival and published records, the collection of many new tree-ring dates and the opportunity to reanalyze the visible architecture of Chetro Ketl combined to suggest that a new study would be a useful addition to the Chacoan literature.

Our study of Chetro Ketl illustrates an increasingly important aspect of archaeological research--old, unpublished notes. There is an abundance of old notes in Southwestern archaeology. Haury's work with the Hemenway Expedition records is an early, but not unique, example of old notes redeemed. But in the past, most archaeologists have used old notes only to augment their own excavations at the same site, or--very selectively--to buttress broader arguments.

With the advent of conservation in American archaeology (along with spiraling costs of field work), the unpublished excavations of yesteryear are now being used less as privileged information than as primary data. This trend is ethically responsible. More research should be structured

Table VI:1 Percentages of dates, floor area, walls and rooms by decade

	Dendro	Area m^2	Walls m^3	Rooms
980–989	0.2			
990–999	0.6			
1000–1009	1.1			
1010–1019	0.6			
1020–1029	6.4			
1030–1039	28.5	10.6	8.4	10.3
1040–1049	24.8	3.8	5.1	5.5
1050–1059	24.4	31.5	27.1	29.6
1060–1069	6.6	19.2	16.5	18.9
1070–1079	2.1	4.7	7.6	2.7
1080–1089	1.1	6.4	8.7	2.4
1090–1099	1.1	9.8	10.1	8.3
1100+	2.3	14.0	16.5	22.3
Total	467	7795	6900	290

specifically toward this largely untapped resource. The challange is asking questions that old notes (and old reports) can answer. At Chaco, the questions we are asking require more than a single building, even one as thoroughly documented as Chetro Ketl.

Chetro Ketl is one of half a dozen massive structures and hundreds of smaller buildings clustered around South Gap at Chaco Canyon. This dense settlement, about 2 miles in diameter, is the center of the Chacoan region. The architecture of Chetro Ketl can only be understood in context: a component of a larger and more complex settlement at Chaco, itself the center of a much larger region.

These settings greatly exceed the scale of this report. Our focus has been much narrower, struggling with architectural detail and critically assessing our dendrochronological record of Chetro Ketl. Along the way, broader issues have been addressed, particularly by Dean; but in the main, this study is grist for larger mills. The construction history, concluding this report, is one of a dozen construction histories of other Chacoan sites, which together constitute the basic data for more general studies of Chacoan building. Getting at Chetro Ketl's construction history was just a little more complicated.

APPENDIX A

A PRIMER AND GLOSSARY OF CHACOAN BUILDING

Site Preparation

The placement of Chacoan buildings probably answered multiple requirements, many of which we will never know. One of the factors was undoubtedly solar efficiency; studies at Pueblo Bonito show that the original plan, and subsequent additions to it, were sensitive to solar considerations. Another important aspect of site placement may have been wind; mesa top buildings particularly, may have been sited to protect plazas from prevailing winds. View--particularly field of view to other large Chacoan buildings--was important. Less easy to define, but probably more significant, were the visual qualities of the site for the building itself. Perhaps some structures were sited to offer a dramatic view to people entering the canyon. In particular, the Pueblo Alto complex must have been a very impressive sight for people coming into Chaco through South Gap.

The design of many of the Chacoan buildings incorporated existing terrain and natural features. Kin Kletso was built around a huge boulder, which served as a platform for a Tower Kiva on the second story. At many outliers (and less often within the canyon) buildings were situated on elevations and promontories; the added height raised the Chacoan structure to visual dominance over its surrounding community.

Less often, the existing terrain was altered or prepared prior to construction. This could take the form of great earth terraces continuing a building level out over a hill slope, or excavation into slopes to allow the extension of a line of rooms on a given level. Buildings were enlarged over decades or centuries, and occasionally whole rows of earlier rooms were filled in with sand to provide stable foundations for later building.

Materials

Three bulk materials were required for Chacoan walls: stone, clay-sand and water. A cubic meter of wall would contain about 1,440 kg stone, 463 kg clay-sand, and 130 liters of water.

Stone was procured from the sandstone cliffs that form the canyon. Two general types of stone were used. The first, a hard gray-brown tabular sandstone forms the bench above the canyon cliffs; and the second, a softer, tan, massively bedded sandstone forms the cliffs themselves. The harder, tabular stone was used more often, probably because it breaks readily into usable sizes and shapes. However, much of the tabular gray-brown stone had to be exposed by removal of overburden,

and then levered out of the ground with wooden poles; it was more difficult to obtain than the massive tan stone of the cliff faces. The tan stone was easier to obtain, but much more difficult to work: the gray-brown stone would break into pieces with parallel upper and lower surfaces and at least one straight face, while the tan stone had to be reduced (by pecking with a hammerstone) to usable dimensions. This is probably the reason tan stone was mainly used only after the more easily quarried gray-brown stone beds were exhausted.

Clay or clay-sand and water were mixed together to make mud mortar. Mortars were usually made from canyon deposits; but some of the clays may have been obtained from rock-clay exposures at the base of the cliffs. Clay and clay-sand in soils or stream deposits were procured simply by digging pits. Excavation with digging sticks would have been eased by the use of water, mixing mortar in the pits and carrying the mix to the construction site in baskets. But water, as always at Chaco, must have been a problem. Some construction probably took place during the late summer and early fall rainy season, using rain water. Other sources of water were small reservoirs in holes and canyons in the slick rock, and wells in the bed of the Chaco Wash. A typical Chaco water jar held about 8 liters of water; each m^3 of wall would require 16 such jars of water.

Materials for roofs would be even more difficult to obtain. Roofs typically consisted of primary beams, secondary beams, and one or two layers of split "shakes," probably of juniper or pinyon. Pinyon and juniper were locally available, although they were probably at a premium for use as firewood. Most of the primary and secondary beams were of pondersosa pine. While small stands of ponderosa might have been found in the heads of side canyons at Chaco, there were no local forests. The nearest extensive ponderosa forests were either upstream, beyond Pueblo Pintado (23 km straight line distance) or to the south, on the mesas behind Kin Ya'a (50 km straight line distance). A single large viga could weigh over 55 kg. One use of the Chacoan roads was surely for the transportation of construction timber.

In addition to bulk materials, construction required other items in smaller quantitites. Cordage was used for lashing roof elements together. Baskets and wood frames were needed for transporting mortar and rock. Hammerstones, digging sticks and other tools were used in quantity; many discarded hammerstones have been found built into the wall interiors.

Site Layout and Foundations

Construction began with laying out the structure. For trial layouts, this may have meant placing poles or posts at corners, or tracing walls on the ground surface with a stick, or even laying out rough stone lines. When the final layout was agreed upon, the outline was permanently marked by the first step of actual construction: foundations. All the foundations for a building project would be laid before wall construction began.

During construction, additions to the original plan required added foundations, while deletions left unused foundations.

Foundations were fairly substantial, consisting of a trench about 50 cm wide by 50 cm deep, filled with rubble and clay mortar. Foundations kept walls from settling unevenly. But since structures with very different wall loads on very different soils had identical foundations, marking layouts was probably as important a function of foundations as supporting the walls.

Walls "as built" did not always correspond to foundation lines; frequently, walls are off-center and sometimes even overhang their foundations.

Wall Construction

Skilled labor was limited to shaping and setting stone; most other labor was carrying and mixing. Wall construction depended partly on the wall's place in the structure: width was the most important variable in wall construction. The first story of a two-story wall would be wider than the second.

Chacoan walls are often called "core-and-veneer," but only the widest walls (usually on the first story) actually had "cores." The Chacoan mason was trying to build a wall of a given width with two flush faces. Since the building stones were all rather small, a wider wall required spacing between the two faces, and this spacing is often called the "core." In most walls, the "core" consisted of roughly shaped stone or rubble, laid at the same time as the two faces. In other walls, the faces were built up independently for 50 cm or so, and the "core" packed in between them. Stability of the wall came mainly from the contact of stones in the faces, and the width of the wall itself, and not from the "core" alone.

"Veneer" is not a very good word for the wall faces, since the faces were important load-bearing elements of the wall and not simply decorative overlays. The "veneers" of some Chacoan walls show considerably more attention to coursing and detail than other Anasazi building, and "veneers" of various styles have become synonymous with Chacoan building. But most walls are much less patterned than the classic Chacoan "veneer" styles.

Depending on the facing style, the joints between the stones would be filled with small spalls, or chinks, set in mud mortar; or the coursing could alternate between larger stones and several courses of smaller tablets (Figure A:3).

Good "veneer" minimized the amount of exposed mortar, and at the same time maximized stone contact. Less exposed morter reduced the maintenance required for keeping stone and mud wall standing in an area of unpredictable thunderstorms. More stone-to-stone contact in the face increased the strength of the wall and reduced the possibility of structural failure.

The earliest Chacoan walls had large mortar joints between stones, and evidently required lots of corrective maintenance and buttressing.

Aside from these structural considerations, some "veneers" are obviously the result of highly skilled masons working within well-developed craft traditions. Skilled masons were in some sense specialized, but they may not have been full-time craftsmen builders. Repeated "veneer" patterns may indicate a widespread style used during a particular period, or they may suggest the work of a single social group, or they may identify a specific line of builders; we do not know the true implications of "veneer" patterns any more than we know the social meanings of pottery designs.

Chacoan masonry was more complex than simply laying up a stone wall with a pretty face. Doors and vents had sills (often of carefully ground flat stone slabs) and lintels (usually a row of thin wood beams) built into the wall. Chacoan masons also frequently included intramural beams, horizontal logs completely enclosed in the wall core. Intramural beams probably were intended to reduce horizontal deformation of the wall (Figure A:1).

Roof Construction

Primaries were carefully peeled and smoothed trunks of small ponderosa pine, usually about 20-25 cm in diameter. The ends of the primaries were cut flush with sandstone saws and abraders. When the highest course of masonry below the primaries was finished (often including an intramural beam or wall plate to help distribute the load of the roof), either of two techniques was used for seating the beams: most often, the primaries were simply placed across the open room, and the masonry continued up around their ends; more rarely, walls were built up leaving rectangular openings, into which the primaries would later be set. After the round primaries were placed into the square holes, the surrounding voids were filled with heavily chinked masonry. Beams were occasionally surrounded by a thin layer of juniper bark to prevent the ponderosa from rotting through contact with the moist wall interior.

At right angles to the primaries were the thinner secondary beams. These beams were finished with much the same care as the larger primaries, but their ends were less frequently cut square. The secondaries were often set in alternate pairs, with the beams lashed together. Secondaries were sometimes replaced by carefully smoothed pine planks. Since the labor of making boards with simple hand tools was considerable, this type of roof was used rarely, and then in very small rooms. A more frequent, but still uncommon, alternative to secondaries were thin willow rods. Willow branches, stripped of their bark and threaded together into thin mats, were placed directly over closely spaced primaries.

Above the secondaries came several layers of moisture-resistant juniper shakes (thin strips of wood split from a juniper trunk), each layer at right angles to the next. Rush mats occasionaly replaced the juniper

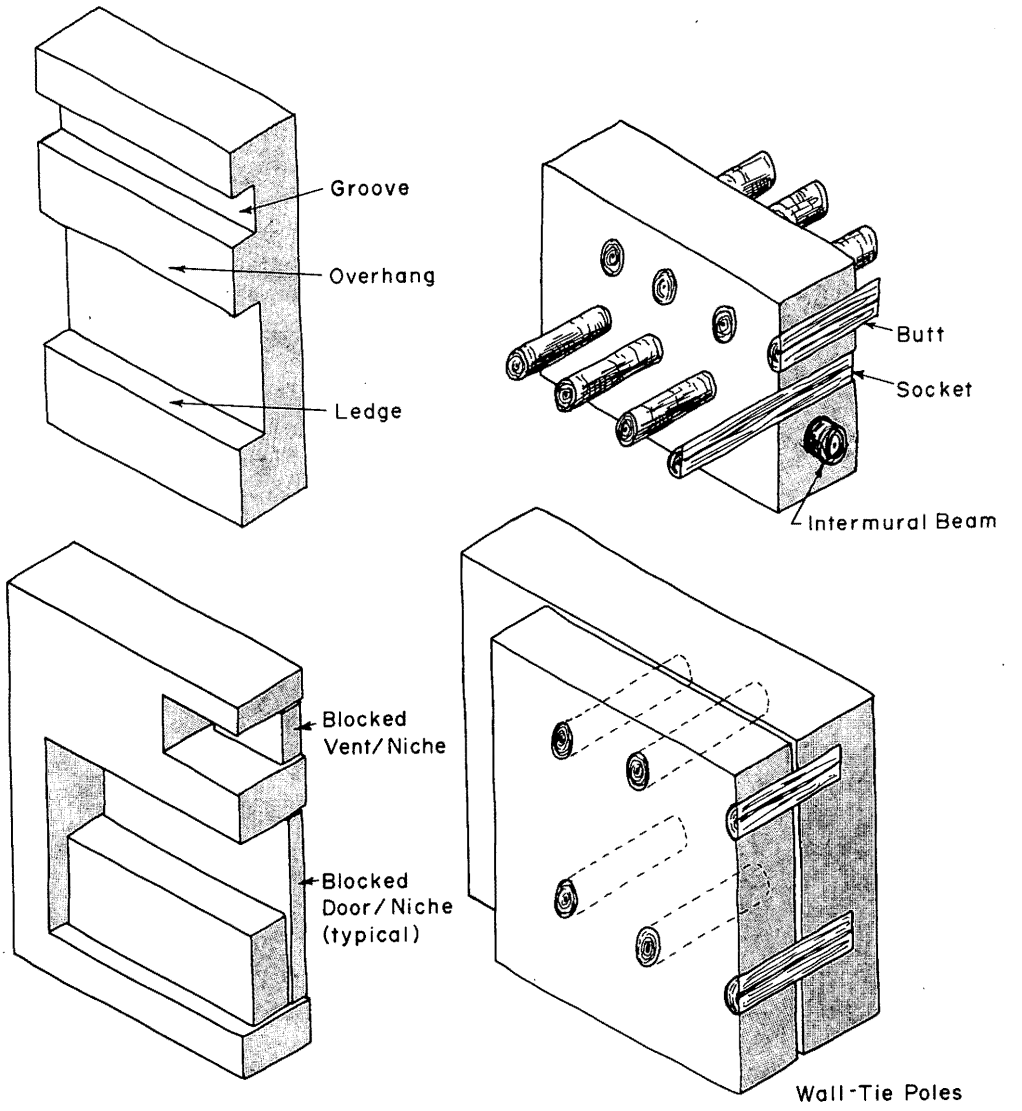


Figure A:1. Wall features.

splints in the lowest layer, visible from the room below. The layers were often separated by thin layers of mud, which, when dry, sealed the roof. Above the last of these layers were several centimeters of loose soil.

Since the roof was frequently the floor of a room above, its timbers had to support considerable loads of stored goods and occupants in addition to the weight of the juniper shakes, mud and loose clayey sand. Several roofs are known that supported masses of fallen rubble and wind blown fill for many years--probably for centuries--and remained intact.

Roof construction was not a difficult or time-consuming task. The major labor was expended in procuring and processing the materials involved: cutting and transporting the beams, and then smoothing and cutting them to the required length. Splitting juniper shakes with stone or wood wedges was a difficult task; rush mats, willow rods, and boards more laborious still.

Building Rooms, Building Stories

Most Chacoan buildings consisted of several large, multi-storied units, and building must have proceeded on a large scale. Building units were generally elongated rectangles; often the long walls were constructed first, with cross walls being built after the long walls were either well along or finished. Thus corners that were built as part of one project sometimes are not bonded together by stones built through both walls at the corner; that is, the walls abut. Abutting walls are more the exception than the rule. More often, walls were bonded in the interior (or "core") while the facings (or "veneers") appear to abut. Interior bonding was accomplished by leaving stones projecting from the long walls at the locations of planned cross walls. The cross walls were then built around these projecting stones.

A single wall may have different bonding and abutting patterns at different levels of its height. As walls settled, the more poorly bonded corners often parted, occasionaly with ruinous results.

In the construction of a multi-storied structure, the lower story would be completely finished and roofed before the walls of the upper story were begun. The roof of the first story provided a working platform for the construction of the second. Because the roofing materials were set slightly into walls all around the room, the exact lines of the lower wall faces were lost, and second-story walls were often slightly out of true with the first.

Although each story was built as a unit, the building plan encompassed the details necessary for all stories. If the building was to be terraced, with plaza-facing rooms only one story and rear rooms two, then the first-story walls that would support a second story were designed to be wider than those that would not. Openings (doors and vents) were carefully aligned from story to story. Balconies on the first-story roof level were

built for access to rooms on the second. Stairs to the second story were built into the walls of the first. These and other details had to be agreed upon before construction began.

Finishing

After the masonry structure was built and roofed, the exterior was plastered with mud. Plaster covered the fine stonework of the facing, but it also preserved it from its greatest enemy, rain. Mud plaster could be easily reapplied after a rain, while rain damage to the mortar of the wall was less easily repaired.

Room interiors were finished as befit their functions. Living rooms were plastered and often whitened; most store rooms were not. Some rooms were probably decorated with murals or simple bi-chrome dados. Only a few decorated rooms have survived, and these are often considered "ceremonial"; but the practice was probably common in living rooms.

Most rooms were floored with clay mud or, more rarely, flagstone. Some rooms, particularly rear "storage" rooms, were left with unplastered earthen floors.

Outside the building were work areas or plazas. The large plazas were carefully leveled and surfaced in construction projects as laborious as masonry building. But most exterior finishing was probably specific to smaller-scale activities, and paralleled construction of features in rooms. Small features and facilities in both rooms and plazas were probably the responsibility of their users, and not included in large-scale construction planning.

Glossary

ABUT Walls not integrally tied at corners.

BLOCKED An opening (door, vent) filled with masonry.

BOND Walls integrally tied at corners.

BUTT The end of a beam exposed in a wall face; the butt belongs to the roof of the room on the opposite side of the wall. See Figure A:1.

CHACOAN KIVA See KIVA. Any kiva with a continuous bench, a recess in the bench above a subfloor ventilator tunnel, and horizontal log-type pilasters (Judd 1964). See Figure A:2.

CIST A slab-lined pit.

CLOSING MATERIAL Layer(s) of material resting on the roof beams, supporting the mud mortar etc. of the floor/roof.

CORE A misnomer. The interior of a compound wall. See discussion of wall construction above.

CORNER DOOR A door running diagonally through the intersection of two walls.

COURSE A line of stones in the vertical plane. Compare WYTHE.

CRIBBED A dome built up of layers of beams, each layer consisting of beams set end to end in (for example) hexagonal or octagonal rings. The ends of each beam in a given layer are supported on the mid-point of two beams of the layer below. Thus, beam length (and roof span) decreases in each layer from the base of the dome to the top of the cribbing. Properly, this is corbelling.

DOUBLE WALL An unusual building technique, in which two structurally independent walls are parallel and contiguous.

ELEVATED KIVA See KIVA. Many kivas are subterranean, with the roof on the ground level. Elevated kivas are round rooms built into above-ground rectangular rooms. Compare TOWER KIVA, with which elevated kivas are often confused.

FIREPIT A stone- or plaster-lined pit used for containing fire.

HEATING PIT An unlined pit used for containing fire or embers.

INTERTIES Beams running between kivas and their rectangular enclosures, particularly in the corners of the enclosures.

INTRAMURAL BEAM A log enclosed in or built into the core of a masonry wall, usually parallel to the ground surface. See Figure A:1.

GREAT KIVA An unusually large round room, with a rectangular framed roof supported on four large posts (Vivian and Reiter 1960).

GROOVE On a wall face, a linear inset, generally corresponding to closing materials built into the wall. The face above and below the groove are in the same plane. See Figure A:1.

HORIZONTAL LOG-TYPE PILASTER In kivas, a short log section set radially and horizontally on the bench, usually enclosed in a masonry box-shaped construction. See Figure A:2.

INTRAMURAL BEAM A horizontal log built into the interior of a wall and generally not visible on the wall face.

JACAL A wall or partition built on a framework of vertical poles or posts, connected with horizontal rods or purlines. The rods are not woven through the posts. Mud is applied over this framework to form a solid wall. Compare WATTLE AND DAUB.

KIVA For this report, any round room. For kiva features, see Figure A:2.

LEDGE On a wall face, an offset with the upper face recessed from the lower face; see Figure A:1.

LINTEL Members, almost always wood, spanning the top of a wall opening and supporting the wall above it. Usually a series of parallel small beams.

MASONRY STYLES Several typologies of Chacoan masonry exist. In the text, we follow Judd (1964:Plate 10); but see also Hawley (1934:Plate XII, reproduced here in our Figure IV:1). See Figure A:3.

TYPE I: Large thin slabs, with beveled edges, laid with abundant mortar.

TYPE II: Large thin slabs, with beveled or flush edges, heavily chinked in horizontal joints.

TYPE III: Brick-like large stones, with flush (often ground) exterior faces alternating with multiple courses of thin, tabular stones.

TYPE IV: Thin, tabular stones with minimum chinking and exposed mortar.

"McELMO": A misnomer. Brick-like large stones with flush (often ground) faces and moderate chinking in all joints.

MEALING BIN A pit, usually rectangular and slab-lined, in which metates were set for use.

NICHE On a wall face, a rectangular or irregular recess; see Figure A:2.

OVERHANG On a wall face, an offset with the upper face projecting over the lower face. See Figure A:1.

PAIRED VENTS On a wall face, vents in both upper corners.

PIER-TYPE PILASTER In kivas, masonry piers or buttresses built up vertically from the rear of the bench. See Figure A:2.

PLAZA A large, open area enclosed on two or three sides by the building and, often, on the remaining side by a single row of rooms.

POLE-AND-WATTLE Architectural wickerwork.

PRIMARY BEAM The large main roof beams, which support secondaries. Also called vigas.

RAISED SILL DOOR A small rectangular door with a sill above floor level.

RAMADA A post and beam frame structure with a light roof and no walls.

RING HOLES On a wall face, small holes on either side of a door, corresponding to small yucca rings through which a bar or pole could be set, closing the door.

ROOM-WIDE PLATFORM A large, deep shelf, built into and spanning one end of a room. Usually, the platforms are at mid-wall height and are about one-third the room length in depth. The platform structure exactly parallels that of a roof, with primary beams, secondary beams, etc.

SECONDARY BEAM Smaller roof beams set perpendicular to and supported by the primaries. Also called latillas.

SECONDARY LINTEL AND JAMBS In raised sill doors, insets of wood (secondary lintel) or masonry (secondary jambs) which serve as collars for large stone or wood slabs. The slabs, resting against the secondary sill and jambs, closed the doors.

SHAKE A long, narrow, thin piece of wood, split out of a log.

SILL The floor of a door; usually stone slabs, occasionally closely set wood beams or planks.

SOCKET On a wall face, the void left by a decayed or removed beam; the socket belongs to the roof of the room enclosed by the wall face.

STRINGER See INTRAMURAL BEAM.

STUB The projecting remainder of an eroded or cut beam. See BUTT.

SUITE Interconnected rooms.

"T" DOOR A door with a rectangular upper portion wider than its lower portion.

TOWER KIVA Any elevated kiva with more than one story.

VENT A small rectangular opening in a wall, usually placed just below roof level.

VENTILATOR In a kiva, a tunnel running from the exterior to the area of the firepit. See Figure A:2.

VENEER A misnomer. The stones exposed in the wall faces. See discussion of wall construction above.

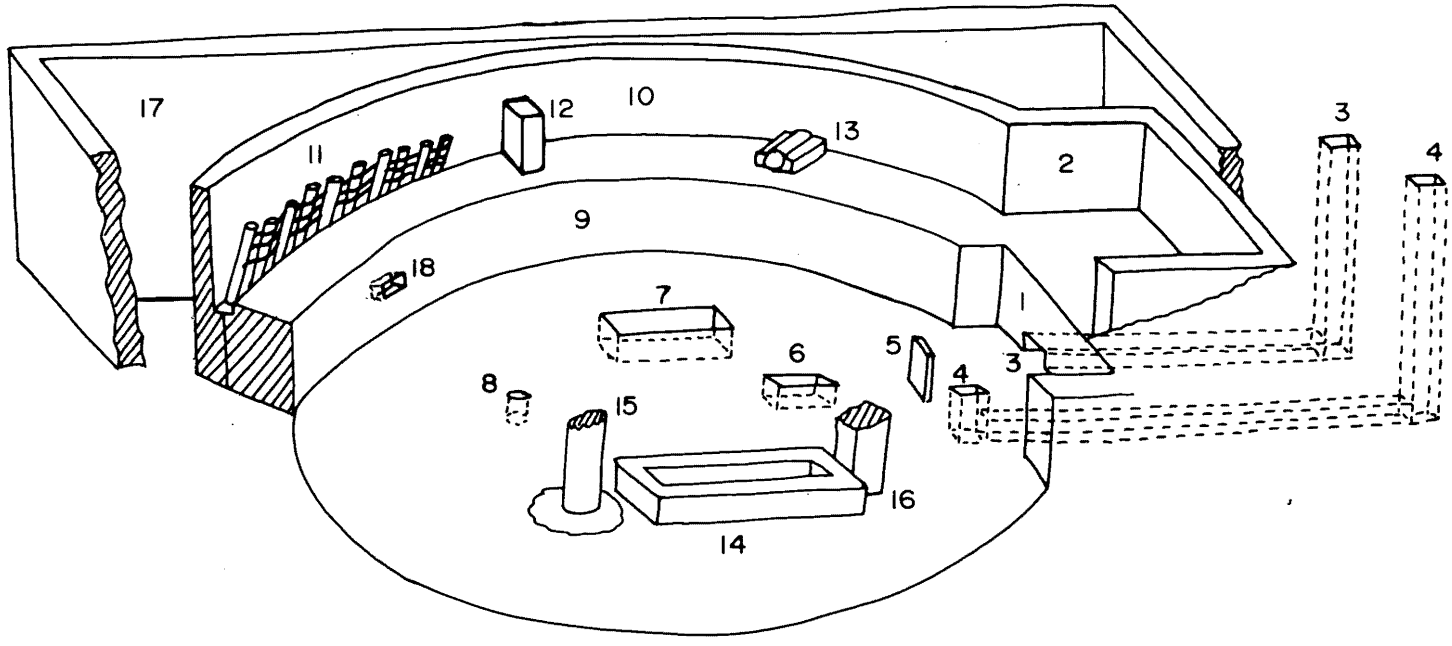
WAINSCOTTING In a kiva, pole-and-wattle construction built from and around the rear of the bench. Also called "bench padding." See Figure A:2.

WALL PLATE An intramural beam partially supporting the ends of the primary beams.

WALL TIE-POLES Small poles running through contiguous parallel walls. See Figure A:1.

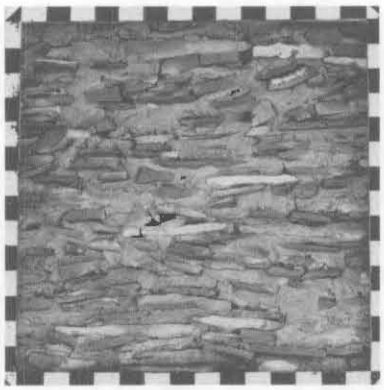
WATTLE-AND-DAUB Pole-and-wattle construction covered with mud plaster (daub). Compare JACAL.

WYTHE A line of stones in the horizontal plane. Compare COURSE.



1	Bench Recess	10	Wall
2	Wall Recess	11	Wainscotting
3	Above Floor Vent	12	Pier - Pilaster
4	Sub-Floor Vent	13	Radial Beam - Pilaster
5	Deflector	14	Raised Vault
6	Fire Pit	15	Post
7	Floor Vault	16	Pier Column
8	Sipapu	17	Enclosure
9	Bench	18	Niche

Figure A:2. Kiva features.



Type I

Type II

Type III

Type IV

"McElmo"

Figure A:3. Masonry types.

APPENDIX B

TABLE B:1 TREE-RING SAMPLES FROM CHETRO KETL

Symbols Used In Table B:1

Species

PP	-	Ponderosa pine
DF	-	Douglas Fir
SF	-	Picea-Abies sp. (Spruce or Fir)
PNN	-	Pinyon
JUN	-	Juniper
Pop	-	Populus sp.
Non Con	-	Unidentified non-coniferous

Tool marks

Ab	-	Abraded
SA	-	Stone axe
MA	-	Metal axe
Sw	-	Saw

Terminal ring

C	-	Complete
I	-	Incomplete
No	-	Not present

Date symbols used with inside date

year	-	No pith ring present.
p	-	Pith ring present.
fp	-	Curvature of inside ring indicates it is far from the pith.
$\underline{+}$p	-	Pith ring present; but due to difficult nature of ring series near the center of specimen, an exact date cannot be assigned to it. The date is obtained by counting back from earliest dated ring.
$\underline{+}$	-	Innermost ring is not the pith ring and an absolute date cannot be assigned to it. A ring count is involved.

Date symbols used with outside date

B	-	Bark present.
G	-	Beetle galleries are present on surface of specimen.
L	-	A characteristic surface patination and smoothness, which develops on beams stripped of bark, is present.
c	-	Outermost ring is continuous around the full circumference of specimen. This symbol is used only if a full section is present.
r	-	Less than a full section is present, but the outermost ring is continuous around available circumference.
v	-	A subjective judgment that, although there is no direct evidence of the true outside on the specimen, the date is within a very few years of being a cutting date.
vv	-	There is no way of estimating how far the last ring is from the true outside.

Symbols Used In Table B:1 Continued

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

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

The symbols B, G, L, c, and r indicate cutting dates in order of decreasing confidence, unless + or ++ is also present.

The symbols L, G, and B may be used in any combination with each other or with the other symbols except v and vv. The r and c symbols are mutually exclusive, but may be used with L, G, B, + and ++. The v and vv are also mutually exclusive, but may be used in combination with all the other symbols.

An underlined symbol indicates a condition observed in the field.

Table B:1

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Hawley Field	Story: 1934	Story: Actual	Source	Tool Marks: Beam end(s)	Tool Marks: Bole	Radius (mm)	Terminal ring	Date: Inside	Date: Outside
					DOORWAY IN SOUTH WALL										
1 and 4	CK-1115	6	1S-2	PP	Lintel 3			1	Original				I	964np	1036+v
	1114	5	1S-2	PP	Lintel 2			1	Original				No	1002p	1037+vv
	1113	4	1S-2	DF	Lintel 1			1	Original			15	C	1009	1039v
	1118	9	1S-2	PP	Lintel 5			1	Original					no date	
					PRIMARY BEAMS										
	1,JPB-142	15	4E-4	SF	Beam 1	1(S)	2	1	Original			124	C	965p	1053r
	CK-130,1119	14	4E-1	PP	Beam 4	1(S)		1	Original			143	C	866	1054v
	2			PP	SECONDARY BEAM	1(S)	2	1	Original	Ab		46	I	1014p	1062cL
	5			PP	"	1(S)	2	1	Original	Ab		44	I	1013p	1062cL
	3			Pop	"	1(S)		1	Original	Ab		41		no date	
	4			Pop	"	1(S)		1	Original	SA		34		no date	
	6			Pop	"	1(S)		1	Original	Ab		38		no date	
	7			Pop	"	1(S)		1	Original	SA		30		no date	
	318			PP	ROOF BEAM	1(H)			Original					no date	
					SECOND STORY CROSSWALL										
	132			PP	Support Log		1	2	Original			133	I	963p	1053v
	129	10	1E-3	PP	"		1	2	Original			126	I	952p	1063v
	131	12	4E-6	PP	"		1	2	Original			94	I	1059p	1103v
	135	11	1E-2	PP	Intramural Log		1	2	Original			86	I	955p	1041+v
	134	13	4E-7	PP	"			2	Original			114		no date	
					INTRAMURAL LOG IN WEST										
	1117	8		PNN	WALL AND THE CROSSWALL			2	Original?	SA		40	No	1015p	1061vv
	133			PP	"				Original					no date	
	8			PP	INTRAMURAL LOG	2(S)			Original	Ab		34		no date	
					DOORWAY IN WEST WALL										
	1116	7	1W-1	PP	Lintel			2	NPS		MA	95		no date	
	369			PP?	UNKNOWN		2		Original					no date	
	JPB-158			?	"				?					Sample Missing	
	CK-9				ERRONEOUSLY ASSIGNED TO THIS ROOM BY WSS AND FMH									See Room 9	
	10				ERRONEOUSLY ASSIGNED TO THIS ROOM BY WSS									See Room 9	
2	68			PP	"CEILING BEAM"		1	?	Original	Ab		109	C	952p	1039cL
	66			PP	"		2	?	Original	Ab		90	I	919p	1053cL

					PASSAGEWAY IN EAST WALL										
8/8A	128, GP-2212			PP	Lintel		1	1	Original			125	I	994p	1062v
	CK-27			PP	PRIMARY BEAM		1	1?	Original	Ab		88	I	968p	1076r
					PRIMARY BEAMS										
9	30, GP-2211	2	9N-3	PP	Beam 3	1(S)	1	1	Original			102	I	989p	1061v
	CK-10, 1111	1	9N-2	PP	Beam 2 (Assigned to Room 4 by WSS)	1(S)	1	1	Original	Ab		79	I	987p	1072+v
	9, JPB-56A			PP	Unnumbered Beam (Assigned to Room 4 by WSS and FMH)	1(S)	2	1?	Original	SA			C	986	1072r
					SECONDARY BEAMS										
	CK-25, 1112	3		DF	Beam 10 (Assigned to Kiva A by FMH)			1	Original	Ab		35	I	1018p	1069r
	26			SF	Beam 11			1	Original	Ab		30		no date	
					DOORWAY IN SOUTH WALL										
18	1124	20	18S-1	SF	Lintel 3			1	NPS			33	No	1001np	1039vv
	1123	19	18S-1	PP	Lintel 1			1	NPS	Sw				no date	
	1125	21	18S-1	JUN	Lintel 2			1	NPS		MA	30		no date	
	1126	22	18S-1	PP	Lintel 4			1	NPS	SA	MA	40		no date	
					DOORWAY IN WEST WALL										
20	1120	16	20W-1	PNN	Lintel 1			1	NPS			55		no date	
	1121	17	20W-1	PNN	Lintel 2			1	NPS			42		no date	
	1122	18	20W-1	PNN	Lintel 4			1	NPS		MA	50		no date	
22	53		22W-5	PP	PRIMARY BEAM			1	Original	Ab		123	C	962±np	1103L
					CEILING BEAMS										
27	1288	197	27N-7	PNN	Beam 5 (Primary)			1	NPS	Sw		77	No	750	850vv
	1287	196	27N-6	PNN	Beam 4 (Primary)			1	NPS	Sw		70	I	762	850v
	308, 1276	185		SF	Beam now in Kiva N		2	1?	Original			105	No	975	1063vv
	307, 1286	195	27N-5	PP	Beam 3 (Primary)			1	Original	AB		115	I	968p	1077v
	309, 1284	193	27N-3	SF	Beam 1 (Primary)		2	1	Original			120	No	994p	1100vv
	306			PP	Beam		2	?	Original			111	I	998p	1101+v
	301, 302, 332			PP	Beam	2(H)	2	?	Original				I	1051np	1103r
	319, 1285		27N-4		Beam 2 (Primary) Originally in Kiva N			1	NPS					See Kiva N	
					DOORWAY IN NORTH WALL										
	1289	198	27N-10	DF	Lintel			1	NPS				I	1032	1080L
					NORTH WALL										
	303, 304			PP	Intramural Log	2(H)	2	2	Original				I	1020p	1117v

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Field	Hawley 1934	Actual	Source	Tool Marks: Beam end(s)	Bole	Radius (mm)	Terminal ring	Date: Inside	Outside
28	GP-2207			PP	CEILING BEAM			?	Original?	Ab		73	No	945p	1058vv
					NORTH WALL										
31	CK-148			PP	Intramural Log		2	?	Original	Ab		57	I	1018p	1061r
35	321			PP	CEILING BEAM		1	?	Original			83	No	998p	1058vv
	322			PP	"		1	?	Original			86	C?	987p	1058r
	313			PP	"		2	?	Original			111	No	916p	1082vv
	314			PP	"	2(H)	2	?	Original	SA		140	C	1035p	1103r
	310			SF	"		2	?	Original					no date	
37	347			PP	UNKNOWN	3(H)	3	?	Original			100	No	974p	1027vv
38	334			PP	POST	2(H)		?	Original				No	967p	1022vv
	323			PP	UNKNOWN		1	?	Original			144	I	1027p	1102r
	29			SF	"				Original					no date	
	324			?	"		2	?	Original					Sample Missing	
					DOORWAY IN SOUTH WALL										
	1136	33	38S-2	PP	Lintel 1			1	NPS			35	I	1048p	1088L
	1137	34	38S-2	PP	Lintel 2			1	NPS					no date	
	1138	35	38S-2	PP	Lintel 3			1	NPS					no date	
	1139	36	38S-2	PP	Lintel 4			1	NPS					no date	
					PRIMARY BEAM										
39	336	131	39E-4	PP	Beam 1		2	1	Original	SA		114	C	954np	1051+L
					SECONDARY BEAMS										
	1232	141	39S-5	PP	Beam 11			1	Original	SA		42	I	984p	1034+L
	1243	152	39N-1	SF	Beam 24			1	NPS	SA		35	I	984p	1039L
	1251	160	"	PP	Beam 37			1	Original	SA		46	C	995p	1044+L
	1228	137	39S-5	PP	Beam 7			1	Original	SA		39	C	977p	1047+L
	1236	145	"	PP	Beam 15			1	Original	SA		36	I	993np	1050+L
	1241	150	39N-1	PP	Beam 22			1	NPS	SA		40	I	998p	1051v
	1230	139	39S-5	PP	Beam 9			1	Original	SA		42	C	1000p	1051L
	1245	154	39N-1	PP	Beam 29			1	Original	SA		39	C	1002p	1051L
	1231	140	39S-5	PP	Beam 10			1	Original	SA		45	C	1006np	1051L
	1248	157	39N-1	PP	Beam 32			1	Original	SA		43	I	1010p	1051L
	1226	135	39S-5	PP	Beam 5			1	Original	SA		39	C	1011p	1051L
	1237	146	"	PP	Beam 16			1	Original	SA		36	I	1012np	1051L
	1249	158	39N-1	PP	Beam 33			1	Original	SA		37	C	1013np	1051L
	1235	144	39S-5	DF	Beam 14			1	Original	SA		42	C	1016p	1051L
	1224	133	"	PP	Beam 3			1	Original	SA		42	C	1017p	1051L
	1238	147	"	PP	Beam 17			1	Original	SA		42	C	1017p	1051L
	1247	156	39N-1	PP	Beam 31			1	Original	SA		32	C	1024p	1051L
	1242	151	"	DF	Beam 23			1	NPS	SA		33	C	1028p	1051L

	1239	148	39S-5	PP	Beam 18		1	Original	SA		36	I	996p	1052L
	1234	143	"	PP	Beam 13		1	Original	SA		47	I	1001p	1052L
	1225	134	"	PP	Beam 4		1	Original	SA		42	I	1007p	1052L
	1233	142	"	PP	Beam 12		1	Original	SA		35	I	1010np	1052L
	1229	138	"	DF	Beam 8		1	Original	SA		37	I	1017p	1052L
	1250	159	39N-1	PP	Beam 34		1	Original	SA		40	C	1017np	1052L
	1244	153	"	PP	Beam 28		1	NPS	Sw	MA	40	I	1064p	1088v
	1223	132	39S-5	SF	Beam 2		1	Original	SA		42		no date	
	1240	149	39N-1	PP	Beam 20		1	Original	SA		45		no date	
	1246	155	"	PP	Beam 30		1	Original	SA		40		no date	
					DOORWAY IN NORTH WALL									
	1152	49	39N-2	SF	Lintel 1		1	NPS				No	1000	1046vv
	1153	50	"	PP	Lintel 2		1	NPS					no date	
					SEALED DOORWAY IN EAST WALL									
	1253	162	39E-3	PP	Sill		1	Original			43	I	998p	1045L
	1254	163	39E-3	SF	Lintel 1		1	Original					no date	
	1255	164	39E-3	Pop	Lintel 2		1	Original					no date	
	1256	165	39E-3	SF	Lintel 4		1	Original			35		no date	
					UPPER DOORWAY IN SOUTH WALL									
	1143	40	39S-3	DF	Lintel 9		1	Original			32	C	1026np	1050L
	1141	38	39S-3	DF	Lintel 4		1	Original				C	1029np	1054L
	1140	37	39S-3	SF	Lintel 1		1	Original	SA				no date	
	1142	39	39S-3	SF	Lintel 8		1	Original					no date	
	1107			PP	SHAPED PLANK		?	Flood	Ab	Ab		No	947	1060vv
					CEILING BEAM									
39A	337, 1252	161	39AE-1	SF	Primary Beam assigned to Room 40 by FMH	2	1	Original	SA		95	C	990	1038v
					CEILING BEAM									
39-39A	174			PP	Beam assigned to Room 40 by FMH	3(S)	3	2?	Original		115	C	889p	1054rL
40	335			PP	PRIMARY (?) BEAM		2	?	Original		86	C	942	1037+v
	67			PP	"		3	?	Original		95	I	989p	1053c
	34			PP	SECONDARY (?) BEAM	2(S)	3	?	Original		40	I	998p	1037+r
	33			PP	"	2(S)	3	?	Original		41	C	1012p	1051r
	32			PP	"	2(S)		?	Original		35		no date	
	31			?	"	2(S)		?	Original				Sample Missing	
	174				Roof beam erroneously assigned to this room by FMH								See Room 39-39A	
	337				Roof beam erroneously assigned to this room by FMH								See Room 39A	
41	159, 1151	48	41E-4		Roof beam originally in Room 42			NPS					See Room 42	

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Hawley Field	1934	Actual	Tool Marks: Source	Beam end(s)	Bole	Radius (mm)	Terminal ring	Date: Inside	Outside
					DOORWAY IN WEST WALL										
41	CK-1154	51	41W-3	PP	Lintel 1			1	NPS			36		no date	
	1155	52	41W-3	SF	Lintel 8			1	NPS					no date	
					PRIMARY (?) BEAMS										
42	159, 1151	48	41E-4	PP	Beam now in Room 41	2(S)	2	1?	Original			121	No	862	1027++vv
	166			PP	Beam	2(S)	2	1?	Original			105	I	963p	1039r
	143			PP	Beam	2(S)	3	?	Original			130	I	989p	1066v
	144,1156	53	42E-1		Beam originally in Room 48				NPS					See Room 48	
Subterranean Room South of															
42	100, 755, 853a			SF	CEILING (?) BEAM			?	Original			115	I	972p	1039rL
					PRIMARY BEAM										
43	1144	41	43N-5	PP	Beam 2			1	NPS?			102	I	955	1043v
	158, 1145	42	43N-4		Beam 1 (Originally in Room 44)				NPS					See Room 44	
					SEALED VENTILATOR IN NORTH WALL										
	1146	43	43N-1	SF	Lintel 1			1	Original?			30		no date	
	1147	44	43N-1	PP	Lintel 2			1	Original?					no date	
					SEALED DOORWAY IN NORTH WALL										
	1148	45	43N-3	SF	Lintel 1			1	Original?					no date	
	1149	46	43N-3	SF	Lintel 2			1	Original?					no date	
	1150	47	43N-3	SF	Lintel 3			1	Original?					no date	
	904			SF	UNKNOWN			?	Flood			97	I	995p	1035cL
					CEILING BEAMS										
43A	36			PP	Beam	2(S)	3	?	Original			102	No	829p	942vv
	99, 1160	58	45N-2	PP	Beam now in Room 45	2(S)	2	?	Original				I	946p	1037+v
	35			PP	Beam	2?(S)		?	Original	SA		43		no date	
	42			PP	Beam		3	?	Original			140	C	965p	1059v
	40				Beam erroneously assigned to this room by WSS & FMH									See Room 44	
	38				Beam erroneously assigned to this room by WSS & FMH										
	39				" "									" "	
	41				" "									" "	
					INTRAMURAL LOGS										
	146			PP	South Wall		2	?	Original			74	I	973p	1029r
	147			PP	South Wall		2	?	Original			70	I	979p	1029r
	175			PP	West Wall	2(S)	2	?	Original			114	I	961np	1033v
	872			PP	UNKNOWN			?	Flood		Ab	92	I	999p	1037+rL
	930			PP	"			?	Flood			48	C	996p	1038cL

	785			PP	"			?	Flood	Ab	49	I	987p	1039cL
	870			DF	"			?	Flood		52	C	977p	1042rL
	865			PP	"			?	Flood		52	C	972p	1045rL
	802			PP	"			?	Flood		57	I?	1003p	1045rL
	732			PP	"			?	Flood		38			no date
	801			SF	"			?	Flood	Bk	38			no date
	807			SF	"			?	Flood		46			no date
					PRIMARY (?) BEAMS									
44	65	55	44N-5	PP	Beam 2	2(S)	3	1	Orig/NPS	SA	128	No	916	1039+vv
	64, 1157	54	44N-6	PP	Beam 1 (Erroneously assigned to Room 2 by FMH)	2(S)		1	Orig/NPS	SA	120	No	932	1040+vv
	158, 1145	42	43N-4	SF	Beam now in Room 43	2(S)	3	?	Original		95	C	942np	1040v
	103			PP	Beam	2(S)	3	?	Original	Ab	108	C	967p	1052rL
	141			PP	Beam	2(S)		?	Original	Ab	102	C	1008p	1052cL
	37			PP	Beam	2(S)	3	?	Original	SA	82	I	940p	1053r
	104			PP	Beam	2(S)	3	?	Original		128	C	967p	1061rL
	157			PP	Beam	2(S)		?	Original		103			no date
					SECONDARY (?) BEAMS									
	40			PP	Beam erroneously assigned to Room 43A by WSS & FMH	1(S)	3	?	Original		34	C	1019p	1052r
	38			PP	" "	1(S)		?	Original	SA	27	C	1023p	1053cL
	39			SF	" "	1(S)		?	Original	SA	34			no date
	41			SF	" "	1(S)		?	Original	SA	34			no date
	112, 113, 116			PP	Beam	2(S)	3	?	Original		58	I	938p	1004+cL
	105, 107, 111, 115			PP	Beam	2(S)	3	?	Original		63	I	945p	1009r
	109, 110			PP	Beam	2(S)	3	?	Original		50	I	985p	1009r
	118, 122			PNN	Beam	2(S)	3	?	Original	SA	39	C	896p	1010cL
	120			PP	Beam	2(S)		?	Original	Ab	38	I	1003p	1037+c
	123			SF	Beam	2(S)	3	?	Original	SA	29	I	1004p	1039r
	119			SF	Beam	2(S)		?	Original	Ab	45	C	961p	1040cL
	117			SF	Beam	2(S)	3	?	Original	Ab	70	C	958p	1047rL
	121			PP	Beam	2(S)	3	?	Original		70	I	977p	1048c
	106			PP	Beam	2(S)		?	Original		51	I	1015p	1048c
	108			Pop	Beam	2(S)		?	Original		43			no date
	114			SF	Beam	2(S)		?	Original	Ab	36			no date
	124-1			Pop	Beam	2(S)		?	Original	SA	30			no date
	124-2			PP	Beam	2(S)		?	Original	SA	27			no date
	125			PP	Beam	2(S)		?	Original	Ab	33			no date
	142			Pop	Beam	2(S)		?	Original		34			no date
					SEALED DOORWAY IN NORTH WALL									
	1158	56	44N-2	DF	Lintel 1			2	?	SA		No	1014	1043vv
	1159	57	"	Pop	Lintel 2			2	?					no date
	710			PP	UNKNOWN			?	Flood			C	982p	1038cL
	701			PP	"			?	Flood			I	918p	1039rL
	706			SF	"			?	Flood			I	976p	1039rL
	616			PP	"			?	?			I	985p	1044+cL
	617			DF	"			?	?			C	1011p	1052cL

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Field	Hawley 1934	Actual	Source	Tool Marks: Beam end(s)	Bole	Radius (mm)	Terminal ring	Date: Inside	Outside
44	CK-615			PNN	UNKNOWN			?	?				C	1026p	1052cL
	705			SF	"			?	Flood				I	962p	1067+r
	614			Pop	"			?	?					no date	
	899			?	"			?	Flood					Sample Missing	
					PRIMARY BEAM										
45	99, 1160	58	45N-2		Beam 1									See Room 43A	
					Originally in Room 43A										
	908			SF	UNKNOWN			?	Flood			49	I?	939p	1034+rL
	846			PP	"			?	Flood			47	C	952p	1036+rL
	933			PP	"			?	Flood			52	I	905p	1043+cL
					EAST WALL										
45/43A/49	907			PP	Intramural Log			?	Flood			49	C?	929p	995+rL
	814			PP	Intramural Log			?	Flood	Ab		56	C	964p	1034+rL
	924			PP	Intramural Log			?	Flood			55	C	1009p	1038cL
	817			PP	Intramural Log			?	Flood			33	C	1014p	1038cL
	753			PP	Intramural Log			?	Flood			122	I	948p	1039rL
	720			SF	Intramural Log			?	Flood			42	C	1000p	1039cL
	748			DF	Intramural Log			?	Flood			40	I	985p	1040c
	839			PP	Intramural Log			?	Flood			46	C	988p	1042cL
	913			SF	Intramural Log			?	Flood			48	C	977p	1044cL
	718			SF	Intramural Log			?	Flood			98	I	983p	1051r
	752			PP	Intramural Log			?	Flood			125	C	970p	1051rL
	804			SF	Intramural Log			?	Flood			47	I?	953p	1052+rL
	715			PP	Intramural Log			?	Flood			91		no date	
					PRIMARY (?) BEAMS										
46	149	59	46N-4		Beam 1										
	1161	87			(Originally in Room 53)				NPS					See Room 53	
	102			PP	Beam	2(S)	2	?	Original			113	I	971p	1041r
	101,				Beam										
	1278	187		PP	(Now in Kiva N)	2(S)	2	?	Original			108	I	963p	1043+r
	95			PP	Beam	2(S)	3	?	Original	SA		86	C	1003p	1063rL
	94			PP	Beam	2(S)	3	?	Original	Ab		110	C	963p	1063cL
	98			SF	Beam	2(S)		?	Original					no date	
	96			?	Beam	2(S)	3	?	Original					Sample Missing Dated at 1063 by FMH(1934)	
					SECONDARY (?) BEAMS										
	93			PP	Beam	2(S)		?	Original	SA		38	I	1028p	1053c
	89			PNN	Beam	2(S)	3	?	Original	SA		25	C	1020p	1053cL
	86			SF	Beam	2(S)		?	Original			36		no date	
	87			SF	Beam	2(S)		?	Original			34		no date	
	90			PP	Beam	2(S)		?	Original			40		no date	
	91			PP	Beam	2(S)		?	Original	SA		33		no date	
	92			PP	Beam	2(S)		?	Original	SA		33		no date	

	97			PP	Beam	2(S)		?	Original		44		no date	
	88			?	Beam	2(S)		?	Original				Sample Missing	
					SEALED DOORWAY IN NORTH WALL									
	1162	60	46N-6	JUN	Lintel 1			1	NPS		32		no date	
	745			SF	UNKNOWN			?	Flood		35	C	975p	1008rL
	921			PP	"			?	Flood		55	I	943p	1037+rL
	833			PP	"			?	Flood		62	I	1013p	1046rL
	618			PP	"			?	?		39	I	1016p	1050r
	620			DF	"			?	?		34	I	1018p	1052c
	619			PP	"			?	?		30		no date	
					PRIMARY (?) BEAMS									
47(47/52)	165			PP	Beam	2(S)	3	?	Original		102	I	867p	1037+cL
	1189	88	47-52N-7	SF	Beam 1			1	NPS	SA		No	984p	1038vv
	156,852			PP	Beam	2(S)	3	?	Original		116	C	883p	1038+cL
					VENTILATOR IN NORTH WALL									
	1190	89	47-52N-9		Lintel 1			1	NPS?		34	I	997p	1039v
	855			PP	UNKNOWN			?	Flood		77	?	892p	1000+rL
	805			PP	"			?	Flood		56	I?	957p	1026r
	889			PP	"			?	Flood	Ab	65	C	959p	1026rL
	836			PP	"			?	Flood		49	I	963p	1026rL
	741			PP	"			?	Flood		48	I	982p	1028rL
	811			PP	"			?	Flood		90	C	987p	1029rL
	879			PP	"			?	Flood		58	I	956p	1030cL
	931			PP	"			?	Flood		55	I	980p	1034cL
	778			PP	"			?	Flood	Ab	31	C	971p	1036+v
	773			PP	"			?	Flood		45	C	985p	1036+cL
	918			PP	"			?	Flood		49	C	988p	1037cL
	810			PP	"			?	Flood		89	I	996p	1038r
	782			PP	"			?	Flood		28	I?	1011p	1038+v
	760			PP	"			?	Flood		117	I	961p	1039rL
	880			PP	"			?	Flood		85	I	952p	1040cL
	853			PP	"			?	Flood		93	I	928p	1043cL
	891			SF	"			?	Flood		86	C	977p	1043cL
	854			PP	"			?	Flood		102	C	976p	1044cL
	775			PP	"			?	Flood	SA	50	C	1011p	1051cL
	784			PP	"			?	Flood	SA	47	C	1017p	1051cL
	722			SF	"			?	Flood		62		no date	
	763			SF	"			?	Flood		34		no date	
	767			SF	"			?	Flood		28		no date	
	845			SF	"			?	Flood		49		no date	
47/48	340			PP?	INTRAMURAL LOG			?	Original				no date	
	341, 346			PP	"		2	?	Original		42		no date Dated at 1054 by FMH(1934)	
	342			?	"			?	Original				Sample Missing	
	343			PP	"			?	Original				no date	
	344			PP	"			?	Original				no date	
	345			PP	"			?	Original		34		no date	

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Field	Hawley 1934	Actual	Source	Tool Marks: Beam end(s)	Bole	Radius (mm)	Terminal ring	Date: Inside	Outside
					LOG IN ROOM FILL PROBABLE DISCARDED										
48	CK-160, 163			PP	ROOF BEAM	1(S)	2	1?	Original				No	940np	1015+vv
	164			PP	"	1(S)		1?	Original			57	No	965np-	1027+vv
	161			PP	"	1(S)		1?	Original					no date	
	162			PP	"	1(S)		1?	Original					no date	
					PRIMARY (?) BEAMS										
	75			PP	Beam	2(S)	2	?	Original	Ab		90	?	872p	1036++r
	144, 1156	53	42E-1	PP	Beam now in Room 42	2(S)	2	?	Original	SA		90	I	953p	1039v
	85			PP	Beam	2(S)	2	?	Original	Ab		81	C	974p	1052r
	82			PP	Beam	2(S)	2	?	Original	Ab		111	I	922p	1053r
	84, 1277	186		PP	Beam now in Kiva N	2(S)	2	?	Original	Ab		96	I	962p	1053cL
	73			PP	Beam	2(S)	3	?	Original	Ab		165	C	955p	1061r
	145			PP	Beam	2(S)		?	Original			104		no date	
					SECONDARY (?) BEAMS										
	83			SF	Beam	2(S)	2	?	Original	SA		57	I	998p	1039r
	81			PP	Beam	2(S)	2	?	Original	SA		37	C	1024p	1052c
	76			SF	Beam	2(S)	2	?	Original	SA		38	C	1030p	1052c
	80			DF	Beam	2(S)	2	?	Original			33	I	1017p	1054r
	74-1			PP	Beam	2(S)		?	Original	SA		61		no date	
	74-2			SF	Beam	2(S)		?	Original	SA		61		no date	
	77			SF	Beam	2(S)		?	Original	Ab		23		no date	
	78			PP	Beam	2(S)		?	Original	SA		24		no date	
	79			SF	Beam	2(S)		?	Original	SA		24		no date	
					POLE SHELF ACROSS EAST END OF ROOM										
	1168	66	48N-5	PP	Beam 2			1	Original?			55	I	978p	1039+v
	1167	65	48N-4	PP	Beam 3			1	Original?			52	I	984np	1039+v
	1166	64	48N-3	PP	Beam 4			1	Original?			57		no date	
					DOORWAY IN NORTH WALL										
	1165	63	48N-2	PP	Lintel 7			1	NPS?			43	I	1011p	1042L
	1163	61	48N-2	SF	Lintel 1			1	NPS?			32		no date	
	1164	62	48N-2	PP	Lintel 6			1	NPS?					no date	
	914			PP	UNKNOWN			?	Flood			50	I	983p	1037+cL
	815			PP	"			?	Flood			50	I?	1007p	1045rL
	719			DF	"			?	Flood	SA		38		no date	
	768			PP	"			?	Flood			21		no date	
49	167			PP	PRIMARY (?) BEAM	2(S)	2	?	Original			125	I	946p	1039rL

49/50	808			PP	UNKNOWN			?	Flood		51	C	987+p	1038cL
	797			SF	"			?	Flood		27	C	1010p	1039+rL
	729			PP	"			?	Flood		32	I	1014p	1039c
	769			DF	"			?	Flood		39	I	975p	1039cL
	772			SF	"			?	Flood		30	I	1008p	1039cL
	765			SF	"			?	Flood		26		no date	
	770			Pop	"			?	Flood		35		no date	
	794			DF	"			?	Flood		39		no date	
	925			DF	"			?	Flood		52		no date	
	728				Duplicate of CK-731, 803. Assigned to Rooms 57 and 58 by RGV								See Room 57	
					PRIMARY (?) BEAMS									
53	149,	59		SF	Beam 1				Original/					
	1161	87	53N-10	SF	(One part now in Room 46)	2(S)	2	1	NPS		149	I	951np	1042v
	356, GP-2205			SF	Beam	2(L)	2	?	Original		105	I	981p	1043r
	CK-150			PP	Beam	2(S)	3	?	Original	Ab	93		no date	
					SECONDARY (?) BEAMS									
	154			PP	Beam	2(S)	2	?	Original		45	C	1013p	1040r
	151			PP	Beam	2(S)	2	?	Original		45	C	997p	1040rL
	153			SF	Beam	2(S)	3	?	Original	Ab	40	I	1002p	1047rL
	152,155			DF	Beam	2(S)	3	?	Original	Ab	47		no date	
					SEALED DOORWAY IN NORTH WALL									
	1169	67	53N-6	PP	Lintel 1			2	Original?			No	999p	1033vv
	1170	68	53N-6	DF	Lintel 3			2	Original?			No	995np	1039vv
	708			PP	UNKNOWN			?	Flood		76	C	973p	1046cL
	709			SF	"			?	Flood		99		no date	
					PRIMARY BEAMS									
54	1191	90	54B-10	SF	Beam 1			1	Orig/NPS	SA	113	No	998	1040vv
	354,1192	91	54N-11	SF	Beam 2	2(L)		1	Orig/NPS	SA	112	I	979p	1043v
	355			PP	UNCLASSIFIED ROOF BEAM		3	?	Original			C	995np	1051v
					SEALED DOORWAY IN NORTH WALL									
	1193	92	54N-14	PNN	Lintel			1	?	SA	31	I	971p	1051v
					SEALED VENTILATOR IN NORTH WALL									
	1194	93	54N-13	PP	Lintel			1	?				no date	
	1171	69	54N-15	PP	Lintel 2			2	?		51		no date	

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Hawley Field	Hawley 1934	Actual	Source	Tool Marks: Beam end(s)	Bole	Radius (mm)	Terminal ring	Date: Inside	Outside
					DOORWAY IN NORTH WALL										
54	CK-1172	70	54N-7	PP	Lintel 2			2	?					no date	
	1173	71	54N-7	SF	Lintel 3			2	?					no date	
	702			SF	UNKNOWN			?	Flood			89	I	949p	1040+cL
	707			PP	"			?	Flood			80	C	1000p	1042cL
					UNCLASSIFIED ROOF BEAMS										
55	568			PP	Beam	1(L)		?	Original				No	950p	1016vv
	559			?	Beam	1(L)	1	?	Original					Sample Missing. Dated at 1020 by FMH(1934)	
	545-1			SF	Beam	2(L)		?	Original	SA		34	I	1015p	1050r
	543			PP	Beam	2(L)		?	Original	SA		28	I	1029p	1065r
	564,1208	110	58N-2	PP	Beam now in Room 58	3(L)		?	Original			100	No	952p	1036+vv
	567,881			PP	Beam (Assigned to Room 58 by Vivian)	3(L)		?	Original			113	I	966p	1038+rL
	563			PP	Beam	3(L)		?	Original					no date	
	903			PP	UNKNOWN			?	Flood			86	I	915p	1021cL
	900			PP	"			?	Flood			122	?	873p	1034++rL
	717,757, 895,897			PP	"			?	Flood			107	C	926p	1037+cL
	902			SF	"			?	Flood			82	C	987p	1038rL
	704			DF	"			?	Flood			104	C	953p	1038r
	894			PP	"			?	Flood			87	I	966p	1039rL
	898			SF	"			?	Flood			94	I	968p	1043cL
	703			PP	"			?	Flood			84	C	995p	1049cL
	896			PP	"			?	Flood			78	C	1063p	1104cL
					EAST WALL										
57	1196	95		PP	Intramural Log			1	?			108	I	966np	1037v
					PRIMARY BEAMS										
	1195	94	57S-6	PP	Beam 1			1	NPS			120	No	970p	1038vv
	348			PP	Beam		3	?	Original			114	I	994	1052r
	906			PP	"ROOF"			?	Flood			44	?	944p	1016++cL
	847			PP	"			?	Flood			47	C?	968p	1036+cL
	746			PP	"			?	Flood			42	C	994p	1036+cL
	912			PP	"			?	Flood			42	C	995p	1036+cL
	938			PP	"			?	Flood			47	I	985p	1037+rL
	934			PP	"			?	Flood			49	I	987p	1037+rL
	920			PP	"			?	Flood			48	I	988p	1037+rL
	917			PP	"			?	Flood			47	C	990p	1037+cL
	911			DF	"			?	Flood			46	C	988p	1038rL
	910			PP	"			?	Flood			46	C	974p	1038cL
	909			PP	"			?	Flood			42	C	993p	1038cL
	905			PP	"			?	Flood			50	C	999p	1038cL

	700			PP	"		?	Flood			43	C	1010p	1038cL
	779			DF	"		?	Flood			46	C	997p	1039rL
	928			PP	"		?	Flood			50	C	959p	1039cL
	929			PP	"		?	Flood			48	C	986p	1039cL
	876			PP	"		?	Flood			52	C	1005p	1039cL
	838			SF	"		?	Flood			54	C	1000p	1040rL
	935			PP	"		?	Flood			46	C	982p	1044cL
	875			SF	"		?	Flood			62	?	966p	1049cL
	728,731													
	803			PP	(728 assigned to Room 49/50 by RGV)(803 assigned to Room 58 by RGV)		?	Flood	Ab		37		no date	
	932			SF	"		?	Flood			55		no date	
	1108			PP	SHAPED PLANK		?	Flood	Ab	Ab		No	1001np	1105vv
					PRIMARY BEAMS									
58	1207	109	58N-1	PP	Beam 1		1	NPS			112	No	991np	1036+vv
	564,1208	110	58N-2		Beam 2 (originally in Room 55)		1	NPS					See Room 55	
					UNCLASSIFIED ROOF BEAMS									
	353			SF	Beam	2(L) 2	?	Original				No	942	1040vv
	541			DF	Beam	2(L)	?	Original			34	C	1016p	1052r
	542			DF	Beam	2(L)	?	Original	SA		24	C	1019p	1066+rL
	566,812			PP	Beam	3(L)	?	Original			67	C	978p	1029c
	565			PP	Beam	3(L)	?	Original			92	I	962p	1039v
	544			?	Beam		?	Original					Sample Missing	
	878			PP	UNKNOWN		?	Flood			69	I	894p	990rL
	883			PP	"		?	Flood			67	C	938p	994rL
	916			PP	"		?	Flood			63	C	989p	1020r
	937			PP	"		?	Flood			58	C	934p	1020rL
	825			PP	"		?	Flood			74	C	988p	1021cL
	834			JUN	"		?	Flood			59	C	852p	1026cL
	890			PP	"		?	Flood			77	C	971p	1029cL
	712			PP	"		?	Flood			95	I	957p	1033rL
	809			PP	"		?	Flood			52	C	1002p	1033rL
	774			PP	"		?	Flood			58	C	949p	1034+rl
	796			PP	"		?	Flood			36	I	994p	1037+v
	735			SF	"		?	Flood			38	C	998p	1037rL
	726			DF	"		?	Flood			39	C	996p	1038+rL
	738			SF	"		?	Flood			39	I	993p	1039rL
	776			DF	"		?	Flood			44	I	1012p	1039rL
	877			SF	"		?	Flood			71	I	994p	1039cL
	816			SF	"		?	Flood			43	I	1015p	1039cL
	739			SF	"		?	Flood			33	I	989p	1040rL
	723			SF	"		?	Flood			41	C	1003p	1040rL
	740			PP	"		?	Flood			44	C	997p	1040cL
	843			PP	"		?	Flood			61	C	989p	1044+rl
	743			PP	"		?	Flood			37	C	1009p	1045rL
	831			SF	"		?	Flood			55	C	1010p	1047rL
	727			SF	"		?	Flood			45		no date	
	730			PP	"		?	Flood			42		no date	

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Field	Hawley 1934	Actual	Source	Tool Marks: Beam end(s)	Bole	Radius (mm)	Terminal ring	Date: Inside	Outside
58	CK-736			SF	UNKNOWN			?	Flood			34		no date	
	751			PP	"			?	Flood			49		no date	
	754			PP	"			?	Flood			60		no date	
	762			SF	"			?	Flood			27		no date	
	788			Pop	"			?	Flood			43		no date	
	790			Pop	"			?	Flood			38		no date	
	793			DF	"			?	Flood			41		no date	
	798			PP	"			?	Flood			29		no date	
	830			PP	"			?	Flood			74		no date	
	851			PP	"			?	Flood			47		no date	
	915			PP	"			?	Flood			42		no date	
	803				Duplicate of CK-728, 731 assigned to Room 57 by RGV			?	Flood					See Room 57	
	567,881				Originally in Room 55			?	Flood					See Room 55	
58/59	923			PP	UNKNOWN			?	Flood			58	C	916p	989rL
	842			PP	"			?	Flood		Ab	57	I	976p	1015cL
	850			PP	"			?	Flood			71	C	967p	1018rL
	886			PP	"			?	Flood			67	I?	927p	1020r
	862			PP	"			?	Flood			57	C	975p	1020cL
	901			PP	"			?	Flood			76	C	968p	1021rL
	758			PP	"			?	Flood			61	I	897p	1023v
	791			PP	"			?	Flood			35	I?	988p	1024rL
	919			PP	"			?	Flood			47	I	991p	1037+rL
	828			PP	"			?	Flood			65	C	1008p	1037rL
	927			PP	"			?	Flood			48	C	1000p	1038rL
	806			PP	"			?	Flood			43	C	1019p	1038cL
	744			PP	"			?	Flood			43	I	1014p	1039cL
	844			SF	"			?	Flood			43	I	1004p	1039cL
	777			DF	"			?	Flood			33	C	1026p	1045cL
	821			PP	"			?	Flood			45	C	1025p	1046cL
	716			PP	"			?	Flood			36		no date	
	750			PP	"			?	Flood			44		no date	
	822			PP	"			?	Flood			44		no date	
					PRIMARY BEAMS										
59	525,1206	108	59N-10	PP	Beam 1			1	Original?			117	I	964	1043v
	GP-2201	107	59N-11	PP	Beam 2			1	Original?			113	I	904p	1043+v
					UNCLASSIFIED ROOF BEAMS										
	CK-357			SF	Beam	2(L)	2	?	Original				I	935	1048r
	361			PP	Beam	3(L)	3	?	Original			33	C	1016p	1060rL
	358			PP	Beam	3(L)	3	?	Original		Ab	40		no date	
	359			Pop	Beam	3(L)	3	?	Original			29		no date	
	362			PP	Beam	3(L)	3	?	Original			43		no date	
					DOORWAY IN WEST WALL										
	1202	103	59W-2	SF	Lintel 3			1	NPS			41	I	997p	1036+L
	1203	104	59W-2	DF	Lintel 4			1	NPS			39	C	970p	1037+L
	1204	105	59W-2	SF	Lintel 5			1	NPS			36	I	995p	1039L

	1201	102	59W-2	DF	Lintel 1	1	NPS			No	1000p	1045vv
					DOORWAY IN NORTH WALL							
	1175	73	59N-7	DF	Lintel 5	2	Original?			No	1016p	1043vv
	1176	74	59N-7	DF	Lintel 6	2	Original?		36	I	1013p	1046v
	1174	72	59N-7	DF	Lintel 2	2	Original?				no date	
	711			PP	UNKNOWN	?	Flood		107	C	952p	1051rL
	360			Pop	"	?	Original	SA	31		no date	
					PRIMARY BEAMS							
60	533,				Beam 1							
	GP-2202	101	60N-11	PP	(CK-533 erroneously assigned to Room 64 by FMH [1934])	1	Original	SA	120	I	864p	1041+v
	CK-534-2	100	60N-10	PP	Beam 2	1	Original	SA	119	I	966	1041v
					"RAFTER OVER SHELF"							
	GP-2203,				(CK-885 is an unpro-							
	CK-885			PP	venienced "flood log")	1	Original		67	I	992p	1046cL
60/61	714			PP	"BASE OF THREE-STORY WALL"	1	Original		73	C	957p	1021c
	892			PP	UNKNOWN	?	Flood		68	C	968p	1020cL
	926			PP	"	?	Flood		57	C	994p	1021rL
	893			PP	"	?	Flood		70	C	975p	1021cL
	721			PP	"	?	Flood	Ab	92	C	995p	1036+cL
	869			DF	"	?	Flood		62	I	968p	1039+cL
	789			SF	"	?	Flood		34	I	1011p	1039cL
	766			SF	"	?	Flood		37	I	1013p	1039cL
	882			SF	"	?	Flood		97	I?	944p	1041cL
	826			PP	"	?	Flood		52	I	979p	1043+rL
	866			PP	"	?	Flood		75	I	972p	1043rL
	737			DF	"	?	Flood		34	I	1022p	1043c
	965			PP	"	?	Flood	SA	62	I	976p	1044cL
	724			DF	"	?	Flood		32	C	1026p	1045cL
	832			PP	"	?	Flood		58	I	1008p	1046v
	859			SF	"	?	Flood		57	C	967p	1046rL
	848			PP	"	?	Flood		60	I	985p	1046rL
	861			PP	"	?	Flood		56	I	1000p	1046rL
	884			PP	"	?	Flood		60	I	1016p	1046cL
	786			SF	"	?	Flood		51	C	1027p	1047c
	936			PP	"	?	Flood		54	I	996p	1047rL
	781			PP	"	?	Flood		43	I	1013p	1047rL
	857			SF	"	?	Flood		69	I	931p	1047cL
	725			SF	"	?	Flood		48		no date	
	747			SF	"	?	Flood		39		no date	
	749			DF	"	?	Flood		20		no date	
	764			PP	"	?	Flood		40		no date	
	780			PP	"	?	Flood		37		no date	
	787			PP	"	?	Flood	Ab	32		no date	
	792			PP	"	?	Flood		40		no date	
	795			SF	"	?	Flood		40		no date	

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Field	Hawley 1934	Actual	Source	Tool Marks: Beam end(s)	Bole	Radius (mm)	Terminal ring	Date: Inside	Outside
60/61	CK-818			Pop	UNKNOWN			?	Flood	SA		44		no date	
	860			PP	"			?	Flood			59		no date	
	888			SF	"			?	Flood	Ab		69		no date	
	922			SF	"			?	Flood			50		no date	
					PRIMARY BEAMS										
61	535-2,1199	98	61N-2	PP	Beam 2	2(L)		1	Original	SA		105	C	997	1038L
	536-1,1198, GP-2200	97	61N-1	PP	Beam 1			1	Original			125	C	964p	1038L
	CK-535-1			PP	UNCLASSIFIED ROOF BEAM	2(L)		?	Original	Ab		115	C	1004p	1061cL
					EASTERN SEALED DOORWAY IN SOUTH WALL										
	1200	99	61S-7	JUN	Lintel 1			1	Original					no date	
					WEST WALL										
	540			PP	Intramural Log	2(L)		?	Original				C	976	1035+v
					PRIMARY BEAM										
62	1197	96	2N-4	PP	Beam 4			1	NPS	Sw		125	I	939	1037+v
					WESTERN SEALED DOORWAY IN NORTH WALL										
63	1211	114	63N-2	PP	Lintel 1			2	NPS	Sw	MA			no date	
					PRIMARY BEAMS										
64	1210	113	64S-9	PP	Beam 3			1	Original?				No	987	1036+vv
	534-1	112	64S-8	PP	Beam 2		1	1	Original				I	970p	1038+v
	1209	111	64S-7	PP	Beam 1			1	Original?					no date	
					UNCLASSIFIED ROOF BEAMS										
	533	101	60N-11		Beam in Room 60 erroneously assigned to Room 64 by FMH (1934)									See Room 60	
	531,1182	80	65N-6		Beam in Room 65 erroneously assigned to Room 64 by FMH (1934)									See Room 65	
					PRIMARY BEAMS										
65	1180	78	65N-5	PP	Beam 1			2	Original?	MA		95	No	971	1063vv
	1181	79	65N-4	PP	Beam 2			2	Original?	SA		93	No	965	1066vv
	531,1182	80	65N-6	PP	Beam 3 (Erroneously assigned to Room 64 by FMH [1934])		4	2	Original?	Ab		99	I	972p	1072r
					DOORWAY IN NORTH WALL										
	1177	75	65N-9	SF	Lintel 1			2	Original?					no date	
	1178	76	65N-9	PP	Lintel 3			2	Original?					no date	
	1179	77	65N-9	JUN	Lintel 2			2	Original?					no date	
	734			PP	UNKNOWN			?	Flood			39	C	969p	1008rL
	783			PP	"			?	Flood			41	I	990p	1009rL
	829			PP	"			?	Flood			57	C	964p	1043+rL
	887			PP	"			?	Flood			74	I	995p	1043rL

	849			PP	"	?	Flood			55	I	947p		1044+rL
	771			SF	"	?	Flood			33	C	1026p		1045cL
	868			SF	"	?	Flood			62	C	990p		1046rL
68?	580			SF	"	?	Original?	Ab		53			no date	
					PRIMARY BEAMS									
70	GP-2195, CK-538	121	70N-4	PP	Beam 4	1	Original			144	C	855		1048L
	GP-2197, CK-539	118	70N-7	PP	Beam 1	1	Original			145	No	822		1050vv
	GP-2196, CK-537	120	70N-5	PP	Beam 3	1	Original			144	I	844		1051+v
	1215	119	70N-6	SF	Beam 2	1	Original?			118	I	908		1056v
					INTRAMURAL LOGS									
	GP-2194, CK-536-2	122	70S-9	PP	West Wall	1	Original			120	C	940p		1045+v
	1216	123	70N-8	DF	North Wall	1	NPS	Sw			No	961p		1047vv
					WESTERN DOORWAY IN SOUTH WALL									
	1217	124	70S-10	PP	Lintel	1	Original?						no date	
					EASTERN DOORWAY IN SOUTH WALL									
	1218	125	70S-12	SF	Lintel 7	1	Original						no date	
	1219	126	70S-12	SF	Lintel 6	1	Original						no date	
	1220	127	70S-12	SF	Lintel 5	1	Original						no date	
	1221	128	70S-12	PP	Lintel 4	1	Original						no date	
	1109			PP	SHAPED PLANK	?	Flood	Ab	Ab		No	995		1037+vv
					SEALED DOORWAY IN SOUTH WALL									
71A	1214	117	71AE-5	PP	Lintel 1	2	Original				No	909p		1037++vv
	1213	116	71AE-4	SF	Lintel 2	2	Original			83	I	955p		1049L
	1212	115	71AE-3	PP	Lintel 3	2	Original						no date	
77?	127			PP	UNKNOWN 2(S)?	?	Original						no date	
					SUBTERRANEAN STRUCTURE 9' BELOW FLOOR UNDER EAST WALL. POSSIBLE ROOFED PASSAGE INTO KIVA N									
87	1106			PP	Shelf Plank	?	Original	SA	Ab		No	840		883vv
	1103			PP	Roof Plank	?	Original	SA	Ab		No	859		909vv
	1104			JUN	"	?	Original	Ab	Ab		No	773+		1003++vv
	1101			PP	"	?	Original	Ab	Ab		No	1029		1073vv
	1102			PP	"	?	Original	Ab	Ab		No	849		1079vv
	1105			PP	Shelf Plank	?	Original	SA	Ab				no date	
					UNKNOWN									
	1110			PP	Plank	?	?	SA	Ab				no date	
					FIRST-STORY SHELF POLES									
88	1266	175	88N-14	SF	Pole 15	1	Original?						no date	
	1267	176	88N-9	DF	Pole 17	1	Original?						no date	

Table B:1 (continue

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Hawley Field 1934	Story: Actual	Source	Tool Marks: Beam end(s)	Tool Marks: Bole	Radius (mm)	Terminal ring	Date: Inside	Date: Outside
88	CK-1268	177	88N-3	DF	Pole 19		1	Original?			60		no date	
	1269	178	88N-2	DF	Pole 20		1	NPS		MA	52		no date	
					FIRST STORY DOORWAY IN WEST WALL									
	1259	168	88W-4	PP	Lintel 2		1	Original?			32	C	1031p	1076+v
	1258	167	88W-4	SF	Lintel 1		1	Original?					no date	
	1260	169	88W-4	SF	Lintel 7		1	Original?					no date	
					SECOND-STORY SECONDARY BEAMS									
	1265	174	88W-1	SF	Beam 8		2	Original?			46	I	1018np	1062v
	1263	172	88W-1	PP	Beam 13		2	Original?			49	I	1031p	1075+v
	1262	171	88W-1	PP	Beam 12		2	Original?					no date	
	1264	173	88W-1	PP	Beam 10		2	Original?					no date	
					SECOND STORY DOORWAY IN WEST WALL									
	1261	170	88W-2	PP	Lintel		2	Original?					no date	
					EAST WALL									
89	GP-2199	130	89E-1	PP	Intramural Log		2	Original			66	No	997p	1060vv
	GP-2198			PP	LOOSE LOG		?	?			94	I	927p	1065+v
					PRIMARY BEAM									
	CK-1222	129	89S-3	PP	Beam 3		2	Original			123	I	965np	1069+L
91	1275	184	92S-3	PP	PRIMARY BEAM		1	Original	SA		88	I	1001	1033L
Room beneath 92	1274	183	92N-14	JUN	PRIMARY BEAM		-1	Original				No	817p	963vv
					UNCLASSIFIED ROOF BEAMS									
92	1032			PP			1	Original			84	I	955p	1033cL
Story	1011			PP			1	Original			84		no date	
assign-	1044			SF	Same as CK-1030		1	Original			102	C	965p	1052rL
ments					from second story									
after	991			PP			1?	Original	Ab		55		no date	
Voll	975			PP			2	Original	Ab		138	C	976p	1069cL
(1978)	971			PP			2	Original	SA		64		no date	
	1030				Same as CK-1044		2?	Original					See CK-1044	
					from first story									
	955			SF			2?	Original			114	I?	938p	1065v
	1028			SF			2?	Original			94	I	954p	1067v
	1031			SF			3	Original			102	C	978p	1053r
	1029			PP			3	Original			125	I	1010p	1070r
	977			PP			4	Original	Ab		100	I	981p	1039+cL
	1022			SF			4	Original			107	?	953p	1066v
	973,996			PP			?	Original			48	No	973p	1007vv
	1047			PP			?	Original				No	960p	1029vv

	974		DF		?	Original		51	C	986p	1033rL
	979		PP		?	Original		56	?	912p	1034++LGB
	972		SF		?	Original		38	I	1018p	1043cL
	970,1051		DF		?	Original		28	I	1008p	1046cL
	1048		PP		?	Original			C	988p	1050rL
	999		SF		?	Original		70	C	962p	1052rL
	1050		SF		?	Original			C?	1012	1052v
	992,1046		PP		?	Original		48	C	998p	1053r
	987,988		PP		?	Original	Ab	31	C	1025p	1053rL
	990-2,1045		PP		?	Original		35	C	1015p	1054r
	1018		PP		?	Original		47	I	1016p	1054cL
	990-1		PP		?	Original	Ab	42	I	997p	1054cL
	1014,1015		PP		?	Original		48	I	1000p	1054cL
	1013		PP		?	Original	Ab	58	I	1018p	1054cL
	1025		PP		?	Original		29	I	1022p	1054cL
	985		PP		?	Original	Ab	32	I	1028p	1054cL
	976		SF		?	Original	Ab	40	I	1017p	1056rL
	1012		SF		?	Original		111	I	964p	1066v
	1024		SF		?	Original		89	I	1000p	1067r
	1026		SF		?	Original		91	I	956p	1067rL
	1023		SF		?	Original		87	C	968p	1067rL
	978		PP		?	Original		45		no date	
	1017		PP		?	Original		45		no date	
	1020		PP		?	Original		38		no date	
	1038		SF		?	Original		31		no date	
	1049		PP		?	Original		23		no date	
	969		SF		?	Original	Ab	17		no date	
	980		SF		?	Original		29		no date	
	981		PP		?	Original		47		no date	
	982		PP		?	Original		29		no date	
	983		Pop		?	Original		31		no date	
	984		Pop		?	Original		32		no date	
	986		Pop		?	Original		29		no date	
	989		PP		?	Original		38		no date	
	993		SF		?	Original		34		no date	
	994		PP		?	Original		26		no date	
	997		SF		?	Original		25		no date	
	998		SF		?	Original		24		no date	
	1016,1019		PP		?	Original		43		no date	
	1021		PP		?	Original		43		no date	
	1027		SF		?	Original		62		no date	
	1033		SF		?	Original		23		no date	
	1034		SF		?	Original		40		no date	
	1035		DF		?	Original		28		no date	
	1036		SF		?	Original		31		no date	
	1037		SF		?	Original		27		no date	
	1039,1040		SF		?	Original		27		no date	
	1041		DF		?	Original		23		no date	
	1042,1043		DF		?	Original		24		no date	
				PRIMARY BEAMS							
93	1054	93N-6	PP	Beam 3	1	Original		102	I	890	1036++L
	1052	93N-8	PP	Beam 1	1	Original		100	I	972p	1041L
	1053	93N-7	SF	Beam 2	1	Original		103	C	983np	1043L

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	Sample Designations: 1979 Field #	Sample Designations: Chapter III	Species	Provenience	Story: Hawley Field	Story: 1934	Story: Actual	Source	Tool Marks: Beam end(s)	Tool Marks: Bole	Radius (mm)	Terminal ring	Date: Inside	Date: Outside
93	CK-1079		93E-2, 93W-3	PP	SECONDARY BEAM			1	Original	SA		39	I	995p	1037+L
	1099		"	PP	"			1	Original	Ab		29	C	978p	1041++L
	1061		"	PP	"			1	Original	SA		44	I	994p	1043++L
	1100		"	PP	"			1	Original	Ab		32	I	1008p	1044++L
	1089		"	PP	"			1	Original	SA		31	I	1005p	1048++L
	1098		"	PP	"			1	Original	SA	SA	32	C	995np	1048++L
	1063		"	PP	"			1	Original	SA		38	C	1014p	1050+L
	1070		"	PP	"			1	Original	SA		39	I	990p	1050+L
	1073		"	PP	"			1	Original	SA		36	I	1010p	1050L
	1072		"	DF	"			1	Original	Bk		39	I	1014p	1051L
	1059		"	PP	"			1	Original	Ab	SA	47	C	1003p	1051L
	1060		"	PP	"			1	Original	SA		42	C	1012np	1051L
	1065		"	DF	"			1	Original	SA		37	C	1020p	1051L
	1066		"	PP	"			1	Original	SA		41	C	1013np	1051L
	1067		"	PP	"			1	Original	SA		41	C	1013p	1051L
	1068		"	PP	"			1	Original	SA		37	C	1016p	1051L
	1069		"	PP	"			1	Original	SA		36	C	1016p	1051L
	1071		"	PP	"			1	Original	SA		31	C	999p	1051L
	1075		"	PP	"			1	Original	Bk		39	C	992p	1051L
	1076		"	PP	"			1	Original	SA		41	C	1006np	1051L
	1077		"	PP	"			1	Original	Bk		39	C	1018p	1051L
	1078		"	DF	"			1	Original	SA		45	C	1007p	1051L
	1080		"	PP	"			1	Original	SA		40	C	1018np	1051L
	1081		"	PP	"			1	Original	SA		34	C	1009p	1051L
	1084		"	PP	"			1	Original	SA		36	C	1017p	1051L
	1085		"	PP	"			1	Original	SA		34	C	1008p	1051L
	1086		"	DF	"			1	Original	SA			C	1030p	1051L
	1090		"	PP	"			1	Original	SA		26	C	994p	1051L
	1062		"	PP	"			1	Original	SA		37	I	1009p	1052L
	1064		"	PP	"			1	Original	SA		38	I	1015np	1052L
	1074		"	PP	"			1	Original	SA		44	I	1017np	1052L
	1082		93E-2, 93W-3	PP	SECONDARY BEAM			1	Original	SA		37	I	1019p	1052L
	1083		"	PP	"			1	Original	SA		39	I	1010p	1052L
	1087		"	PP	"			1	Original	Ab		36		no date	
	1088		"	PP	"			1	Original	SA		33		no date	
					RECESS IN SOUTH WALL										
	1058		93S-8	PP	Lintel			1	Original	Ab		61	I	991np	1047L
					VENTILATOR IN SOUTH WALL										
	1096		93S-6	SF	Sill			1	Original			83	C	966p	1041v
	1095		"	PP	Lintel			1	Original			44	C	988p	1045L
					VENTILATOR IN SOUTH WALL										
	1096		93S-6	SF	Sill			1	Original			83	C	966	1041v
	1095		"	PP	Lintel			1	Original			44	C	988p	1045L

					SEALED DOORWAY IN NORTH WALL								
	1093		93N-11	PP	Lintel	1	Original			41	?	956p	1020++L
	1094		"	PP	Lintel	1	Original			36	C	1020p	1045L
	1092		"	SF	Lintel	1	Original	Ab		38		no date	
					EASTERN VENTILATOR IN NORTH WALL								
	1097		93N-12	SF	Lintel	1	Original				No	1020np	1043vv
					SEALED WESTERN VENTILATOR IN NORTH WALL								
	1091		93N-10	SF	Lintel	1	Original	Ab				no date	
					POLE SHELF ACROSS EAST END OF ROOM								
	1056		93N-13	DF	Pole	1	Original		SA	36	I	1009p	1051L
	1057		"	SF	Pole	1	Original	SA		55	I	1013p	1064L
	1055		"	PP	Pole	1	Original		SA	39		no date	
					DOORWAY IN NORTH WALL								
	1185	83	93N-2	SF	Lintel	2	Original?			38		no date	
					DOORWAY IN WEST WALL								
	966		93W-1	PP	Lintel	2	Original			34		no date	
94	1270	179	94N-11	PP	PRIMARY BEAM	1	Original			105	No	967	1038vv
					DOORWAY IN NORTH WALL								
	1272	181	94N-2	DF	Lintel 5	2	Original?			31	C	1018p	1048L
	1273	182	"	DF	Lintel 1	2	Original?				No	979p	1051+vv
	1271	180	"	PP	Lintel 4	2	Original?				No	1041p	1087vv
					VENTILATOR IN NORTH WALL								
	1186	84	94N-8	PP	Lintel 1	2	Original			38		no date	
					DOORWAY IN NORTH WALL								
2ND RM WEST OF RM 94	1187	85		PP	Lintel 1	2	Original			40	C	1011p	1052L
	1188	86		PP	Lintel 3	2	Original					no date	
					DOORWAY IN NORTH WALL								
101	1183	81	101N-7	PP	Lintel 3	2	Original?			48	I	983np	1037+L
	1184	82	"	Pop	Lintel 4	2	Original?					no date	

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Hawley Field	1934	Actual	Source	Tool Marks: Beam end(s)	Bole	Radius (mm)	Terminal ring	Date: Inside	Outside
104	CK-968			PP	SECONDARY BEAM			1	Original					no date	
					SEALED DOORWAY IN SOUTH WALL					SA					
	1257	166	104S-12	PP	Lintel			1	NPS	Sw			No	1050	1080vv
	GP-2193		"	?	Lintel			1	Original					no date	
														Discarded by Gila Pueblo	
					WEST WALL										
	CK-967			PP	Intramural Log			1	Original					no date	
					PRIMARY BEAMS										
106	1294	203	106E-6	SF	Beam 5			1	Original		SA	53	I	992p	1032L
	1308	217	"	DF	Beam 19			1	Original			53	C	965p	1033L
	1303	212	"	PP	Beam 14			1	Original			57	C	994p	1033L
	1292	201	"	SF	Beam 2			1	Original		SA	50	C	996p	1033L
	1300	209	"	PP	Beam 11			1	Original		SA	48	C	996np	1033L
	1304	213	"	PP	Beam 15			1	Original			57	C	997p	1033L
	1306	215	"	PP	Beam 17			1	Original			54	C	997p	1033L
	1295	204	"	DF	Beam 6			1	Original		SA	38	I	988p	1034L
	1307	216	"	PP	Beam 18			1	Original			40	C	989p	1034+L
	1309	218	"	SF	Beam 20			1	Original			41	C	989p	1034+L
	1302	211	"	DF	Beam 13			1	Original		SA	55	C	1007np	1034+L
	1305	214	"	PP	Beam 16			1	Original			58	C	940np	1036+L
	1291	200	"	PP	Beam 1			1	Original	or NPS	SA	60	I	1016	1050L
	1293	202	"	SF	Beam 3			1	Original		SA	53		no date	
	1296	205	"	PP	Beam 7			1	Original		SA	50		no date	
	1297	206	"	PP	Beam 8			1	Original		SA	40		no date	
	1298	207	"	DF	Beam 9			1	Original		SA	47		no date	
	1299	208	"	PP	Beam 10			1	Original		SA	42		no date	
	1301	210	"	PP	Beam 12			1	Original		SA	51		no date	
					SEALED DOORWAY IN SOUTH WALL										
	1311	220	106S-1	DF	Lintel			1	Original?		SA		I	1030np	1066L
					SEALED VENTILATOR IN WEST WALL										
	1310	219	106W-1	PP	Lintel			1	Original	SA	SA			no date	
					PRIMARY BEAM										
107	GP-2210	23	107N-3	SF	Beam 1			2	Original?				C	1007	1053v
					DOORWAY IN NORTH WALL										
108	CK-1131	28	108N-7	SF	Lintel 2			2	Original			46	I	997p	1047L
	1134	31	"	SF	Lintel 5			2	Original			49	I	1014p	1047L
	1130	27	"	DF	Lintel 1			2	Original			45	No	1020p	1050vv
	1133	30	"	DF	Lintel 4			2	Original			46	I	1019p	1050L
	1132	29	"	PP	Lintel 3			2	Original					no date	
	1135	32	"	PP	Lintel 6			2	Original					no date	

					DOORWAY IN EAST WALL									
110	1129	26	110E-1	DF	Lintel 2		2	NPS		34	C	1029p	1080v	
					DOORWAY IN SOUTH WALL									
	1127	24	110S-1	Pop	Lintel 1		2	Original		33		no date		
	1128	25	"	Pop	Lintel 4		2	Original		41		no date		
113 or 115	GP-2208			PP	UNCLASSIFIED ROOF BEAM		?	Original	Ab	162	No	939p	1053vv	
118	CK-325			PP	UNCLASSIFIED ROOF BEAM	2	1	Original		96	No	865p	952vv	
	326			PP	"	2	1	Original		100	No	955p	1007vv	
119	327			PP	UNCLASSIFIED ROOF BEAM	2	1	Original			No	952	1034vv	
121	140			PP	UNCLASSIFIED ROOF BEAM 1(S)	2	?	Original	Ab	135	I	917p	1051v	
UNNUMBERED NW CORNER ROOM	713			PP	UNKNOWN		?	Flood	Ab	154	C	807p	1045cL	
ROOM IN PLAZA	962			PNN	CHARCOAL IN FILL			Original				no date		
	963			PNN	"			Original				no date		
	964			PNN	"			Original				no date		
Kiva A	13, 19			PP	UNCLASSIFIED ROOF BEAM			Original		34	I?	1016p	1058v	
	14,24			PP	"			Original		119	I	966p	1070v	
	11			PP	"			Original	Ab	50		no date		
	12			Pop	"			Original	Ab	32		no date		
	15			Pop	"			Original		39		no date		
	16			Pop	"			Original		33		no date		
	17			Pop	"			Original		38		no date		
	18			Pop	"			Original		36		no date		
	20			Pop	"			Original		40		no date		
	21			SF	"			Original	Ab	31		no date		
	22			Pop	"			Original		39		no date		
	23			SF	"			Original		96		no date		
	25				Sample from Room 9 erroneously assigned to Kiva A by FMH (1934)							See Room 9		
					SHAPED PILASTER SUPPORTS ON BENCH									
KIVAS G-1 AND G-2	316			PP	Support			Original	Ab	Ab	No	847	912vv	
	311,GP-2209 CK-312, 331			PP	"			Original	Ab	Ab	No	753	952vv	
	GP-1396,2171			PP	"			Original	Ab	Ab	No	643p	957vv	
					CORNER COMPARTMENT TIE LOGS									
	CK-55			PP	SE Compartment			Original		126	C	935	1037+L	
	63			SF	"			Original		100	No	975	1047vv	
	136,1290	199		SF	NW Compartment			Original/NPS		85	I	951p	1049rL	
	72			SF	"			Original	Ab	88	C	943p	1049v	
	126			PP	SW Compartment			Original		63	C	992p	1049rL	

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Hawley Field	1934	Actual	Source	Tool Marks: Beam end(s)	Bole	Radius (mm)	Terminal ring	Date: Inside	Outside
KIVAS G-1	CK-56			SF	SE Compartment				Original			69	I	1008p	1053v
AND G-2	138			PP	SW Compartment				Original			54	I	962p	1066L
	137			PP	"				Original			64	I	1057p	1098v
	168			SF	NE Compartment				Original			57	C	1034p	1098r
	60			SF	SE Compartment				Original				C	1054	1099v
	57			SF	"				Original			50	C	1058p	1099L
	61			PP	"				Original			54	I	1059p	1100v
	58			PP	"				Original			64	I	1063p	1100v
	50,51			SF	"				Original					no date	
	52			SF	"				Original					no date	
	54-1			SF	"				Original					no date	
	54-2			SF	"				Original					no date	
	59			SF	"				Original			64		no date	
	62			SF	"				Original					no date	
	69			PP	NW Compartment				Original	Ab		45		no date	
	70			SF	"				Original			50		no date	
	71			PP	"				Original	SA		50		no date	
	139			PP	SW Compartment				Original					no date	
	606			DF	UNKNOWN				Original				I	1015p	1099r
	521			?	"				Original?					Sample Missing	
	350-3			PP	CHARCOAL				Original				No	1071	1101vv
	350-1			PNN	"				Original				C	1058p	1112r
	350-2			PNN	"				Original					no date	
KIVA G-5	330			PP	UNKNOWN				Original				No	900p	931vv
	333			SF	"				Original			54	No	963p	1028vv
	400			PP	"				Original				C	1000	1029v
					NICHE?										
	328			Non Con	Lintel?				Original					no date	
	329			SF	"				Original					no date	
					SUBFLOOR										
KIVA I	363			?	"Straight Wall"				Original					Sample Missing	
	364			PP	"				Original					no date	
					SHAPED PILASTER SUPPORTS ON BENCH										
	GP-2206			PP	Northeast				Original		Ab		No	940	1061vv
	CK-320			JUN	South				Original		Ab			no date	
	170,171,173			SF	POLE PROJECTING FROM BENCH				Original			37	C	1053+p	1087r
	169			SF	"				Original			50		no date	
	172			SF	"				Original					no date	
KIVA J	522, GP-2172			PP	SHAPED PILASTER SUPPORT ON BENCH				Original				No	770p	1040vv

				NE CORNER OF RECTANGULAR ENCLOSURE								
	GP-2204		PP	Lintel		Original			60		no date	
	CK-571		PP	UNKNOWN		Original				No	942np	1033vv
	572		PP	"		Original				No	948np	1039+vv
	524		PP	"		Original				I	917	1043v
	569,573		PP	"		Original					no date	
	570		SF	"		Original					no date	
				UNCLASSIFIED ROOF BEAM								
KIVA N	319, 1285	194	SF	Beam now in Room 27		Original			113	No	995p	1100vv
				PRIMARY BEAMS								
	1279	188	PP	Beam 1		NPS		MA	97		no date	
	101,1278	187		Beam 2 (Originally in Room 46)		NPS					See Room 46	
	84,1277	186		Beam 3 (Originally in Room 48)		NPS					See Room 48	
	308,1276	185		Beam 10 (Originally in Room 27)		NPS					See Room 27	
				DOORWAY IN WALL BEYOND NORTH WALL								
	1283	192	DF	Lintel 3		Original			35	I	1026p	1074L
	1282	191	PP	Lintel 4		Original					no date	
	1281	190	SF	Lintel 5		Original					no date	
	1280	189	SF	Lintel 6		Original					no date	
	352		PP	UNKNOWN		Original					no date	
				"NORTHERN PART OF SITE"								
IMPRECISE	GP-2438		SF	"Deep Excavations"	?	?			49	I	990p	1033r
PROVENI-	2437,2444		DF	"	?	?			41	C	964p	1034+rL
ENCES	2441		DF	"	?	?			48	C	979p	1034+rL
	2443		DF	"	?	?				I	997p	1034r
	2442-1		SF	"	?	?				I	1018p	1045v
	2440		SF	"	?	?			46	C	1002p	1045rL
	2439		PP	"	?	?		Ab	43		no date	
	2442-2		PP	"	?	?					no date	
	2445		PP	"	?	?					no date	
				FLOOD LOGS FROM NORTH CENTRAL PART OF SITE								
	CK-944		PP	UNKNOWN	?	Flood			52	?	939p	1006+rL
	940		PP	"	?	Flood			55	I	988p	1021rL
	946		PP	"	?	Flood			49	I	1004p	1024cL
	827		PP	"	?	Flood			62	I	940p	1028v
	858		PP	"	?	Flood			57	I	943p	1028rL
	840		PP	"	?	Flood			55	I	974p	1028cL
	956		PP	"	?	Flood			47	I	940p	1028cL
	939		PP	"	?	Flood			54	?	933p	1032++cL
	947		PP	"	?	Flood			47	C	987p	1036+rL
	952		PP	"	?	Flood			45	C	1002p	1036+cL
	949		PP	"	?	Flood			45	C	984p	1037+cL
	819		PP	"	?	Flood			44	C?	987p	1038cL

Table B:1 (continued)

Room(s)	Sample Designations: TRL Catalog #	1979 Field #	Chapter III	Species	Provenience	Story: Hawley Field	1934	Actual	Source	Tool Marks: Beam end(s)	Bole	Radius (mm)	Terminal ring	Date: Inside	Outside
IMPRECISE PROVENIENCES	CK-941,957			PP	UNKNOWN			?	Flood			47	I	947p	1038+cL
	950			PP	"			?	Flood			48	I	1002p	1039rL
	942			PP	"			?	Flood			46	C	1008p	1039cL
	945			PP	"			?	Flood			48	C	1007p	1039cL
	951			PP	"			?	Flood			44	C	1007p	1039cL
	955			PP	"			?	Flood			50	C	1002p	1039cL
	943			PP	"			?	Flood			46	I	989p	1040rL
	959			PP	"			?	Flood			49	I	994p	1040rL
	835			SF	"			?	Flood			58	C	989p	1040rL
	871			PP	"			?	Flood	Ab		54	I	1008p	1040cL
	759			PP	"			?	Flood			79	I	947p	1040+cL
	873			PP	"			?	Flood			64	I?	936p	1042+rL
	874			PP	"			?	Flood			52	I	1001p	1043cL
	867			PP	"			?	Flood	SA		57	C	999p	1045rL
	958			SF	"			?	Flood			58	C	996p	1045rL
	800			PP	"			?	Flood			48	C	1018p	1045cL
	824			PP	"			?	Flood			41	C	1017p	1045cL
	953			PP	"			?	Flood			51	C	1004p	1045cL
	823			PP	"			?	Flood			42	C	1020p	1046rL
	841			PP	"			?	Flood			57	I	997p	1046rL
	856			PP	"			?	Flood			59	I	975p	1046rL
	864			PP	"			?	Flood			68	I	1021p	1046cL
	954			PP	"			?	Flood			59	I	1024p	1046cL
	813			SF	"			?	Flood			54	C	969p	1047rL
	733			SF	"			?	Flood			43	I	1018p	1050rL
	761			SF	"			?	Flood			104	C	984p	1051rL
	742			SF	"			?	Flood			41		no date	
	756			?	"			?	Flood					Sample Missing	
	799			PP	"			?	Flood	Ab		57		no date	
	820			PP	"			?	Flood			54		no date	
	837			?	"			?	Flood					Sample Missing	
	863			DF	"			?	Flood			58		no date	
	948			SF	"			?	Flood			55		no date	
	960			SF	"			?	Flood					no date	
					SOUTHEAST SECTION ROOF										
	JPB-140			PP	("Hewett Scrap Pile")			?	Original?	Ab		120	I	931p	1070v
	141			PP	"			?	Original?			57	No	966p	1072vv
	119			SF	Unknown			?	Original?			92	No	no date	
					NORTHEAST QUARTER										
	143			PP	"Log"			?	Original			128	I	985p	1053v
					MIDDLE OF EAST SIDE										
	144			PP	"Log"			?	Original			116	No	943p	1050vv

UNKNOWN PROVENIENCE	CK-317	PP	?	Original?			No	689p	1005+vv
	A-11	PP	?	?		48	No	973p	1024vv
	12	PP	?	?		64	No	958p	1025vv
	10	PP	?	?		42	I	994	1033r
	CK-546	PP	?	Original?		133	I	940p	1046+v
	548-1	PP	?	Original?			No	988	1049vv
	613	PP	?	Original?		90	C	972p	1049v
	587	SF	?	Original?		131	I	919p	1050r
	556	PP	?	Original?	Ab	106	C	944p	1051rL
	547	PP	?	Original?		133	No	939p	1052vv
	589	SF	?	Original?	Ab	82	No	989np	1052vv
	612-1	PP	?	Original?			No	882	1052vv
	555	SF	?	Original?	Ab	92	C?	957p	1052v
	549	SF	?	Original?			I	1007np	1054v
	373	PP	?	Original?		97	C	963p	1061cL
	557	PP	?	Original?	Ab	163	C	976p	1064rL
	338	PP	?	Original?		110		no date	
	349	?	?	?				Sample Missing	
	366	?	?	?				Sample Missing	
	367	?	?	?				Sample Missing	
	368	JUN	?	Original?				no date	
	370	JUN	?	Original?				no date	
	526	PP	?	Original?	Ab	62		no date	
	545-2	SF	?	Original?	Ab	42		no date	
	548-2	PP	?	Original?				no date	
	550	SF	?	Original?				no date	
	552	?	?	?				Sample Missing	
	612-2	PP	?	Original?		48		no date	
	961	JUN	?	?		124		no date	

APPENDIX C

PORTABLE ARTIFACTS

Chetro Ketl was notoriously sterile. After the spectacular amounts of material recovered by Pepper at Pueblo Bonito, expectations for Chetro Ketl were undoubtedly high. But, except for the 17,454 beads taken from niches in the the Great Kiva, Chetro Ketl was a disappointment for Dr. Hewett and his students. The later discovery of an extraordinary collection of wooden ritual paraphernalia in Room 93 (Vivian et al. 1978) has not disspelled the notion that Chetro Ketl was a "dry hole."

It is impossible to say how much material was recovered during the many seasons at Chetro Ketl. The notes suggest that every room had several major items: a basket, a sandal, green painted wood fragments, a few arrow heads, one or two crushed pots. Not the massive amounts of material found at Pueblo Bonito; but it is our impression that the amount of material recovered from Chetro Ketl was substantial and the variety comparable to the collections from Pueblo Bonito. The location of this material is one of the great archaeological mysteries of the Southwest. The Chetro Ketl collections may have seemed limited when compared to Pepper's outrageous treasure troves, and consequently Hewett may have treated the collections more lightly than would have been possible anywhere outside of Chaco. How else to explain the almost total disappearance of the Chetro Ketl materials?

A few specific comments can be made from the field notes: 1) Perishables were, apparently, well represented; 2) Digging sticks ("paddles") were found built into the ceilings of several rooms; 3) Painted wood, especially green painted wood fragments, seem to have been fairly common; 4) The one extended discussion of ceramics from trash fill in an architectural unit (Chapman 1921) indicates a strong McElmo occupation. See also Hawley (1934:Part II), Hewett (1936:111-118), W. Reiter (1933), and Vivian (1931).

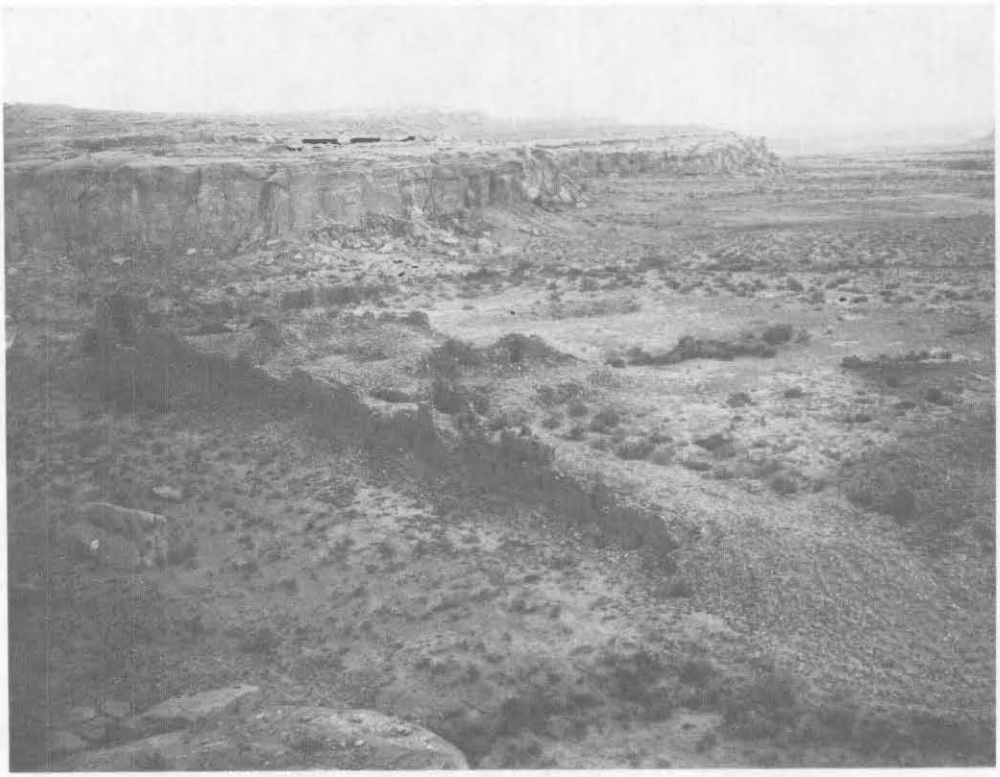


Plate 1. Chetro Ketl in 1898. From the NW. (Hyde Expedition, George Pepper. Courtesy American Museum of Natural History. Neg. No. 411906.)

Plate 2. Chetro Ketl in 1983. Same view as Plate 1. (National Park Service, Thomas C. Windes.)

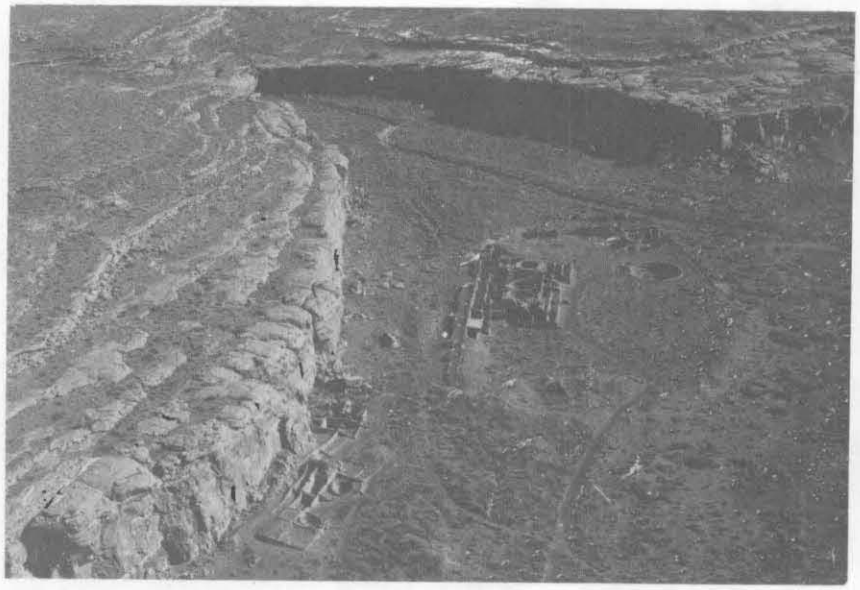


Plate 3. Chetro Ketl and Talus Unit #1 (at base of cliff, foreground). From the W. 1981. (National Park Service, Fred Mang.)

Plate 4. Chetro Ketl in the early 1930s. Trash mound in foreground, Pueblo Bonito in rear (at base of cliff). From the ESE. (Reiter No. 1115.653. Chaco Center Archive No. 2176H.)

Plate 5. Chetro Ketl and Talus Unit #1 (at base of cliff, left). From the S. 1981. (National Park Service, Stephen Lekson.)

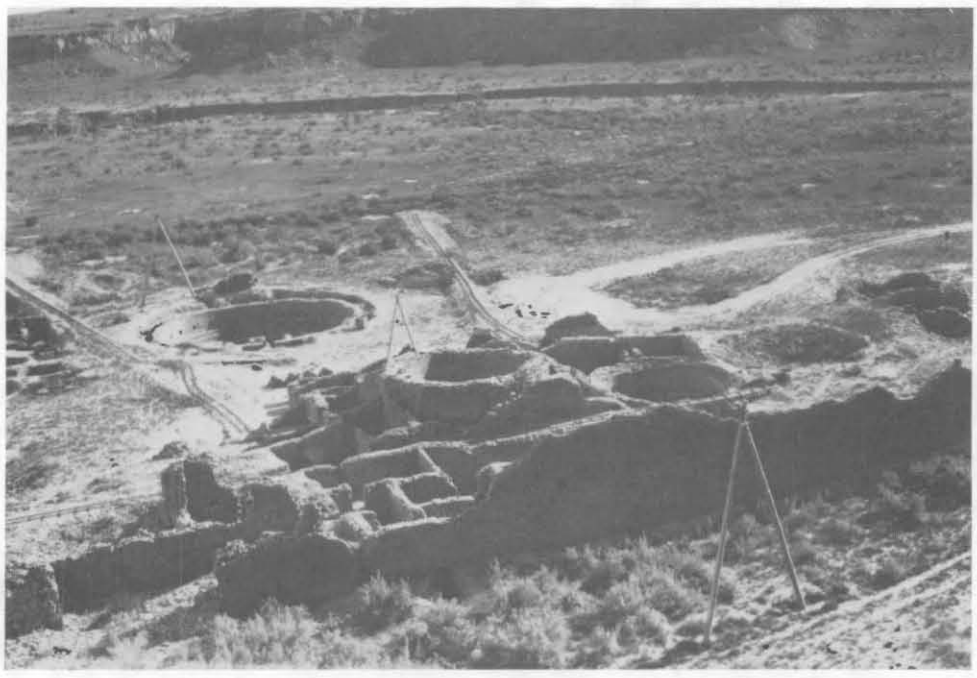


Plate 6. Chetro Ketl in the early 1930s. Rear wall, Kivas G and H, and Great Kiva. Note "aerial tramway" and mining railroads. From the N. (Courtesy Museum of New Mexico. Neg. No. 80850.)

Plate 7. Ceiling detail, Room 1-4. Note second-story cross wall dividing Rooms 1 and 4 in background. From the N. 1920. (Courtesy Museum of New Mexico. Neg. No. 80399.)

Plate 8. Ceiling detail, Room 9. Note rectangular hatchway. From the E. 1920. (Courtesy Museum of New Mexico. Neg. No. 80482.)

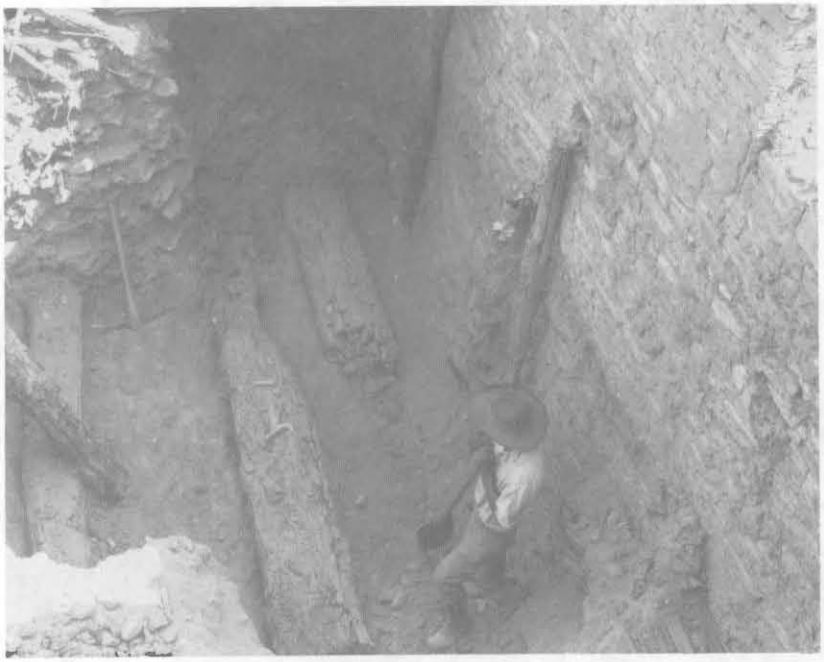


Plate 9. Floor of Room 1-4. Note huge beams lying on floor of room and upright roof support posts (?) along walls. From the N. 1920. (Courtesy Museum of New Mexico. Neg. No. 80400.)

Plate 10. The "Moat" and Rooms 12, 13 and 130. From the W. Early 1930s. (Reiter No. 1115.581. Chaco Center Archive No. 2176H.)

Plate 11. The "Moat" and its juncture with the main building. From the S. 1920. (Courtesy Museum of New Mexico. Neg. No. 80480.)

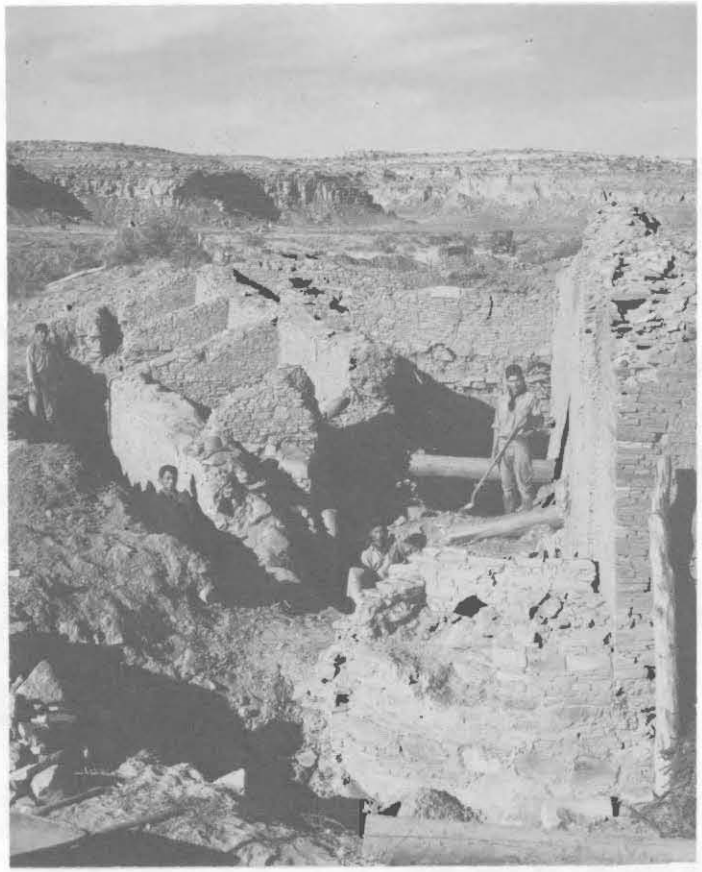


Plate 12. The SE corner of Chetro Ketl. From the E. 1921. (Courtesy Museum of New Mexico. Neg. No. 81720.)

Plate 13. Kiva A, foreground. Hearth complex and Room 12, rear. From the N. 1920. (Courtesy Museum of New Mexico. Neg. No. 87883.)

Plate 14. Excavations in Room 70. Note roof support post, lower left; peg in wall, lower right. From the E. Early 1930s. (Reiter No. 1115.595. Chaco Center Archive No. 2176H.)

Plate 15. Excavations behind Kiva N. From the E. Early 1930s. (No Reiter Number. Chaco Center Archive No. 2176H.)

Plate 16. Partition wall or possible room-wide platform curtain wall in Room 18. From the E. Early 1930s. (Reiter No. 1115.716. Chaco Center Archive No. 2176H.)

Plate 17. Plaza-facing wall of Room 38; Room 24, foreground. From the S. (Reiter No. 1115.609. Chaco Center Archive No. 2176H.)

Plate 18. Kiva I, subfloor features. From the N. Early 1930s. (Reiter No. 1115.555. Chaco Center Archive No. 2176H.)

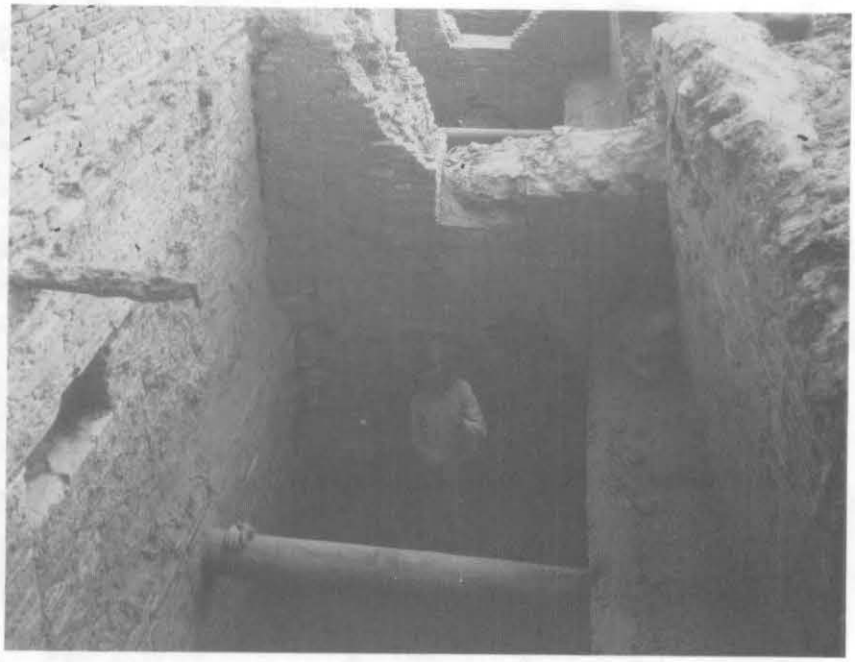


Plate 19. Rear row of Chetro Ketl. Probably Room 59 or 60, foreground. Note double wall at base of right wall. From the W. Early 1930s. (Courtesy Museum of New Mexico. Neg. No. 66932.)

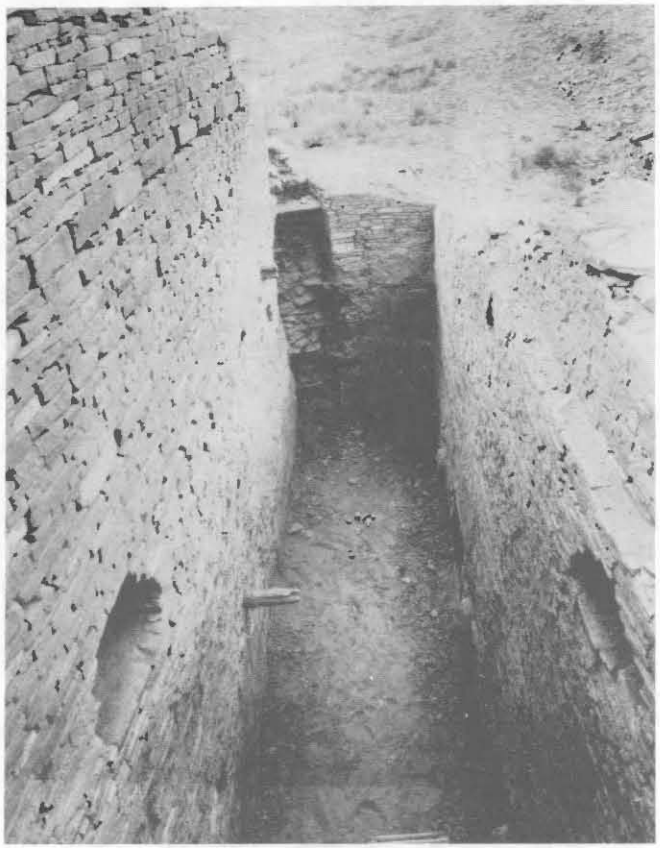


Plate 20. Room 89. From the E. Early 1930s. (Reiter No. 1115.534. Chaco Center Archive No. 2176H.)

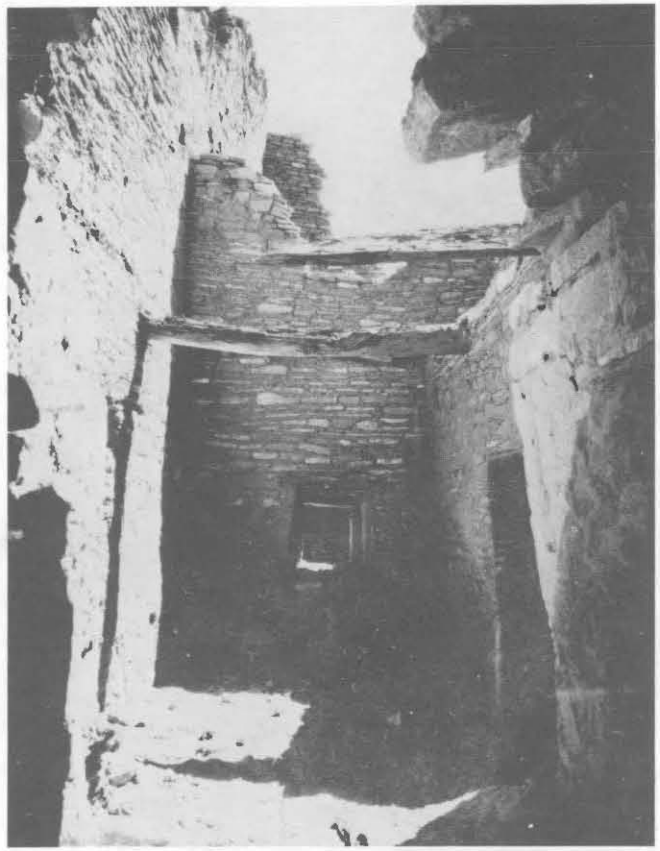


Plate 21. Room 53. Note large niche in double wall, right. From the W. Early 1930s. (Reiter No. 1115.621. Chaco Center Archive No. 2176H.)

Plate 22. Kiva G bench detail. Note "wainscotting" at rear of bench, horizontal log pilaster on bench, center. 1929. (Courtesy Museum of New Mexico. Neg. No. 67049.)

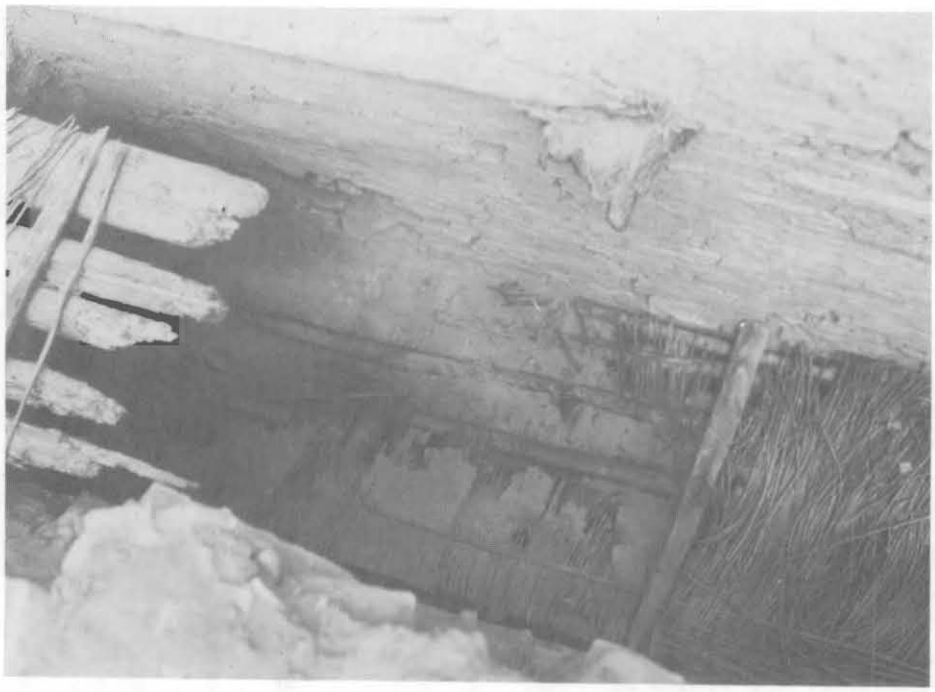


Plate 23. Room 88, roof and shelf details. From the S. Early 1930s. (Courtesy Museum of New Mexico. Neg. No. 67031.)

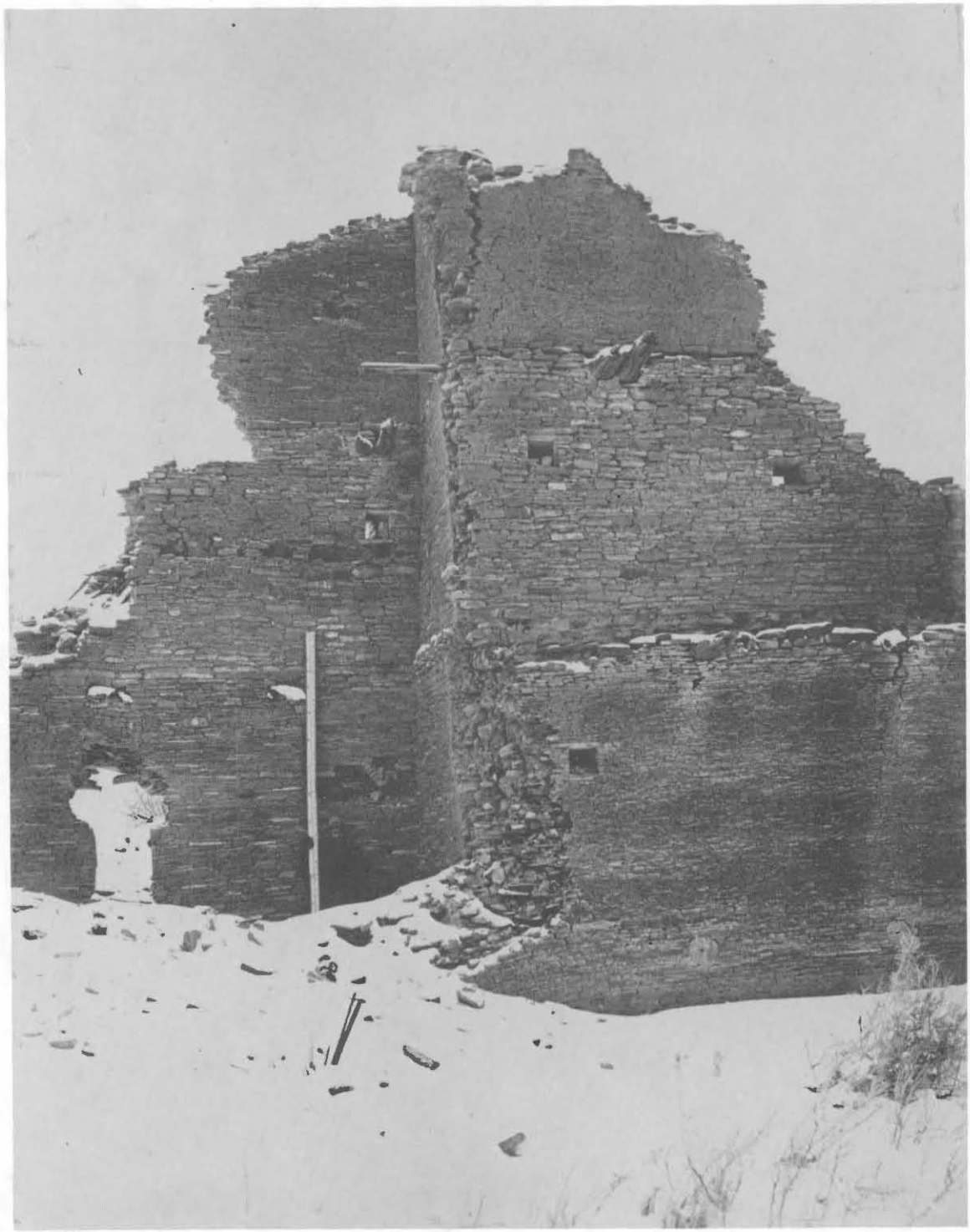


Plate 24. Room 109 (exterior, right) and Room 110 (interior, left). Stadia rod is 12 feet. From the N. 1887. (Courtesy Smithsonian Institution.)

BIBLIOGRAPHY

This bibliography lists the main published primary sources on Chetro Ketl, major unpublished sources, and cited field notes and student papers. Brief comments, where appropriate, describe the portions of the work that pertain to Chetro Ketl. Other cited materials are included, but without annotation. Not all items in this bibliography are cited in the text.

Art and Archaeology, the journal of the Archaeological Society of Washington and the Archaeological Institute of America was the main vehicle for Chetro Ketl papers by Hewett. El Palacio, at the time published by the School of American Research, the University of New Mexico, and the Museum of New Mexico, published student papers and the field school newsletter, "Digs," edited by Winifred Stamm (1929, 1930a, 1930b) during its brief existence. "Digs" and the later "Hogan Number" of El Palacio (Vol. 43, Nos. 13-15) are delightful reading, and offer considerably more detail on the pleasures and quandries of field school life than we have on the excavations themselves.

Field notes and student papers are included only if cited. Other notes, in six bound volumes once belonging to Paul Reiter, are now in the Chaco Center Archives at the Division of Cultural Research. A few unpublished papers and notes were obtained from the Museum of New Mexico's Laboratory of Anthropology, to whom the School of American Research apparently turned over all their records several years ago.

Entries preceded by an asterisk are cited in the text, but do not pertain directly to Chetro Ketl.

*Ahlstrom, Richard, Jeffrey S. Dean, and William J. Robinson
1978 Tree-ring studies of Walpi Pueblo. Laboratory of Tree-Ring Research, University of Arizona, Tucson.

Anonymous
n.d.a [field notes.] Chaco Center Archive #1923. On file at Chaco Center, University of New Mexico, Albuquerque.

n.d.b [field notes.] Chaco Center Archive #1935. On file at Chaco Center, University of New Mexico, Albuquerque.

1929a University group works at Chetro Ketl. El Palacio 26(19-25):312-313.

Details of camp life, staff names.

1929b Hewett decribes Chaco Canyon, past and present. El Palacio 26(19-25):313-315.

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1929c East tower uncovered. El Palacio 26(19-25):315-316.

Very brief announcement of the excavation of Kiva G-1.

1930a Excavations and other work (section V of Director's Annual Report). El Palacio 29(12-13):201-203.

Brief summary of 1930 excavations.

1930b Dam saves pueblo from enemy stream. El Palacio 29(12-13):233.

Brief account of diversion dam rerouting gully away from northeast corner of Chetro Ketl.

1931a Summer field work under way. El Palacio 30(21-22):274-277.

Brief summary of previous work, proposed schedule for 1930 season, staff names, plans for use of State Highway Department earth-moving equipment.

1931b Summer field school at Chaco Canyo El Palacio 31(3):29-37.

Summary of previous work, discussion of earlier, buried walls, staff and student names, field museum established in Pueblo Bonito Lodge outbuilding, earth-moving tramway, stabilization, brief account of work at Rinconada.

1932a Dr. Hewett announces discoveries. El Palacio 32(19-20):255-257.

Very brief, general account of field work at Chetro Ketl.

1932b Excavations at Chetro Ketl. El Palacio 33(2):13-20.

Staff and student names, Great Kiva, deeper excavations in rooms north of Kiva G, Kiva N, dendrochronology, rock shelters near Chetro Ketl, digging sticks found built into room ceiling, hydrology.

1933 Summer field sessions. El Palacio 35(7-8):65-70.

Staff and student names, details of camp life, brief mention of portable artifacts, excavation of Kiva N, excavation of rooms along back wall, Talus Unit, cliff cavaties, observation of Threatening Rock.

1937 New Chaco building and season's work discussed. El Palacio 42(13-15):84-84.

Bannister, Bryant

1959 Tree-ring dating of archaeological sites in the Chaco Canyon region, New Mexico. Ph.D.dissertation, University of Arizona, Tucson.

1965 Tree-ring dating of the archaeological sites in the Chaco Canyon region, New Mexico. Southwest Parks and Monuments Association Technical Series, 6(2).

Pages 138-158 deal in detail with the dendrochronology of Chetro Ketl. The dates given here have been superseded by those published in Robinson, Harrill and Warren (1974), but Bannister's work remains the standard interpretation of Chetro Ketl's dating. Bannister (page 147) notes "On the whole, Hawley's (1934) conclusions require little modification in light of the new tree-ring dates. Only refinement is indicated." Gladwin's (1945) interpretation is reviewed: "It is questionable...that the tree-ring evidence supports Gladwin's theory of Chaco Canyon building periods" (page 151).

Bannister, Bryant and William J. Robinson

1978 The dendrochronology of Room 93, Chetro Ketl. Appendix C in Vivian et al. 1978.

A detailed analysis of the best sampled room at Chetro Ketl concludes, among other things, that construction took place "around June 1, 1052, give or take a few weeks" (page 133). The dating of wooden artifacts from Room 93 is also discussed.

Betancourt, Julio
1979 Inventory and provenience check: Tree-ring specimens from Chetro Ketl, Chaco Canyon. Ms. on file at the Chaco Center, University of New Mexico, Albuquerque, and the Laboratory of Tree-Ring Research, Tucson.

Critical analysis of all records and specimens at the Laboratory of Tree-Ring Research. Includes copies of original field notes.

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Case, Janet M.
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1955 A trial survey of Mexican-Southwestern architectural parallels. School of American Research Monographs, 21.

Comparison of the Colonnade (Rooms 32, 76, 81, 105) and other architectural details at Chetro Ketl to forms in Central Mexico and the Yucatan. Plan of Colonnade.

Fisher, Reginald G.
1932 Engineering in Southwestern excavation and research. El Palacio 34 (15-16):116-120.

Paper read at the 1932 meeting of the Archaeological Institute of America. Details of stabilization, earth-moving (railroads, mining cars, and the aerial tramway) at Chetro Ketl.

1934 The Chaco Canyon in 1934. El Palacio 37(15-16):117-132.

Summary of the 1934 season; the Court Kiva, Talus Unit Number 1, deeper excavations in the G Kivas; also work at Kin Kletso, Coffin's restorations of the Chaco ruins, staff names, and list of projects. Seven photos, plan of Great Kiva.

Foraker, Margaret
1931 Report on work in Chaco Canyon. Chaco Center Archive #1862. On file at Chaco Center, University of New Mexico, Albuquerque.

Franstead, Dennis and Oswald Werner
1974 The ethnogeography of the Chaco Canyon area. Ms. on file, Chaco Center, University of New Mexico, Albuquerque.

Gladwin, Harold Sterling
1945 The Chaco Branch: excavations at White Mound and in the Red Mesa Valley. Medallion Papers, 33.

A monograph examining the archaeological sequence leading to the Bonito Phase, with a detailed discussion of the dendrochronology of the Bonito Phase sites. In Chapter 20, Gladwin reinterprets Hawley's (1934) dates from Chetro Ketl, and--with other evidence--concludes: "...I would think that the Bonito Phase had developed out of the Hosta Butte Phase by about 1080. In some cases, as at Pueblo Bonito and Chetro Ketl, the Bonito Phase began as an enlargement and elaboration of Hosta Butte pueblos...it came to an end by 1225 A.D. or somewhat earlier" (pp. 128-129).

*Graham, Samuel A.
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Hawley, Florence M.
1934 The significance of the dated prehistory of Chetro Ketl, Chaco Canyon, New Mexico. The University of New Mexico Bulletin 1(246), Monographs of the School of American Research, 2.

This is a published version of Hawley's Ph.D. dissertation at the University of Chicago. Three main topics are discussed: Chetro Ketl masonry sequence and building periods; stratigraphic study of the Chetro Ketl refuse mound; and weather as a factor in Chetro Ketl prehistory. Six masonry types are defined. These types are dated by dendrochronology and superimposition, and building stages are derived from the distribution of dated masonry types. Stratigraphy of the refuse mound is described, and interpreted with the aid of ceramic typology and dendrochronology. Finally, years indicated as relatively dry by tree-ring studies were correlated with building stages and trash mound deposition.

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A masonry typology for Chaco is outlined from Basketmaker through the Bonito Phase. Includes the classic figure depicting sequential, dated, facing styles.

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1921b The Excavation of Chetro Ketl. Art and Archaeology 11(1-2):45-62.

Summary of work at Chetro Ketl in 1920. Excavation of southeast part of site, trenching of the trash mound. Plan of southeast corner of site, 16 photos of Chetro Ketl.

1922 The Chaco Canyon in 1921. Art and Archaeology 14(3):115-131.

Excavation and discussion of Great Kiva, brief comments on cliff erosion and prehistoric irrigation. Twelve photos of Chaco and Chetro Ketl, one line drawing restoration of Chetro Ketl by Kenneth Chapman.

1930 Ancient life in the American Southwest. Bobbs-Merrill, Indianapolis.

Pages 289-322 deal with Chaco Canyon; pages 305, 309-319 with Chetro Ketl specifically. Summarizes work at the site to 1930, including much material from earlier Art and Archaeology articles.

1931 The significance of the deeper excavations at Chetro Ketl. American Journal of Archaeology 35:58.

Abstract of a paper read at the 1930 meeting of the Archaeological Institute of America. Summarizes, very briefly, the 1929 and 1930 seasons at Chetro Ketl.

1932 The Chaco Canon in 1932. Art and Archaeology 33(3):147-158.

Paper read at the 1932 meeting of the Southwestern division of the A.A.A.S., revised for publication. Summary of work to 1929, Great Kiva bead caches in sealed niches, subfloor excavations in Great Kiva, deeper excavations in rooms north of Kiva G, work in Casa Rinconada, discussion of dating and speculations about abandonment.

1934 The excavation of Chetro Ketl, Chaco Canon, 1932-33. Art and Archaeology 35(2):51-58, 68.

Summary of papers read at the 1932 and 1933 meetings of the Archaeological Institute of America. Completion of subfloor excavations in the Great Kiva, excavations of Kivas G and N, and the Talus Unit; other studies, including dendrochronology. Eleven photos of Chetro Ketl and portable artifacts.

1936 The Chaco Canyon and its monuments. Handbooks of Archaeological History. The University of New Mexico Press, Albuquerque.

Hewett's summary of his work at Chaco and Chetro Ketl. Descriptions of the canyon, and all major sites. Fifty page account of excavations at Chetro Ketl from 1920 to 1936. Includes a great deal of material from earlier Art and Archaeology articles, followed by generalized kiva descriptions, a detailed account of the excavation of the Great Kiva, and short discussions of Kiva G and Kiva N. Also includes brief accounts of excavations at other

sites in Chaco (Rinconada, Kin Kletso, Talus Unit, cliff cavaties), minor artifacts, burials, terrain and hydrology, and chronology. Appendices include some of the other articles from Art, and Archaeology (Vol. 11 Nos.1-2), excerpts from Simpson's and Jackson's accounts, Reginald G. Fisher's discussion of geological influences on past population (UNM Bull. 244), Pepper's 1920 "Pueblo Bonito" (Anthro. Pap. A.M.N.H. Vol. 27), Roberts' "Shabik'eshchee" (BAE Bull. 92), Reiter's (1933) M.A. thesis, and Hawley's (1934) Ph.D. dissertation. Numerous photos, Robert Coffin's reconstructions of major sites, maps and plans.

Holsinger, S.J.
1901 Report on prehistoric ruins of Chaco Canyon. General Land Office. Ms. on file at National Archives, Washington, D.C.

Early description of Chetro Ketl. Most material is also covered by Jackson (1878). Several photos.

Howe, J.D.
1933 Report on the south wall enclosing the plaza at Chetro Ketl. Chaco Center Archive #1876. On file at Chaco Center, University of New Mexico, Albuquerque.

Jackson, William H.
1878 Report on the ancient ruins examined in 1875 and 1877. In 10th Annual Report of the U.S. Geological and Geographical Survey.

Probably the best early account of Chetro Ketl. Jackson notes the northeast corner stood four stories tall and thought that Kiva N was three stories. Jackson also notes that beams projected 4-5 feet out from the first story of the rear wall, probably north of Rooms 109 and 110.

*Judd, Neil M.
1964 The architecture of Pueblo Bonito. Smithsonian Miscellaneous Collections, 147(1). Smithsonian Institution, Washington, D.C.

Keur, Dorothy
1933 Observation of excavations of Chetro Ketl. Chaco Center Archive #1872. On file at Chaco Center, University of New Mexico, Albuquerque.

Kluckhohn, Clyde
1933 [field notes.] Chaco Center Archive #1909. On file at Chaco Center, University of New Mexico, Albuquerque.

*Lange, C.H. and C. L. Riley
1966 The Southwestern Journals of Adolph F. Bandelier 1880-1882. UNM Press, Albuquerque. The School of American Research, Museum of New Mexico Press, Santa Fe.

Lassetter, Roy, Jr.
1934 Chetro Ketl. Notes on file at the Laboratory of Tree-Ring Research, University of Arizona, Tucson.

Leinau, Alice
1933 [field notes.] Chaco Center Archive #1090. On file at Chaco Center, University of New Mexico, Albuquerque.

1934 Sanctuaries in the ancient pueblo of Chetro Ketl. Unpublished M.A. thesis. On file at Department of Anthropology, University of New Mexico, Albuquerque.

A short paper describing kivas at Chetro Ketl (excluding the lower G Kivas and the Court Kiva, which had not been excavated). Numerous photos, map of Chetro Ketl, but no plans of individual kivas.

Lekson, Stephen H.
1978 An evaluation of the dendrochronology of Chetro Ketl. Ms. on file at the Chaco Center, University of New Mexico, Albuquerque.

1981 Standing architecture and the interpretation of local and regional organization of Chaco Canyon. Paper presented at the 46th Annual Meeting of the Society of American Archaeology, San Diego.

Lister, Robert H. and Florence C. Lister
1981 Chaco Canyon: Archaeology and Archaeologists. University of New Mexico Press, Albuquerque.

Miller, James Marshall
1937 The G Kivas of Chetro Ketl. Unpublished M.A. thesis. On file at Department of Architecture, University of Southern California, Los Angeles.

Well illustrated description of architecture and stratigraphy of the G Kivas. Includes a glossary (later published separately) of architectural terms, and a clear account of the stabilization of these units by Miller and Reginald G. Fisher. Excellent photos, plans, and profiles.

*Morenon, E. Pierre
1977 Architectural analysis and intra-site variation: a case study. Unpublished Ph.D. dissertation. On file at School of Humanities and Sciences, Southern Methodist University, Dallas.

O'Bryan, Deric
1940 Chetro Ketl tree-ring sample,collection notes. Ms. on file at the Arizona State Museum (Archives A-0097), Tucson.

Pierce, Sallie
1932 [field notes, July 5-9, 1932.] Chaco Center Archive #1877. On file at Chaco Center, University of New Mexico, Albuquerque.

Pierson, Lloyd M.
1956 A history of Chaco Canyon National Monument. Chaco Center Archive #726. Ms. on file at the Chaco Center, Albuquerque, and Chaco Culture NHP, New Mexico.

Pages 29-32 are a detailed account of research at Chetro Ketl from 1902 to 1947.

Postlethwaite, W.W.
1933 Excavations of areas adjoining the Sun Sanctuary. Ms. on file at the Chaco Center, University of New Mexico, Albuquerque.

Descriptions, photos, maps of excavations south and east of Great Kiva including rooms at the plaza-facing arc.

1937 The frontal walls of Chetro Ketl. Chaco Center Archive #2125. On file at Chaco Center, University of New Mexico, Albuquerque.

1938 The outer walls at Chetro Ketl. New Mexico Anthropologist 2(4-5): 81.

Abstract of paper given at meeting of Southwestern division of A.A.A.S. 1938. Brief description of the Moat.

Reed, Erik K.
1947 Flood damage to Chetro Ketl. El Palacio 54(10):238-240.

Brief account of the flood of 1947 which destroyed large sections of Chetro Ketl. A much more detailed account appears in Vivian (1948). Sketch map of Chetro Ketl.

Reiter, Paul
1933 The ancient pueblo of Chetro Ketl. Unpublished M.A. thesis. On file at Department of Anthropology, University of New Mexico, Albuquerque.

Reiter was field supervisor at Chetro Ketl from 1929 to 1933; this is a general account of excavations in the rooms and in the Great Kiva during that period. It includes: a discussion of field methods, room fill, a generalized discussion of room features and wall construction, some detailed description of particular rooms, a general discussion of kivas (including a table of kiva features which appears to contain a few errors). Also included are a description of the Great Kiva, a brief consideration of site plan and stratigraphy, and a very detailed account of masonry and stabilization. Numerous photos, but only one plan, which is a map of the entire site.

1946 Form and function in some prehistoric ceremonial structuctures in the Southwest. Unpublished Ph.D. dissertation. On file at Department of Anthropology, Harvard University, Cambridge.

Includes some material on Chetro Ketl kivas, most of which was later included in Vivian and Reiter (1960).

Reiter, Winifred
1932 [field notes.] Chaco Center Archive #1877. On file at Chaco Center, University of New Mexico, Albuquerque.

1933 Personal adornment of the ancient Pueblo Indians. Unpublished M.A. thesis, University of New Mexico, Albuquerque.

Descriptions and photos of perishable artifacts and ornaments from Chetro Ketl.

Richert, Roland and Charles Voll
1964 Stabilization of Chettro Kettle ruin, Chaco Canyon National Monument, New Mexico 1963. Ms. on file at Chaco Culture NHP, New Mexico.

Maintenance stabilization, and an early version of Voll 1978.

*Robinson, William J.
1967 Tree-ring materials as a basis for cultural interpretations. Ph.D. disseration, University of Arizona, Tucson.

Robinson, William J., Bruce G. Harrill, and Richard L. Warren
1974 Tree-ring dates from New Mexico G: Chaco-Gobernador Area. The Laboratory of Tree-Ring Research, University of Arizona, Tucson.

Pages 16-24 list definitive dates from Chetro Ketl. "Discussions of the dates in terms of architectural development have been assessed by Hawley (1934) and Bannister (1965) and very little can be added on the basis of this presentation."

Simpson. J.H., Lt.
1852 Journal of a military reconnaissance from Santa Fe, New Mexico, to the Navajo country. Report of the Secretary of the War, 31st Congress, 1st Session, Senate Ex. Doc. 64, Washinton, D.C.

The first description and map of Chetro Ketl.

Stallings, W.S.
1930 Catalog of tree-ring material collected from Chetro Ketl, June and July, 1930. Ms. on file at the Laboratory of Tree-Ring Research, University of Arizona, Tucson.

Stamm, Winifred, editor
1929 Digs. El Palacio 27(1-7):15-52.

Details of camp life, staff names, projects, excavation of Kiva G and Talus Unit, comments on portable artifacts, stabilization.

1930a Digs, No. 1. El Palacio 28(26):198-208.

Excavation of rooms north of Kiva G and Great Kiva, details of camp life.

1930b Digs, Vol. 2 No. 2. El Palacio 28(10-15):13-27 (reprinted in El Palacio 29 [1]).

Details of camp life, subfloor excavations in Great Kiva, Kiva G, trash mound, deeper room north of Kiva G, brief mention of portable artifacts, dendrochronology.

1930c Digs. El Palacio 28(26):198-208.

Details of camp life, excavation in Great Kiva and rooms north of Kiva G, Court Kiva, trench outside rear wall, trash mound, diversion of arroyo.

1930d Digs. El Palacio 29(1):46-58.

See 1930b.

Stubbs, Stanley

1929 The east tower of Chetro Ketl, 1929. Ms. on file at Laboratory of Anthropology, Museum of New Mexico, Santa Fe. Also Chaco Center Archive #2125, on file at Chaco Center, University of New Mexico, Albuquerque.

1930 Excavation of the east tower of Chetro Ketl, 1929. Bulletin of the State University of New Mexico, Educational Series 4(2).

Brief abstract of paper given at New Mexico Association for the Advancement of Science, October 1929. "Figures illustrating the construction of the tower were given at the end of this bulletin."

Vivian, R. Gordon

1931 Basketry of Chetro Ketl. Chaco Center Archive #2107. On file at Chaco Center, University of New Mexico, Albuquerque.

Analysis of basketry technology at Chetro Ketl. Twelve figures, seven photos.

1941 1941 annual report: Navajo Indian mobile unit, Chaco Canyon National Monument. Southwestern Monuments Special Report 27.

Reports the first large government sponsored stabilization at Chetro Ketl.

1948 Chaco Canyon National Monument, Chettro Kettle emergency stabilization, 1948. Ms. on file Chaco Culture NHP, New Mexico.

Detailed account of the 1947 flood that damaged Chetro Ketl, and the repairs made afterwards.

1949 Pre-historic handy man. New Mexico Magazine 27(6):14, 39-41.

Construction details of Room 63 and another room, probably 71A. Several photos.

Vivian, R. Gordon and James A. Lancaster

1947 Ruins stabilization, Chaco Canyon National Monument, Chettro Kettle Ruin, 1947. Ms. on file, Chaco Culture NHP, New Mexico.

Describes the extensive stabilization program almost completed before the flood of 1947. Photos and map.

Vivian, R. Gordon and Tom W. Mathews
1965 Kin Kletso: A Pueblo III community in Chaco Canyon, New Mexico. Southwest Parks and Monuments Association, Technical Series 6(1).

Vivian, R. Gordon and Paul Reiter
1960 The Great Kivas of Chaco Canyon. School of American Research Monographs, 22.

Includes the best description of the Great Kiva and the Court Kiva available. Plans, profiles, and photos. Reprinted in 1965 by UNM Press, Albuquerque.

Vivian, R. Gwinn, Dulce N. Dodgen, and Gayle H. Hartman
1978 Wooden ritual artifacts from Chaco Canyon, New Mexico: the Chetro Ketl collection. Anthropological Papers of the University of Arizona 22.

Description and interpretation of the extraordinary collection of painted wood artifacts excavated from Room 93. Includes appendices by Bannister and Robinson (1978), and Voll (1978), listed separately here. Numerous photos, drawings, plans and maps.

Voll, Charles B.
1978 The Excavation of Room 92, Chetro Ketl. Appendix E of Vivian et al. 1978.

Description and discussion of 1964 excavations of Room 92, including a discussion of masonry-facing chronology. Photos, plans and profiles.

Voll, Charles B. and Martin T. Mayer
1964 1964 Maintenance and stabilization at Chettro Kettle ruin, Chaco Canyon National Monument. Ms. on file, Chaco Culture NHP, New Mexico.

Windes, Thomas C.
1980 A review of extramural greathouse middens in Chaco Canyon National Monument. Ms. on file at the Chaco Center, University of New Mexico, Albuquerque.

Includes an analysis of surface lithics and ceramics from the highly disturbed Chetro Ketl trash mound; ceramics appear to be a fairly homogeneous assemblage dating from about 1050 to 1100.

Woods, Janet McC.
1934 Excavation of the Court Kiva, Chetro Ketl. Chaco Center Archive #1941. On file at Chaco Center, University of New Mexico, Albuquerque.

Major source for Vivian and Reiter (1965).

Woods, Margaret S.
1932a Report on the excavation of the west tower Kiva, Chetro Ketl, Chaco Canyon, New Mexico. Chaco Center Archive #1957. On file at Chaco Center, University of New Mexico, Albuquerque.

1932b Excavations. Chaco Center Archive #1867. . On file at Chaco Center, University of New Mexico, Albuquerque.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The Department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

Publication services were provided by the graphics staff of the Denver Service Center. NPS 2124

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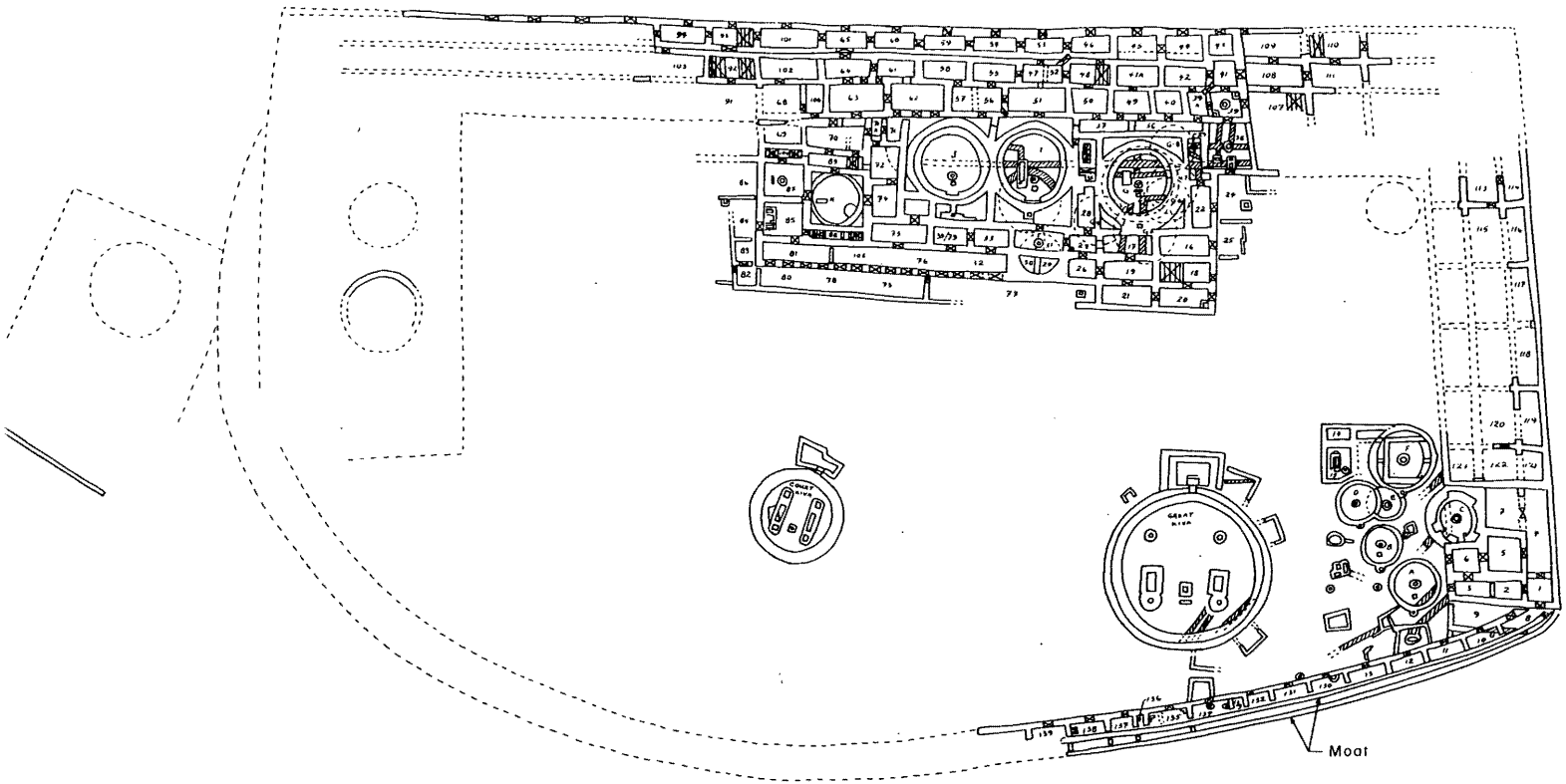
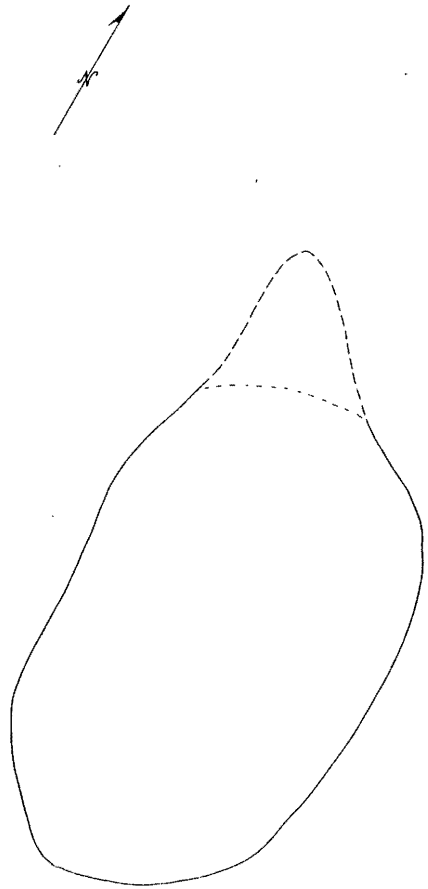




CHETRO KETL

CHACO CULTURE NATIONAL HISTORICAL PARK

Composite Map 1979
Base Map 1972 - Remote Sensing Archive No. 6A3

Note: position of doors ⊠ approx.
position of floor features approx.

0 25 50 75 100 ft.
0 10 20 30 m.

Figure I:2. Chetro Ketl, Chaco Culture National Historical Park. Position of first floor doors and floor features are approximate. Composite map, 1979; base map, 1972 (Remote Sensing Archive No. 6A3.)

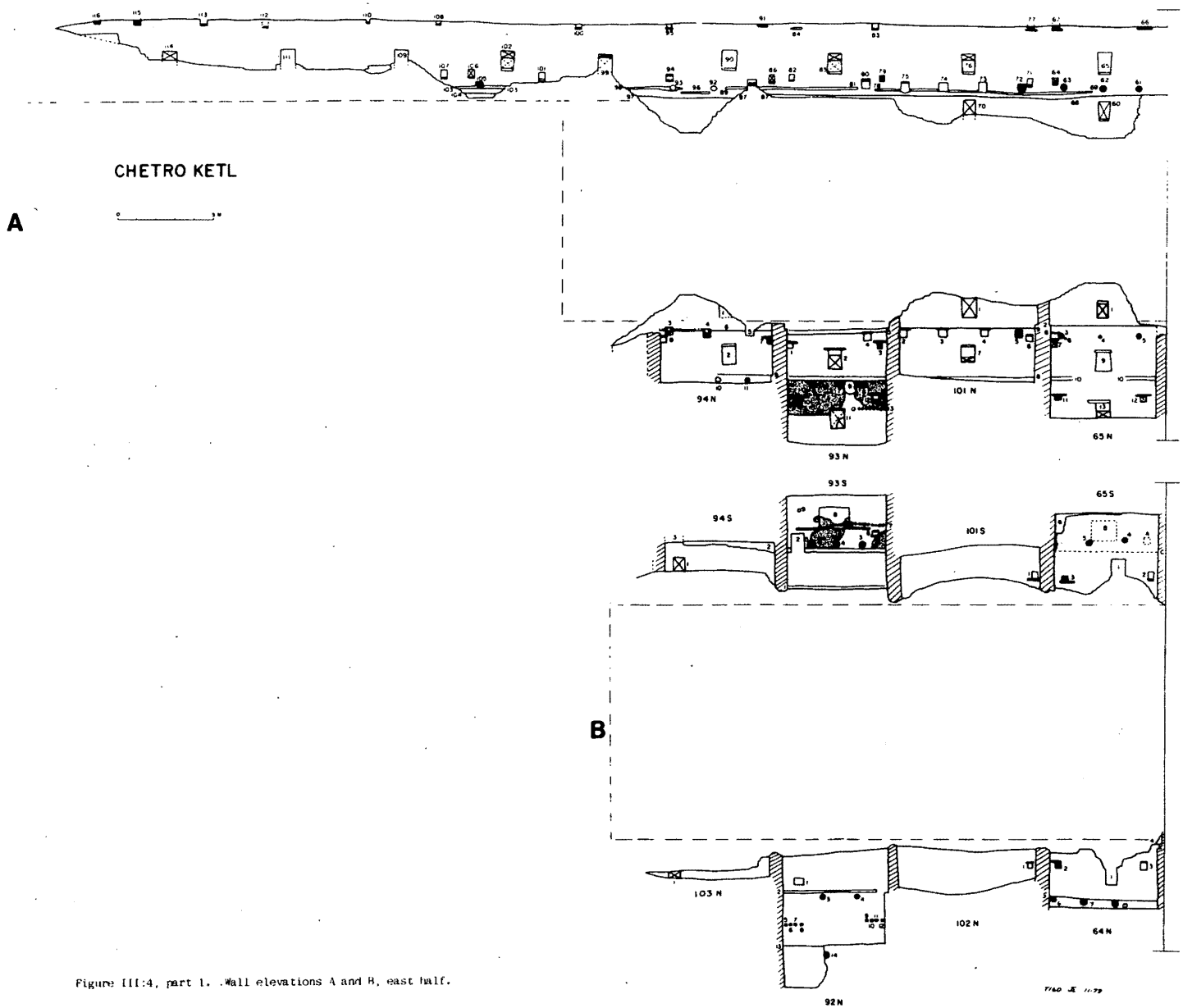


Figure III:4, part 1. Wall elevations A and B, east half.

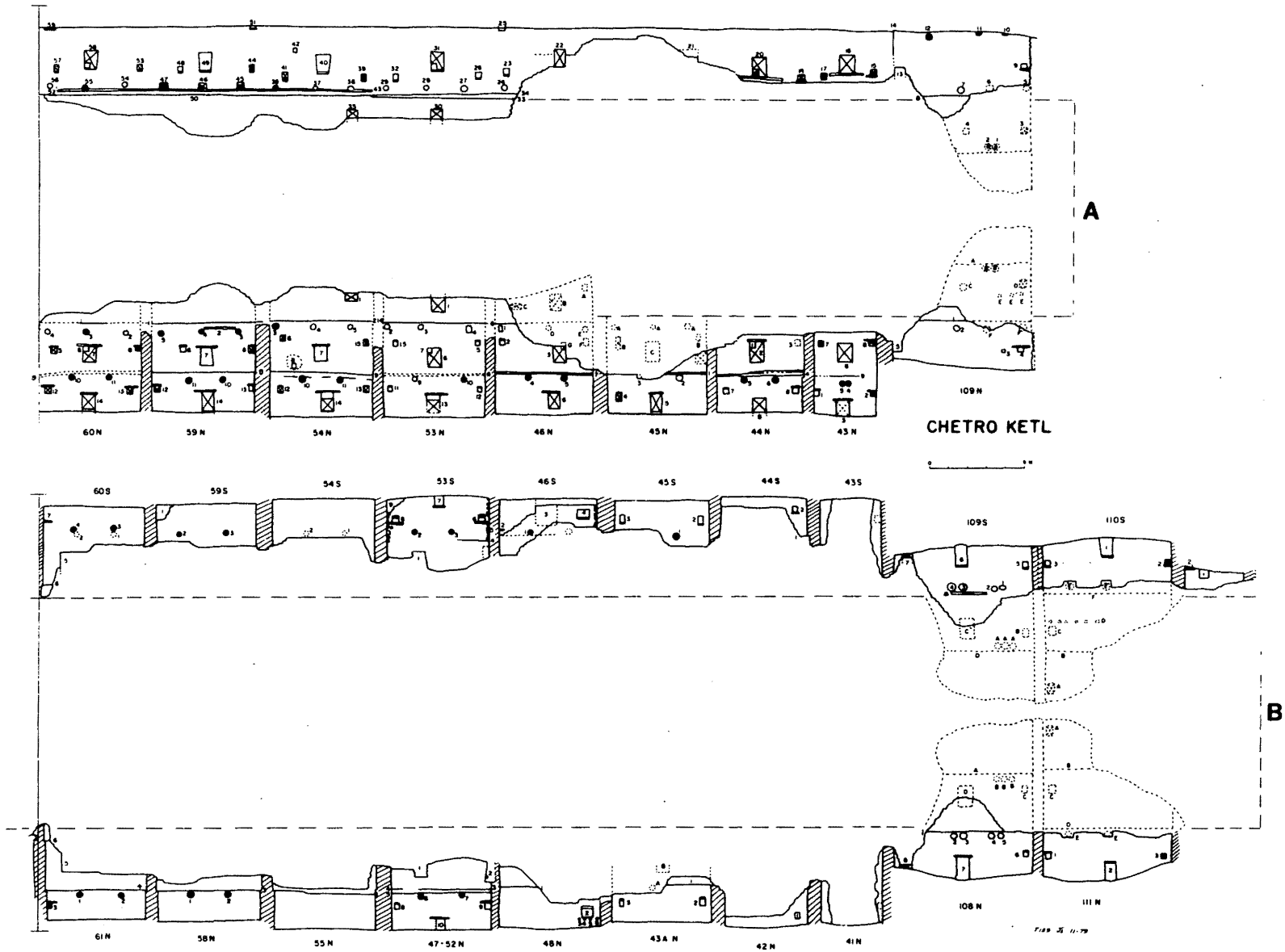


Figure III:4, part 2. Wall elevations A and B, west half.

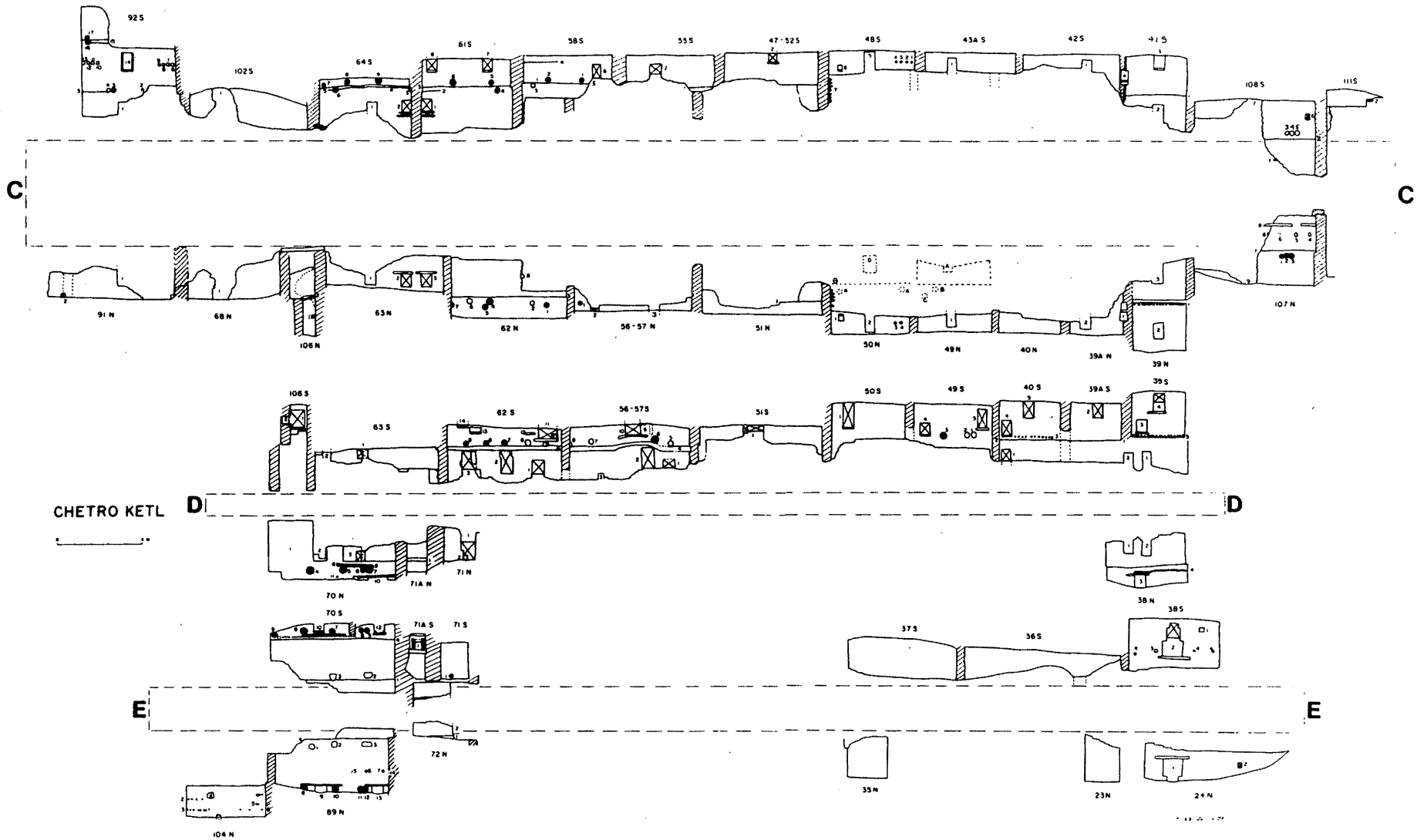


Figure III:5. Wall elevations C, D and E.

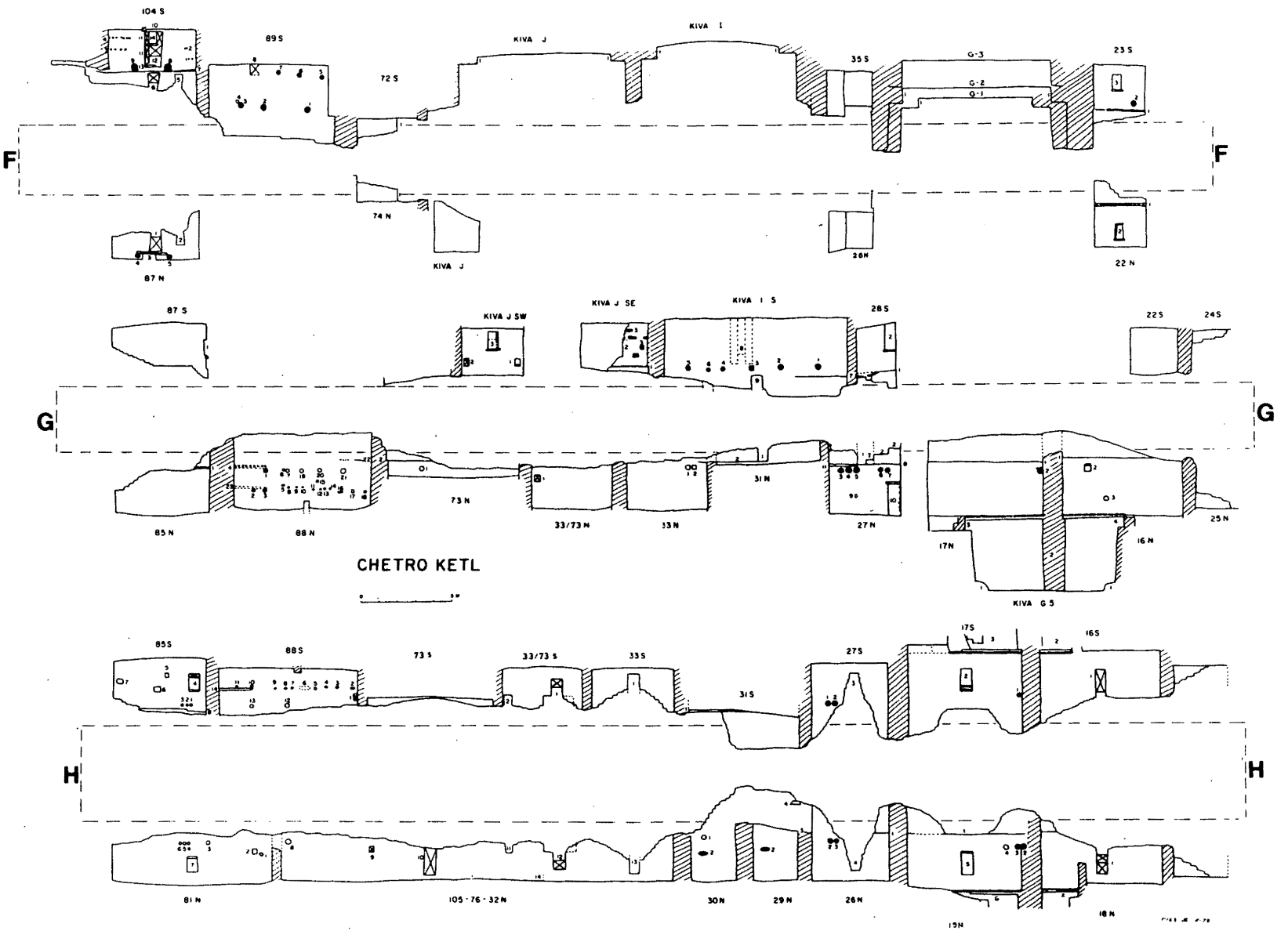


Figure III:6. Wall elevations F, G and H.

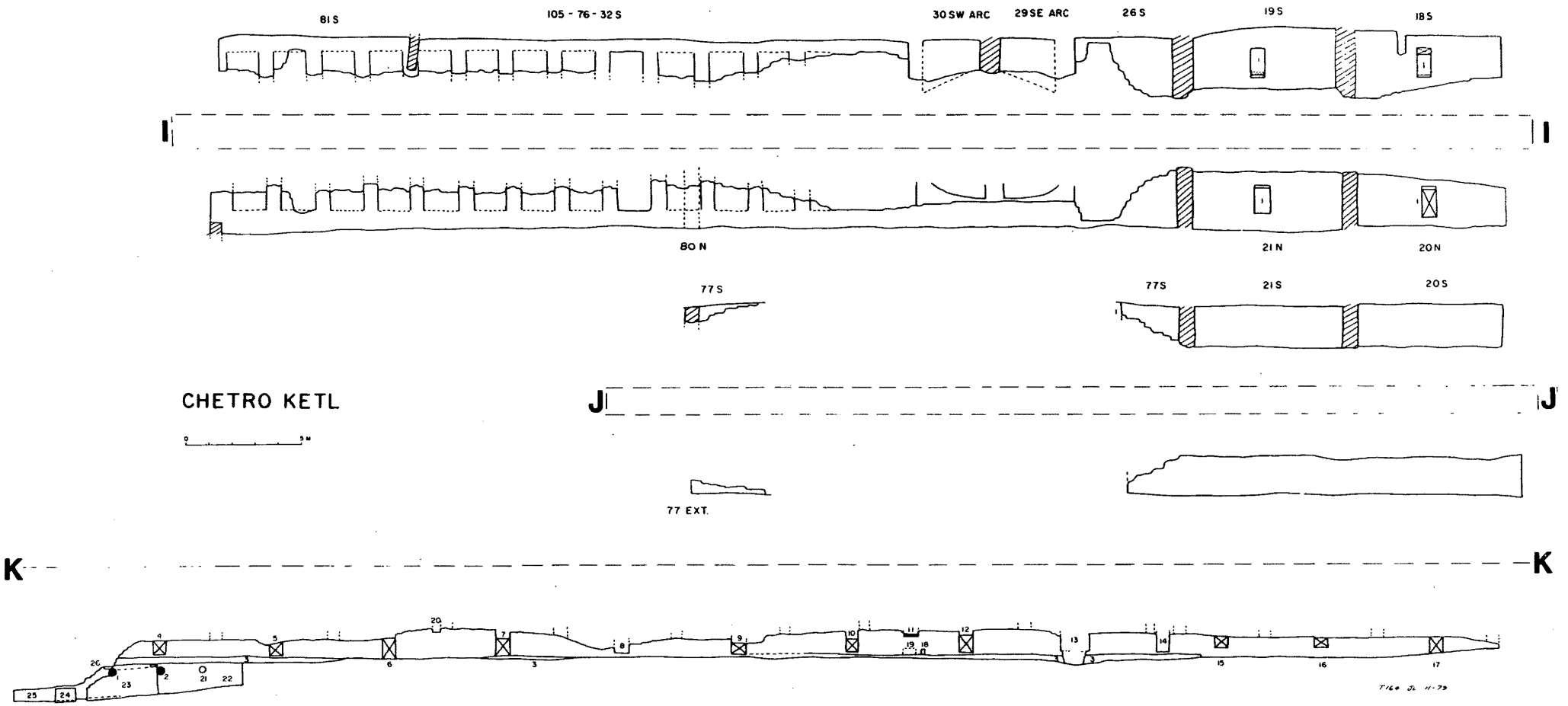


Figure III:7. Wall elevations I, J and K.

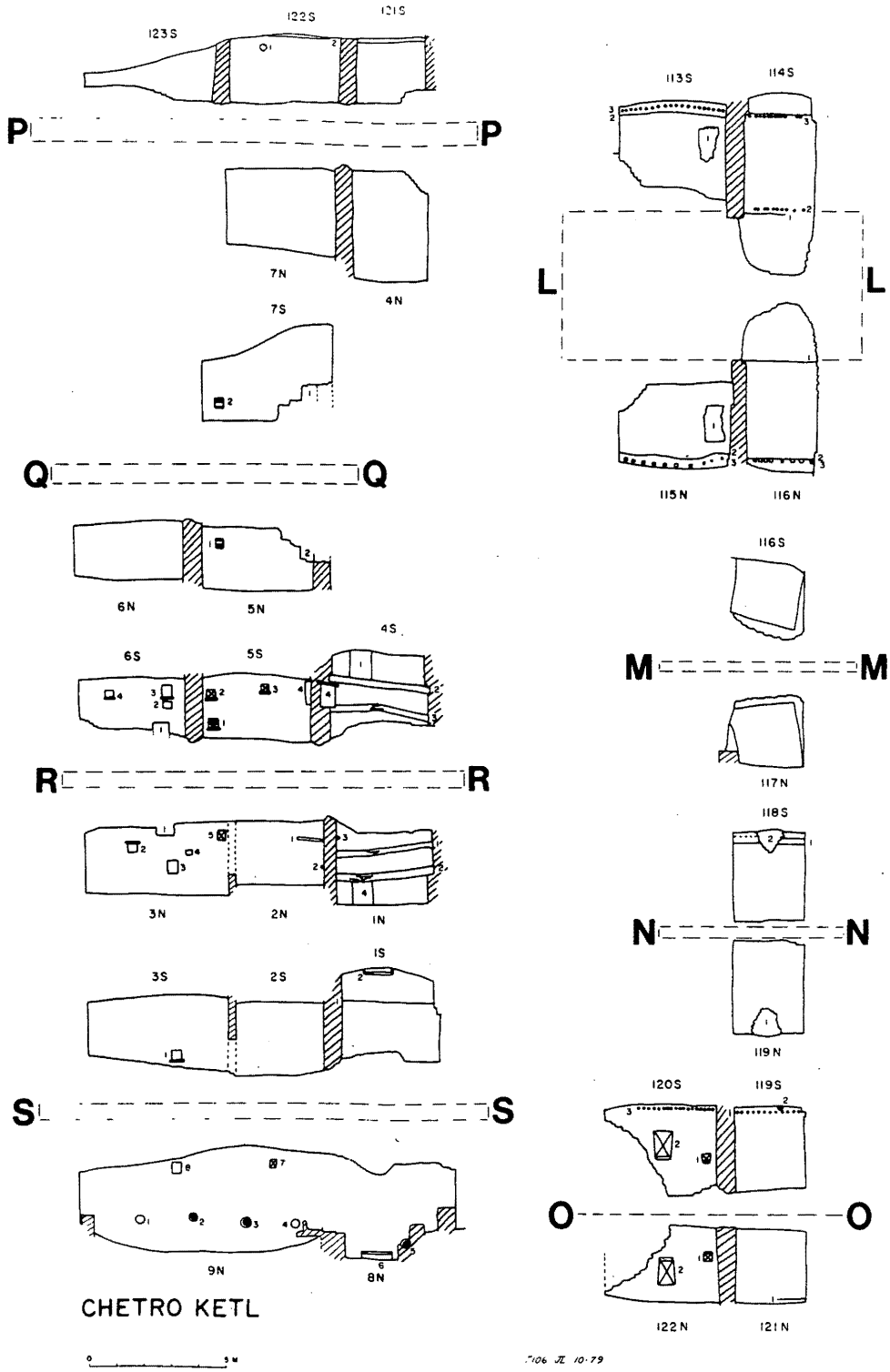


Figure III:8. Wall elevations L through S.

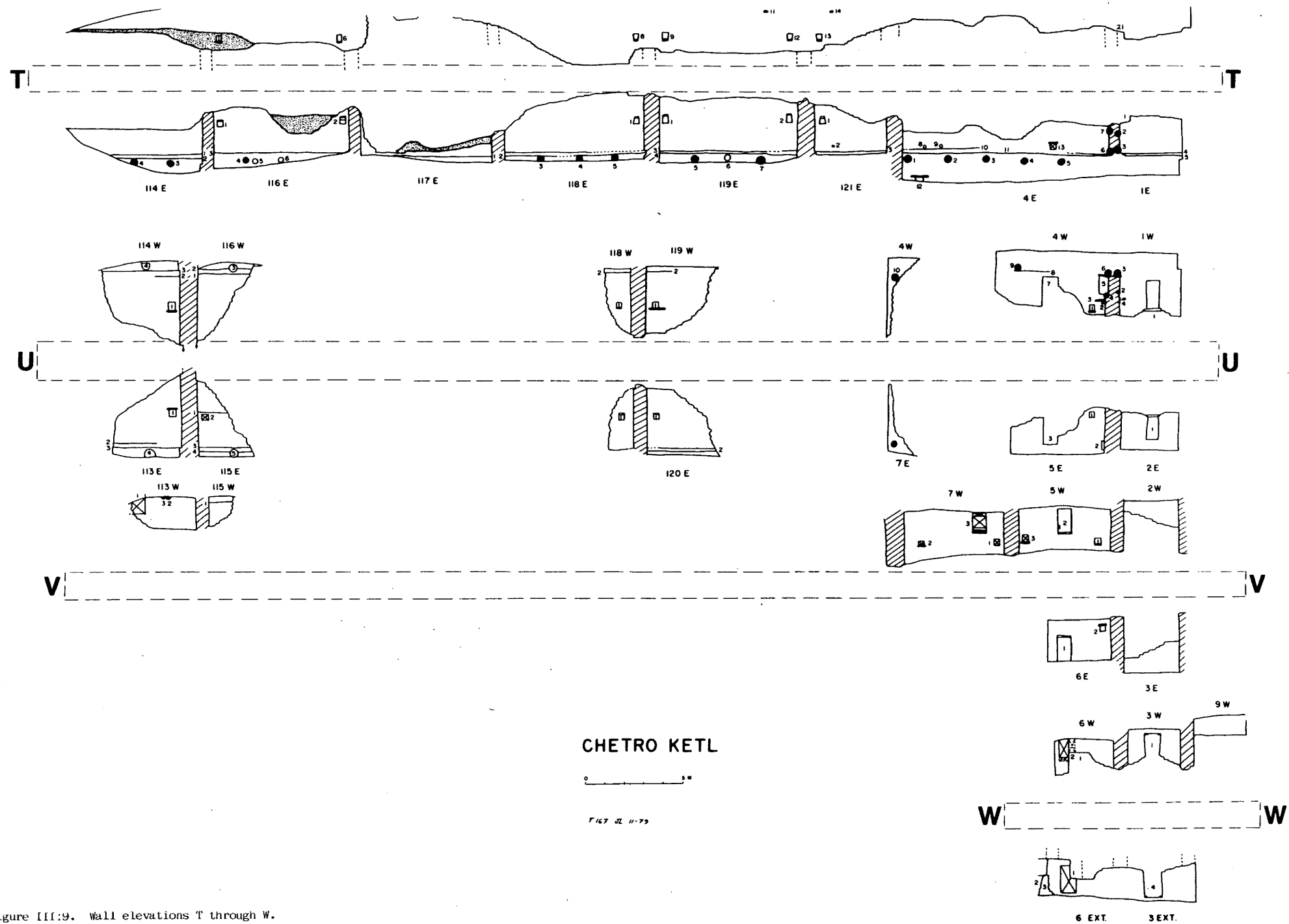


Figure III:9. Wall elevations T through W.

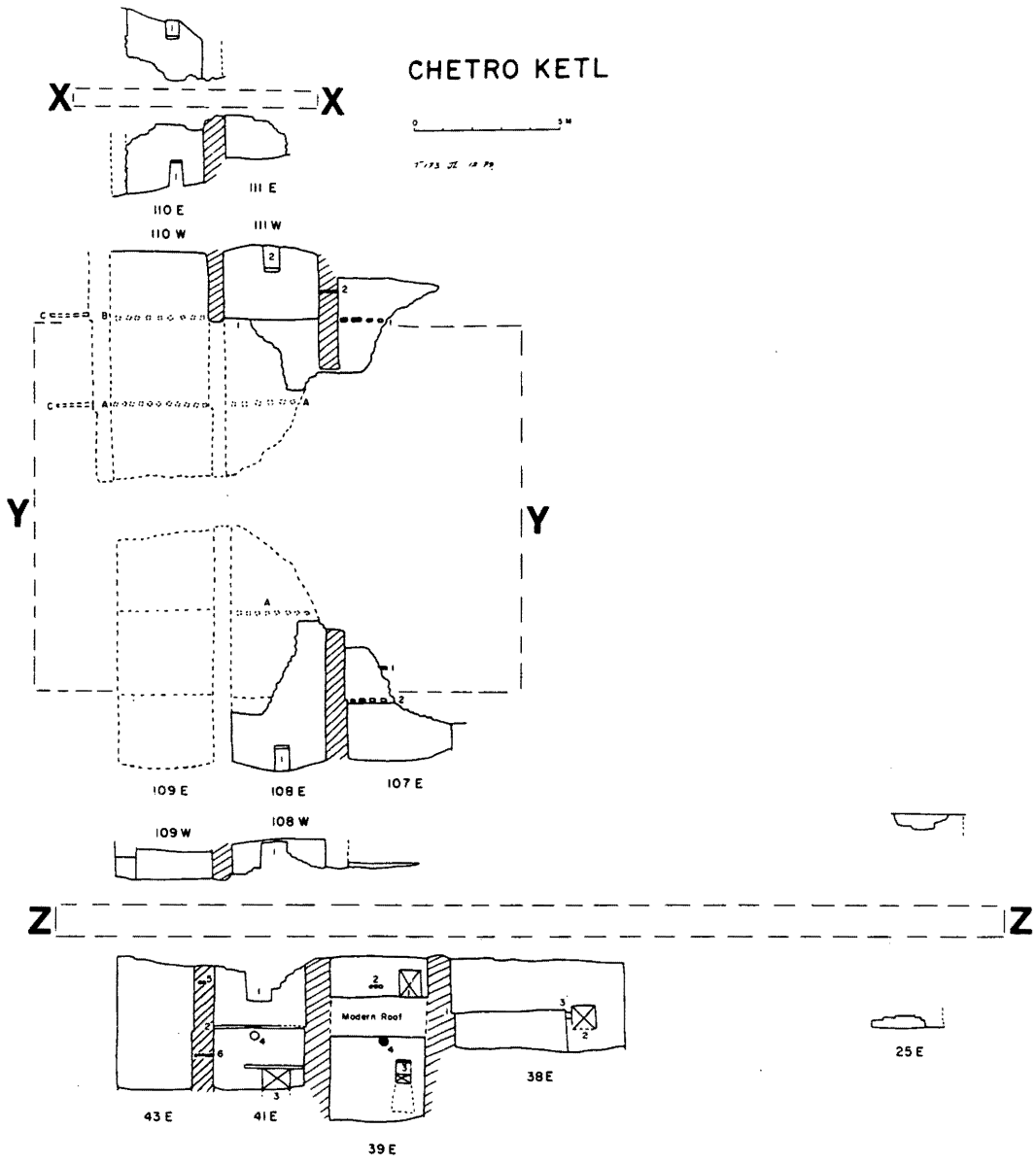


Figure III:10. Wall elevations X, Y and Z.

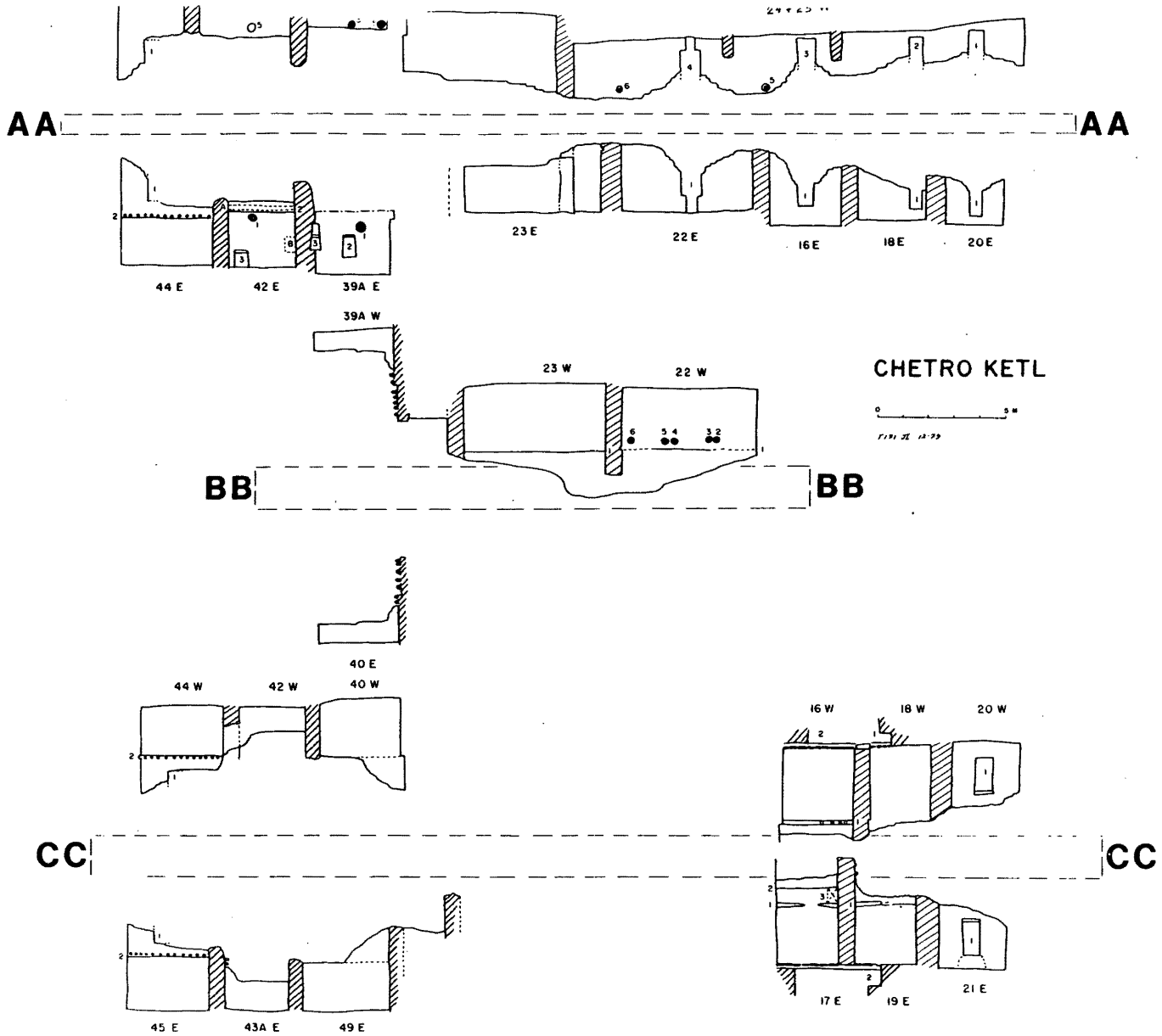


Figure III:11. Wall elevations AA, BB and CC.

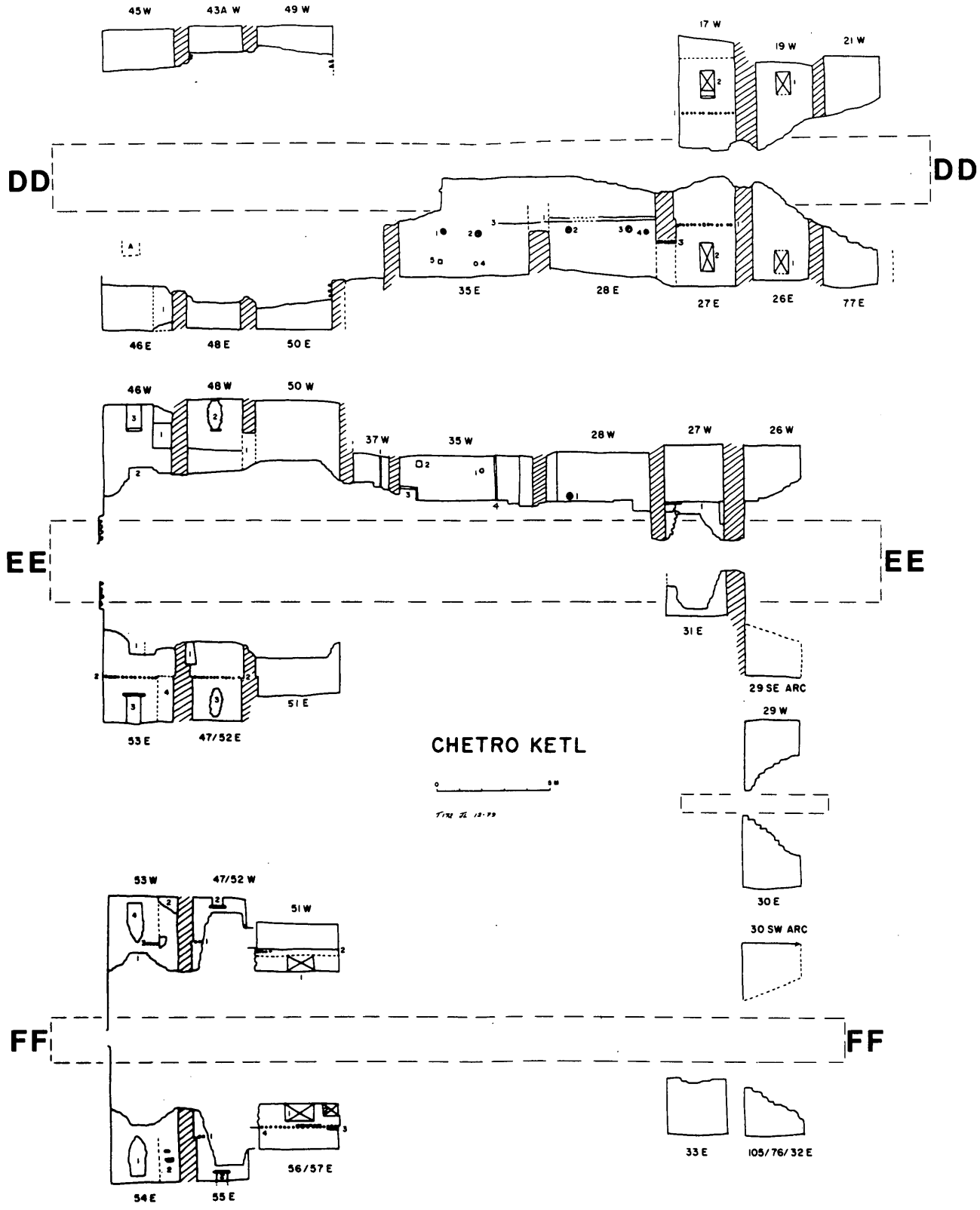


Figure III:12. Wall elevations DD, EE and FF.

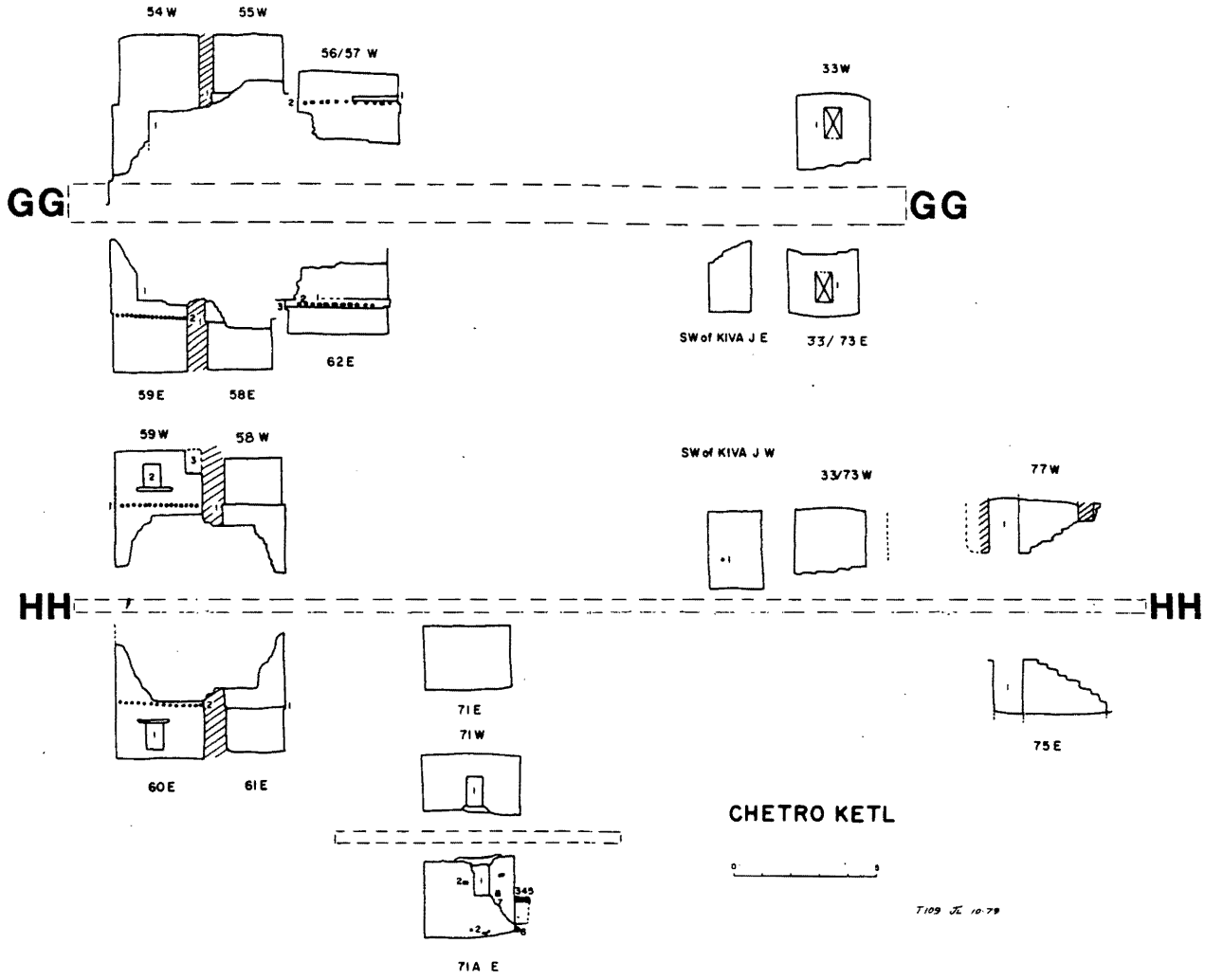
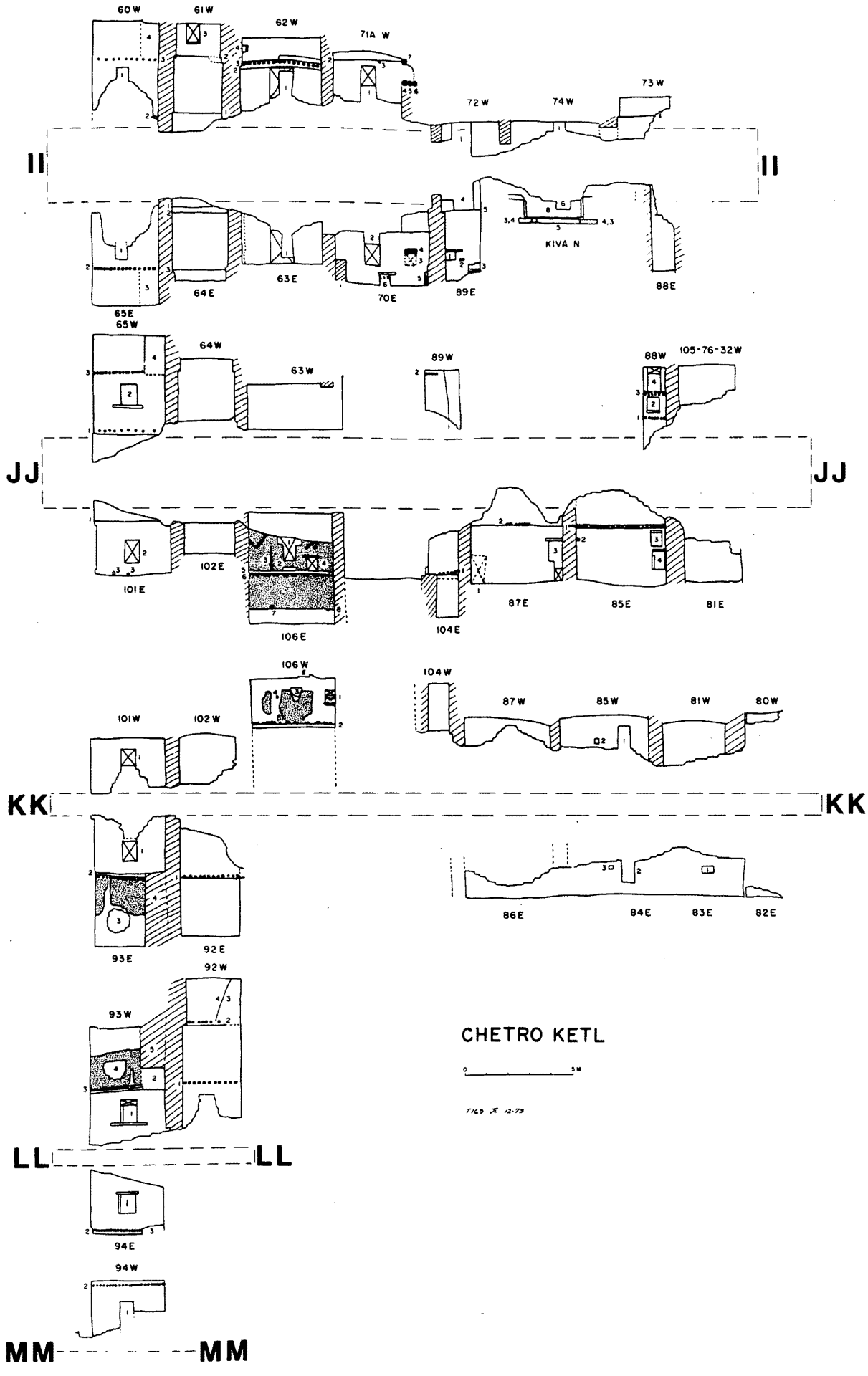


Figure III:13. Wall elevations GG and HH.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61W
62W
71A W
72W
74W
73W
II
II
KIVA N
65E
64E
63E
70E
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89W
88W
105-76-32W
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102E
106E
104E
87E
85E
81E
106W
104W
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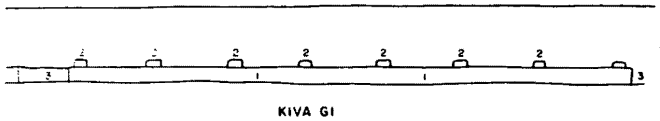
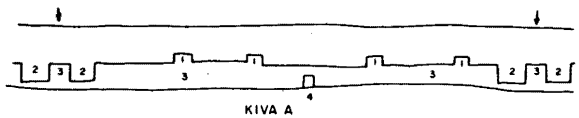
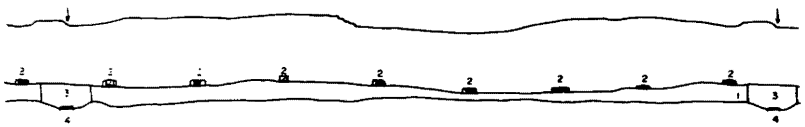
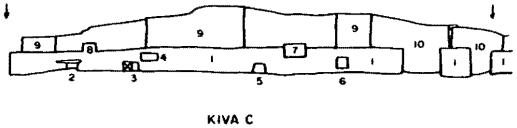
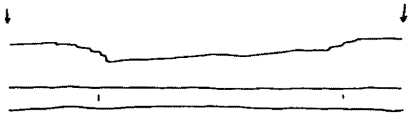
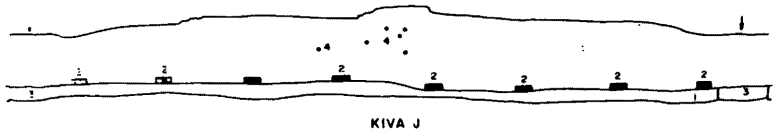


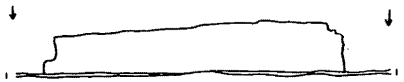


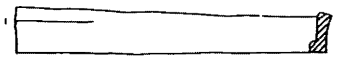


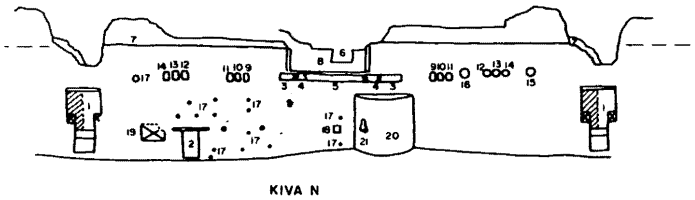


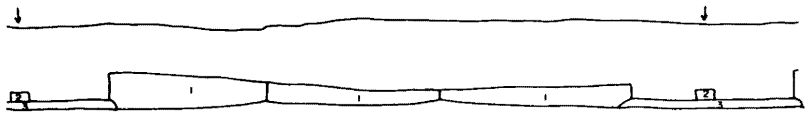










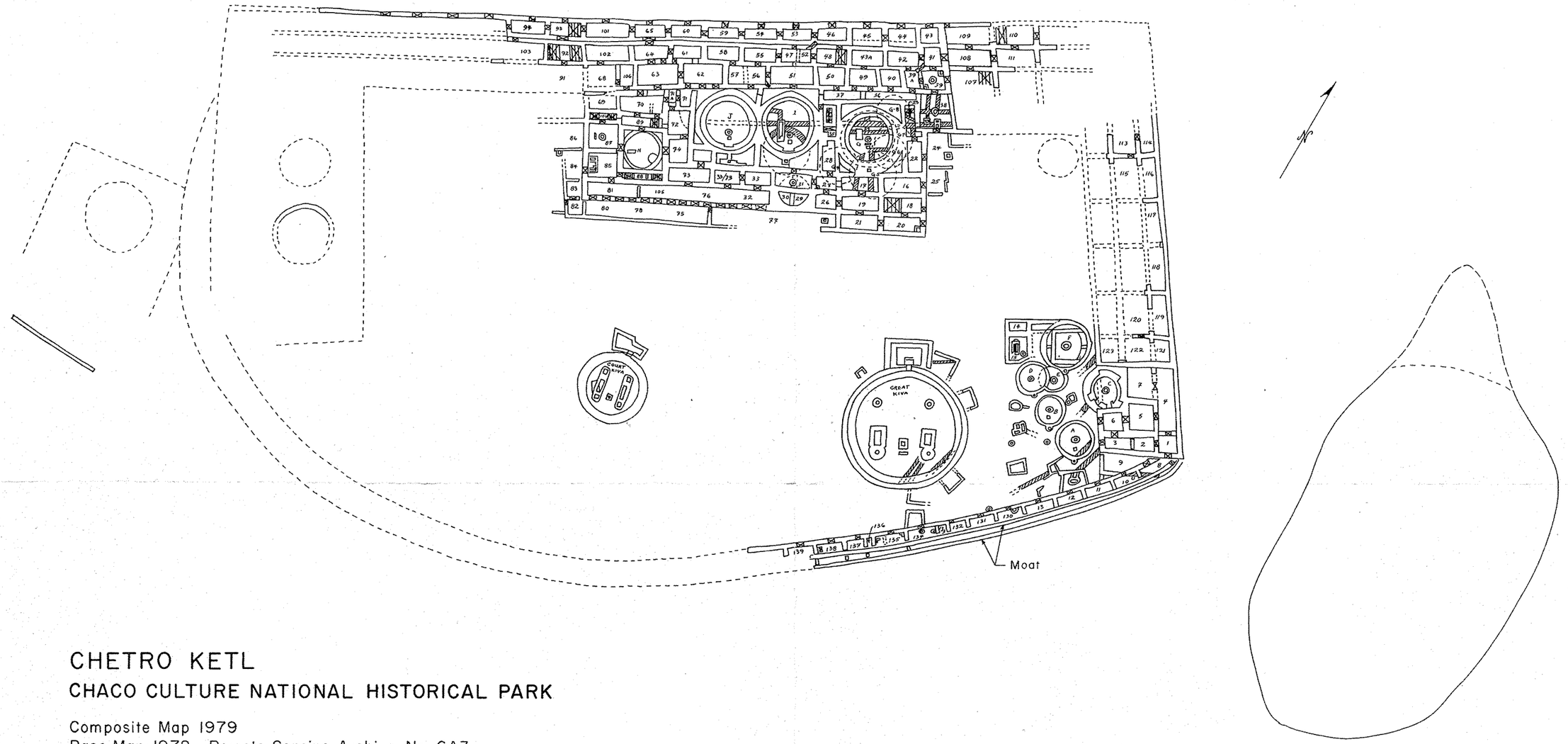


CHETRO KETL

KIVAS

0 3 m

Figure III:15. Wall elevations, kivas. Arrows indicate beginning and ending point of elevation.



CHETRO KETL

CHACO CULTURE NATIONAL HISTORICAL PARK

Composite Map 1979
Base Map 1972 - Remote Sensing Archive No. 6A3

Note: position of doors ⊠ approx.
position of floor features approx.

0 25 50 75 100 ft.
0 10 20 30 m.

Figure I:2. Chetro Ketl, Chaco Culture National Historical Park. Position of first floor doors and floor features are approximate. Composite map, 1979; base map, 1972 (Remote Sensing Archive No. 6A3.)

ON MICROFILM

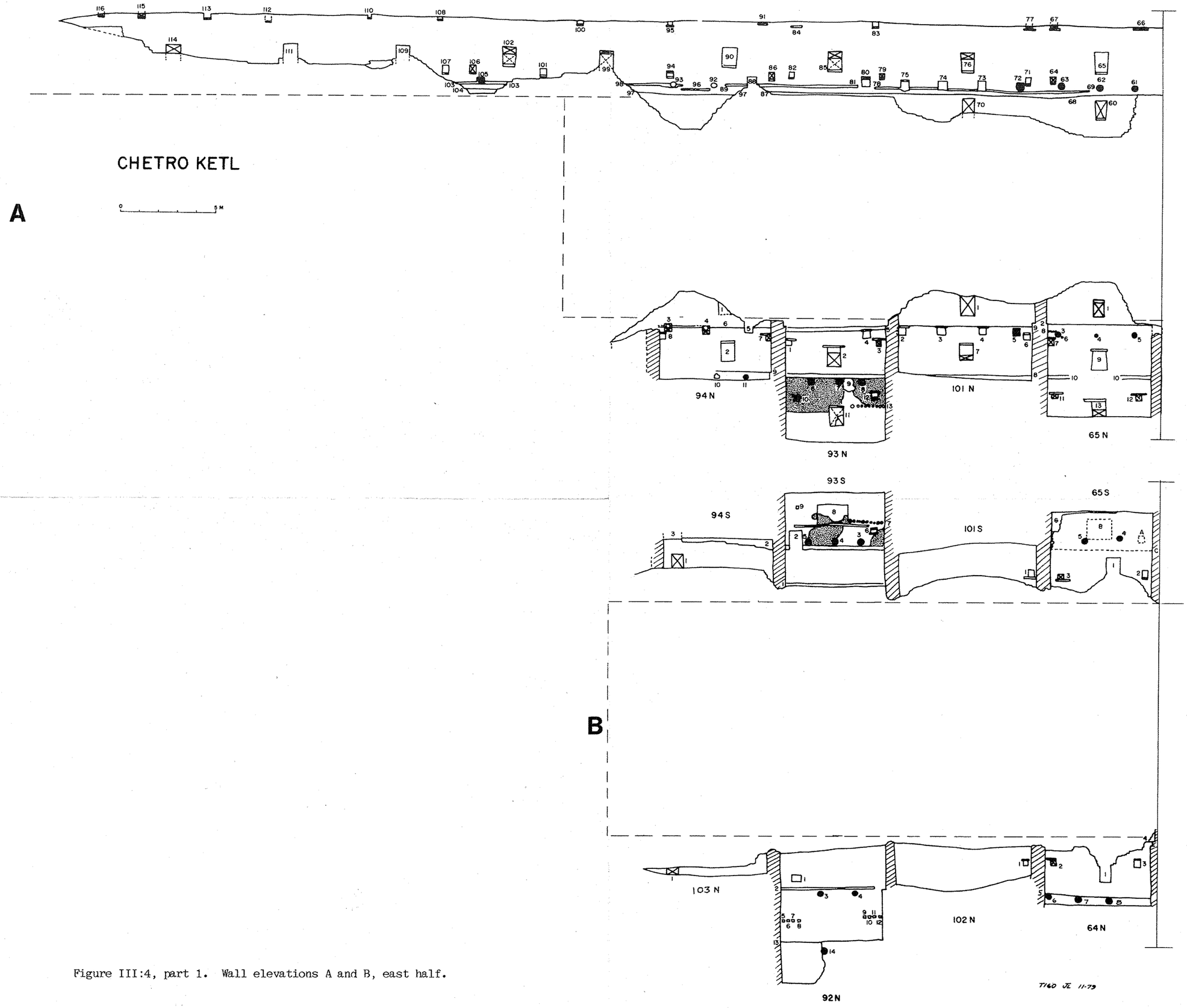


Figure III:4, part 1. Wall elevations A and B, east half.

ON MICROFILM

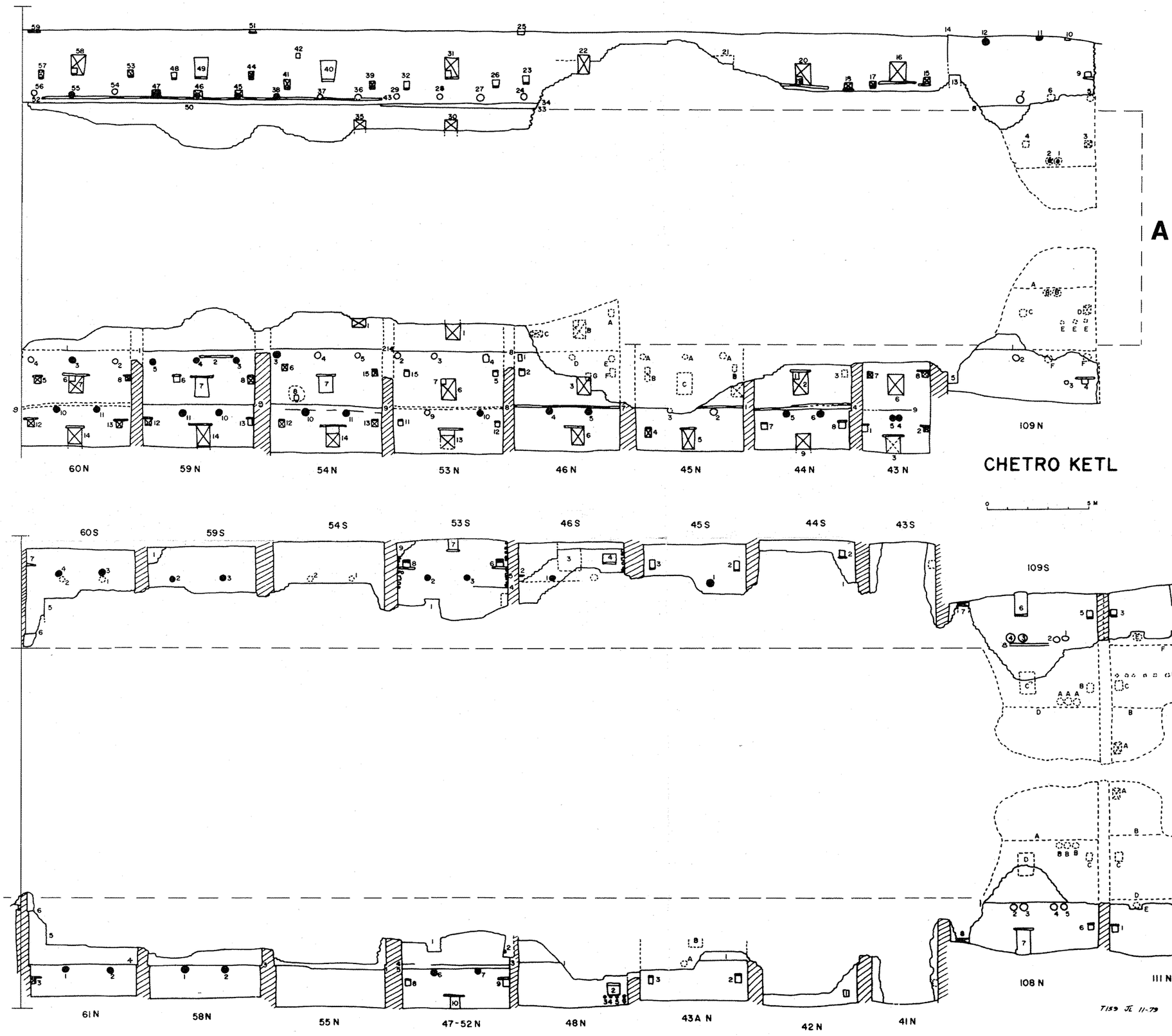


Figure III:4, part 2. Wall elevations A and B, west half.

ON MICROFILM

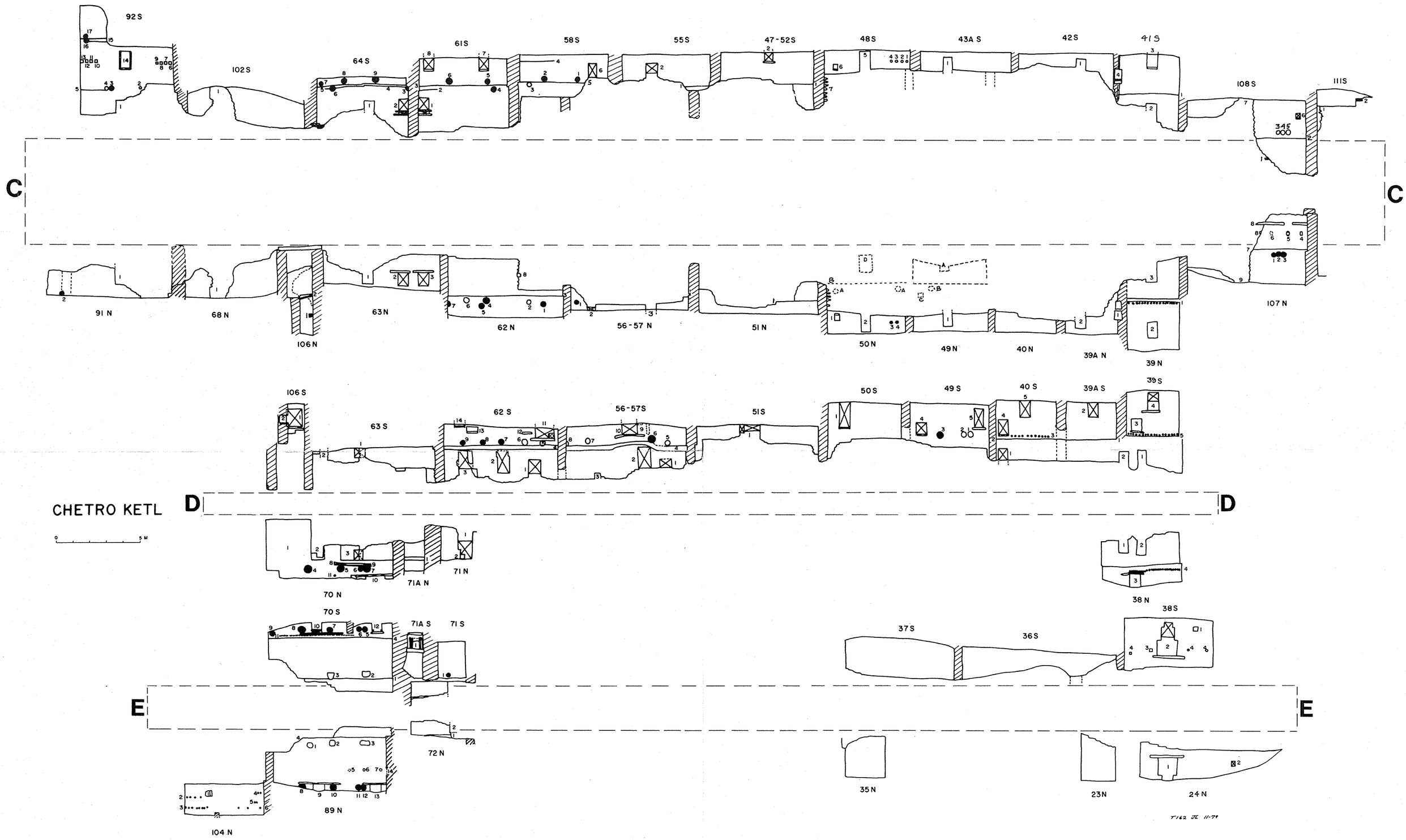


Figure III:5. Wall elevations C, D and E.

ON MICROFILM

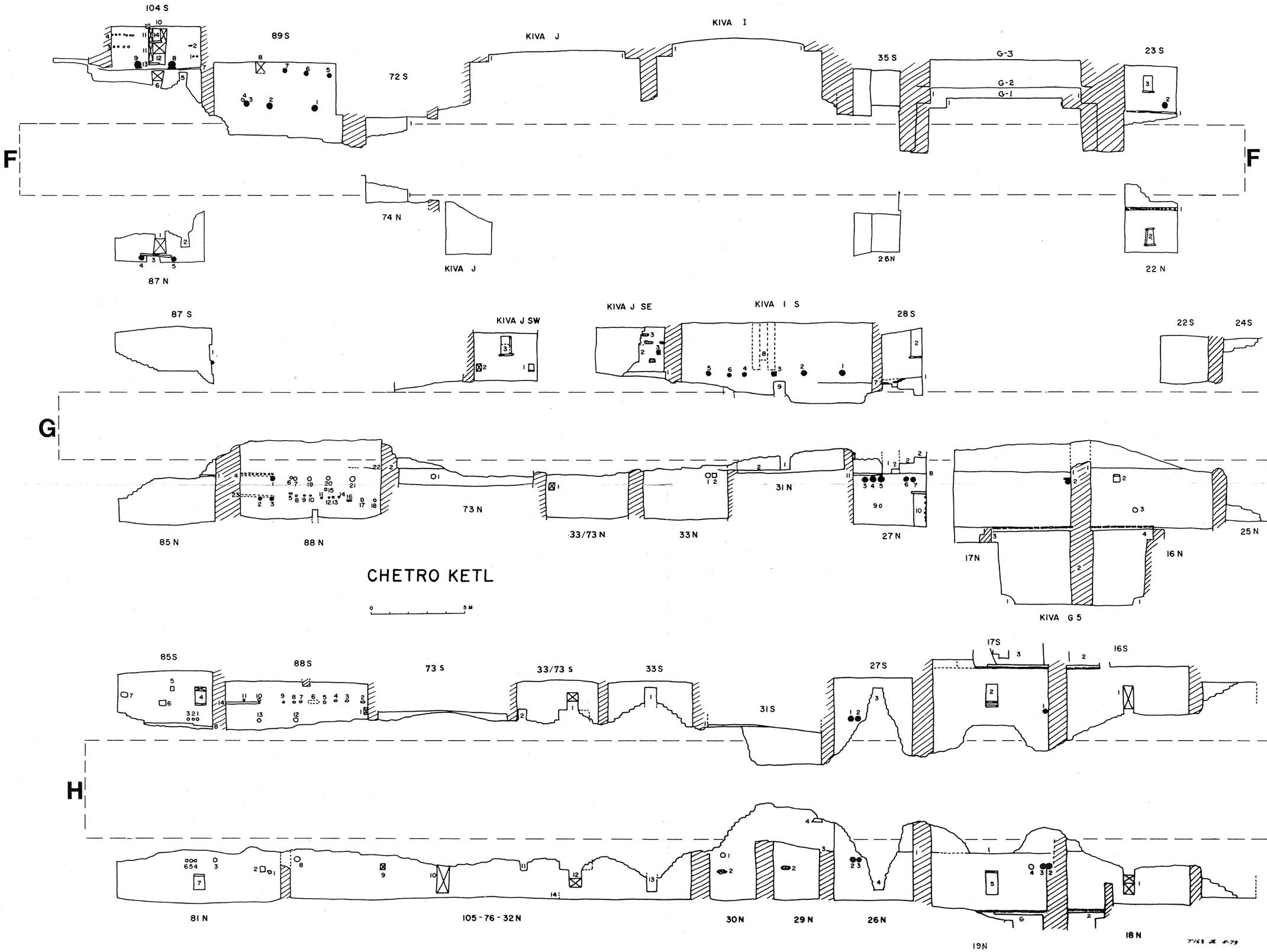
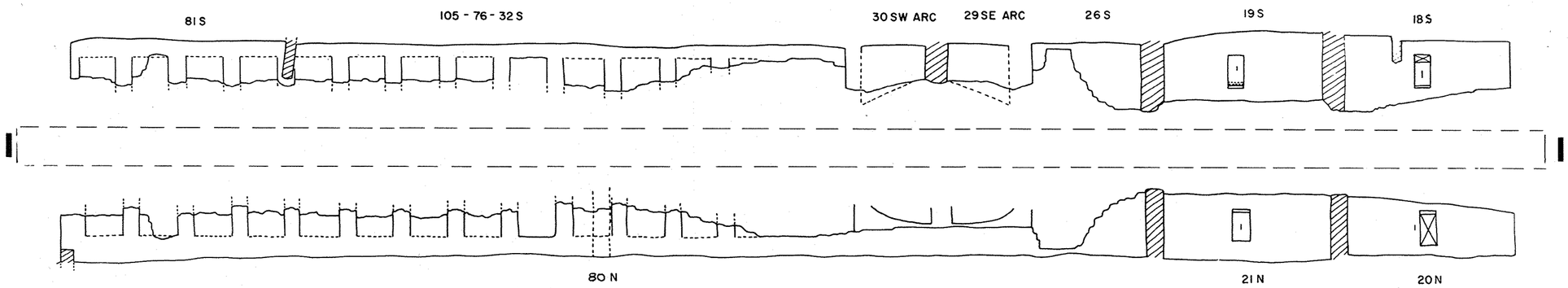


Figure III:6. Wall elevations F, G and H.

ON MICROFILM



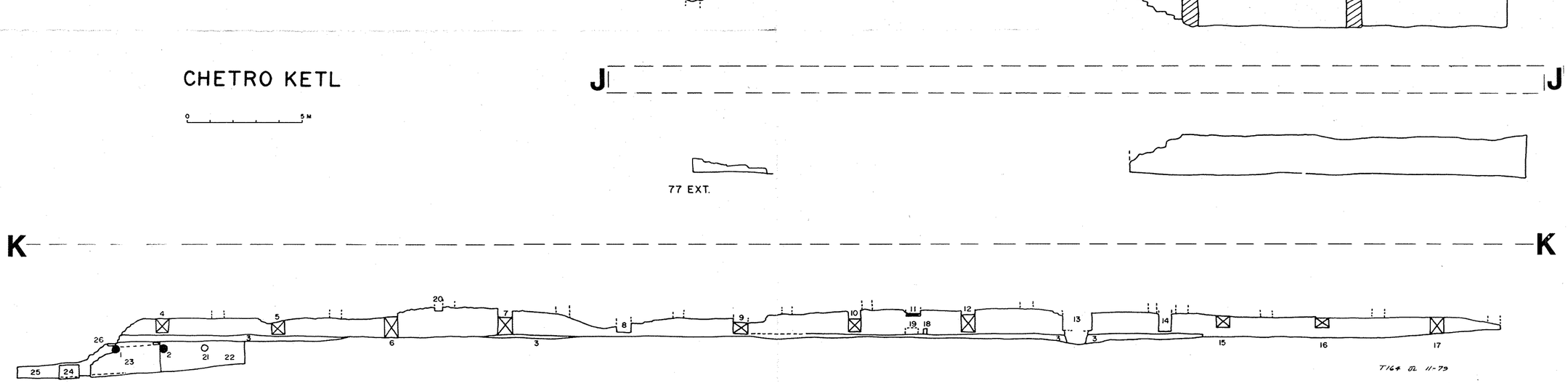
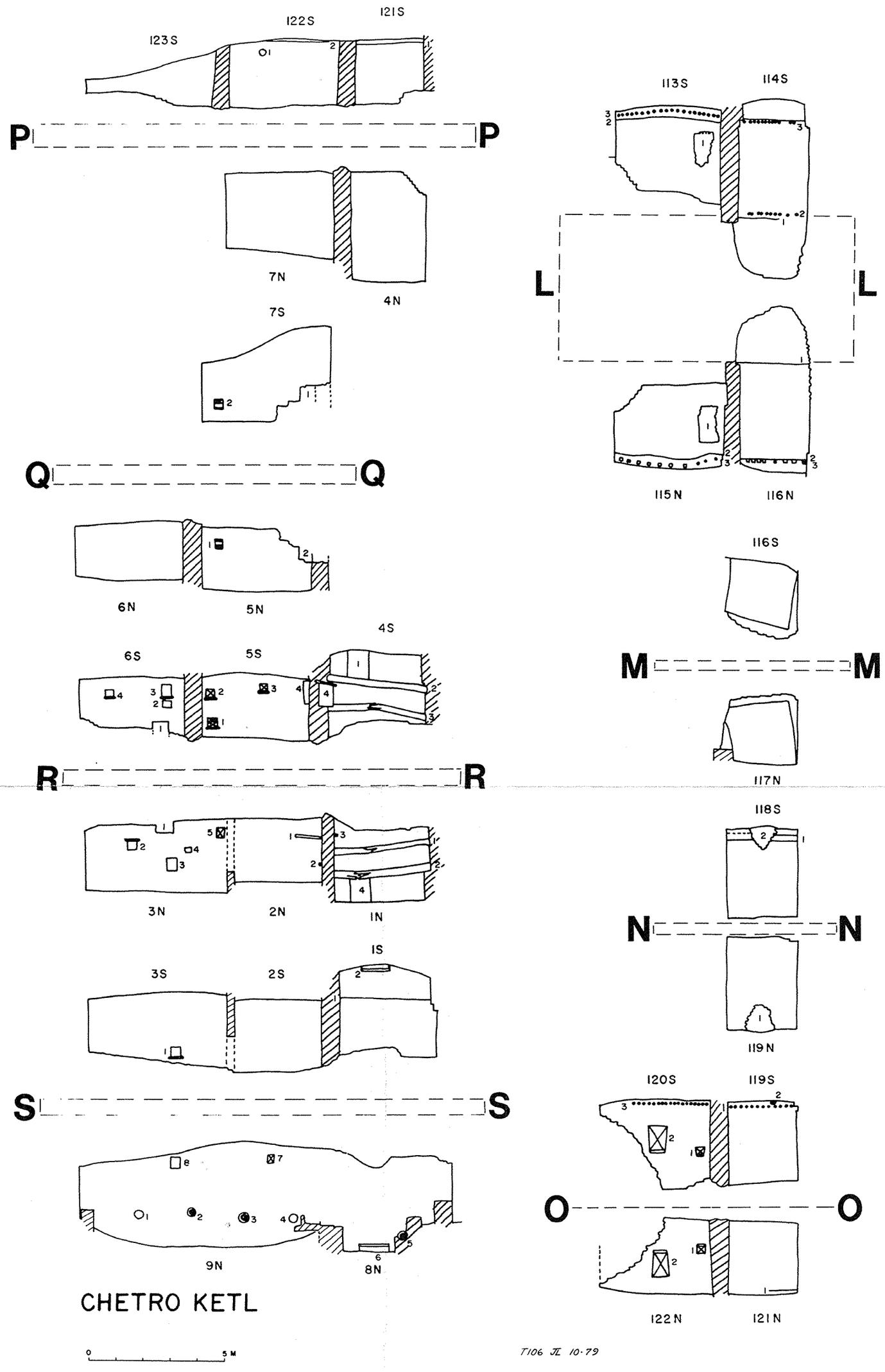


Figure III:7. Wall elevations I, J and K.

ON MICROFILM



T106 JL 10-79

Figure III:8. Wall elevations L through S.

UMI MICROFILM

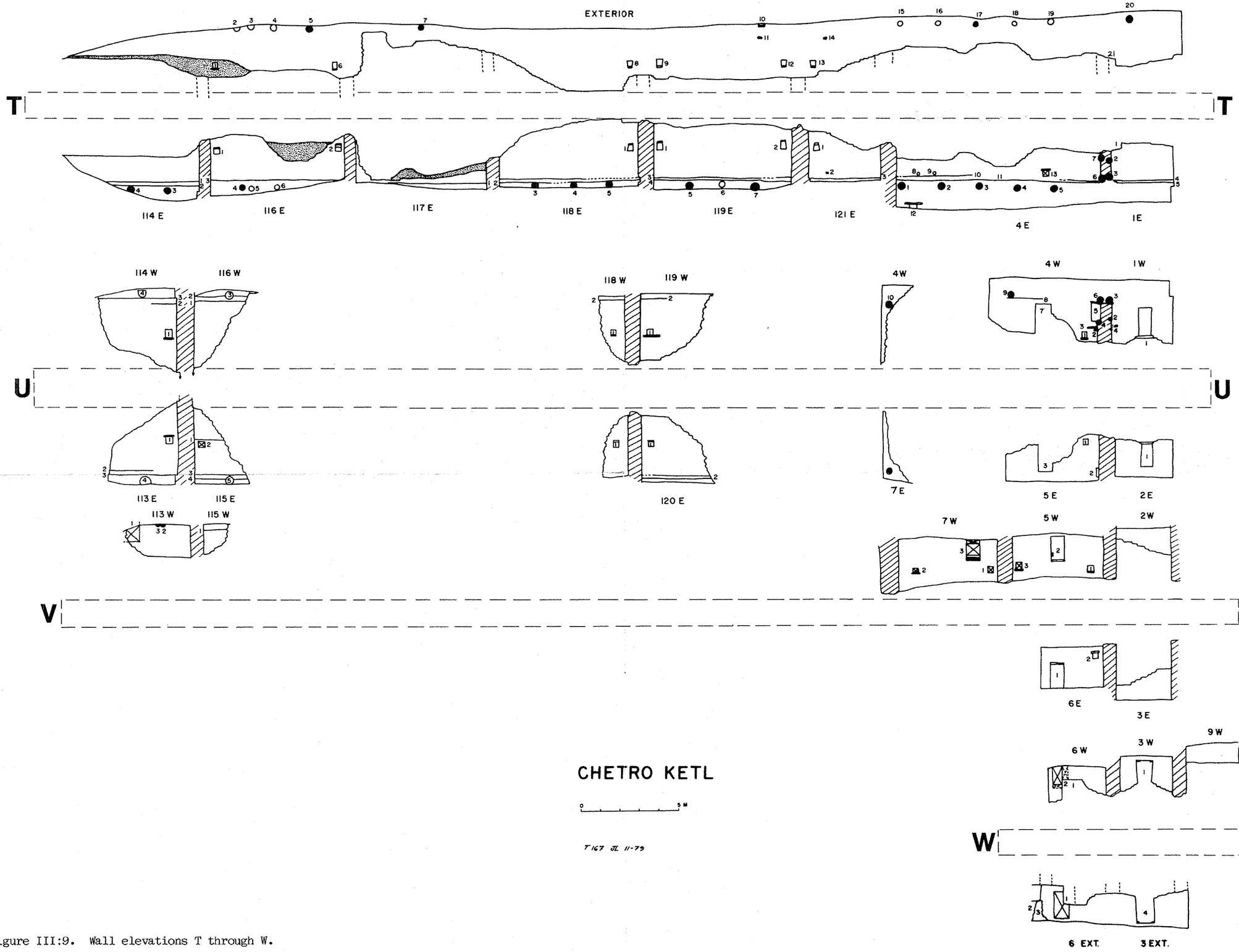


Figure III:9. Wall elevations T through W.

ON MICROFILM

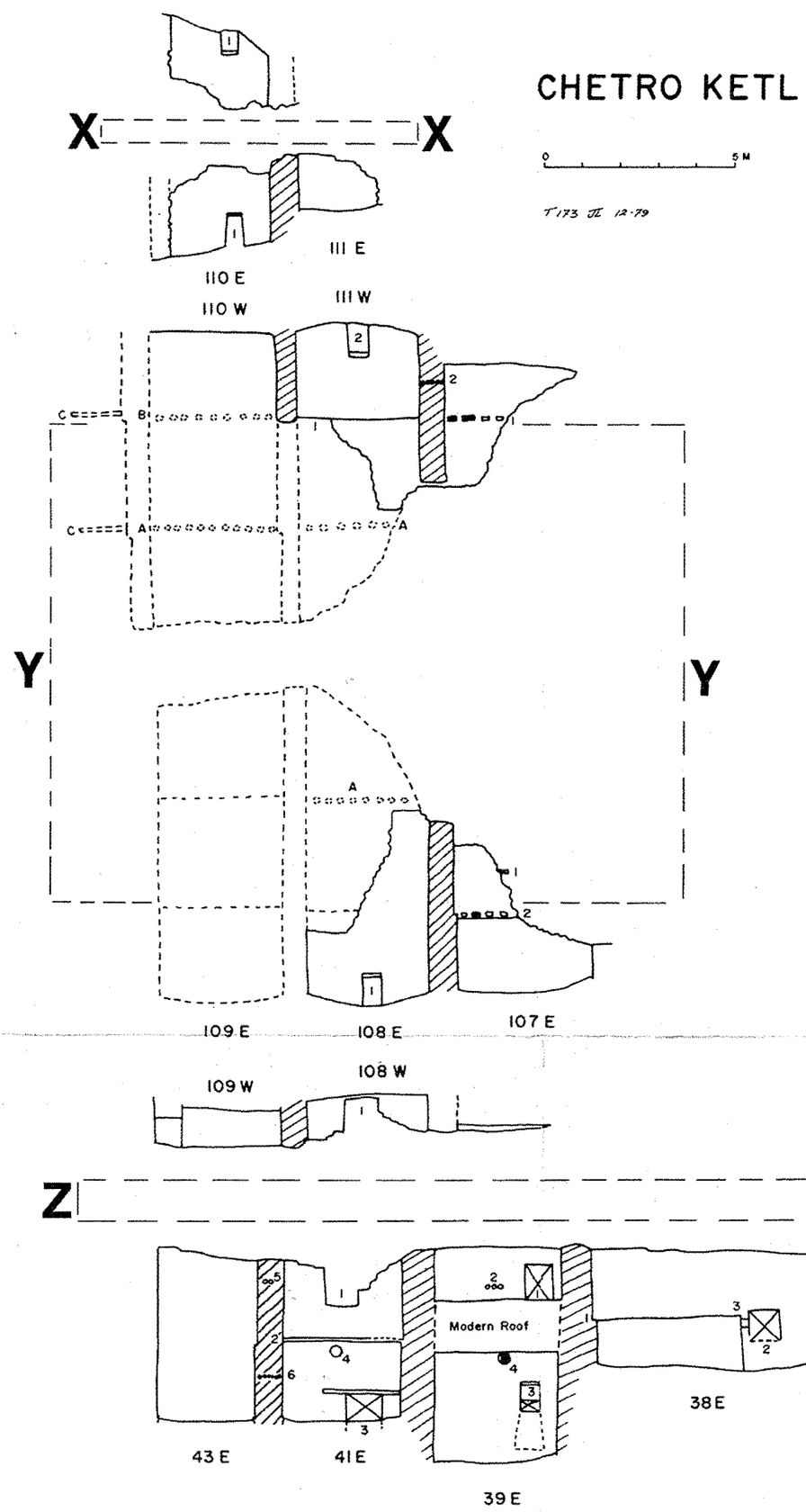


Figure III:10. Wall elevations X, Y and Z.

ON MICROFILM

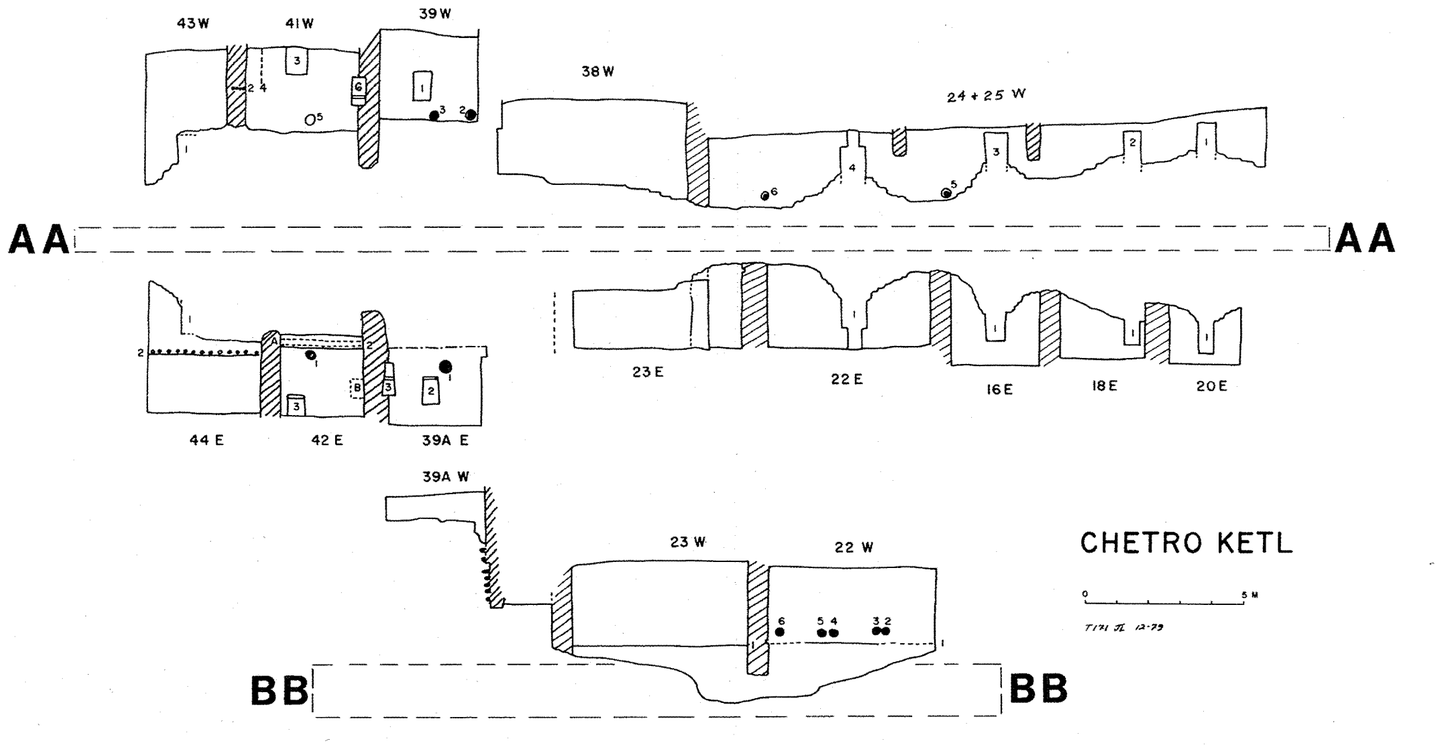


Figure III:11. Wall elevations AA, BB and CC.

ON MICROFILM

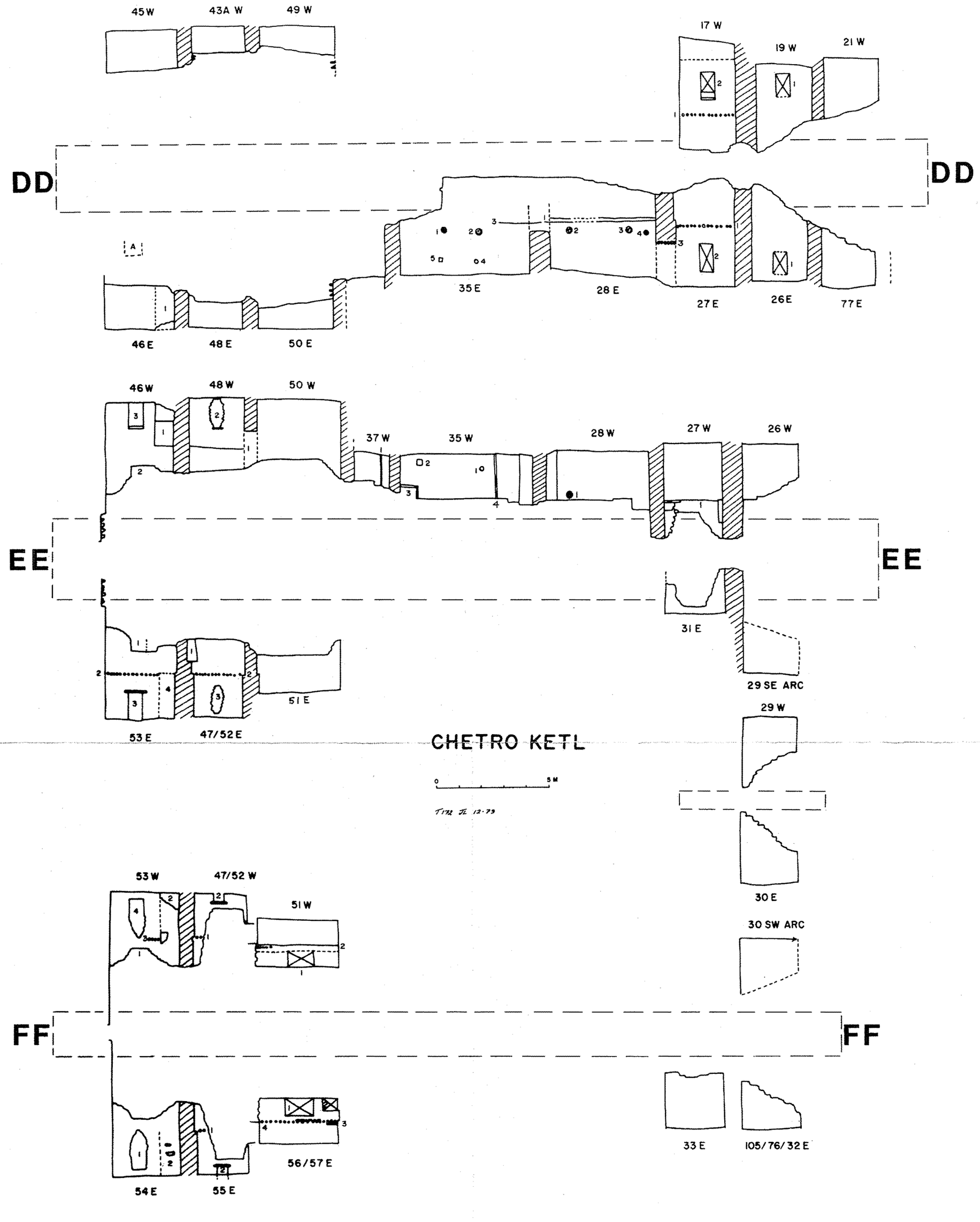


Figure III:12. Wall elevations DD, EE and FF.

ON MICROFILM

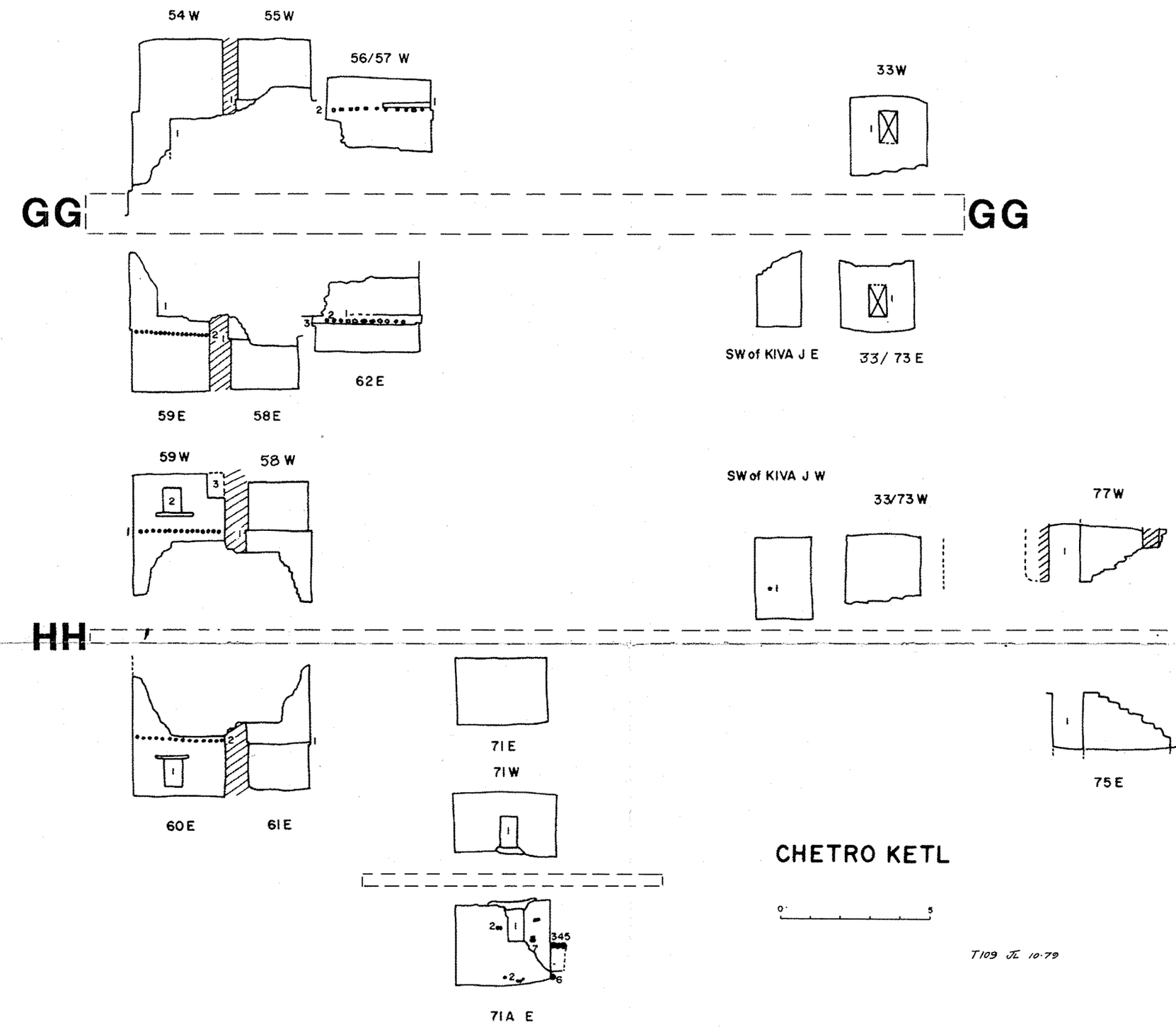


Figure III:13. Wall elevations GG and HH.

ON MICROFILM

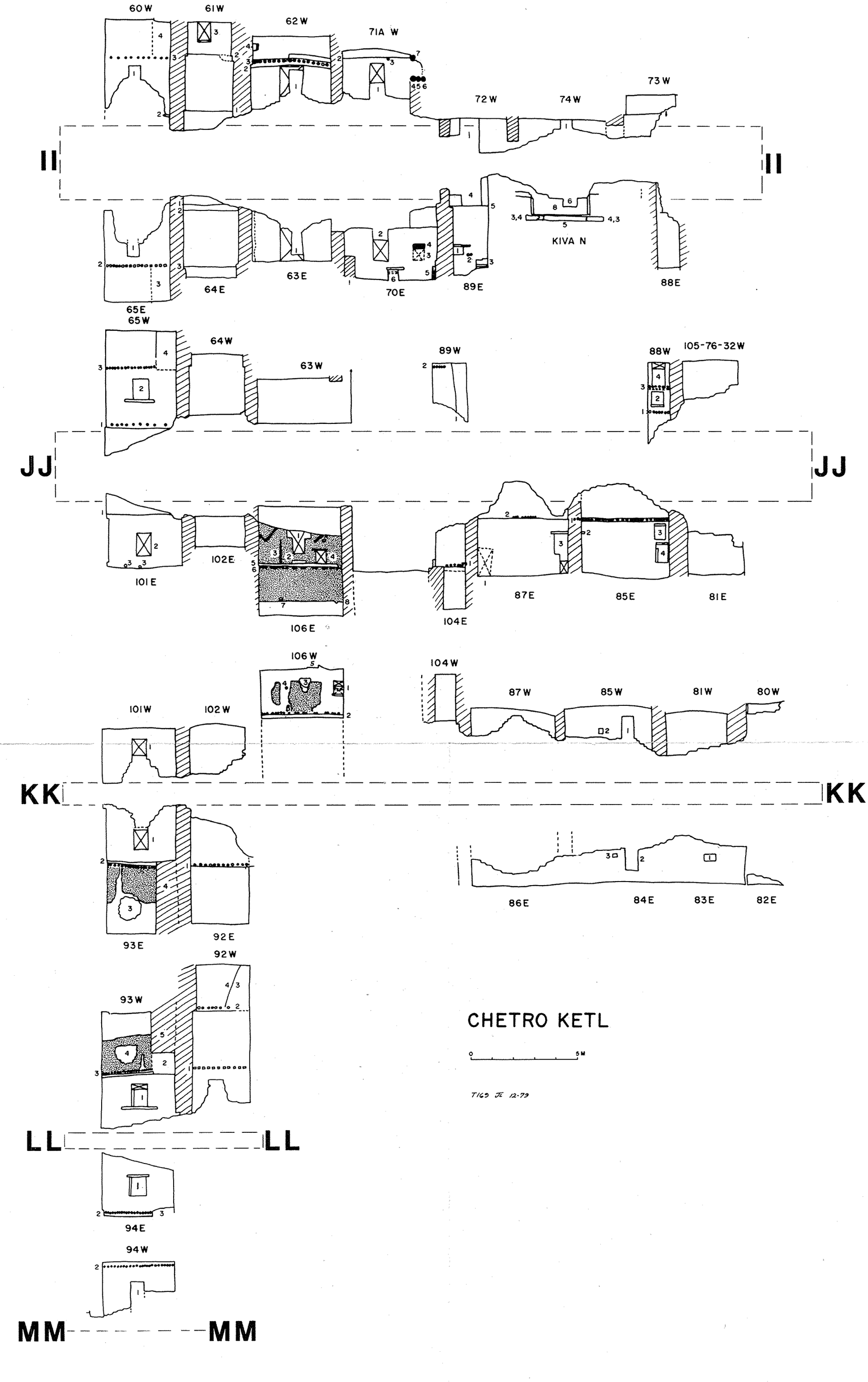
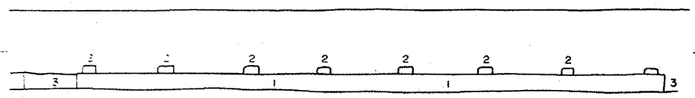
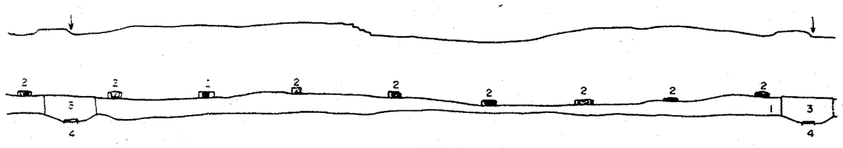


Figure III:14. Wall elevations II through MM.

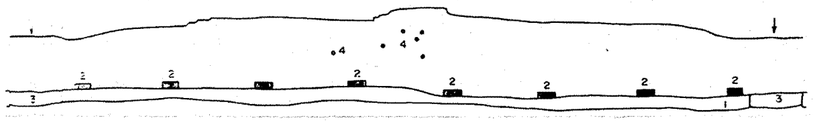
ON MICROFILM



KIVA GI



KIVA I



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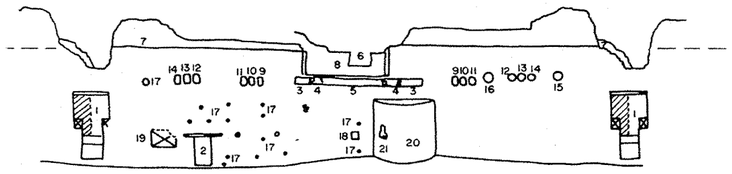
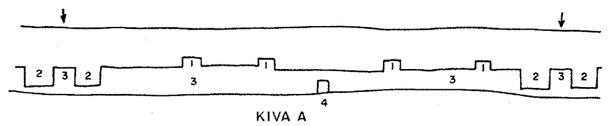
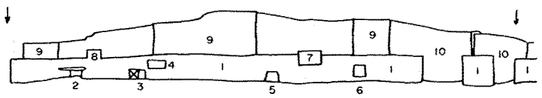


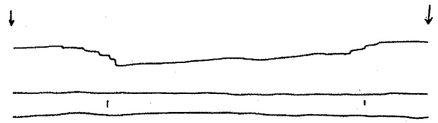
KIVA N



KIVA A

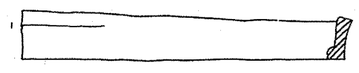


KIVA C

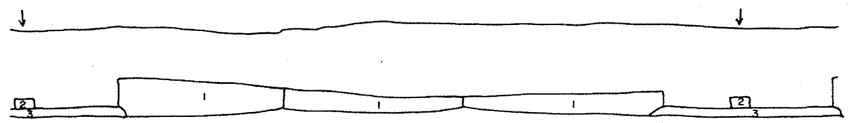


KIVA B

KIVA D



KIVA E



KIVA F

CHETRO KETL

KIVAS

0 5 M

Figure III:15. Wall elevations, kivas. Arrows indicate beginning and ending point of elevation.

ON MICROFILM