

HISTORIC STRUCTURES PRESERVATION GUIDE

Aztec Ruins National Monument

by

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Division 1, 01000

Introduction

The National Park Service was established, in part, to preserve structures significant to American history. The White House National Monument was established by Presidential (Warren G. Harding) Proclamation No. 1650, January 24, 1923 "... with a view to the preservation of said ruin for the enlightenment and culture of the Nation...".

This document has been developed to guide the preservation of Aztec's pre-historic ruins. It contains instructions for adherence to policies and procedures governing historic preservation activities, methods for preservation, material specifications, maintenance and inspection schedules, and reference materials for historic preservation and Aztec in particular.

Instructions in this guide are to be followed by all park personnel for activities affecting cultural resources preservation.

Division 1, 01100

Laws

Preservation activities are subject to the provisions of the Historic Sites Act of 1935, the Historic Preservation Act of 1966 and 1980 amendments, and the Programmatic Memorandum of Agreement (PMOA) between the National Park Service and the Advisory Council on Historic Preservation.

Division 1, 01200

Policies

This document and its use are subject to the provisions of the National Park Service Cultural Resource Management Guidelines (NPS-28), National Park Service Management Policies, and the cultural resources management policies of the Southwest Regional Office Southwest Cultural Resources Center.

Preservation activities conducted by park personnel shall be limited to annual or routine maintenance.

Any preservation activities or plan, or having the potential to affect, cultural resources, including any type of structural interference, shall be reviewed by the Southwest Region NHP Planning Committee (Regional Archeologist, Regional Historical Architect, Regional Historian). The proposed activity shall be documented on the XXX Assessment of Effects Form (see Reference Materials) by the park and forwarded to the Regional Historian for registration and review. The activity shall not be undertaken or implemented until the park receives written approval from the Regional Director through the Regional Historian. This process normally requires forty-five to sixty days and the XXX form should be submitted well in advance of the scheduled start of the activity.

Division 1, 01300Inspection Schedule

The inspection schedule is important in determining the preservation needs of a structure and for tracking problem areas or identifying new problems.

Section 2 contains specific information on the inspection schedule for the Aztec ruins. This schedule should be followed closely. The organization, however, can be changed to better suit the needs of the structures. Any such changes must be documented in the schedule organization portion of this document.

Division 1, 01400Cyclic Preservation Maintenance Schedule

The cyclic preservation maintenance schedule details procedures for ~~implemen~~ta-tion of cyclic maintenance. This schedule is set by the SWRO in ~~consultation~~ with park and professional preservation personnel.

Division 1, 01450Annual Preservation Maintenance Schedule

This schedule contains information on conducting annual ruins maintenance. It is very specific and is set by park and professional preservation personnel.

Work should follow this schedule of work.

Division 1, 01100 Safety
Preservation activities must, at all times, conform to OSHA regulations (29CFR1910). This includes public (visitor) safety as well as worker safety. Each preservation project should, therefore, have a Job Safety Analysis completed before implementation.

Division 1, 01564 Pest Control
Rabbits, squirrels, mice, rats, badgers, insects, etc., do inflict considerable damage to ruin fabric and archeological fill. These pests should be removed, as necessary, by a method or methods approved by the Southwest Regional Office Division of Natural Resources Management.

Division 1, 01720 Records
Pueblo structures were built by many different individuals. Each structure has unique masonry styles and there is variation even within each structure. It is therefore critical that repairs to original construction match the masonry style, the stone size and treatment, mortar color and treatment (e.g. spalls or chinking, etc.), and other such variables. To assist in matching prehistoric materials and workmanship and as documentation of your preservation work, two major pre-stabilization activities are ~~required~~: (1) as-is photographs of areas to be repaired; (2) recording of ~~architectural~~ information and work requirements (see Ruins Preservation ~~Form~~ form, Appendices). The work forms and photographs should be completed ~~and~~ placed in a binder for use on the job site. Be sure that your photographs are properly taken and developed before any work is done. Samples of stone ~~and~~ mortar should be taken for use in locating stabilization materials sources. These sources should be documented in your stabilization report for future reference.

It is also helpful, for later reference, to take work-in-progress photos. This assists in identifying personnel and provides other important visual information.

When the work is completed, a stabilization report is required to fully document the stabilization activities. This report must be completed in duplicate (one for the park and one for Region) and before the beginning of the next year's field season.

The report should contain (in order) a Table of Contents, a Project Narrative, any special documents (e.g. a Tree Cutting Permit), a plan map of the site (requires specific indications of where work was performed), and a Ruins Preservation Record form and photographs (before, during, and after shots) for each room worked on.

The project narrative should include any pertinent background information on the site, who supervised the project, workers and their positions, when the work was performed, how much was expended and under what account number, what materials and methods were used, unusual problems and solutions, materials and supply sources, a breakdown of work day expenditures, and any other information deemed relevant.

Reports should be permanently bound and each copy should contain photographic prints rather than xerox copies of prints.

Records of major stabilization work are on file at the National Monument and on file in the present library.

The stabilization reports for the West Ruin are:

1938 - 1946:	Steen, Charlie R., et. al.
1939 - 1941:	Vivian, R. Gordon
1950:	Vivian, R. Gordon, and Raymond Rixey
1951:	Richert, Roland
1959, 1959 - 1960 and 1961:	Shiner, Joel
1965:	Voll, Charles B., and Martin T. Mayer
1967:	Mayer, Martin T.
1973:	Sudderth, W.E. and Peter Laudeman
1974:	Chambers, G. and M. Trussell
1975:	Chambers, G. and Stephen E. Adams
1977:	Adams, Stephen E.
1978:	Schart, William L.
1979:	Adams, Stephen E.
1982:	Adams, Stephen E.

The stabilization reports for the East Ruin are:

1949:	Vivian, R. Gordon
1953 and 1956:	Richert, Roland
1957:	Vivian, R. Gordon, and Roland Richert
1960:	Shiner, Joel L.
1965:	Voll, Charles B., and Martin T. Mayer
1967:	Mayer, Martin T.

The stabilization reports for the Hubbard Mound are:

1954:	Vivian, R. Gordon, and Tom Mathews
1960:	Shiner, Joel

- 1965: Zell, Charles B., & Martin C. Weyer
- 1973: Schert, William L.
- 1979: Adams, Stephen E.

Part 1: Background

Several drainage jobs exist for the Arhee Ruins. The West Ruin contains a number of drain pipes, drain channels, and drain holes (see Reference Section). In 1977, a French double drainage system was installed around Kiva N. In 1979, a drainage system was installed to carry excess water from the Hubbard Pond, across park property, to the east, exterior boundary of the park. That system is built of 12" PVC pipe. Also built of 12" PVC pipe, in 1982, is a drainage system designed to carry excess subsurface water (see 1982 drainage project report) away from the ruins and dump it into the old 1933-34 interceptor line. The old interceptor is still in place and functioning. In conjunction with the 1982 drainage system project, a soil berm was built along the north boundary of park property to divert surface field irrigation water to the Hubbard Pond. At the same time, the irrigation overflow ditch, across the park from NW of the East Ruin to the SE corner of the park, was filled in.

Part 2: Inspect

Inspect man-holes, clean-outs, drain channels, and drain entrances and exits; inspect soil berm along north boundary. Look for clogged areas, signs of damage or vandalism, check berm for erosion.

Part 3: Maintenance

- A. Keep all drain lines clear and free of dead leaves, ~~=====~~ and debris. Keep surface area over drain line free of trees, large ~~b=====~~ and shrubs, and any other vegetation with deep penetrating roots. ~~A---~~ grasses and minor bushes to grow along drain lines.
- B. Monitor the soil berm for erosion. Minor erosion areas can be patched with tamped soil. Control vegetation as above.

Sept 4: Materials

Granite, cement, curable, and 170 materials have been used in the large
apartments at AZRU. These materials should be replaced in the future. Additional
soil needed for the berm will be imported to the area (see AZRU Airs Preser-
vation Guide for soil borrow procedures).

Revision 2, 06/20

Walls

Part 1: Background

The visitor trail in the West Main and Great Kiva is constructed mainly of asphalt. Part of the walk is pea gravel and there are wooden, stone, and cement steps along the trail. Some of the trail is accessible to the handicapped. In 1977, the asphalt trail around Kiva N was removed for better control of drainage. It was replaced, after installation of the French double system, by pea gravel.

Part 2: Inspect

Inspect all trail surfaces, stairs, and stair/guard rails for loose or damaged surfaces.

Part 3: Maintenance

Repair damaged sections, reset loose elements, refill eroded pea gravel sections to grade.

Part 4: Materials

Repair or replace in kind. Stone must be imported (see RPG for procedure), wood should be wolmanized dimensional lumber, and cold, rolled asphalt used for patching. Pea gravel should not exceed 3/8" diameter.

Division 2, 11-20

Plants and Shrubs

Part 1: Planting and

Common shrubs and trees at Aztec include those whose root systems are dragging to drain lines, wall fabric, and archeological fill. Species such as sagebrushes, cottonwoods, rabbit brush, saltbrushes, willows, Russian olives, elms, and greasewoods should be kept out of the ruins.

Part 2: Inspect

Inspect room floors, open areas, walls, and wall tops for undesirable vegetation.

Part 3: Maintenance

Remove undesirable vegetation, by hand, when it is small enough to easily pull out. For well-grown plants, an approved herbicide might be necessary (check with SWRO Division of Natural Resources Management). Only small grasses and brush should be allowed to grow, and no vegetation should be allowed to grow on or in wall fabric.

Division 3. 0320Cast-in-place ConcretePart 1: Background

Capillary moisture is very damaging to masonry walls at base -- wall bases are gradually eroded until they no longer provide support and this cause the upper wall portions to collapse. In the early 1950's, hydropel concrete was formed in-place along wall bases in many of the rooms in the NE section of the West Ruin. The waterproofed footing was supposed to prevent, or at least substantially decrease, capillary action. These foundations have been at least partially effective.

Part 2: Inspect

Inspect all hydropel foundations (see Reference Section) for damage, exfoliation, cracking, etc.

Part 3: Maintenance

Clean and repair damaged area with waterproofed concrete or cement patch (concrete for larger repairs, cement for small). Match surface treatment and form of existing foundation.

Part 4: Material

Use hydropel or other such compatible material for waterproofing Type I cement.

Division 4, 03110

Mortar

Part 1: Background

The original mortar on the exterior of the AZRU structures consisted of natural soil and water. Much of the wall surfaces of the pueblos was covered with a soil plaster. A large amount of the original mortar remains in-situ. It is important that preservationists understand how this mortar was applied so that they can match it closely in color, texture, and effectiveness when repairing wall fabric or repointing eroded mortar joints.

Part 2: Inspect

Inspect all mortar joints and wall caps for loose, eroded, or missing mortar. Mortar joints should be flush and sound, however, generally, joints are not repointed until the erosion is advanced enough to allow at least one inch joint depth for the new mortar (or, if necessary, joints can be cleaned to that depth preparatory to repointing).

Part 3: Maintenance

- A. Remove loose mortar, clean out joint to one inch depth, brush joint clean.
- B. Wet joint well (do not soak) until all surfaces are moist.
- C. Repoint joint with freshly mixed mortar. Be sure to match any spalling treatment necessary, whether pressed or integral. The mortar should be dry as possible yet workable and should be packed into the joint as tightly as possible. The exterior surface of the mortar should match the surface of the original.

Part 4: Materials

Soil for mortar must be imported. Soil borrow procedure is outlined in the RPG for AZRU. It is often necessary to mix different soils to obtain the desired characteristics of composition, color and texture.

Part 1: Background

Cement mortars have been used extensively in the portions of the West ruin. This cement has a higher shrinkage potential than the building stones and also has a different expansion/contraction rate. It is contributing to the rapid deterioration of the wall fabric. Use of portland cement mortars in the ruins is prohibited by WASO directive.

Part 2: Inspect

Inspect all mortar joints, veneers, and wall caps for loose or eroded cement.

Part 3: Maintenance

- A. Remove all loose cement, clean out joint to at least one inch depth, brush joint clean.
- B. Wet joint well until all surfaces are moist.
- C. Repoint with plain soil mortar if area is below grade; repoint with chemically amended mortar if area is above grade (see Division 4, 04150).

Division 4, 04100

Chemically Resistant Mortars

Part 1: Background

The Western Archaeological Center tests on mortar emulsion at Green Culture BMP indicate that chemically resinated mortars can have a longer maintenance cycle than unresinated mortars. A longer maintenance cycle reduces the amount of funds necessary for ruins preservation.

Part 2: Materials

Rhoplex E330, manufactured by Rohm and Haas Company, 1920 South Tibeway Avenue, Los Angeles, CA 90040, (213) 722-5434, is currently recommended by WAC as the most durable (while compatible) amender for the soil mortars used at AZRU. Rhoplex E330 (be sure it is the E330 type) is an acrylic resin emulsion that is liquid and looks like milk. It comes in 500 lb. drums. Recommended dilution is one part E330 to 2 1/2 parts water by volume. A stronger mix is not economically productive. A weaker mix will not function properly. Therefore, do not dilute the E330 more than 2 1/2 to 1. The diluted E330 is then used to mix the soil mortar. The mortar should be the consistency of bread dough -- workable but not very wet. When repointing joints, pack the mortar in tightly by hand or with a rigid tool. This helps reduce cracking during the drying process. Once the mortar begins to dry in the bucket, throw the mortar away (once it reaches this stage, it is no longer effective, even if you wet it down and remix it). For this reason, small batches should be mixed. Rhoplex E330 is expensive and the more efficiently you use it, the less expensive its long term cost will be.

Remember, no matter what kind of mortar you are going to use, to test the mortar for texture and color to match, as closely as possible, the original mortar. Test patties should be made and allowed to dry on a flat, hard surface. Break open the dried patties -- the interiors will indicate true color and texture of the samples.

1. 1. 4, 1120

Special Stone

Part 1: Rebuilding

The ruins at AZU are constructed of stone, mud, and adobe. Most of the building stone is a soft sandstone which is hand-laid (shaped by hand to fit into place). This stone deteriorates rapidly in some parts of the ruins, particularly wall bases. When replacing this stone, it is necessary to dress the replacement stone in a manner which replicates the exterior finish of the original stone. The walls of the ruins have two veneers and a rubble core. Thus, when replacing veneer stones, one usually has to do some work on the wall core.

Part 2: Inspect

Inspect all wall veneer surfaces for eroded or loose stones. Also look for voids (hollow spaces) in the walls. Look for stones that are causing or contributing to structural instability, or those so severe that they grossly detract from the aesthetic integrity of the structure. If the stone has deteriorated to the point of disfunction, it should be replaced. Do not replace the stone unless it is necessary according to the above criteria.

Part 3: Maintenance

A. Eroded Stone

Remove eroded stone and attendant mortar, brush dirt off exposed rock surfaces, dress fresh stone to size ~~one~~ course at a time, wet in-situ rock surfaces, lay in fresh mortar, ~~and~~ lay in stone, repeat process until all stones are replaced, dress ~~new~~ joints to remove tool marks, finish joint exterior by hand to match original mortar. Work in sections small enough to avoid structural stress, brace large areas if necessary. Be sure to match masonry type/style.

4. Voids:

1. Small voids.

Clean out loose material and loose deteriorated mortar; brush area clean as possible; get all surfaces involved; trowel-in mortar or use caulking gun; relay stone and pack joints; dress joints. Viscosity of mortar can be adjusted for the particular application.

2. Large voids.

Procedure 1 (if no bulge in veneer exterior to void): remove several stones from veneer at top of void, enough to be able to fit small stones into void; pump in small amount of slurry; plug flowing holes with oakum as they appear; begin filling void with small amounts of slurry with small, predampened stones thrown in to add strength and binding, the end result should be mortar slurry matrix with interspersed small stones -- this replicates the rubble core of the wall; when slurry has hardened, remove oakum and caulk and dress mortar joints.

Procedure 2 (veneer bulges, or if you are, for some reason, unable to form a slurry/rock core): remove bulged section of veneer; clean out bottom of void; rebuild veneer, forming the core behind the veneer as you work upward; dress joints.

Procedure 1 is preferred; Procedure 2 is more applicable to void areas creating severe structural stress; be sure to work with areas small enough to handle when you have to remove and rebuild veneer; be careful when pumping mortar -- tremendous pressures can be created.

Part 4: Materials

The display area will be made of stone (stone is only - below
the plain wall altar).

Some stone for the ruins is stockpiled NE of the West Ruin. Sometimes it is
necessary to obtain more stone from BUM or private sources. Consult stabili-
zation reports for borrow procedures.

Part 1: Background

Ruin stabilization is designed to accomplish "the structural stability of a structure through the reinforcement of its bearing members..." (LAC-48:2:12). To this end, various stabilizers have added metal plates, rods, and bars to unstable portions of ruins, particularly doorway lintels. Some of these metal reinforcements rust and/or become loose thereby negating their value as load-bearers. When this happens, they must be replaced or reset, as appropriate.

Part 2: Inspect

Inspect doorway and ventilator areas and large wall holes for the presence of metal members. Look for rusted, loose, or failed units.

Part 3: Maintenance

- A. Where possible, remove metal members and replace with fresh wood or stone loadbearers, as appropriate. Install stone as per section 04420; wood as per section 06450.
- B. If metal unit is required: reset loose but otherwise sound units; replace loose or failed units in kind, if appropriate (if not, replace with appropriate unit).

Part 4: Materials

- A. Metal. Reinforcement bar should be used where possible because it is small enough to be hidden by stone and mortar. Where ~~long~~ spans are necessary, old grader blades can be used. In areas ~~with~~ high moisture, stainless steel rods should be used.
- B. Wood. Several different species were used in construction of the ruins. Primary beams are usually Douglas Fir, secondaries are aspen, and lintels cedar. Be sure to determine which specie is most appropriate to the particular application.

C. Above. If p is a prime and a is a fixed integer. In this case, replace in kind.

Part 1: Bridge and

In 1979, 4" x 4" and 2" x 4" roof beams were installed in Bays 120, 121, 122, and 126 to support sagging timber in the original roofs.

Part 2: Inspect

Inspect all wood surfaces, articulation, and fastenings. Look for strain, damage, looseness, etc.

Part 3: Maintenance

Replace damaged portions in kind. Re-fasten loose members. Re-establish any loadbearing lost through brace settling.

Part 4: Materials

Use fir timber, 16d nails, and 3/8" to 1/2" x 6" steel bolts.

April 6, 1960 Chillings and Other Wood Members

Part 1: Background

Wood has been used extensively in the construction of the ruins at AZRU. Ceilings are wood, doorway and ventilator lintels are usually wood, and some wood was used as a primitive type of reinforcement bar inside walls. There are also wood transom rods in doorways. Douglass Fir, aspen, and cedar were the most common woods used at AZRU. This wood is subject to wet and dry rot, animal and insect damage, age, and structural strain.

Part 2: Inspect

Inspect all ceiling members, all doorway and ventilator lintels, and all exposed integral members for signs of damage, strain, or failure.

Part 3: Maintenance

Wood damaged severely or otherwise rendered disfunctional should be replaced in kind if it is a structurally important unit. If not structurally important, it should be preserved in place as best as possible by bracing/reinforcement and application of a wood preservative (see below). Wood preservatives will also arrest a certain amount of damaging activity by rodents and insects.

Dendrochronological core holes should be treated with an approved insecticide (check with SWRO Division of Natural Resources) and sealed tightly with laboratory corks.

Be sure that walls, ~~lintels~~ are braced, if necessary, before damaged units to be replaced are removed. Replacement pieces should be treated with wood preservative before installation. New wood and corks can be stained to render them less obtrusive (remember that wood will weather and blend-in to some degree).

Part 4: Materials

A. Cuprinol. Cuprinol brand wood preservative has worked well in ruins. Be

are to apply only a clear, flat liquid. It is available locally at hardware stores/builders' suppliers.

8. Wood preservative. A good wood preservative can be made at your area and is less expensive than commercial products. It requires boiled linseed oil, paraffin wax, and paint thinner (or turpentine or mineral spirits). To make one gallon of preservative: melt 1 ounce of paraffin in a double boiler arrangement (never apply direct heat to paraffin -- it will ignite); slowly pour the melted paraffin into 1/2 gallon room temperature thinner, while stirring thinner; add 1 1/2 cups boiled linseed oil, stir well; add more thinner until total volume of 1 gallon is obtained; stir until mixture is uniform.

These materials should be applied directly by brush or, if possible, soak the wood in the solution. The wood should be treated when it and the surrounding air are warm (summer is best) and dry. The solution must also be warm. Exercise caution in application. Wear proper clothing and protective gear such as gloves and face shield.

For further information on USFS preservative, see Research Note, FPL-0124 available at Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, Madison, Wisconsin, 53705.

March 7, 1980

Protective Roofs

Part 1: Background

There are thirty-three rooms at 7200 with hole or partial protective roofs built during this century. Earl Morris poured concrete over the original roofs still in place, thinking this was a good preservation method. In addition to leaking heavily, these concrete roofs added tremendous weight and strain on the original roofs. These concrete roofs were removed in 1978 and 1979 and replaced with lighter, independent units (see Adams, 1979, West Ruin and Hubbard -- available in park library) designed to reduce strain and to prevent moisture from leaking onto the original roofs.

Part 2: Inspect

Inspect roof hatches, exterior roof surfaces, ventilator pipes, roof drains, and room interiors. Look for leaks, material cracks, drain or ventilator obstructions.

Part 3: Maintenance

Clean and repair all cracks, gaps, and material damage; clear obstructions.

Part 4: Materials

Fill cracks and gaps with a tempered epoxy compound (joint compound temper plus two parts resin to one part hardener).

Resin: Shell 815 or equivalent.

Hardener: Vermiac 140 (General Mills = equivalent).

Ventilator - 4" black PVC pipe.

Sheathing - 2" insulated urethane (John Manville) or equivalent. From Goodrich Roofing Co., Farmington, NM.

Plywood - 5/8" CDX. GSA

Lattice timbers - 4" x 4" fir. Local purchase.

Division 16, 16100

Basic Wiring System

Part 1: Background

In order to ensure visitor safety in dark areas, a lighting system was installed in Rooms 127, 128, 191, 195, 199, 206, and 201, and in the Great Kiva (also supplying power in the Kiva for musical recording playback). For location of the basic system, see drawing BHM-AZF, 2303, 5/66, Sheet 1, "Utility Systems as Maintained" in the park map file. For the Great Kiva, see appendices, Division 16, section 16100.

Part 2: Inspect

Inspect to ensure all lights are functioning and power system in Great Kiva is working. Check circuit breakers and GFCI in Great Kiva; test.

Part 3: Maintenance

Maintain and repair all materials, fixtures, and equipment to standard. Replace burned out or broken light bulbs as necessary.

SECTION 01

011-10-13

Annual Preservation Maintenance Schedule

Frequency: each fiscal year during field season, mid-April to mid-October.

Location: in-situ, on-site, in East Ruin, Great Kiva, Hubbard Mound, and West Ruin. Occasional off-site borrow of stone and soil is necessary.

Time: Task time requirements (based on an average, trained crew familiar with resources; time includes support activities)

<u>Task</u>	<u>Time Required</u>
Replace eroded stone	1 sq. ft./hr.; 8 sq. ft./day
Reset loose stone	1 sq. ft./hr.; 8 sq. ft./day
Repoint fine to medium mortar joints	1½ sq. ft./hr.; 10 sq. ft./day
Wood treatment	1 sq. ft./min.; approx. 3 md/year
Clean 8" interceptor drain (1425')	5 mandays/year
Other drains (approx. 251')	1 lineal ft./minute
Replace wood sign	3 man hours
Replace wood trailer marker	1.5 man hours
Replace bulb in trail light	15 minutes
Sweep visitor trail	2 man hours
Snow removal	5 man days/year
Replace wood stair step	30 minutes
Clean doorway sealer	10 minutes
Remove intrusive vegetation	4 man days/year
Trim over grown vegetation	1 man day/year
Clear roof drainage, West Ruin (20 roofs)	15 minutes/roof
Clear Kiva N drainage (7 flush caps, approx. 220 ft. of pipe)	15 minutes/flush cap
Clear Great Kiva roof drainage (5 spouts)	10 minutes/spout
Clear East Ruin roof drainage (1 pipe currently exposed)	15 minutes

Task time requirements are based on the experiences of a few project supervisors. Once you begin performing these tasks, you may find that requirements vary from those listed. When this happens, document the actual time you expend. If your figures recur consistently, substitute them for the figures listed in the task time requirements. On your seasonal crews you will have individuals who exceed the rates and others that perform below the rates. It is the average rate of the crew as a whole that you must be concerned with.

When reviewing time requirements, take into consideration support activities: collection and transport to the work site of materials and tools; making of exploratory items such as new trail signs; difficulty of access to the work site (i.e. is a ladder needed); temperature and precipitation conditions; etc.

It should be emphasized that unless tasks are scheduled and the schedule adhered to as closely as possible, it will be virtually impossible to either keep track of time requirements or to accomplish the tasks. Organization is the key to timely execution. Organization also allows you to shift task schedules in order to circumscribe unforeseen circumstances that would otherwise delay and confuse your maintenance program.

The more information you compile, the broader the base for your organization will be. Therefore, it is imperative that you keep accurate records. Not only will this help you, it will also prove invaluable to your successor. The more information he/she has, the more quickly and better the job will be performed.

Material: fresh stone, mortar soil -- begin stocking in early April. Rhoplex E330 -- order by January 15th.

Equipment: heavy duty, 2 1/2 gallon metal pails (2 for each), ~~pruning~~ trowels (2 for each), rock hammers (1 for each), 1" cold chisels (1 for ~~each~~), brick chisels (1 for each), hard hats (1 for each), chipper's goggles ~~1 pair~~ for each), work gloves (3 pair for each) -- purchase GSA; steel-toe ~~boots~~ (1 pair for each) -- Federal Prison Industries or local purchase -- with ~~permission~~; metal scaffolding -- available at park, rent or purchase (Federal Contract) any additional necessary; various ladders -- available at park, purchase (GSA) any necessary additional ladders. Most of this equipment used every day.

Space: A stream should be joined, if necessary, to facilitate scaffold and supply operations. Working to be done at soil and stone block area between West Ruin and Mound F. Actual work performed in-situ, thus existing space must be utilized. Keep visitor trail clear or restrict traffic only as long as necessary.

Personnel: area ruins maintenance worker acts as crew leader, takes pre-work photographs (complete and have on-hand before work commences), keeps work log and record, completes stabilization report at end of season; area Superintendent submits XXX form (Assessment of Effects) to Regional Historian 60 days before work is to commence; seasonal day labor performs actual stabilization work or in absence of crew, ruins maintenance worker performs stabilization. Skills needed require use of WG-5 or WG-8 Masonry Workers and WG-3 Laborers (see area P.D.'s for actual skills required).

Assistance: consultation on methodology, materials, scheduling, personnel, training, etc., available from Southwest Cultural Resources Center, Southwest Region, through incumbent, Farmington Area Archeologist.

Costs: initial -- initial costs already incurred; recurring -- consumables (GSA supplies, tools) and materials (Rhoplex E330). Soil and rock, if obtained from BLM, are free borrow.

How to accomplish: in-house; ONPS funding.

Priority: #1 health and safety, #2 severity of ~~structural~~ defect, #3 aesthetics.

Cyclic Preservation Maintenance Schedule

Identical to Annual Schedule except in frequency and funding.

Frequency and funding: Cyclic maintenance is designed to accomplish preservation tasks that build up over successive seasons due to inadequate annual maintenance. The cyclic funds are currently generated under the PRIP program and projects should be implemented as they are funded. However, no more than five years should elapse between cyclic projects needed. Consult Regional Archeologist for current fiscal year cyclic funding for the area.

Inspection Schedule

Inspect all rooms of each room in each unit. Check concrete foundations, window joints, door joints, veneer and trim, wall corners, metal loadbearers, ceilings and other wood members, protective roofs, electrical systems, and drainage. Inspect all drainage systems and ground cover. Look for leaks, structural damage, insect and animal damage, erosion, loose materials, structural strain or failure, vandalism, drainage system leaks or obstructions, and obtrusive vegetation. Note defects on the inspection form. All defects warranting repair should be recorded, room by room. Record all defects by category and by repair requirements in the form of work hours or work days. This information can also be used on the 10-377 Job Order Request. Record all defects needing repair even if they can't all be repaired in one season. This provides information on the dynamics of resource deterioration and can be used to plan future work and to use as justification for base funding increases.

APPENDIX C - 10E

Item	Section Number	Frequency				
		Daily	Weekly	Monthly	Bi-annually	Periodically
Pest damage	01564					X
Site drainage	02900		X(Winter)	X(Summer)		
Visitor trail	02630	X				
Trees and Shrubs	02830			X(Summer)		X(Other)
Cast-in-place Concrete	03300				X	
Mortar joints	04110, 04130, 04150				X	
Wall veneers and cores	04420				X	
Metal loadbearers	05150				X	
Ceilings and wood members	06450				X	
Wood roof supports	06110					X
Protective roofs	07000					X
Wiring systems	16100					X

Section 3

Reference Materials

SCALE 1:50,000

11 E

SECTION 1, 01000

SECTION 1, 01000

SECTION 1, 01000

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SECTION 1, 01000

SECTION 1, 01000

SECTION 1, 01000

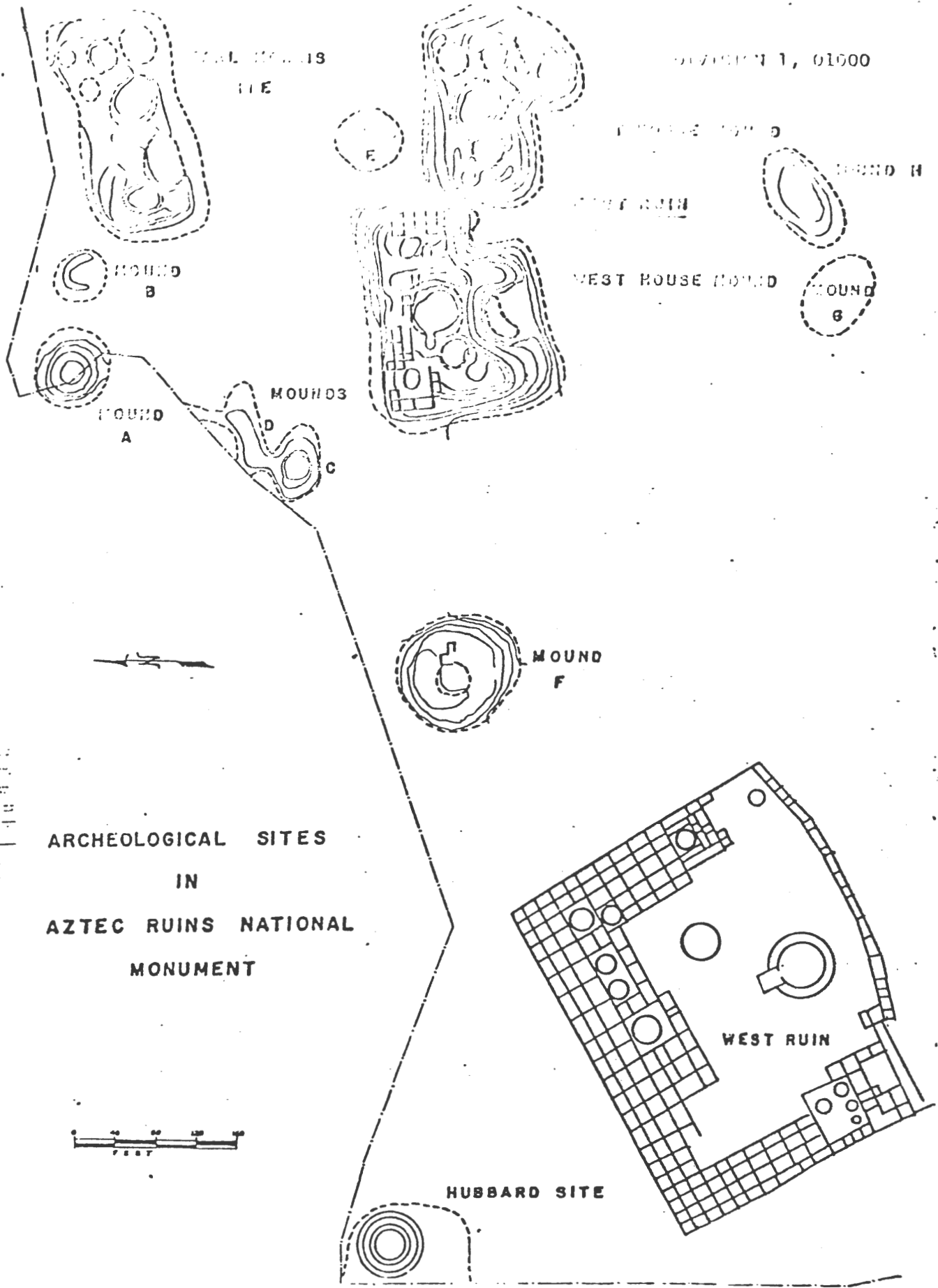
SECTION 1, 01000

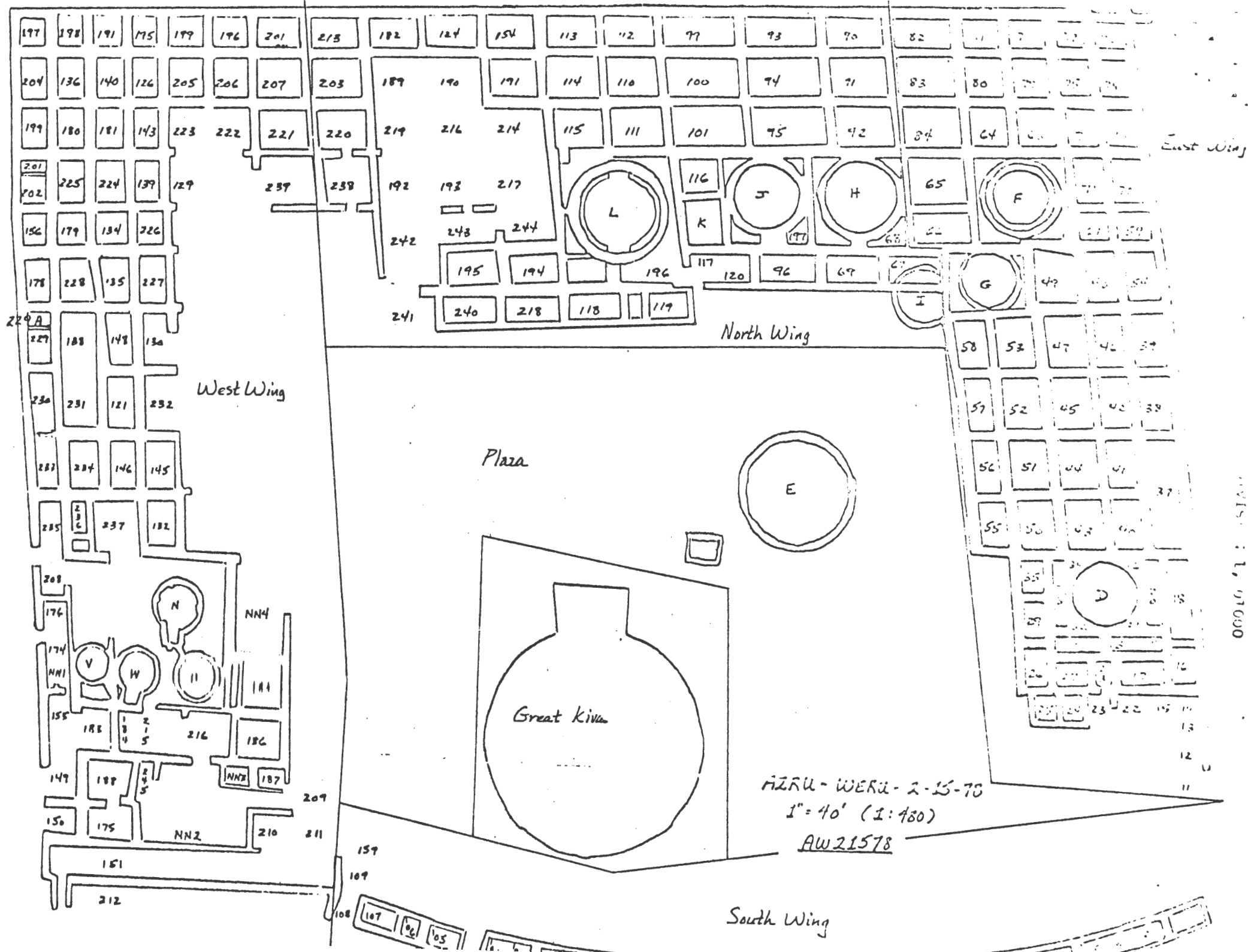
ARCHEOLOGICAL SITES
IN
AZTEC RUINS NATIONAL
MONUMENT

SECTION 1, 01000

SECTION 1, 01000

SECTION 1, 01000





ASSESSMENT OF ACTIONS HAVING AN EFFECT ON CULTURAL RESOURCES

(Attach certification forms as necessary)

This form is required for all actions that have the potential to affect historic properties.

A. Originating Office

1. Park:

2. Description of proposed action:

- ☐ Implementing action included in plan under PMOA
- ☐ Other PMOA Action
- ☐ Action not under PMOA.

3. Explain why the action is needed:

4. Cultural resources affected by proposed action (name and LCS number, if applicable):

5. The proposed action will (check as many as apply):

- ☐ Destroy historic fabric.
- ☐ Remove historic fabric.
- ☐ Replace historic fabric in kind.
- ☐ Replace missing historic fabric.
- ☐ Add nonhistoric elements to a historic structure.
- ☐ Remove nonhistoric elements from a historic structure.
- ☐ Alter historic terrain, groundcover, or vegetation.
- ☐ Introduce nonhistoric elements (visible, audible, or atmospheric) into a historic setting or environment.
- ☐ Reintroduce historic elements in a historic setting or environment.
- ☐ Remove historic elements from a historic environment.
- ☐ Remove nonhistoric elements from a historic environment.
- ☐ Disturb, destroy, impair, or render inaccessible archeological (surface or subsurface) resources.
- ☐ Possibly disturb presently unidentified archeological resources or historic fabric.
- ☐ Incur gradual deterioration of historic fabric, terrain, or setting.
- ☐ Other (Describe briefly):

Describe the indicated effect(s) concisely:

6. Identify supporting approved plan(s). Comment and/or action thereon by Advisory Council on Historic Preservation, dates of ACHP action and NPS approval, and section(s) of the plan(s) pertaining to the action. If none, so state:

7. Identify relevant NPS management policies and guidelines:

8. Describe any measures planned to minimize or lessen the loss or impairment of historic fabric, setting, integrity, or data:

9. Identify supporting study data and date(s) of preparation (attach if feasible):

10. Prepared by: _____ Title: _____

11. Signature of Park Superintendent: _____ Date: _____

B. Regional Cultural Resources Staff Review and Certification

1. The foregoing assessment is adequate; the proposed action is consistent with all applicable NPS management policies, standards, and guidelines reviewed and concurred in by the Advisory Council; and the proposal incorporates all feasible measures to minimize adverse effects to cultural resources.

2. The proposed action is authorized by a planning document or program reviewed and concurred in by the Advisory Council.

(Negative certifications
must be justified on
attachments.)

	Yes	No	N/A
1	☐	☐	☐
2	☐	☐	☐

Regional Archeologist Date

☐ Energy Consultation
Held

1	☐	☐	☐
2	☐	☐	☐

Regional Historian Date

Regional Energy Date
Coordinator

1	☐	☐	☐
2	☐	☐	☐

Regional Historical
Architect Date

Additional requirements of the proposed action:

1	☐	☐	☐
2	☐	☐	☐

Regional Curator Date

C. Regional Director Approval of Proposed Action including Additional Requirements

☐ The proposed action, including any additional requirements stated above, meets all conditions in B.1 and 2.

Date

Regional Director

D. WASO Record

Assessment received and noted:

Associate Director,
Cultural Resources Management

Date

Paint Preservation Record

National Monument _____ Date _____
 Structure _____ Room _____ Kiva _____ Other _____
 Repair involves: Wall N S E W ; Roof _____ floor _____
 Last prior repair (Object & floor, date): _____

Architecture: Standing stories _____ Smoked _____
 Burned _____

Standing roof _____ Masonry _____ Jacal _____ Other (Specify) _____

Room plan _____ Long axis _____ Foundation _____

Room situated _____

Room/Kiva N _____ S _____ E _____ W _____

Other notes: _____

Roof type: Pueblo (primary & secondary beams, etc.) _____

Other _____ Unknown _____

Floor type: Adobe _____ Flagstone _____ Other _____

Unknown _____

General condition of this unit prior to this repair (critical, very poor, poor, average, good, very good, excellent) _____

Preservation materials, technique: Fresh stone _____ Site stone _____

Soil mortar, _____ Fortified soil mortar _____

Soil plaster _____ Fortified soil plaster _____

Soil cement _____

Other _____

Standard masonry techniques _____ Special techniques _____

Further notes: _____

Work started _____ Finished _____

Approximate work days _____

Defects: North wall: basal stone erosion (extreme, severe, heavy,
medium, moderate, light)

veneer stone erosion

mortar erosion

other

South wall: basal stone erosion

veneer stone erosion

mortar erosion

other

East wall: basal stone erosion

veneer stone erosion

mortar erosion

other

West wall: basal stone erosion

veneer stone erosion

mortar erosion

other

Other notes, defects:

Architectural details
(Doornays, ventilators, lintels, etc.)

North wall:

South wall: _____

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nest wall.

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
AZTEC RUINS NATIONAL MONUMENT

COMPLETION REPORT

DAY LABOR PROJECT

SIGNIFICANT RESOURCE PROBLEM*

"IMPROVE DRAINAGE TO PROTECT WEST RUIN"

PREPARED BY: Stephen E. Adams
Area Archeologist
Farmington Field Office

DATE: OCTOBER 13, 1982

*82 PR & IP

FACE SHEET FOR COMPLETION REPORT

Park

Aztec Ruins National Monument

Location in Park

Park General

Region

SW

State(s)

NM

County or Counties

San Juan

Year Proposed

FY1982

PCP No.

Master Plan No.

Master Plan Corrected By

As Built Drawings By

Date Started

April 12, 1982

Date Completed

July 16, 1982

Work Order Title

Improve Drainage To Protect West Ruin

DESCRIPTION OF FIXED ASSETS
(For completion by employee in charge of project)

TOTAL COSTS
(For completion by FFO)

1. Installation of new, French type drainage system along a portion of the north boundary to intercept sub-surface water and divert it away from the ruins and into the 1945 drain line. Approximately 900' new line installed.

29,041.44

2. Backfilling of selected portions of the West Ruin to ease lateral structural stress and reduce maintenance costs. Five rooms backfilled to grade. Materials only charged.

534.11

3. Replacement of north boundary fence to prevent trespass of domestic stock onto park property and over the new drain line area. Approximately 1400' new 5' high chain link. Materials only charged.

3,294.45

TOTAL

\$32,870.00

DISTRIBUTION		THE FIXED ASSET DESCRIBED ABOVE HAS BEEN COMPLETED IN ACCORDANCE WITH APPROVED DRAWINGS, SPECIFICATIONS, AND AUTHORIZED CHANGES		
No.	To			
		Submitted	Title:	Date:
		By: Stephen E. Adams	Archeologist	10/13/82
		Approved	Title:	Date:
		By:		
		COSTS VERIFIED	Title:	Date:
		BY		

COMPOSITION OF COST FOR COMPLETION REPORT

Park: Glacier House National Monument Region: W Year Begun: 1982
Location in Park: Park General
Work Order Title: Improve Drainage To Protect West Ruin

COMPOSITION OF COST

COSTS CHARGED TO FUNDS ALLOTTED TO FIELD FINANCE OFFICE

(1) Personal Services.....	\$ 3,837.85	
(2) Travel.....	62.50	
(3) Contract Work.....	4,178.21	
(4) Supplies and Materials.....	17,205.08	
(5) Other Direct Expenses.....		
(6) Operation of Equipment.....		
(7) Depreciation of Equipment.....		
(8) Purchase of Construction Equipment.....		
(9) Purchase of Other Accountable Equipment.....		
(10) Other Costs <u>Equipment Rental</u>	7,586.36	
(11) TOTAL COST CHARGED TO FFO FUNDS.....	XXXXXXXXXXXXXXXX	\$ 32,870.00

LESS:

(12) Residual Value of Construction Equipment on Line 8.....	\$	
(13) Value of Other Accountable Equipment on Line 9.....		
(14) Other Credits.....		
(15) FFO FUNDS CHARGED TO CONSTRUCTION PROJECT.....	XXXXXXXXXXXXXXXX	\$ 32,870.00

OTHER COSTS:

(16) Non-Fund Costs (Includes "free inventory," donated materials, etc.)..	\$	
(17) ON-SITE CONSTRUCTION COSTS.....		
(18) PS&S, AP, and/or Facilitating Services at ___% of Line 17.....		
(19) TOTAL CONSTRUCTION COSTS		
(20) Equipment Included on Lines 12 and 13.....		
(21) Line 14 Credits.....		
(22) GROSS WORK ORDER COSTS.....		\$ 32,870.00

Identify other costs and other credits by line item entry, on an attached schedule, or explain in narrative.

NARRATIVE TO MONUMENT PROJECT COMPLETION REPORT
HISTORIC PRESERVATION
AZTEC RUINS NATIONAL MONUMENT

The Aztec ruins have long suffered from moisture erosion caused by farm flood and ditch irrigation run-off onto and into, via subsurface, the park area. An attempt was made, in 1945, to intercept the sub-surface water and divert it across the north boundary and out of the park into a drainage ditch. This system was placed deeply underground (some 30' at the west end) due to the recommendations of a study conducted by the Soil Conservation Service in 1944. The system functioned properly for awhile but began malfunctioning after years of not receiving normal cleaning and clearing. Cottonwood trees thrived along the drain line and their roots punctured and blocked the line. Additionally, no attempt was made to divert surface water running onto park property northwest of the East Ruin. Rather, a surface drainage ditch was cut across the park, towards the southeast corner, to accommodate this surface run-off. The Hubbard pond, north of the East Ruin, was not maintained. It periodically flooded park property to the south and east and created a literal swamp in which cattails and willows abounded and multiplied. Over the years, the north boundary fence continued to deteriorate; no maintenance or up-grading was performed. Consequently, trespass by domestic stock on park property and the ruins was not an uncommon occurrence.

Thus, from approximately 1953, the last definable period of favorable report, to 1978, deterioration from sub-surface and surface moisture and from trespass stock continued. In 1979, with the permission of the lessee, Russel Miller, a special drain was added to the pond to carry excess water over the park to a drainage ditch on the east boundary. This 12" PVC system has functioned very well and the swamp southeast of the pond has dried up.

In 1979, the Regional Hydrologist, Gary Moore installed some test wells along the 1945 interceptor line. After two years of data were analyzed, it was determined that flood irrigation of the hay field north of the monument was causing the excess sub-surface water and that this water was being carried on top of a very thick stratum of clay, the top of which was 4-5 feet underground.

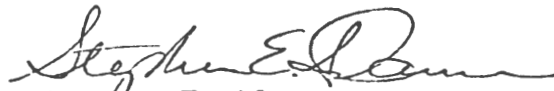
The 1945 drain, repaired in 1978 by NALA at considerable expense and trouble, was again functioning but apparently only because the sub-surface water was travelling down the sides of the 1945 trench surfaces and being ~~eventually~~ picked up by the drain line. Aside from being somewhat inefficient, ~~this~~ allowed a considerable amount of water to escape from the old line.

In FY 1982, a new drain line was installed to intercept the ~~sub-surface~~ surface water at the aquifer level (see diagram of French Drainage System, ~~in~~ volume). This line was later extended to pick up water from the trail ~~line~~ north of Room 213, West Ruin and carry it directly into the new French ~~line~~ (see plan view of drain line). A soil berm was built up along the edge ~~of~~ the new line where it parallels the north boundary fence. This berm will ~~direct~~ surface water to the Hubbard pond where excess can be carried away by ~~the~~ 1979 pond drain line. The surface water ditch across the monument was filled in, since it is no longer necessary, and a new 5' chain-link fence was installed along the north boundary (except for the easternmost 80') to keep out domestic stock.

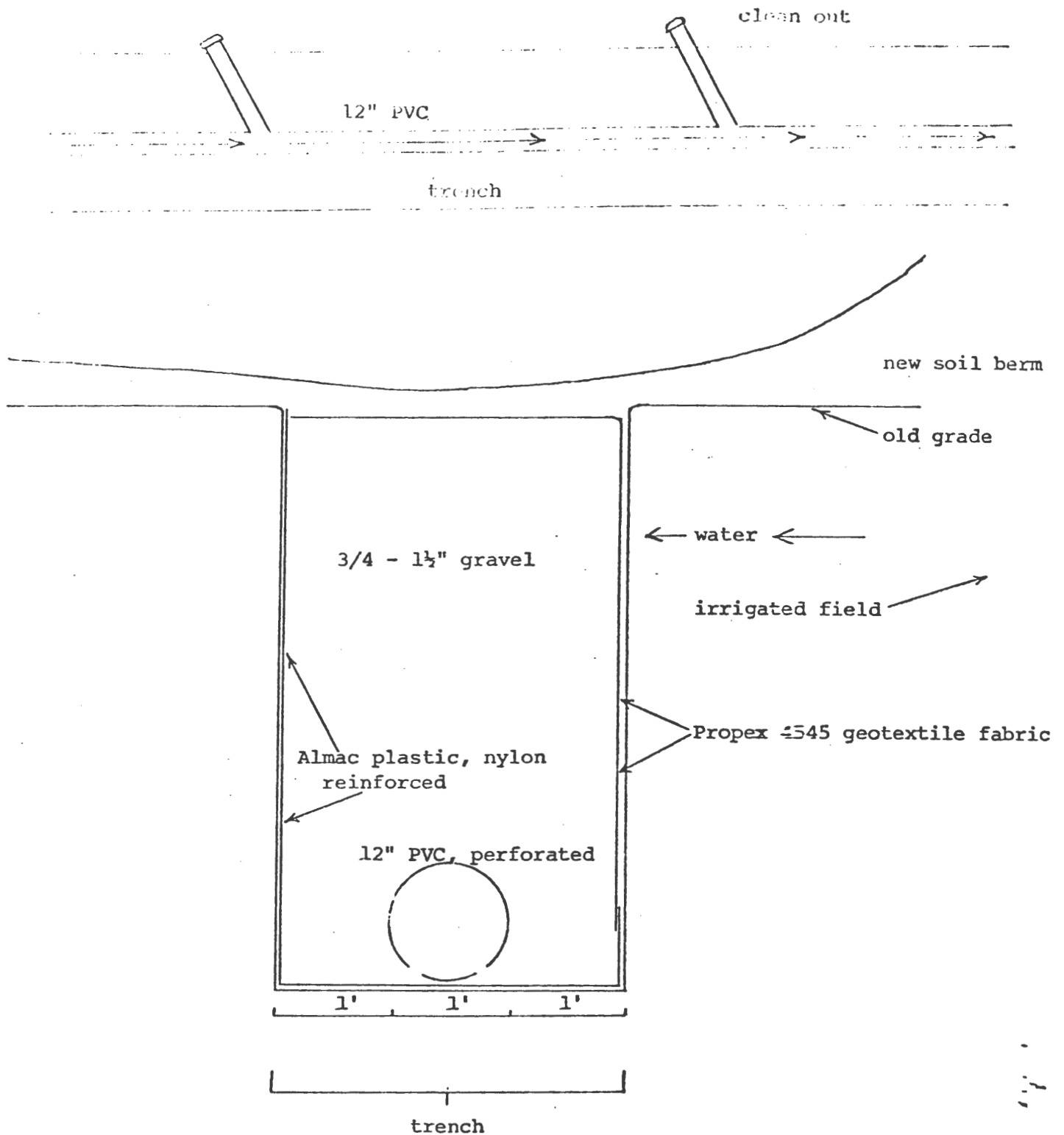
Several areas in the West Main area were drilled (#'s 124, 142, 220A, 230, and 243) to determine soil structural strengths caused by air-filled fill in adjacent areas. The southeast side of the Hobbs building was built up with clay soil for reinforcement.

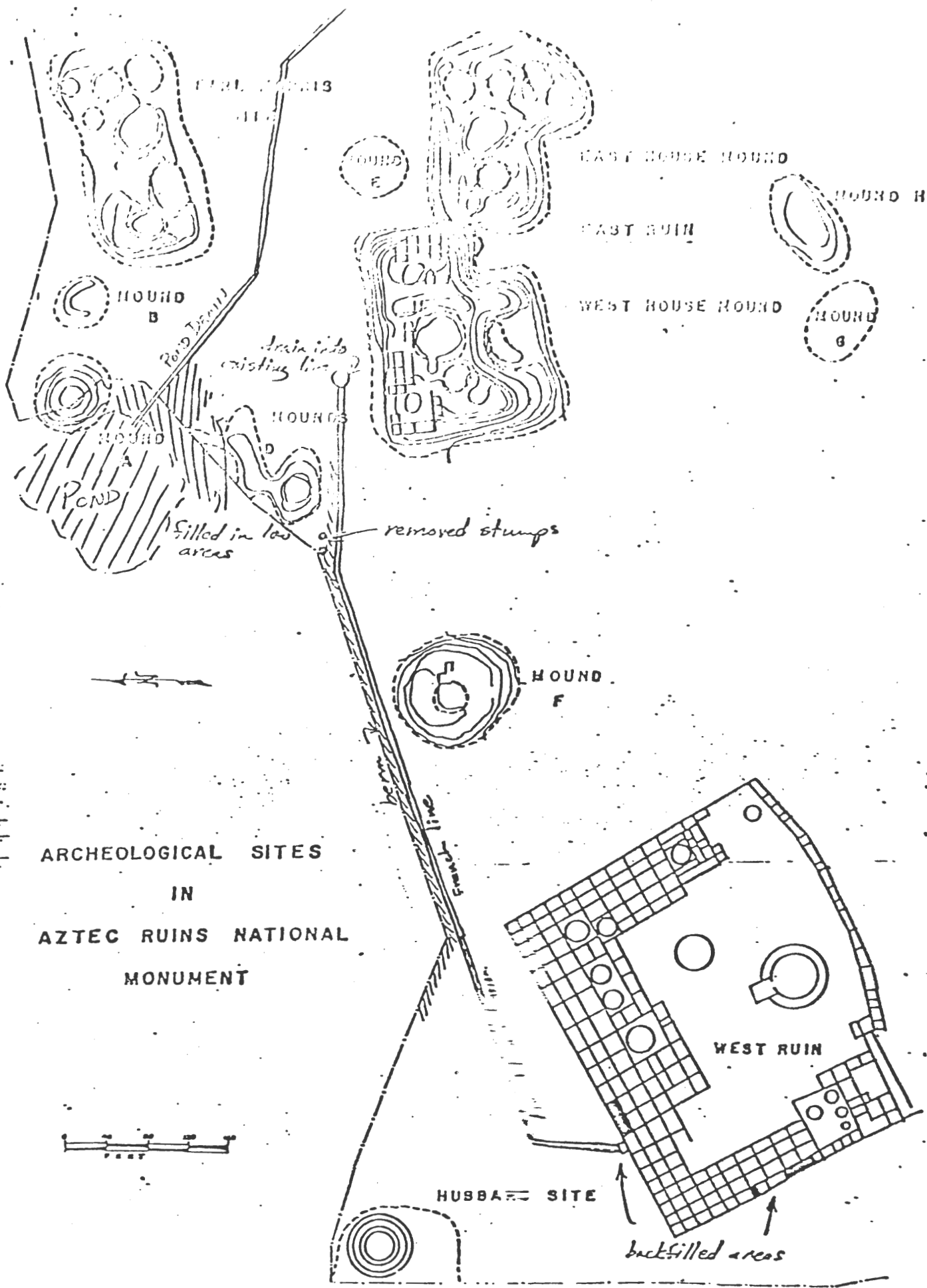
The first phase of the new drain line was started and completed in April, 1982. The second phase was started in June and completed in July, 1982. The option of extending the new line to the west boundary was not exercised.

The drainage project was funded for \$33,000.00 under FY 1982 PRIP account number 7371-1001-302. Archeologist Stephen E. Adams supervised the first phase. Facilities Management Specialist Sheldon L. Smith supervised the second phase. Laborers Ernest Yazzie and James Best participated in phase one. Engineer Technician Bobby Clark levelled-in the 12" PVC pipe in phase two. Gary L. Douglass, NALA VIP, photographed the project. Robert Yazzie of Yazzie Construction, Cortez, Colorado excavated the drain line trenches.


Stephen E. Adams

APPLYING THE TRENCH SYSTEM





Trail Appointments

Stair/steps: 6 rock steps with one wood railing, at interior east wall of Room 151

2 rock steps, southeast exterior of Room 187

2 rock steps, southwest corner of Room 216

2 rock steps, northeast corner of Room 216

2 rock steps, east exterior of kiva W

1 rock step, southeast exterior of kiva N

7 rock steps, east wall of Room 205

9 rock steps, west exterior of Room 205

7 wood stair steps with the two wood railings and platform with wood railing situated in Rooms 6 & 15A

2 concrete steps and 4 wood stair steps with one wood railing, west interior of Room 197

1 concrete step, east doorway of Room 197

2 concrete steps, one in each of east and west doorways, Rm 198

2 concrete steps, one in each of east and west doorways, Rm 191

2 concrete steps, one in each of east and west doorways, Rm 195

2 concrete steps, one in each of east and west doorways, Rm 199

2 concrete steps in west doorway, 1 in east doorway, Rm 196

1 concrete step in west doorway, 2 in east doorway, Rm 201

10 rock steps, southeast corner of Rm ~~151~~

1 rock step, west exterior wall of Room ~~151~~

3 concrete steps in east doorway of Room ~~151~~

13 wood stair steps with two wood railings ~~on~~ north wall of Great Kiva.

8 wood stair steps with two wood railings ~~on~~ lower part of south exit of the Great Kiva.

6 rock steps with two wood railings at upper part of south exit of the Great Kiva

Other stairs/steps: 12 wood stair steps down into Room 202

2 concrete steps, one on either side
of the north doorway of Room 156

Markers (see 40, unless otherwise noted)

Room 151: Exterior southwest, also interior northwest

211: Exterior of east wall (steel marker)

224: Exterior of west wall

205: Ext. of west wall

202: Ext. of west wall

197: Ext. of west wall (2 markers), also interior at east wall

220: Int. of west half of room

238: Marker on west side of trail south of this room

118: South exterior

120: South exterior

196: Northwest corner

58: West exterior

kiva E: East exterior

160: by northeast corner of altar

Great kiva : by northeast exterior of west "foot drum"

105: north exterior

107: north side of trail south of this room

212: south side of trail south of this room

Wood markers (unless otherwise noted) -

Covered rooms on or along visitor trail

Room 197: northeast corner of room

191: by northeast corner

195: on wall on east side of south doorway

199: at bottom center of north wall

196: on east wall of south doorway

Trail signs (wood, and an interpretive sign)

151: trail sign by exterior of west wall

184: interpretive sign by exterior of west wall

Kiva N : by exterior of west wall (interpretive)

197: by exterior of west wall (trail sign)

Int. sign: on east side of trail between WERU and Hubbard

Int. sign : by south exterior of the cobble kiwa south of Hubbard

238: metal trail sign in southwest corner

119: by southeast exterior (metal interpretive sign)

Kiva L : by north exterior

57: by southwest exterior (metal trail sign)

160: by east exterior (metal trail sign)

212: interpretive sign on north side of trail south of the southeast exterior corner of this room; int. sign in same location but on south side of trail; int. sign on south side of trail south of the southwest ext. corner of this room.

East Ruin: warning sign on west side of ruin by foot path up to Room 1.

Sealers for doorways (leading off trail (WERU))

Room 197: 3' X 3' glass with metal frame mounted with wall screws over south doorway

198: 3' X 5' glass with wood frame sealing south doorway exteriorally

191: same as 198

195: " " "

199: " " "

196: " " "

201: " " "

47: " " "

April 19, 1964

Electrical (WERU)

Room 197: electrical conduit integral with west wall

198: trail light in center of north wall

191: same as above

195: " " "

199: " " "

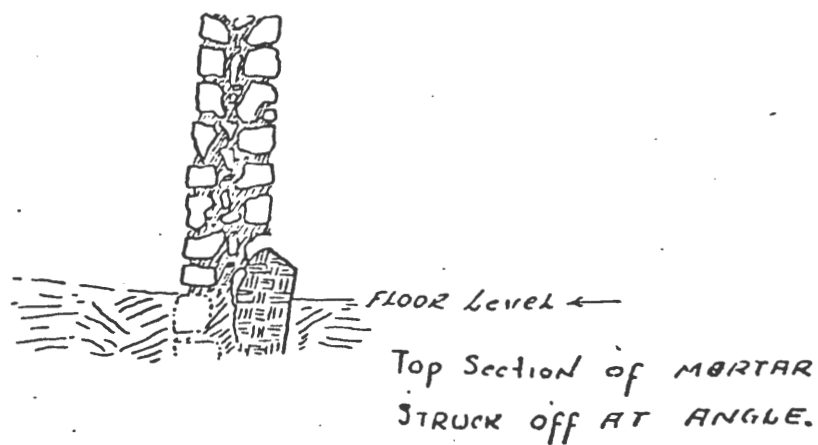
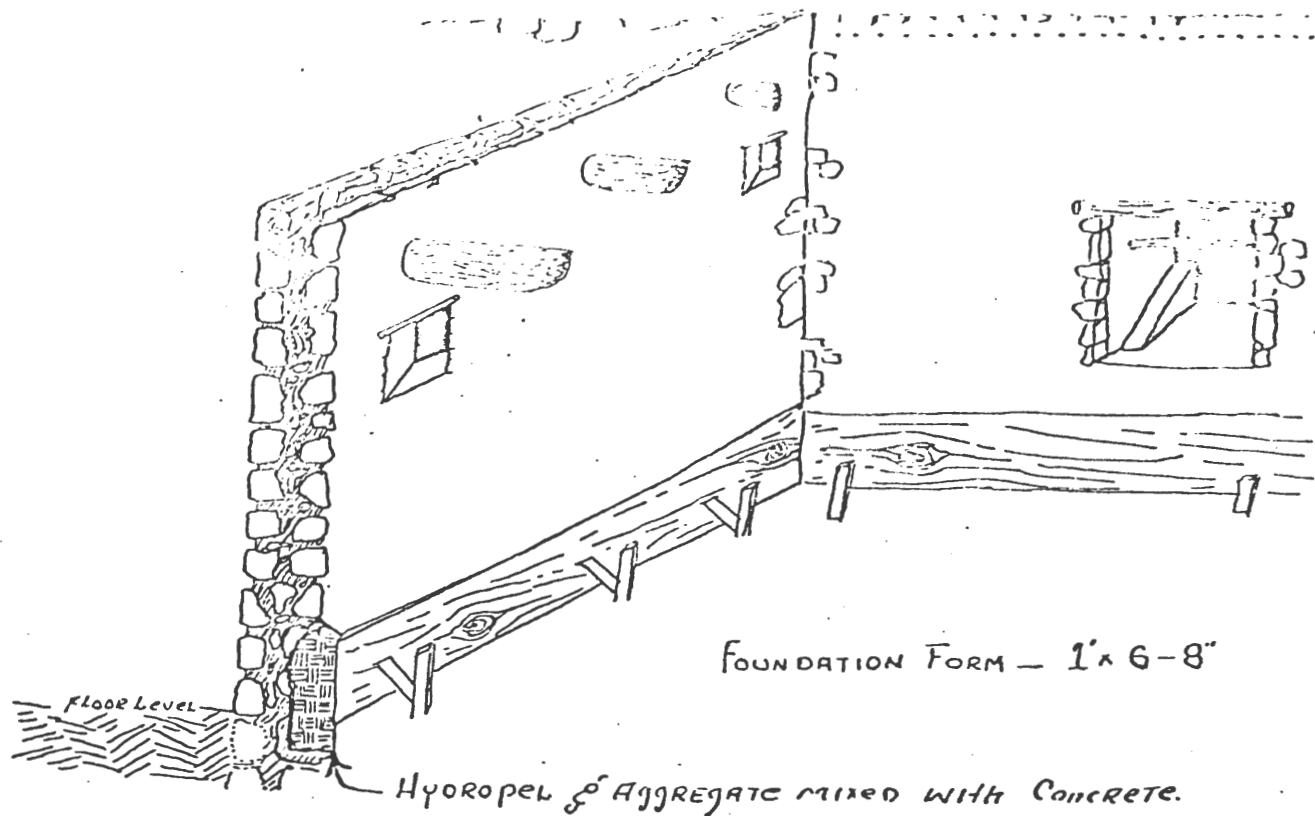
196: " " "

160: trail light on east wall south of the doorway;
music button for kiva music, mounted on wood
pedestal in southeast corner of the room.

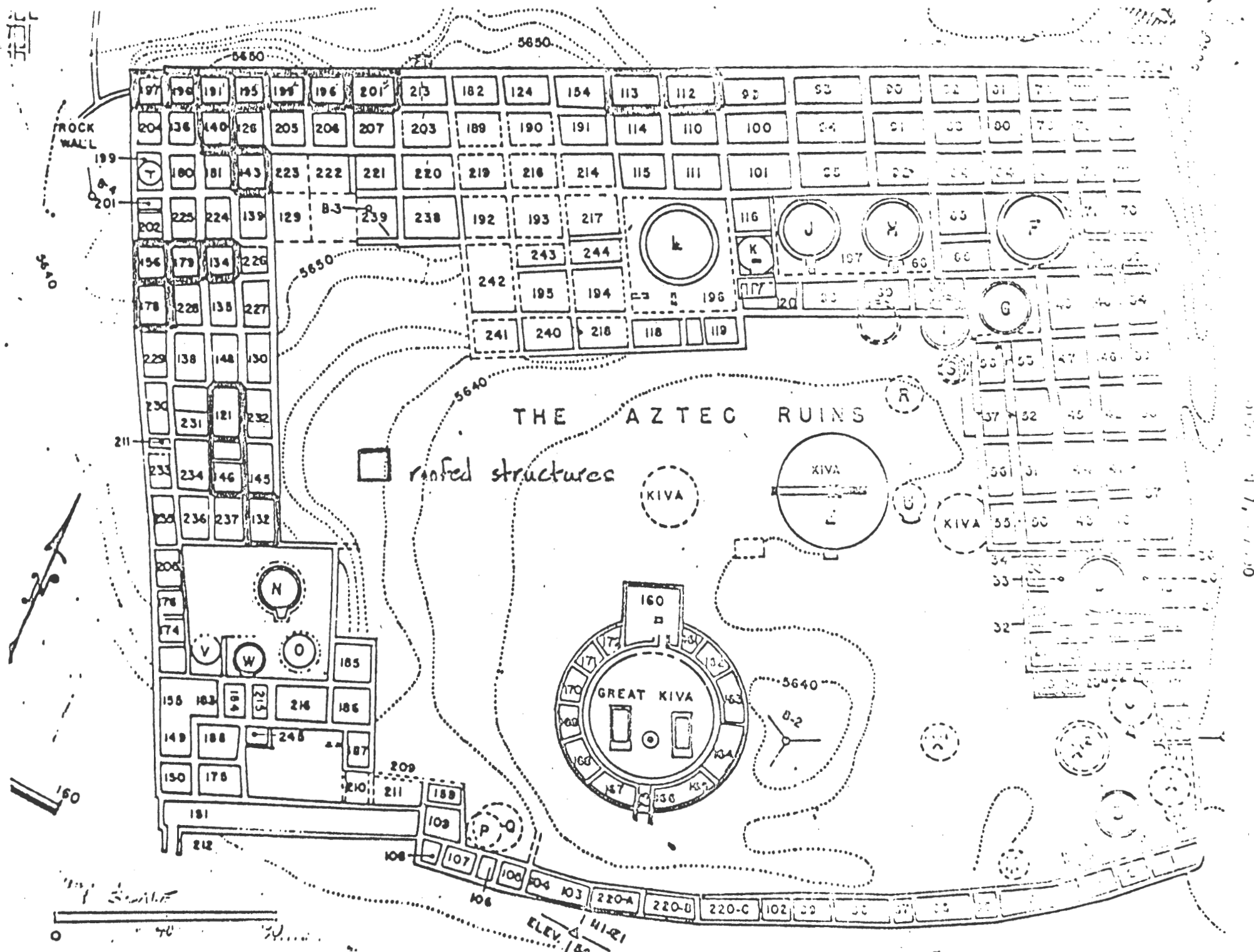
Great kiva: see diagram

Miscellaneous (WERU)

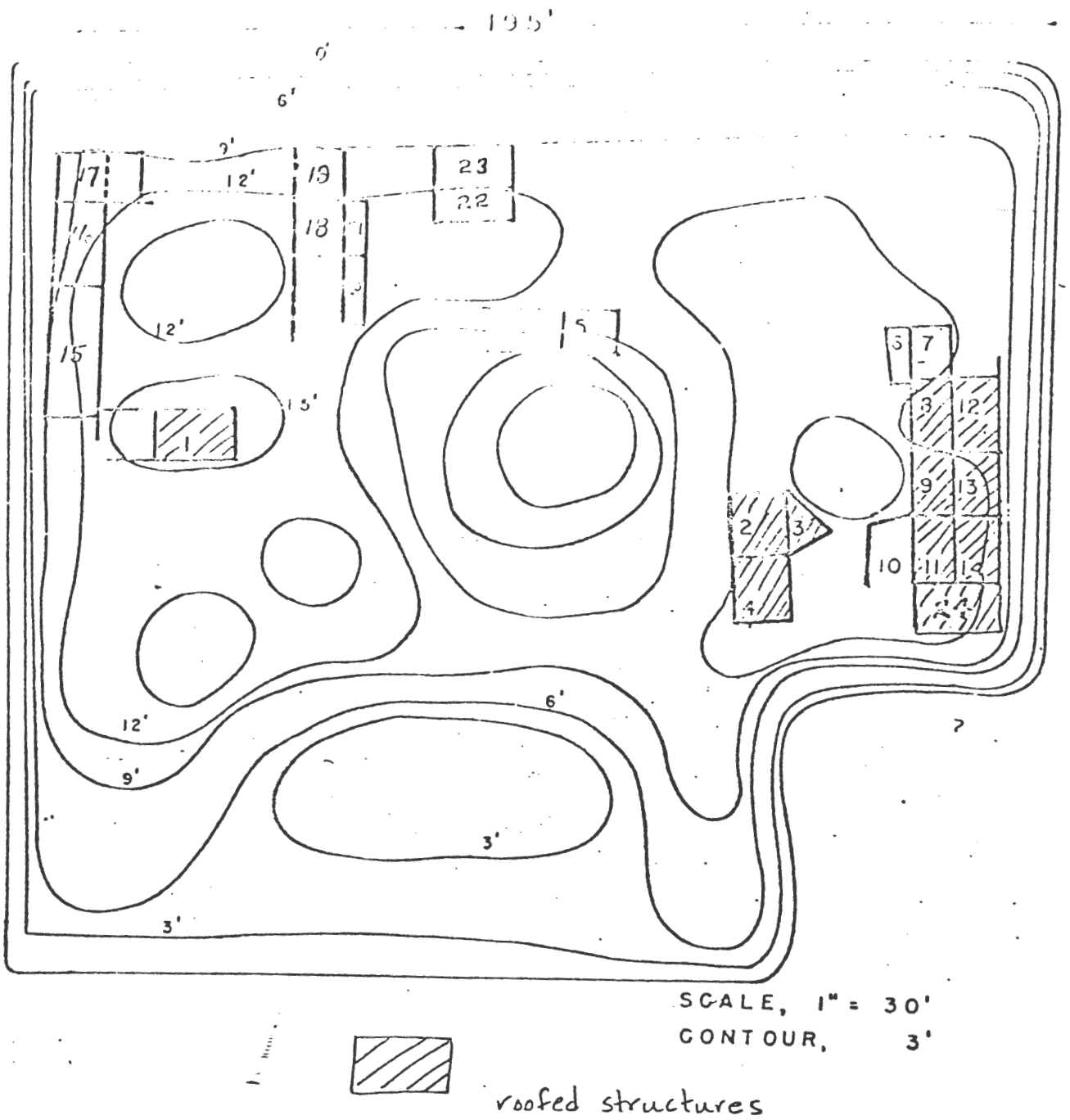
Room 160: 3 chains between pilasters on south end of room.



From Ulvian & Rixey, 1950: 5



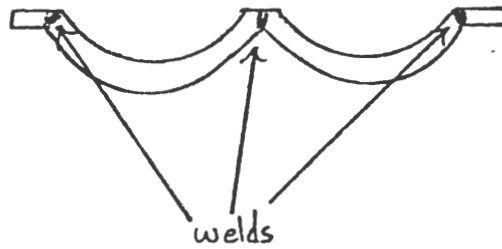
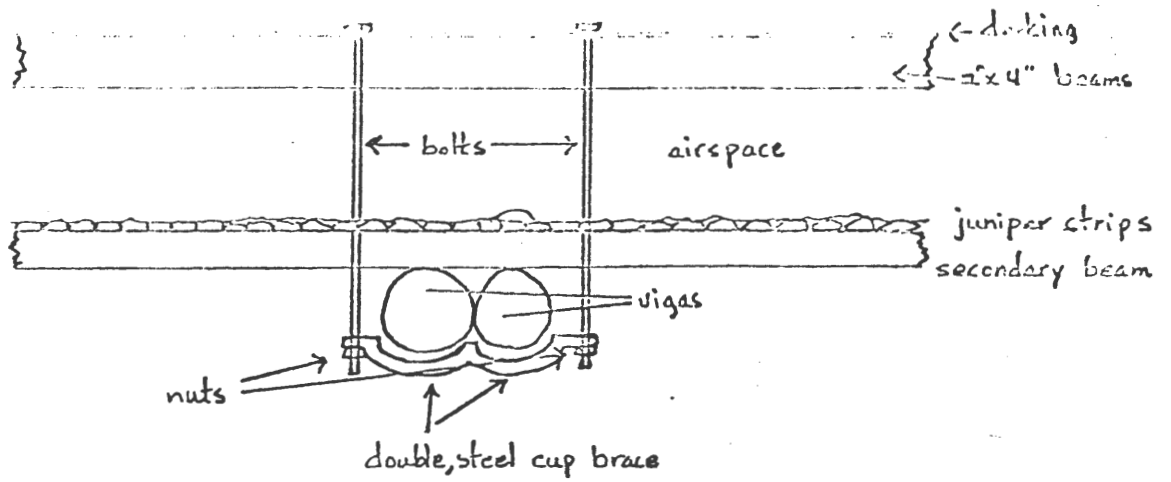
THE LAST RUIN AZTEC RUINS NATIONAL MONUMENT

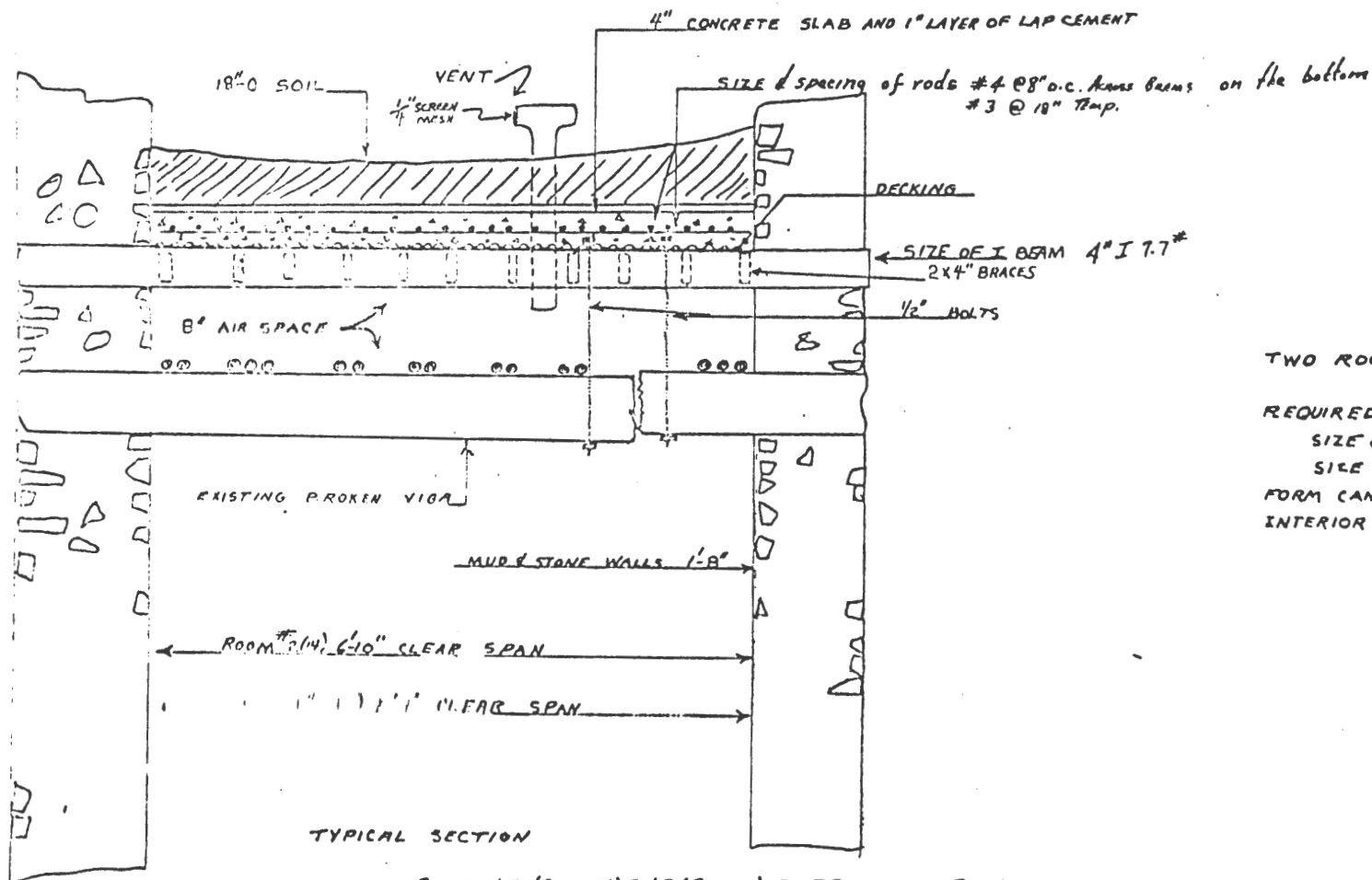
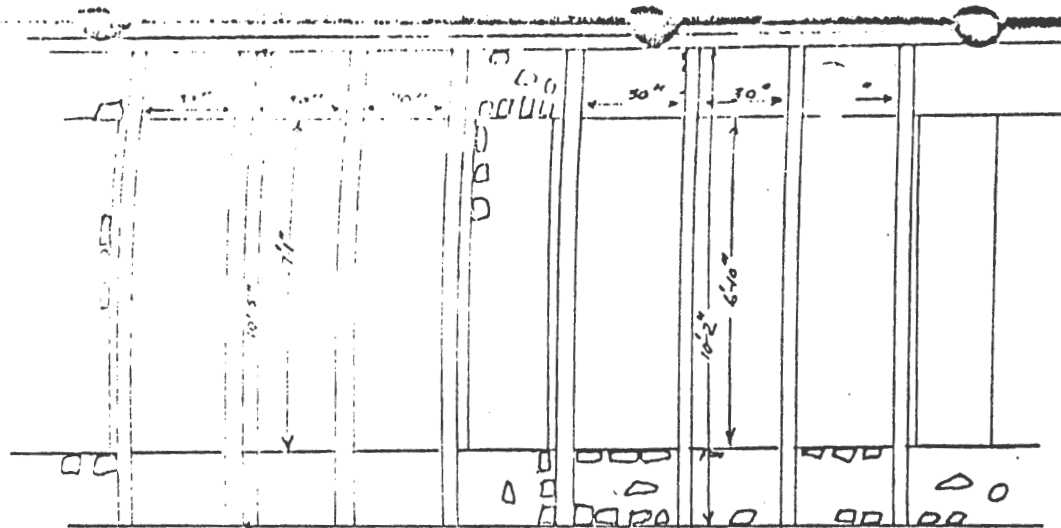


AFTER T. ONSTOTT, 12/29/48

FIG. 1

Custer Bridge - Foot Rail Post Beams

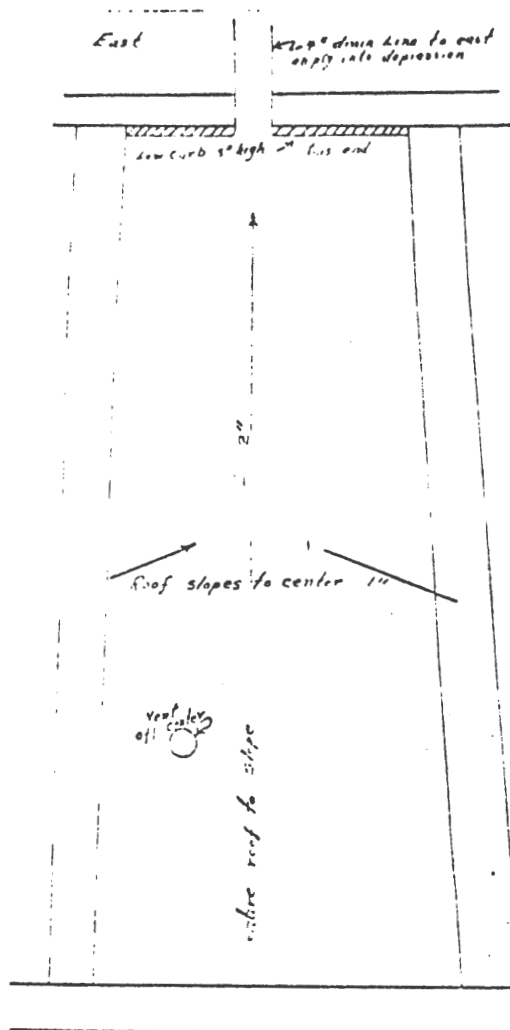




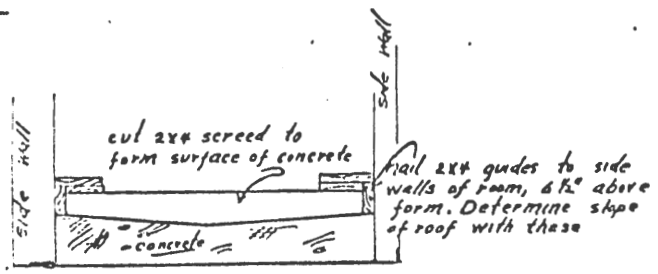
TWO ROOFS- (1) 7'-1" (+3'-4") x 7'-8"
(2) 6'-10" (+3'-4") x 7'-7"

REQUIRED:
SIZE & SPACING REINFORCING RODS
SIZE OF I BEAMS
FORM CANNOT BE SUPPORTED FROM INTERIOR

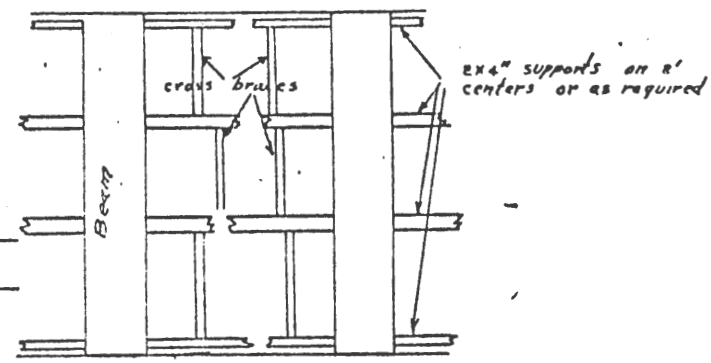
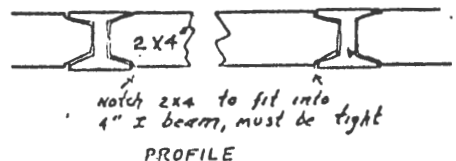
ROOFS #2 (ROOM 14) & #3 (ROOM 13), EAST RUIN, AZTEC RUINS



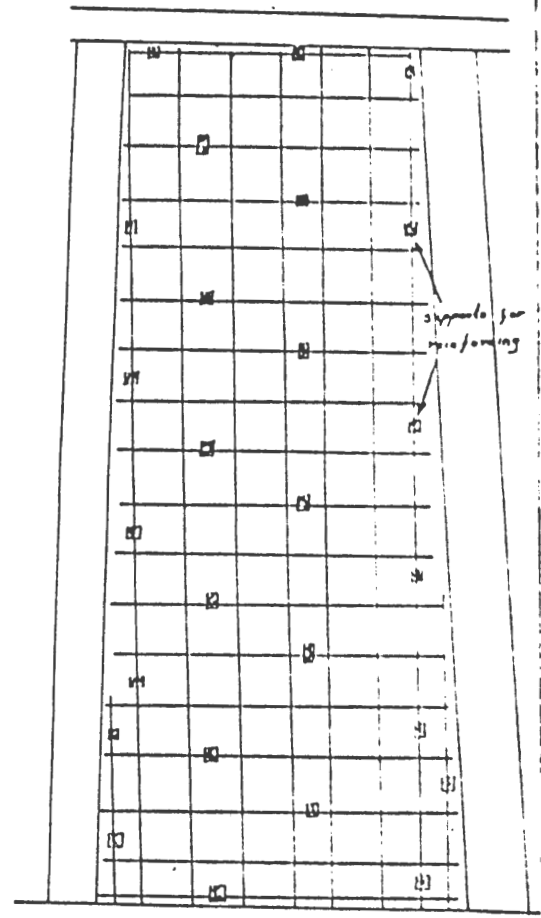
2" curb 8" high 2" flange
apply into depression



TO FORM SURFACE OF CONCRETE



PLAN
TO SUPPORT FORM FOR CONCRETE



5/8" reinforcing - place on 1' centers, support reinforcing 2 1/2" above form on precast blocks "chairs" about 3" square

tie all joints

(as installed, August, 1913)

16, 16100

Construction:

Alfred E. ...

Inc.

Pres. ... High

... ..

221-1115

Cross Section of North St. way

Kiva music button

Fluorescent light fixture

Double receptacle, outdoor type

Incandescent light fixture

Electrical cable

GREAT KIVA

Covered receptacle

"Square D"
DD Load Center
Cat. QD 6-12
Series L5

Scale in feet

Circuit 4 = ...

Circuit 5 = Light

Circuit 6 (with

Debris GFCI) =

North Plu

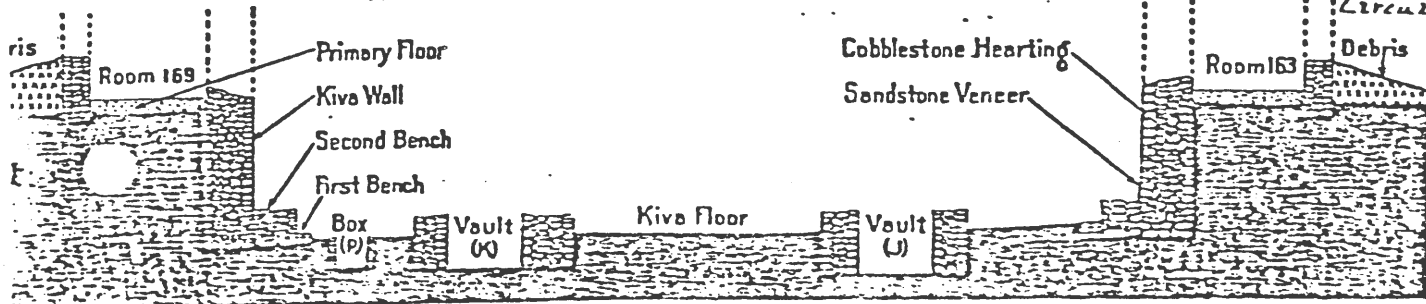
Mains 1

Amp. m

120/220

1ph. 3w

House of the Kiva at the Aztec Ruin



Cross Section, House of the Great Kiva from Z to Z'

										REPAIR REQUIREMENTS	
										(inspection form)	
Item											pest control
											pest damage
											drainage
											visitor trail
											remove vegetation
											concrete foundations
											mortar joints
											veneer stone
											wall core
											metal load-bearers
											roof supports
											ceiling
											other wood
											protective roof
										electrical system	
										item total	
										REMARKS	