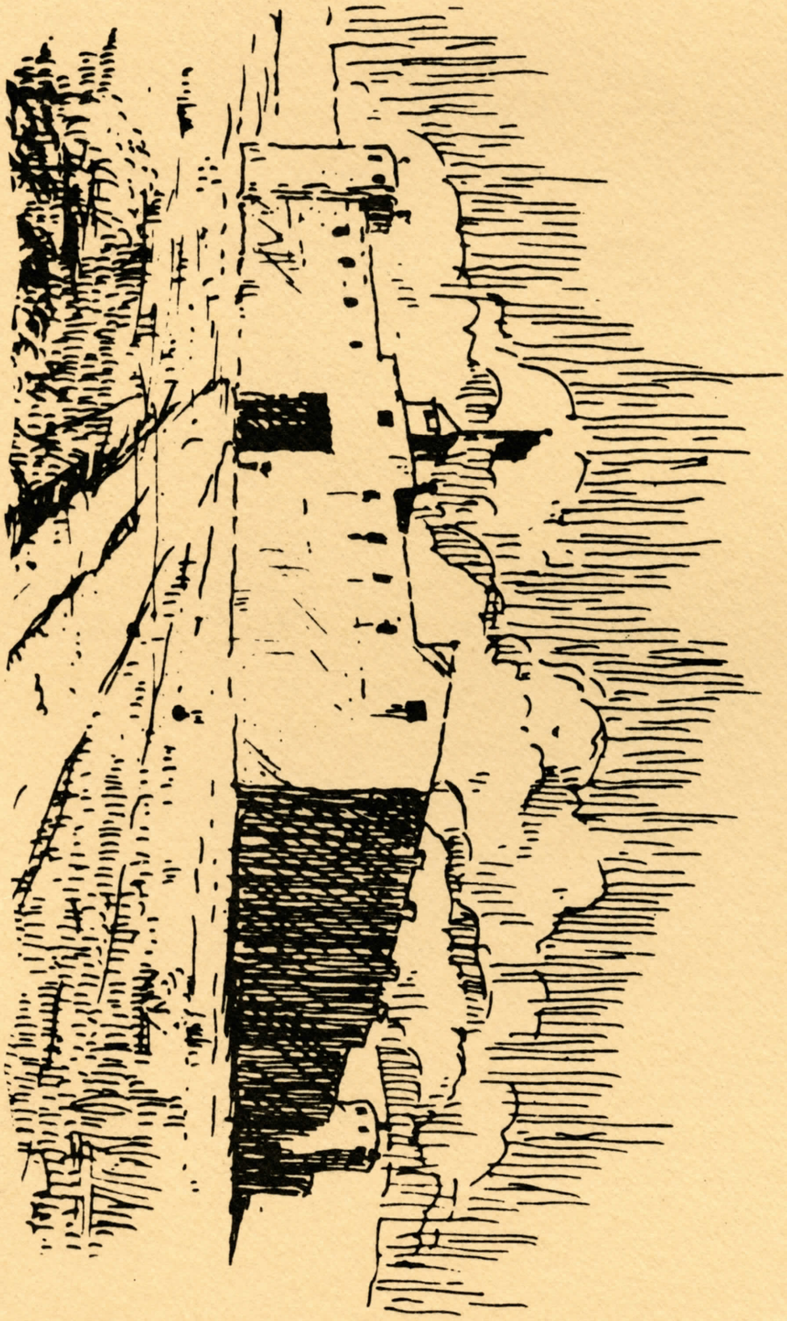


BENT'S OLD FORT

Development Concept Plan

010071
BEDL

BENT'S OLD FORT

Development Concept Plan

National Historic Site
Otero County, Colorado

15 October 1973

Glenn O. Hendrix, Manager Denver Service Center
Merrill J. Mattes, Manager Historic Preservation
Russell Jones, Project Manager

David E. Nichols, AIA, Vice President Architecture
George A. Thorson, AIA, Project Architect

NPS NATIONAL PARK SERVICE

KW URS/KEN R. WHITE COMPANY

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J	outline specification
K	construction
L	cost estimate

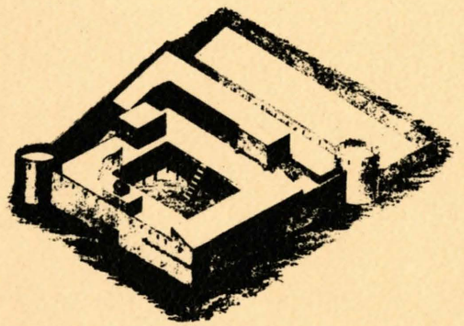
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BENT'S FORT IN 1845

Lt. James W. Abert, a topographical engineer on John C. Fremont's 1845 expedition, sketched both this aerial perspective and the front view over. The following year he returned with Kearny's army and made the wash drawing of a Cheyenne Indian from which this folder's cover is adapted. He described the fort on his first visit:

'The fort is composed of a series of rooms resembling casemates, and forming a hollow square, the entrance on the [north] side. A round tower on the left, as you enter, and another diagonally opposite, constitute the flanking arrangements. The outer walls, which are nearly two feet in thickness, intersect in the axes of the others, thus permitting their faces to be completely enfiladed; the outside walls of the enceinte and towers, pierced with loop holes, are continued four feet above the flat roofs which serve for the banquette, which being composed of clay cannot be fired by inflammable substances that might be cast upon it; the whole is built of "adobes," sunburnt brick, formed of clay and cut straw, in size about four times as large as our common bricks. The roofs are sustained by poles. On the [south] side is the cattle yard, which is surrounded by a wall so high as effectually to shelter them. The coping of the wall is planted with cacti, which bear red and white flowers.'



SIGNIFICANCE

Bent's Old Fort was one of the significant centers of the early west, the first American settlement along the Santa Fe Trail in S.E. Colorado. The Fort documented one of the major elements of westward expansion in the United States . . . economic imperialism.

BENT, ST. VRAIN & CO.

The partners who formed Bent, St. Vrain & Co. in 1831 were not new to the West. The brothers Charles and William Bent and Ceran St. Vrain had all ventured out from their native St. Louis to take part in the upper Missouri fur trade, arriving in the Arkansas Valley late in the third decade of the 19th Century. Charles Bent, the Senior Partner, handled much of the business operations between St. Louis and Santa Fe, New Mexico, on the West where he lived. Charles assisted the American Government, and became the 1st Governor of New Mexico, only to be killed 4 months later. William Bent, younger brother, was manager of the Fort and principal trader with the Indians and trappers. Ceran St. Vrain did not spend much time at Fort but was active in the trade operations & mercantile outlets.

TRADE OPERATIONS

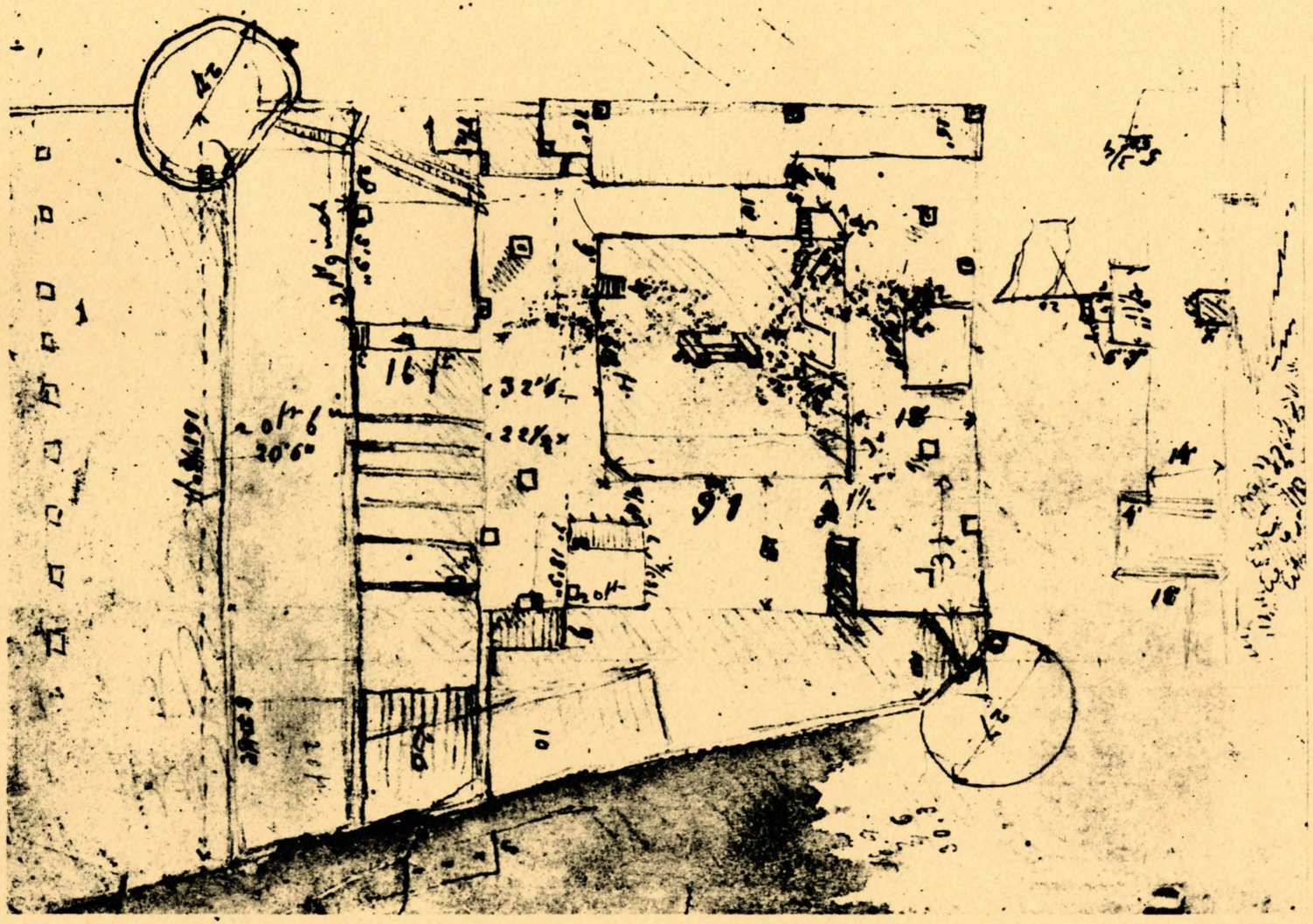
The trading post was in the center of the fur trade . . . the leading industry west of the Mississippi in the early 1830's. The activities were "three cornered." American manufactured goods were hauled from the East along the Santa Fe Trail, a portion deposited and the remainder continuing on to Taos & Santa Fe in the Mexican Territory for sale. The same method operated in reverse, with goods of Mexican & Indian origin being allocated to the Fort or carried on to Missouri. The third operation was fur trade with the Indians and trappers which originated in the area of the Fort.

INDIAN OPERATIONS

Its location in the heart of the Southern Plain Indian Country made it a natural contact point between the whites and several major tribes including the Southern Cheyenne, Arapahoe, Kiowa, and Commanche. William Bent, married to a Cheyenne, recognized the importance of the relationship and was in a position of great influence with the Indians.

MILITARY POST

The Federal government took advantage of the Fort's location to foster relations with the Indians. As early as 1835, the Fort was a constant stop for military expeditions along the route. By 1843, the Fort housed Army provisions, and was its western center. In the spring of 1846, the war with Mexico broke out with Colonel Kearny commanding troops using the Fort as base.



LIEUTENANT ABERT'S SKETCH OF BENT'S FORT

NOTED PERSONALITIES

Most visitors in the West seemed to eventually pass thru Bent's Old Fort, forming a "Who's Who of the West." Among those known to have visited during the Bent Period were Matthew Field, Thomas J. Farnham, Frederick A. Wislizenus, Marcus Whitman, Francis Parkman, and George F. Ruxton. Susan Magoffin & Lieutenant Abert stayed at the Fort and recorded the most important data in their diaries. Kit Carson, the most famous of Western figures, was employed by the firm intermittently.

CONSTRUCTION

The Fort was started in 1828, interrupted by smallpox epidemic, and completed probably in the spring of 1833. Presumably it was designed by Charles Bent with William assisting and in charge of construction. It was probably based on forts he had seen in the East, and then influenced by the Mexican-Indian pueblos he saw in the Mexican Territory. The 150 Indian workers they brought up from around Taos definitely effected the materials and construction technique. The adobe construction with wood vigas resulted in a castle-like fortress. The Fort was almost fireproof and the bastions at the two corners and the portholes along the battlement made it easy to protect. Lt. Abert's drawings were probably made so other similar forts could be built. The materials probably came mainly from the vicinity of the Fort . . . the adobe & wood vigas. Other materials like glass for windows would have been brought carefully along the Santa Fe Trail from the East. The Fort was self- sufficient so the blacksmith could have made metal hardware and the carpenter built the "millwork" items.

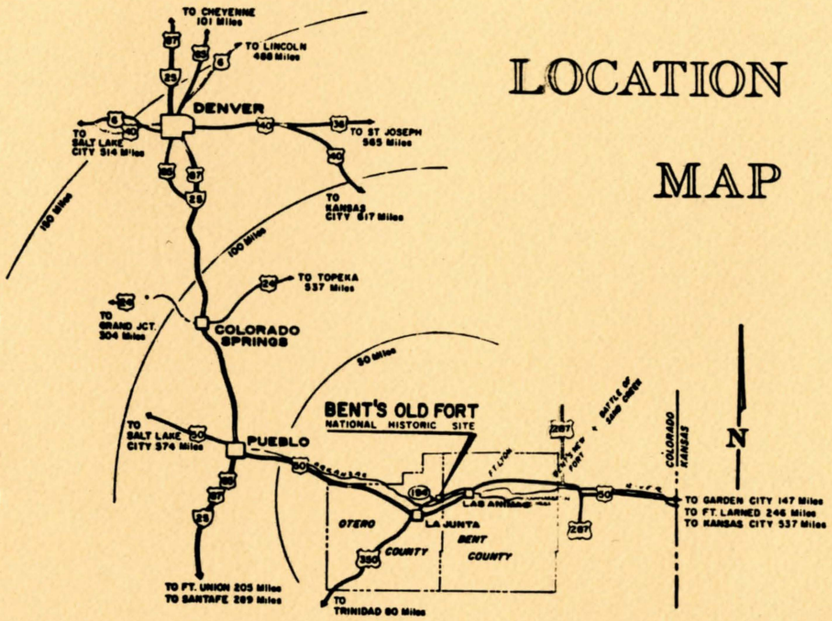
BENT PERIOD (1833-1849)

The Fort rose to its peak of activity by 1846, the designated time for the reconstruction. When Indian warfare started in 1847, the rich trading days were over. By 1849, it further declined, scores of Indians were dying from Cholera, William Bent's 3 brothers and his first wife had died, and clashes with the Plains Indians became more frequent. Bent decided to quit. Removing his family and valuable goods, he set fire to the Fort.

STAGE COACH PERIOD (1861-1881)

After an interim period when the structure was allowed to deteriorate, it was occupied by the Barlow-Sanderson Overland Mail and Express Co. as a home station and general repair shop for the line which ran from Kansas City to Santa Fe. The second floor rooms and some along the back were gone and others remodeled.

CATTLE PERIOD (1881-1884)	*Used as a cattle stable, the structure was beaten down and abused.*
INTERIM PERIOD (1884-1920)	*The materials of the Fort were carried away by settlers and used on nearby buildings, and the remains deteriorated virtually unchecked.*
DAR PERIOD (1920-1954)	*The Daughters of the American Revolution became interested and dedicated a monument in 1912. Late in 1920 the DAR was given the site itself. The Arkansas River 1921 flood swept over the Fort site, completing the destruction.*
STATE OF COLORADO (1954-1960)	*The title was transferred to Colorado in 1954, under the care of the State Historical Society. That same year Dr. Herbert Dick of Trinidad State Junior College did preliminary archeology exploration.*
NATIONAL PARK SERVICE (1960-TO DATE)	*The funds and resources of the Federal Government were enlisted. By an act of Congress approved June 3, 1960, it was established as a National Historic Site. The National Park Service took over administration in 1963. During the next 3 years, the N.P.S. did the History and Archeology Studies of the Fort. The Master Plan/Interpretive Study was completed more recently and the Furnishings Study is now being completed. This year funds were appropriated to do the Architectural-Engineering Documents for Reconstruction of Bent's Old Fort, now being executed by The Ken R. White Company with direct assistance from the National Park Service. The objective is to obtain funds so construction can start in Spring of 1974 and be completed in 1975, before the Centennial celebration for Colorado.*



LOCATION MAP

PROJECT

Includes all architectural and engineering services for the in-situ reconstruction of the Fort, attached corral, and adjacent ice house to duplicate as nearly as possible these original structures of 1846.

SCOPE

Provide all professional services and supporting activities required for planning & design of. the "Reconstruction of Bent's Old Fort," with all necessary architectural, structural, electrical, plumbing, heating, air conditioning, fire and burglar alarm systems. Project area includes the Fort, attached corral, and ice house, to a distance of 5' beyond the buildings. All site development and utilities beyond this area are not included in the scope of this project.

SERVICES

Provide Title I and Title II services under this contract now.

Title I

A. **Preliminary Surveys**

B. **Preliminary Design**

Title II

A. **Drawings & Specifications**

B. **Construction Bidding Phase**

BACKGROUND

The site in its existing condition consists of: adobe remains of walls about 1' high and eroded in width so dimensions are not determinable; visitors' information shelter; reproduction of an adobe blacksmith shop; temporary trailer for Superintendent's office & park center; small museum in the barn; farm house; and maintenance building. Since the excavation was completed in 1966, protective steps have been taken to attempt preservation of the in-situ adobe remains, although they have been relatively unsuccessful. Pencapsula, a polyurethane preservative, was applied, which sealed the surface but subsequent freeze & thaw broke the surface off. A concrete cap permitted erosion of the surfaces from capillary

action of the below ground water. Wood shelters built have protected the top, but not prevented capillary action. The same is true presumably of an in-situ remains in the N.E. Bastion which was enclosed on the top surfaces with cement plaster. Prevention of water reaching the adobe and subsequent freeze & thaw cycles is essential to adobe preservation. Two in-situ remains will try to be woven into the reconstruction fabric, however, other remains will be removed in order to provide proper drainage & foundations directly on original Fort site.

OBJECTIVES

The prime objective is the historically authentic reconstruction of the Fort, providing the visitor with a time space trip back to the life of the Fort as it existed in 1846. Administration functions, public requirements, and engineering modifications will be concealed within the Fort in order to minimize the 20th century intrusion on to the scene. No separate visitors' center is planned; semi-concealed parking, minimum use of signage, and living costumed interpreters are designed to further preserve the atmosphere.

ACKNOWLEDGEMENTS

All architectural projects involve the assistance of many people of diverse talents in a total team effort. This is particularly true in Historical Architectural Reconstruction. The National Park Service personnel have been particularly cooperative and their assistance essential. A few of the N.P.S. staff are mentioned here, although it is not a complete list, in order to express our appreciation and provide some measure of credit.

Historic Preservation Team
Merrill Mattes, Manager
Russell Jones, Restoration Architect & Project Manager
Laurence B. Coryell, Former Director of Architecture
Vern Smith, Present Director of Architecture

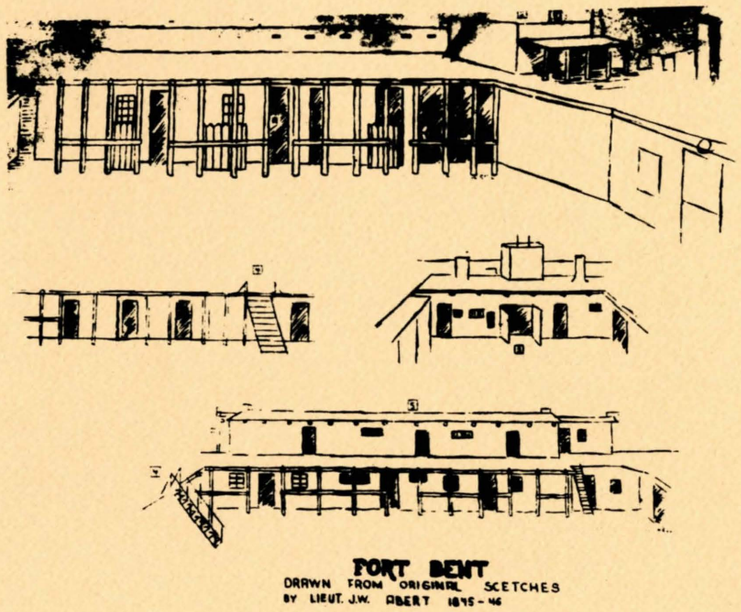
Midwest Region; Denver Service Center
Nan Rickey
Doug Nadeau

Colorado State Office, N.P.S.
Jim Dunning
William L. Featherstone

Bent's Old Fort, N.H.S.
John Patterson
Alexandra Aldred

Archeology
Jackson W. Moore, Jr.
Will Logan

Historical
Dwight E. Stinson, Jr.



Harper's Ferry Interpretive Center
Alan Kent
Dave Wallace
Bud Dutton
Fred Jessen
Richard Strand

Furnishings Study
Enid Thompson

Adobe
Charlie R. Steen

Other persons have also contributed to the completeness of this project in their interest of Bent's Old Fort.

Architectural Consultant
William Lumpkins

Colorado State Historical Society
Lorna Hart
Perry Eberhard
William Marshal
James Hartman

The Fort Restaurant
Sam Arnold

DOCUMENTS

Research has included review of documents furnished by the National Park Service & other independent sources. Herein are listed only the most significant documents:

- **N.P.S. Historic Structures Report** *which includes: Historical Data Section by Dwight E. Stinson, Jr., Historian; Archeological Data by Jackson W. Moore, Jr., Archeologist - Dec. 1964.*

- **N.P.S. Historic Structures Report Drawings** *(note that written report was not executed), by Charles S. Pope, Architect and Bob Smith, draftsman - Mar. 1965.*

- **N.P.S. Archeology Drawings,** *by Jackson W. Moore, Jr., archeologist and Darwin E. Rogers, delineator - Oct. 1966.*

- **N.P.S. Master Plan Drawings,** *by Midwest Region - April 1963.*

- **N.P.S. Master Plan/Interpretive Prospectus,** *by Midwest Region, Nan Rickey - 1973.*

- **N.P.S. Furnishings Study,** *by Enid T. Thompson - May 1973.*

- **Bent's Fort** *by David Lavender, University of Nebraska Press - 1954.*

- **Bent's Old Fort and Its Builders,** *by Dr. George Bird Grinnell, Kansas Historical Society Collections - 1919 to 1922.*

- **Lieutenant Abert's Diary 1845-1846**, *by John Galvin, John Howell Books - 1971.*

- **Historic American Building Survey**, *drawings on New Mexico adobe architecture - 1930's.*

- **Old Zuni Mission**, *by Franciscan Fathers of St. Anthony's Mission, Rev. Niles Kraft.*

- **El Palacio, Adobe Past and Present,** *article by William Lumpkins, Architect, Museum of New Mexico - Vol. 77, No. 4, Sept. 1971.*

- **Earth Brick Construction,** *by Elbert Hubbell, U.S. Office of Indian Affairs - May 1943.*

- **Specifying: Adobe Masonry, No. 04212**, *by Construction Specifications Institute - Sept. 1972.*

- **Handbook for Building Homes of Earth** *by Wolfskill, Dunlap & Gallaway, Texas A&M College - 1963.*

FIELD RESEARCH

- *Inspection trips were made to Bent's Old Fort site with National Park Service representatives. The first trip was April 30, 1973. The next trip was July 24-25, 1972, and Jackson Moore, Archeologist, was present. Reports have been issued on these inspections.*

- *From August 5 to 11, 1973, a research trip of comparable adobe construction in New Mexico was made, under the direction of Russell Jones, N.P.S. Project Manager.*

- *The itinerary (previously submitted) included: Gallup; Zuni Mission; Acoma Pueblo; Laguna Pueblo; Albuquerque Old Town; Santa Fe, N.P.S. Southwest Region Office; Ildefonso Pueblo; Santa Clara Pueblo; Rancho De Taos; Taos; and Taos Pueblo.*

- *The Fort Restaurant and museum was visited Sept. 11, 1973.*

- *On Sept. 24 & 25, 1973, meetings were held at Harper's Ferry, W. Virginia in the N.P.S. Interpretive Center, accompanied by Mr. Jones. Audio Visual and Furnishings requirements and studies were discussed and reported separately.*

MEETINGS & REPORTS

Reports have been issued on significant meetings or phases and are here summarized.

- *July 5, 1973 - Progress report.*
- *July 23, 1973 - Orientation Conference with all interested N.P.S. personnel to determine preliminary objectives and concepts, also design program schedule.*
- *July 24-25, 1973 - Field inspection at Bent's Old Fort site.*
- *July 5, 1973 - New Mexico, Research trip.*
- *August 15, 1973 - Title I, Phase A/Preliminary Surveys Report.*
- *September 24 & 25, 1973 - Harper's Ferry meetings.*

SOILS STUDY

Report, dated September 14, 1973, has been issued by Materials & Substructures, Consulting Engineers. The on site tests were drilled in July, 1973. The examination was directed at 4 areas of concern: the foundation conditions at the Fort site; visitors' parking area & pathway to the Fort; seepage characteristics of possible sanitary leeching fields; and on-site materials for manufacture of adobe bricks. The tests were satisfactory and no major problems were found.

ADOBE STUDY

Details are reported in Section H, Adobe, however, the research consisted of: review of written technical data on adobe construction; discussions with Charlie R. Steen, N.P.S. research; Nils Christiansen, soils engineer & adobe manufacturer in Golden; Sangre de Christo Center, adobe manufacturer in San Luis Valley; soils tests & research with Materials & Substructures; and on-site adobe bricks being manufactured at the site, to be tested.

UTILITIES

Procedures have begun with the available utility suppliers in the area, however these utilities beyond the 5' line from the building will be provided under a separate site development design contract. The National Park Service should start negotiations now in order to have these available for construction. A summary on a preliminary basis is:

- **Electric:** *Southeast Colorado Power Association, 901 West Third, La Junta, Colorado. Existing 1 phase power services runs on poles from the highway 194, east of the entrance where 3 phase power exists, to the Fort. This would be replaced with buried service, to be borne by the user.*

- **Telephone:** *Mountain States Telephone Company, 610 Colorado Avenue, La Junta, Colorado. Existing service at temporary headquarters building. Buried service would be carried to the administration area in the Fort.*

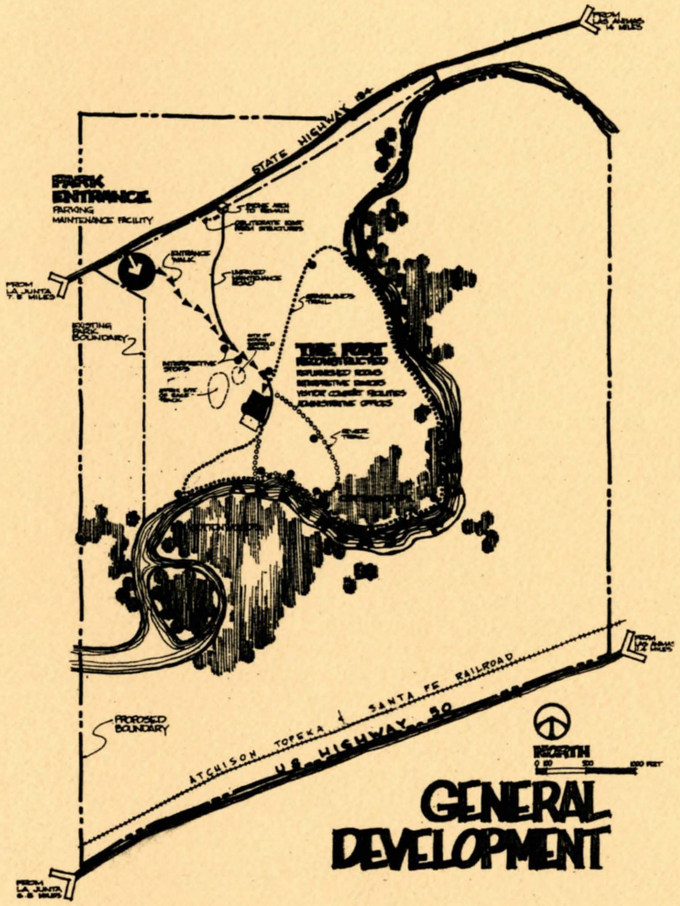
- **Water System:** *Wells are potentially contaminated, and should only be used for irrigation or fire protection. The well at the Superintendent's farmhouse is very near the cesspool, and the well near the Fort site should also be considered non-potable. Bent's Fort Water Company, Box 305, La Junta, Colorado, has been contacted for details to obtain domestic water. The district is currently undersupplied with a waiting list of 40-50 potential users. A second well is now being drilled adjacent to their present well to augment the supply, but the supply will still be limited.*

- **Sewerage System:** *The present cesspool at the Superintendent's farmhouse is inadequate and will be abandoned when the buildings are removed. The maintenance area has a septic tank and leaching field. Alternates of expanding this system and development of a new system south of the Fort will be considered in Site Study. Percolation tests have been made at the site and subsoils are moderately permeable, the better results being near the Fort site.*

- **Storm System:** *none available. Fort should be designed with good drainage and flood levels should be determined under the Site Study.*

- **Heating Fuel:** *Natural gas lines are not now available at the Fort, although there are several in the La Junta area. Gas lines could be extended 27,876' at users' cost which is not feasible unless shared. There is a similar situation of an oil pipe line about 5 miles from the Fort. Electric power prices are not yet competitive for heating purposes. L.P. gas is now used at the Superintendent's area but would be difficult to conceal at the Fort, therefore an underground oil tank is the preliminary recommendation.*

- **Trash and Garbage:** *Presumably, garbage would be taken to the La Junta garbage pit, and trash would be incinerated by a small incinerator near the maintenance area.*



LOCATION

The project is located at Bent's Old Fort National Historic Site, 8 miles east of La Junta, Colorado, on State Highway 194; 65 miles east of Pueblo & 165 miles from Denver by road. The property consists of 178 acres, lying north of the Arkansas River, along the Santa Fe Trail. Additional land around the Fort may need to be obtained to protect the environment.

VISITATIONS

See master plan for extensive details, however, it indicates 150,000 visitors/year. This would be approximately 1,000/day or 200/hour design basis. The Fort would be a daytime operation except for occasional special evening events.

DESIGN CONDITIONS

Preliminary data will be finalized before engineering design.

- **Snow load** = *25 PSF or 3' depth w/15% water*
- **Wind load** = *80 MPH max.*
- **Temperatures, Max.** = *107°F max. & -27°F min.*
- **Temperatures, Design** = *95°F max. & -10°F min.*
- **Soils** = *full report, generally clayey topsoil over well drained sub.*
- **Water Table** = *11' @ Fort, July 1973, presumably rises with level of river or adjacent irrigation*

EXISTING SITE

Highway 194 lies on the north boundary. The Park entrance, a stone arched opening, constructed by the DAR, leads to the present farmhouse & temporary headquarters building. The entrance road leads up to the Fort site. The maintenance complex is at the NW corner and consists primarily of 1 metal building surrounded by a chain-link fence. At the Fort site, the cemetery lies to the west of the approach with the visitor's shelter on the east. The parking lot is west of the Fort site with the temporary blacksmith beyond. A nature trail leads to the meandering Arkansas River. The remainder of the site is relatively level with a few animals grazing on the natural plains grasses.

SITE DEVELOPMENT PLAN

This is not included in the scope of this contract, but a separate program is now being developed. The Preliminary Master Plan has been executed by the National Park Service and will be referred to herein.

MAJOR PREMISES

The N.P.S. plan has two stated objectives:

"(1) To restore the Fort and its environs as nearly as possible to its appearance in the 1840's.

(2) To minimize the physical and esthetic impact upon the site of 20th Century man, his activities, and his contrivances."

"The reconstructed Fort should stand stark and lonely on the plain."

The reconstructed Fort is to be authentically built & furnished, becoming a living museum itself. Six mini audiovisual programs integrated into the small historic rooms along with living interpreters complete the program. Administration and visitors' facilities are to be housed within the Fort with minimum intrusion.

SITE PLAN

The Visitors' entrance and parking area will be relocated to the NW corner near the maintenance area. The existing farmhouse & park temporary headquarters will be obliterated, although the DAR arch will remain as a monument. The new parking area will be for 50 cars now and a possible 50 additional in the future. An earth berm on the south and east sides will minimize the visual intrusion of the auto. The new entrance sign will be interpretive as well as identifying. An emergency phone located at the trail head will provide direct communication with the Fort. No other visitors center or comfort facilities are planned for the entrance.

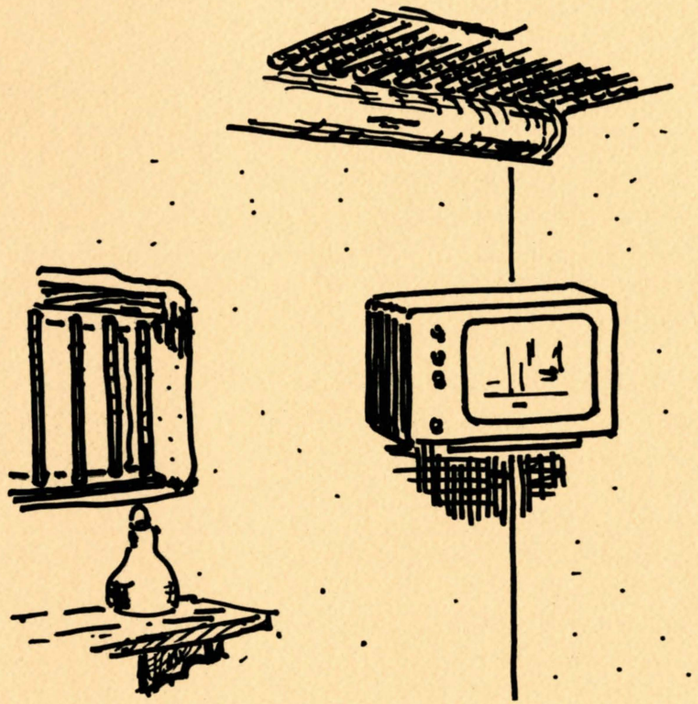
From the parking at the entrance a 3/8 mile long trail leads to the Fort's gate, traveling over to and along the original Santa Fe Trail. The Trail also serves as a low standard emergency road, blocked by a locked gate. All people will walk to the Fort, although a possible wagon for the handicapped and older visitors is being investigated as a concession and part of the interpretive program. The exceptional vehicle allowed to drive to the Fort would be concealed under the Wagon Shed in the Corral.

Two self-guided loop trails will be developed to take visitors from the Fort to the Arkansas River and along the Santa Fe Trail.

Utilities and all other 20th Century improvements will be concealed from the public. Signage will be eliminated or minimized. Self-guided pamphlets will reduce this intrusion on the historic scene.

INTERPRETIVE PROGRAM

The proposed interpretive program within the Fort will be here outlined and details shown in Section G, Program. Harper's Ferry N.P.S. Interpretive Center in West Virginia will be responsible for execution of the Audio-Visual and Furnishings Programs . . . the main physical elements of the program to be designed into the Fort. Requirements will be provided to the Architect-Engineer by December 1, 1973, for incorporation into the contract documents. Primarily, this involves electrical service or installation of materials to be furnished by N.P.S. such as: audio-visual equipment; historically authentic light fixtures; blacksmith forge; and all furnishings.



AUDIO VISUAL

The 6 AV rooms are very small (16' x 15' to 20' x 20'), particularly the first AV room in Trade Room 101 where the introduction show would occur. Therefore, in order to preserve the historic atmosphere and have the minimum intrusion, use of TV is suggested with slide show "idiot box" as a less desireable second choice. The remainder of the room could be furnished historically. If TV does not function satisfactorily, it can be removed and the room preserved. The Cook's Room No. 111, assigned AV, is being considered for possible shift to less-used quarters on the 2nd floor. The AV equipment room will be centrally located in the Administration for control & operation.

The 1st introduction show would be the longest (10-15 min.) and other shows shorter (5-7½ min.) to match interest span and subject matter. A combination of movies and slides could be used for variety. The programs would include the following and are located on the Room Schedule: (1) Bent, St. Vrain and Company Trading; (2) Santa Fe Trade; (3) Indian Relationships; (4) Exploration; (5) Mexican War; and (6) Personalities. The full story of the construction of the Fort, explaining the Pueblo Adobe style of architecture & its materials is also being considered. The show would be on 16 MM film and transferred to TV tape. The audience would consist of 15 to 20 persons and require minimum seating except at the 1st longer show.

Facilities for projection & sound equipment to handle larger special night functions would be included in the Plaza.

FURNISHINGS

N.P.S. will also provide all furnishings under a separate contract. Those items to be built-in, such as electrified candle lights, forge, special cabinets, etc., will be furnished to the General Contractor for installation. The furnishings will be replicas which can be replaced, rather than authentic originals.

LIGHTING

At the historically restored areas for public viewing, live candles, torches or other authentic original sources are being considered as the total light source. Feasibility of cost of materials and labor is now being considered by the N.P.S. The alternate recommended by the AE is a compromise of minimal use of electrified candles & special demonstration lighting, supplemented by live candles. Live candles could be used in electrified fixtures for special occasions.

FIREPLACES & TORCHES

These fireplaces should be operating regularly as a heat source. Pitch torches are preferred for night functions, backed up by portable electric lighting.

LIVING INTERPRETERS

Visitors will ordinarily tour Bent's Old Fort on a self-guiding basis, using the park minifolder. However, this will be supplemented by costumed interpreters "cast" as surrogates in the following roles & functions.

Name	Permanent	Part-time	Fixed	Circulating
William Bent	•			•
Clerk	•		•	
Mexican Laborer	•			•
Mexican Woman		•		•
Mountain Man, Trapper		•		•
Charlotte, Black Cook		•	•	
Blacksmith		•	•	
Carpenter		•	•	
Southern Cheyenne Indian		•		•

The schedule indicates permanent staff or part-time seasonal (William Bent would also be the Park Historian), and it shows those who would have a fixed station or those who would be circulating interpreters.

The maintenance operations will be combined with the interpretive demonstration program. Such repair done by Mexicans and Indians, visible by visitors as a special feature showing the activities of the Fort as it had been in 1846, would include: adobe mud plaster & brick making; viga stipping & other wood carpentry; metal blacksmithing, wheelwright, and gun smith; candle making; bread baking, etc. The eagle in the Belfry, domestic farm animals in the Plaza, and stock in the Corral and around the Fort would complete the "refurnishing" . . . a time space trip back to 1846 in the Colorado frontier.

ROOM SCHEDULE

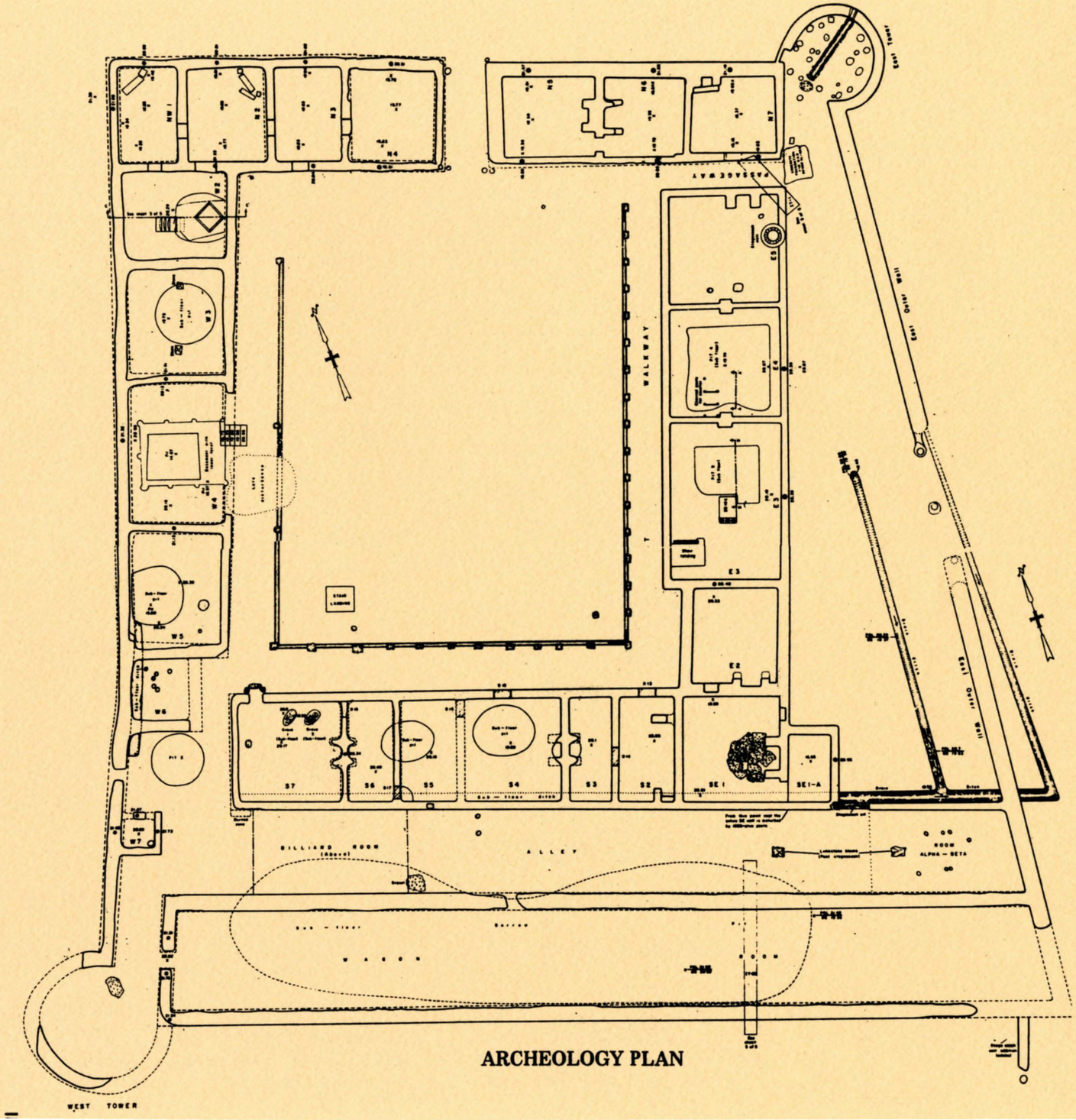
Room No.	Inter-pretive	Arch-eology	Room Name	Room Finish	Refurn-ished	Audio Visual	Heat	Vent	A/C	Plumb	Remarks
100	—		Entry	II	—	—	—	—	—	—	Gates @ North & South, Indian
101	1	N5	Trade Room	I	•	•	60°	•	—	—	"The Bent, St. Vrain & Co."
102	A	N6	Trade Room	I	•	—	60°	—	—	—	Counters & sales *2 - Clerk
103	B	N7	Trade Room	I	•	—	60°	—	—	—	Counters & sales *2
104	C		N.E. Bastion	IV	•	—	60°	—	—	—	In-situ preserved wall Small arms, gun racks, ladder
105	—		Front Alley	III	—	—	—	—	—	—	
106	—		Corral	III	—	—	—	—	—	—	Laborer & Mexican woman *1
107	—		Stable	II	—	—	—	—	—	—	
108	D	E5	Council Rm.	V	•	—	60°	—	—	—	Also living, Quarters, bench
109	2	E4	Trade Room	V	•	•	60°	•	—	—	"The Santa Fe Trade" *2
110	E	E3	Dining Room	V	•	—	60°	—	—	—	Stairs to 2nd fl., center brazier
111	3	E2	Cook's Room	I	•	•	60°	•	—	—	"The Indian Trade"
112	F	SE1	Kitchen	II	•	—	60°	—	—	—	Charlotte the Cook
113	F	SE1-A	Pantry	III	•	—	60°	—	—	—	In-situ preserved wall
114	G	S2	Bent's Quarters	I	•	—	60°	—	—	—	Wm. Bent *1
115	G	S3	Bent's Quarters	I	•	—	60°	—	—	—	
116	H	S4	Wheelwright	I	•	—	60°	—	—	—	Blacksmith w/back door
117	H	S5	Blacksmith	I	•	—	60°	—	—	—	Blacksmith (maybe quarters)
118	I	S6	Gunsmith	I	•	—	60°				Carpenter
119	I	S7	Carpentry	I	•	—	60°				Carpenter
120a			Ventibule	VII	—	—	72°	—	—	•	Drinking fountain
120b	—		Women	VI	—	—	72°	•	—	•	Formerly wagon house Public toilet w/exhaust
120c	—		Men	VI	—	—	72°	•	—	•	Formerly wagon house Public toilet w/exhaust
121a			Mechanical	VII	—	—	72°	•	—	—	
121b	—		Utility	VIII	—	—	72°	•	—	•	For uniforms w/exhaust & service sink
122a	—		Restroom	VIII	—	—	72°	•	•	•	Private Staff Toilet-Kitchen w/refrigerator-range
122b			AV Equipment	VIII	—	—	72°	•	•	—	Shelves
123			Hall	VIII	—	—	72°	•	•	—	
124	—		Storage, Artifacts	VII	—	—	72°	—	•	—	50%-60% humidity, walls
125	—		Work Room, Curator	VIII	—	—	72°	•	—	•	Also supplies w/8' lab sink
126	—		Conference	VIII	—	—	72°	•	•	—	Also Library
127a	—		Reception	VIII	—	—	72°	•	•	—	
127b	—		Admin. Asst.	VIII	—	—	72°	•	•	—	Semi-private—100 sq. ft.
128	—		Superintendent	VIII	—	—	72°	•	•	—	Private—120 sq. ft.
129	—		SW Bastion	IV	?	—	60°	—	—	—	Save for interpretive or staff
130	—		Wagon Shed	II	—	•	—	—	—	—	Also shelter for cars, Audio System
131	—		Main Corral	III	—	•	—	—	—	—	Audio System
132a	—		Corral Alley	II-III	—	—	—	—	—	—	
132b	—		Stable	IV	—	—	—	—	—	—	
133	—	W7	Unknown	II	—	—	—	—	—	—	
134	—		Wash Area	III	—	—	—	—	—	—	
135	—	W6	Privy	II	—	—	—	—	—	—	
136	—		Back Alley	III	—	—	—	—	—	—	
137	5	W5	Storage	I	•	•	60°	•	—	—	"The Mexican War"
138	J	W4	Storage w/Pit	I	•	—	60°	—	—	—	
139	4	W3	Storage	I	•	•	60°	•	—	—	"Exploration"
140	K	W2	Well	I	•	—	60°	—	—	—	Possible In-situ preservation
141	—	NW 1	Quarters	I	—	—	72°	—	—	—	Interpretive staff
142	—	N2	Quarters	I	—	—	72°	—	—	—	Interpretive staff
143	—	N3	Quarters	I	—	—	72°	—	—	—	Interpretive staff
144	L	N4	Quarters	I	•	—	60°	—	—	—	
145	—		Plaza	III	•	•	—	—	—	—	Audio system, Mountain man *1, fur press, log benches

*1 Floating Interpreter
*2 Counter and shelves

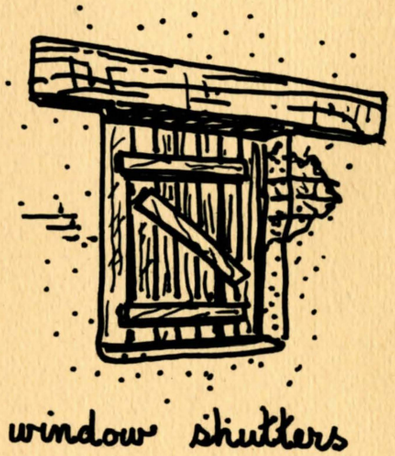
Room No.	Inter-pretive	Arch-eology	Room Name	Room Finish	Refurn-ished	Audio Visual	Heat	Vent	A/C	Plumb	Remarks
2nd Floor											
201		P	Watch Tower	I	•	—	60°	—	—	—	
202		—	Promenade	III	—	—	—	—	—	—	
203		O	NE Bastion	III	•	—	—	—	—	—	Cannon
204		—	Promenade	III	—	—	—	—	—	—	
205		N	St. Vrain's	I	•	—	60°	—	—	—	
206		—	Promenade	III	—	—	—	—	—	—	
207		M	Billiard Room	I	•	—	60°	—	—	—	
208		—	Promenade	III	—	—	—	—	—	—	
209		R	SW Bastion	III	—	—	—	—	—	—	Cannon
210		—	Roof	III	—	—	—	—	—	—	
211		—	Clerk	I	•	—	60°	—	—	—	
212		6	Quarters	I	•	•	60°	—	—	—	"Personalities," clerk's room
213		Q	Quarters	I	•	—	60°	—	—	—	
214		Q	Quarters	I	•	—	60°	—	—	—	
215		Q	Quarters	I	•	—	60°	—	—	—	
216		Q	Quarters	I	•	—	60°	—	—	—	Susan Magoffin's
217		—	Promenade	III	—	—	—	—	—	—	
218		—	Promenade	III	—	—	—	—	—	—	

ROOM FINISH SCHEDULE TYPES

Symbol	Use	Floor	Walls	Ceiling	Remarks
I	Historical interior	Adobe	Stab. Adobe	Wood	Masonry & plaster stabilized w/white wash vigas & latias
II	Historical exterior	Gravel	Reg. Adobe	Wood	Masonry & plaster regular unstabilized mud
III	Historical exterior	Gravel	Reg. Adobe	Open	Masonry & plaster regular unstabilized mud
IV	Historical rough	Gravel	Reg. Adobe	Wood	Same as II; but w/o mud plaster
V	Historical interior	Adobe	Stab. Adobe	Wood	Rectangular beams w/possible burlap or mud plaster ceiling
VI	Public Toilet	Cer. Tile	Cer. Tile	Wood	
VII	Administration	Conc.	Stab. Adobe & Dry Wall	Wood	Plank wood panels @ Vestibule 120a
VIII	Administration	Resilient	Stab. Adobe & Dry Wall	Wood	Plank wood panels @ Reception 127a & Supt. 128



ARCHEOLOGY PLAN



HISTORICAL ARCHITECTURE

Charles Pope, N.P.S. architect, was scheduled to write the architectural section of the research in 1966, however funds were cut off and only the preliminary sketches were done. This was unfortunate as it is most desirable for the historical, archeological, and architectural research to be done concurrently. Therefore, historical decisions on the architecture are now being made. This is primarily a joint effort by Russell Jones, N.P.S. Southwest Historic Architecture Specialist along with other N.P.S. personnel, and George A. Thorson, KW Architect. The procedure is based on first analyzing the on-site archeology and historical evidence, particularly Lieutenant Abert's drawings and diary. If not a conclusive answer, then the Method Acting approach is used to determine what typical function or detail would have been executed by the 150 Indian and Mexican workers brought from New Mexico. The construction was primarily the pueblo adobe style used prior to the Territorial Style which was later adopted by the Americans about 1845.

DIMENSIONS

The on-site evidence of the archeology plans has first priority on determining dimensions, backed up by the original Lt. Abert's drawings. Although his drawings are the most accurate source of information, some discrepancies were uncovered. A notable example shows both bastions with a 27' diameter, although the actual ruins show only the S.W. bastion at 27' while the N.E. bastion is 20'. Presumably Lt. Abert measured only one bastion and assumed the other was the same. Allowance has been made to increase wall thickness from the eroded ruins dimensions back to the assumed original width. Vertical dimensions are per Lt. Abert's elevation & logical heights for other rooms.

DIRECTIONS

For ease of identification the entrance gate is shown as North, although actually N.E. This added to confusion in the history as the gate was sometimes called East.

PHASED CONSTRUCTION

As the historical research indicates, construction may have started as early as 1828, interrupted by the smallpox epidemic in 1829, and probably completed by 1833. However, the Fort was not completed in total as it existed in 1846. The Fort constantly was remodeled and additions made, a relative easy procedure with adobe construction. Although the evidence is not complete, conjecture suggests the following phased construction.

a. *North gate, north rooms on the west side, NE bastion, east, south, and west rooms . . . all forming a square around the plaza.*
b. *East & south corral walls & SW bastion, with a simple wagon shed on the south open on the north side.*
c. *North trade rooms on the east.*
d. *2nd floor quarters on the west, St. Vrain's room, north guard house & belfry, and the billiard room.*
e. *Wagon shed replaced by permanent storage area for the military supplies, and a new wagon shed to the south in the new larger corral.*

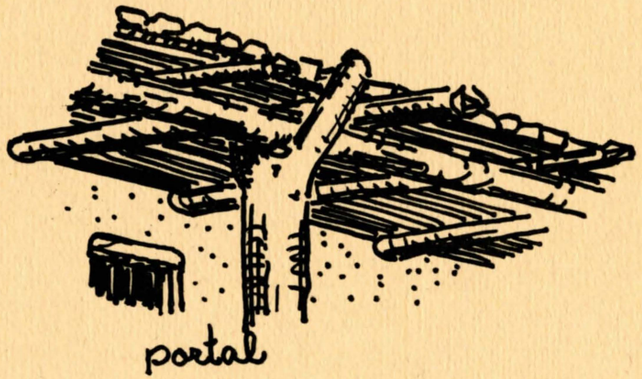
This is mentioned as some decisions are based on phased construction which explains certain details.

HISTORICAL RECONSTRUCTION

All of the Fort, except the Wagon House No. 120-128, will be constructed historically without apparent 20th century intrusion and will be available for use in the Interpretive program. The Wagon House will house all staff functions, public toilets, and equipment. This administrative area will have authentic appearance and materials, although the interior will be adapted to the functional requirements using materials & light fixtures compatible to the Southwest style architecture but not authentic 1846. The authentic materials & staff requirements are discussed later in greater detail. Following starts discussion of some specific area decisions.

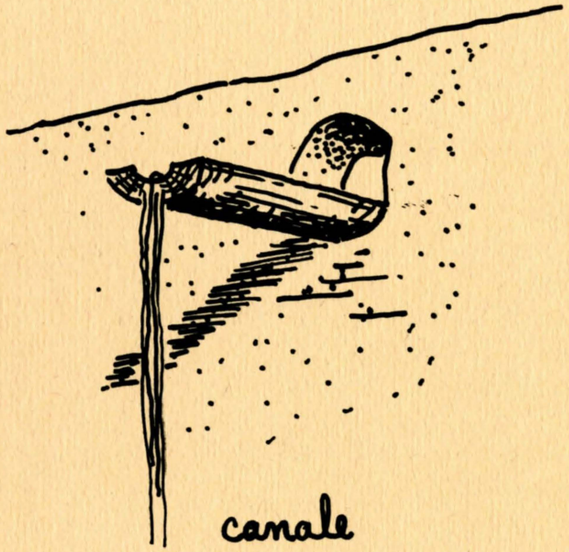
IN-SITU PRESERVATION

Little remains of the adobe ruins, which is now a row of mud about 1' high. However, 2 areas will be preserved if possible. One is in the NE bastion No. 104 and the other is in Pantry No. 113.



ROOFS & FRAMING

Most of the roof types and dimensions are determined by the historical data, particularly Lt. Abert's drawings. However, the Billiard room and Pantry are based on typical pueblo architecture. The framing plan, showing vigas & posts, is based primarily on the archeology ruins that indicates direction of beams etc. along with the typical framing of that period. Vigas vary from 8" to 12" in diameter, depending on span, and average 2'-8" O.C. They would vary, show extra posts for support of sagged beams and othe r natural imperfections.



Lt. Abert, in his elevations of the court, showed all round vigas. However, a water color of the Council Room shows rectangular beams. It is possible that these may have been replaced due to damage or because this was a more refined area. Therefore, rooms No. 108, 109, and 110 will have rectangular beams.

CANALES

These rain gutter spouts projected about 2' thru the adobe parapets, and are located on the lower side of the roofs. The roof vigas' taper are set in the same direction to provide the natural slope for drainage.

DOORS & GATES

These openings are sometimes evidenced in the ruins, but not always as there may have been a buried adobe sill or a step-over curb. Therefore, historical evidence or conjecture of an absolute need is used.

The main north gate is shown as 6½' wide x 7' high, extremely small for wagons to enter. However, the ruins indicate about an 8' opening with evidence of posts. Therefore, we are showing the larger opening with a pair of wood planked doors sheated with metal and nail studs, per history. Also, there is a similar pair on the inside, forming a protected entry area where Indians traded & formed extra protection under attack. The east corral gates are a similar pair of gates, per history & ruins. The south corral had one larger gate, more like a regular cattle gate than a fort. From the south corral thru the Wagon House, there must have been barn doors to connect the two corrals, although the ruins were destroyed in this area by a later road. History indicates a cattle gate near the pantry and stable controlling the alley.

Plaza doors appear on Abert's drawings although are too high to always show on archeology plans. Furnishings study indicates connecting doors with raised sills connecting Council No. 108, Trade No. 109 and Dining No. 110. There also would have been a connecting door to Cook's No. 111 for serving, rather than taking food outside. Similar connecting doors are shown near the Blacksmith No. 117-118. At this same room archeology shows a major opening with outside plank floor. This is probably the back gate referred to by Boggs, and would be required for the blacksmith. Furnishings study indicates an arched opening which is unusual but interesting.

WINDOWS

Windows are also shown on Lt. Abert's drawings of the Plaza. Other windows are above the level of the ruins, so not identified. A major premise is that a fort would not have exterior windows, so based on phased construction, we assume there were no windows on the east side of rooms No. 109-113 to the inner corral.

ENTRY NO. 100

Formed by the two pair of gates, this entry has a hatch opening into Trade Room No. 101 for Indians to use occasionally.

WATCH TOWER NO. 201

Above the main entrance, the watch tower had small windows on 3 sides and a door on the south. The belfry above was open except for the woven diagonal screens to house the eagles and bell. A ladder would be here for access. The flag pole is shown in several locations but we indicate it mounted on the west side, per Lt. Abert and easier to construct originally.

TRADE ROOMS NO. 101, 102, 103

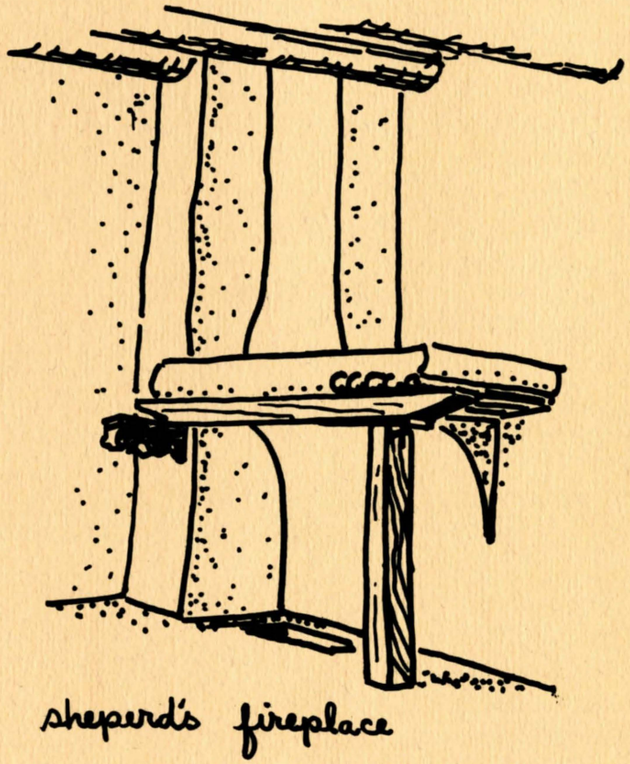
These 3 rooms are similar with connecting doors & raised sills. There are back to back American fireplaces in No. 101 & 102 and a corner Indian fireplace in No. 103. The vigas in No. 103, as the archeology shows them, span east-west, opposite of normal framing, and projecting on the east.

BASTION NO. 104

The basions are unique round towers with the muskets, sabers, and lances mounted on the walls. The framing here is shown spanning diagonally with many posts, shown in the archeology, to support a cannon on the upper floor. The ladder is shown on the side, per Lt. Abert's plan. The trench going under the wall may have been some form of drainage or privy. Boggs refers to a coal hole, but its use is not satisfactorily explained because it would weaken protection of the fortress wall. On the upper level, which is 4' higher than the main 2nd floor, are steps bridging across. Handrails are included for safety, although no evidence is available.

CORRAL NO. 106

There is an alley No. 105 leading from the Plaza to this corral, which was the main original stockade for all animals, but later after the main corral to the south was built it was presumably only used for special animals. There is a wood walkway shown along the battlement, connecting the bastion to the roof of the stable. This is conjecture that this existed, although it is logical for protection, port holes are shown on some drawings, and even posts for the stable were not able to be found.



BATTLEMENTS

This outside wall was the firing line of the fortress. The parapet was 4' high, enough to protect a defender or able to be fired over. The portholes for musket fire are actually shown 3 different ways in the historical data . . . conical, horizontal, and vertical. However, our concensus is that they were vertical, about 6" wide x 8" high on the outside, and sloping inside to approximately 14" x 14" at a 30" height for firing from a kneeling position.

EAST ROOMS

Abert's drawings of the court show all roofs sloping inward toward the Plaza and there are no handrails or parapets on the Plaza side. Here is where Indians and other people of the Fort sat to watch functions in the Plaza. However one Abert drawing shows a possible parapet on the exterior side of these East rooms. For this reason and safety we have shown a 2' parapet along the east side and around the south to the billiard, the presumed original exterior walls.

COUNCIL NO. 108

This was a major area, used as: council room with the Indians; living room; and visitor's quarters. The rectangular beams are mentioned elsewhere. They had two intermediate beams supported from adobe buttresses & posts due to the bigger span. The American fireplace along the north wall could have had the sheperd's shelf above, typical of New Mexican style, also the built in adobe bench shown along the east wall.

TRADE ROOM NO. 109

Here is where special trading was probably carried on . . . firearms, gun powder, jewelry, etc. There is on-site evidence of the counter, shelves, and pit cellar shown.

DINING NO. 110

The largest room in the Fort, it was a center of social activity. The mid-span beams were supported by 3 posts in the center of the room. However, surprisingly there is no fireplace indicated, but heat was obviously provided . . . probably from an oven or brazier in the center of the room. Historical refers to a "winding stairs going up to St. Vrain's room above." A base & sill for stairs shows on the site in the SW corner. However, a true spiral stairs is not indicated on the ground and it would not have gone up to St. Vrain's which is above the cook's room. Therefore, a stairs rising to a landing, offset & then going to St. Vrain's is shown.



hornos

COOKS NO. 111 — *This was the serving area, possibly the Negro cook Carlotte's room, and furnishings indicates it was also for any children at the Fort. It would have had a connecting door for serving.*

KITCHEN NO. 112 — *This room has the largest fireplace and hearth. Although trappers and other workers probably cooked in their own quarters, meals for principals of the Fort and honored guests were prepared here.*

PANTRY NO. 113 — *This small room off the kitchen, probably added later, has a fairly well-preserved adobe foundation in the cellar which is down 4½'. This wall will be an in-situ remains exhibit. Steps down & shelves completed this room.*

HORNOS — *These adobe beehive ovens used for baking are located outside to keep the heat out in the summer. Two are shown in the area near the kitchen.*

STABLES NO. 107 & NO. 132b — *These 2 shed areas in the inner corral are similar with a wood portal roof. Stables No. 107 was probably more of a shelter for animals to be separated from others. It is possible that No. 132b was sometimes used for sleeping also.*

TRENCHES — *Drainage trenches occur at various locations, some probably received water from roofs and drained away from the adobe walls. Others may have been for watering of animals or waste drainage.*

BENTS NO. 114 & NO. 115 — *These 2 rooms form a suite for William Bent with sleeping area, living room, and office. The niche in No. 114 presumably was a closet.*

WORK ROOMS NO. 116, NO. 117, NO. 118 & NO. 119 — *These 4 rooms are designated by supposed function and have connecting doors & American fireplaces. The Blacksmith Shop No. 117 is also discussed under Doors & Gates. A forge is located in the SW corner.*

ALLEY CORRAL NO. 132a — *This open area, originally corral, has an area with widely spaced vigas and wood-brush roof forming a sun shelter, much like the portal of the Taos Pueblo.*

WAGON HOUSE NO. 122-128

As mentioned under 'Phased Construction', this wagon shed probably was open on the north side when it housed the 12 to 15 large wagons mentioned in the history study. However, later when the expansion occurred and the wagon shed was relocated in the new corral, this area was built higher with a roof at 12' and probably used for military supplies . . . a fact they may not have advertized. Abert's drawing, shows steps from the porch of the billiard room up 2' to the roof.

This will become the administrative area, housing functions discussed separately, and will not be part of the authentic interpretive program although materials will be compatible with the Southwest Architectural style.

WAGON SHED NO. 130 & CORRAL NO. 131

The wood roofed wagon shed can also conceal the few automobiles permitted to drive to the Fort. The barn doors to the administrative Reception No. 127a would actually be wood walls with personnel doors for access and safety exit. The main corral at the rear of the Fort was enclosed by a 6 foot high wall topped with prickly pear cactus to discourage raiders.

BILLIARDS NO. 207

This unique room bridges from the main Fort across the alley to the Wagon House. On the east, there is a porch with portal above and the entrance door. Handrails are added for safety although no evidence. The fire place and small bar are at the west end.

BASTION NO. 129

This larger bastion, 27' diameter, is similar to the NE bastion, however, a center opening for a main ladder and stronger support of posts is shown. An exit door is included for safety & functional use, although no evidence for or against its existance. A bridge & stairs connect the upper level to the 2nd floor.

AREA NO. 133

This small area is still a mystery, although a possible smoke house or gun powder storage has been suggested by History.

PRIVY NO. 135

Presumably, the principals used chamber pots in their rooms, however there apparently was a privy for others when the cold or dangers prevented them from going outside the Fort. There is a trench along the west wall and it is near the cistern for water. It may have been combined with the adjacent wash area.

STORAGE NO. 137, NO. 138 & NO. 139

The stairs going down to a 2 level pit in Storage No. 138 is an interesting problem as they start outside the only door, which would make the main level floor unaccessible. Our conclusion is that there was a wood plank floor over the pit with a trap door at the entrance.

WELL NO. 140

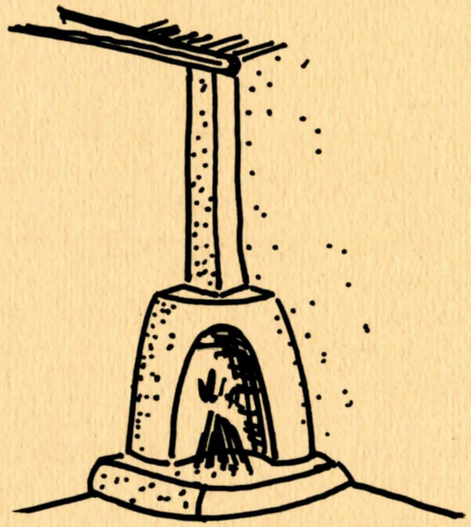
Here is the sunken well, sheathed with wood plank walls and a stairs leading down from inside the room.

QUARTERS NO. 141-NO. 144

This area was probably the main quarters for the Mexican workers & trappers, as noted by the Spanish type corner fireplaces. Other functions may have occasionally happened here as mentioned by Boggs & George Bent.

QUARTERS NO. 211-NO. 216

Not too much is known about these rooms as there is no on-site evidence. However, the Clerk's Room No. 211 apparently had a short bridge to the door, shown by Abert. This plan also shows chimneys in room No. 211, No. 212, No. 214, & No. 216 for corner fireplaces. The end room No. 216 with windows to the outside & the Plaza had to be the one mentioned by Susan Magoffin in her diary.



corner fireplace.

ST. VRAIN NO. 205

This was another special guest room with a corner fireplace and the winding stairs down to the dining room. The door & portal are on the west side.

FIREPLACES

There were primarily two main styles, although variations of each. The corner fireplaces are of the Mexican-Indian type where the fire was built in teepee fashion. The two cheeked fireplaces along the wall were of American design and often 2 were backed up to each other in an H shape. The chimneys were high adobe stacks, however if it did not draw they were extended by stacking open pots on top.

LADDERS & STAIRS

Two external stairs from the 2nd floor down to Plaza are wood and have rough handrails for safety. Other ladders of the Indian type run from 1st to 2nd floor and on to the roofs. Some of these are shown on Abert's drawing and others are located where logical.

HANDRAILS

Where there is no definite historical evidence, handrails will be added for safety . . . such as stairs & bridges to the bastions. However, Abert's drawings absolutely show no handrails at the roof edge to the Plaza. These are not added as they would be historical intrusions. A portable rope rail may be required for safety, but N.P.S. should advise us of their requirements. Any railing along the edge of the portal would ruin the building from a photographic standpoint.

RELIGION

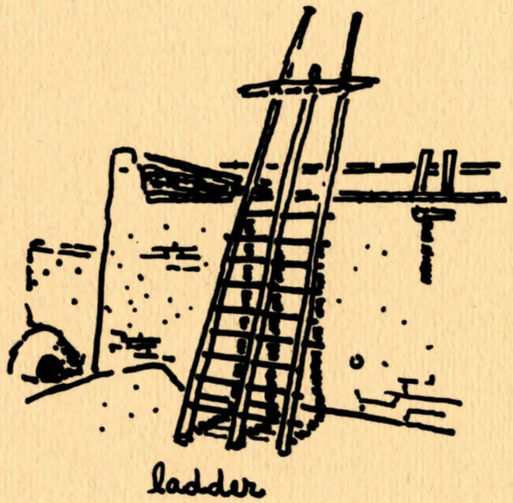
There is no reference to religion or chapel in the history data. However, the Mexicans were generally Catholic and the Bents were protestant. There probably was a small niche for a shrine in the Mexican area and maybe a cross hanging on the wall.

INTERIOR WALLS

These plaster walls were generally white washed, although the archeology also indicates some colored walls which will be followed.

ICE HOUSE

There is no historical evidence of what the ice house looked like or where it was located. However, a George Bent drawing shows it SE toward the Arkansas River. We will need to be provided information on appearance of ice house desired by N.P.S. in order to execute the design.



RECONSTRUCTION CONCEPTS

The Fort should have the authentic appearance as it existed in 1846, showing imperfections and state of partial repair. However, in order to be practical and reduce maintenance, engineering modifications will be incorporated.

Under Sections H & I, Materials & Systems, these decisions are discussed in detail. However, they particularly involve: adobe bricks, mud plaster walls, and floors; fireplaces & chimneys; rough hewn aged viga beams and latia deck roofs; wood windows, doors, cabinet work; stairs & ladders; metal & hardware; and other authentic materials. Engineering modifications include: stabilized adobe brick core walls coping & interior plaster; concrete foundation; masonry bond beams; concrete floors & roof decks; insulation & water proofing, glass windows; radiant heating, exhaust ventilation, and plumbing; and lighting & power.

SAFETY REQUIREMENTS

AE's will be concerned about safety protection, but will not over-do to the detriment of the historical preservation authenticity. Handicapped people will be given special permission to use service lane to Fort, however, will be expected to remain on 1st floor only. Do include one special size water closet at public toilets for handicapped.

BUILDING CODES

The Uniform Building Code will be the guide for standards where shown, and will be followed where the historical preservation will permit. Good architectural & engineering practices will be applicable.

HISTORIC PROGRAM

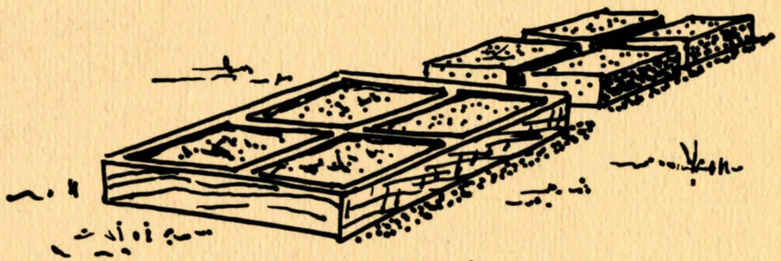
The interpretations of use of historic rooms is discussed fully in Section F, Historic Structures, and shown in Room Schedule.

ADMINISTRATION PROGRAM

All of the administrative & public facilities will be housed within the area originally designated as the Wagon House No. 120-No. 128. The permanent staff consists of 6 persons, listed below with the space requirements, 4 having office space in the administrative area. The clerk will have a permanent station at Trade Room No. 102 in charge of sales at the Fort. The maintenance man will have headquarters at the maintenance building. The 7 part-time seasonal interpreters would have use of Quarters No. 141, 142 & 143 as their headquarters.

Space	Remarks
Superintendent	*Private*
Administrative Asst.	*Adjacent to Superintendent*
Reception	*Centrally at entrances*
Conference	*10-15 persons maximum, with Library*
Curator	*Office for Curator & desk for Park Historian, with workroom & 8' double sink.*
Artifacts Storage	*Dead storage (7) metal cabinets & shelves, humidity control.*
Audio-Visual Equip.	*Central TV, tape decks & storage*
Staff Restroom	*Water closet, lavatory, cabinets, small refrigerator & hot plate.*
Utility Room	*Washer & dryer for costumes, janitor's sink, and electric panels.*
Mechanical Room	*Heating & air-conditioning equipment.*
	Comfort Stations
Public, Women	*3 water closets (1 for handicapped), 3 lavs.*
Public, Men	*2 water closets (1 for handicapped), 2 lavs., 2 urinals*
Vestibule	*Drinking fountain*

These areas will have the same historic walls and roof as the Fort, however, the interior finishes will be conventional materials compatible with Southwest Architectural style, such as: resilient floor over concrete; drywall partitions (permanent type @ toilets thru the Artifacts Storage & temporary type for future modifications if required at office areas); ceramic tile floor & walls, metal partitions, etc. at toilets; and Spanish light fixtures.



adobe bricks

HISTORY

Adobe is one of man's first building materials and still is used extensively in the dry climates of the world. The Spanish word derives from the Arabic "atub," literally, sun-dried brick.

The Indians in the American Southwest had used the adobe mud for their permanent shelters long before the arrival of the Spaniards in the 1500's. But the Indians' method was to "puddle" the adobe, a slower, less refined technique. Stiff damp mud was carried in baskets and placed in courses of 8 to 10 inches deep, allowed to dry, and then another course placed on top. This is a method still used in North Africa and the Middle East.

The Spanish explorers were interested in finding the Indian mud buildings, which they compared with their own adobe homes. Fray Marcas of Niza, the first Spanish Franciscan explorer into the Mexican Territory, discovered the Zuni Pueblo before 1539 and was amazed by the temples of mud & stone. But the Spanish had made brick units, a faster and easier method of construction. They taught the Indians who quickly adapted the bricks into their buildings, known as the Pueblo Adobe style.

After the American army occupation in 1846, there was a strong movement to Americanize the Spanish villages of New Mexico. The brick coping on top of the parapet was added . . . to protect the adobe from rain fall. The buildings had new exteriors of more refined wood windows, doors columns, and other colonial trim . . . this became the Territorial Adobe style.

The San Diego Exposition was the next great influence in 1917. New Mexico's exhibit was done in the Earlier Pueblo Adobe style. Apparently very popular, it was brought back to Santa Fe for a rebirth. The Palace of the Governor in Santa Fe tells the whole story in one building. The oldest civil structure in the United States, it was begun in 1610 in the Pueblo Adobe style. It was gradually "modernized" after 1846 and the major renovation in 1878 created a full Territorial style. Later in the 20th Century, the corner & portal were remodeled back to the Pueblo Adobe style. Architectural Control ordinance passed in 1957, requires the exterior central historic part of Santa Fe to be designed in the Historic Pueblo

style. But the newer designs are generally not authentic . . . adapting new methods to attempt less maintenance.

The Spanish house was built around a central court or plaza, originally brought to Mediterranean Area with the Moslem occupation. This form dominates the houses and squares of the Southwest, and is the nucleous shape for Bent's Old Fort. There were very few exterior windows (in fact none at the Fort on the 1st floor for protection), as the openings turned in to court . . . center of activity.

CHARACTERISTICS

The main reason for the use of adobe construction was the availability of materials and labor. There was practically no cost for adobe soil and inexperienced labor can do the construction. Of course, as techniques change and minimum wage laws go up, the cost of adobe goes up also, comparable to conventional construction. Adobe walls have adequate strength, particularly when the thicker 16"+ walls are used. It is completely fire resistant & vermin proof. The thick walls result in several comfort factors: it is warm during the winter and cool in the summer due to temperature time lag—a savings on heating & cooling costs; the small openings also are involved; and finally the sound insulation against noise pollution. In the warm, dry climate of the Southwest, the style is an attractive sculptural shape and part of the cultural heritage of the area.

The main concern of adobe is the maintenance, particularly of the exterior plaster. Standard adobe bricks erode away from water, particularly at 3 points: the top of exposed copings from direct rain; base of the wall from splash; and the foundation from capillary sub-soil water action. Therefore, repair is done by applying plaster over the bricks. The authentic mud coat plaster, applied generally by hand by the Indian women, requires minor repairs every few years and is probably the most economical finish. It melts together with the bricks forming a conglomerate mass with the soft appearance. None of the exterior stuccos or new "soft coatings" have been successful and they do not look authentic. The cement stucco cracks after a few years. Water, thru the surface & from capillary action, gets behind the stucco . . . thus melting away the adobe. One church now has a hollow wall with only a stucco skin. The new "soft coatings" and the lime-sand stucco breathes some and do work better. Stabilized bricks and plaster have minimum erosion, but do not look authentic texture or color.

Roofs now are used to protect the top of the adobe wall, but we cannot deviate from the historical evidence on the Fort. Although Bent's Old Fort was built with the adobe layed directly on the ground as the foundation, many pueblo walls used a stone foundation running about 8" above grade to prevent splash & capillary problems thru good drainage. The thicker adobe walls do require thicker foundations, however cost can be lowered by reducing formwork and pouring directly into a rough trench.

The interior plaster surfaces were used more to provide a finish appearance than for maintenance repair. Therefore, the whitewash or colors taken from adding actual soils were protected and more permanent. Natural adobe or lime were originally used, but the current water-soluble points have a similar appearance.

MATERIALS

UNSTABILIZED

A suitable adobe soil is primarily based on trial tests. Originally the Indians could moisten some soil into a ball in the hand and be able to know. The basic characteristics are:

1. *Easy mixing and slip free of mold, if sticking occurs = too much clay.*
2. *Not fall apart if 8" high mound = too much sand.*
3. *When dry, it should not warp or crack = too much clay.*
4. *When dry, it should not chip = too much sand.*
5. *Excessive erosion under moderate rain = too much sand.*

Basically, adobe is comparable to concrete with the clay similar to the cement and the sand being the aggregate.

The ideal mix generally is: 25%-40% clay; 60%-75% sand; and 4% water. The straw is optional in unstabilized adobe, as it is a binder like the sand, but should not be used in stabilized soils. However, straw does create a more authentic appearance.

STABILIZED

Stabilized adobe bricks, those that have admixtures for better strength & erosion properties, are of many types, but a summary can be simplified to 3: chemical compounds; asphalt emulsion; and soil cement. Generally, there is an appearance change in stabilized adobe which is objectionable for authentic historical appearance.

CHEMICALS

The chemical compounds, almost every type of binder or water-proofer has been tried, were tested particularly in order to find a preservative for adobe ruins. However, the National Park Service at Pecos National Monument under the direction of Charlie Steen & Gary Matlock have tested the following chemicals:

- *Pencapsula, a polyurethane resin by Texas Refinery Corp., Fortworth, Texas.*
- *Acryl 60, an acrylic polymer by Standard Dry Wall Products, Inc., New Eagle, Pennslyvania.*
- *Soil Seal, a methacrylate by Soil Seal Corporation, Riverside, California.*
- *ISO-110, a silicate by Hoesch-Chemic, Duren, West Germany.*
- *Silicone by commercial source.*
- *Hydrozo, a synthetic wax.*
- *Concrete Sealer & Hardener, by Camp Co., Chicago, Illinois.*
- *Tyndall Solution, a special mixture, by Merritt Tyndall, Albuquerque, New Mexico.*
- *CB-224, a water miscible liquid like casein, by National Chemsearch Corp., Irving, Texas.*

Other materials tested internationally include straw, sulfite liquor, Aliquat H226, fly ash & lime, wood ashes, resins, coconut oil, tannic acid, rotted plantain leaves, cattle urine, cow dung, molasses, gum arabic, and juice from various plants.

Some of the above chemicals were partially successful as an adobe preservative in areas that were warm & dry, but they all broke down under a true freeze-thaw test. Mainly, either a surface seal or penetration creates a water stop behind the seal depth which freezes and the surface spawls off from expansion. More research is needed.

ASPHALT EMULSION

These asphalt solutions are used extensively, particularly in California. The typical mix is a 5% additive. However, our findings indicate 2 objections: the brick is a darker, non-authentic color and it reacts unfavorably when more than .5% alkali salt solution is in the soil.

SOIL CEMENT

The soil cements are used throughout New Mexico for the greater strength & durability. A 10%, by weight, mix of: 1 part Portland cement, C150, type II: 2 parts lime C207, type S: & 12-14 parts sand, C144, is added to the regular adobe soil. There is a slight grayer color and slicker finish resulting, which may be objectionable. However, tests are being made and stabilized materials will almost always be concealed.

SITE SOILS

Three different soils from the Fort site have been tested and reported in the Soils Investigation Report. Interestingly, they are 3 different colors, similar to the 3 found in Fort excavations. A summary:

Type	Location	Color	Clay	Sand	Comment
Soil No. 1	*Near Fort*	*Brown*	*78%*	*22%*	*better*
Soil No. 2	*Flood Plain*	*Gray*	*99%*	*1%*	*no good*
Soil No. 3	*State Land*	*Tan*	*54%*	*46%*	*best*

Actually, all soils indicate too high of a clay content, so probably sand will need to be added.

PROPERTIES

The minimum acceptable properties to be tested will be specified, however a summary is:

- *compression* — *300 PSI*
- *moisture* — *4% by weight*
- *absorption* — *2½%, at 7 days on 1 face*
- *rupture shear* — *40-50 PSI*
- *erosion* — *1/16" at 2 hours of 20 PSI water spray*
- *freeze-thaw* — *non-sprawling*

SAMPLES & TESTS

Presently, adobe samples are being manufactured at the site, under the direction of John Patterson from instructions provided by KRW. Different soils are being used, along with 3 types of bricks: unstabilized; soil cement; and asphalt emulsion. Samples will then be tested for the above properties and the results included in the final design.

MANUFACTURING

On-site manufacturing, the most authentic material source and interest to visitors, can be of 2 basic methods: hand or machine. The hand method would be similar to the original brick making at the Fort. Ingredients are mixed dry, then water is added (sufficient only for adequate mixing—the dryer mixes are stronger). A pug-mill type mixer is recommended, not a cement mixer. The soil mix is placed in wood forms on a level ground area and tamped. Then the forms are carefully removed. Brick is allowed to dry slowly to reduce shrinking and increase strength. Forms are wet at start to prevent sticking, moisture is sprinkled on tap during molding, and kept moist during curing period. Sometimes they are covered with moist burlap if extra hot or dry.

The bricks are left on the ground, undisturbed for 3 or 4 days or until hard enough to handle, then stood up on side to facilitate "drying out" from all sides. They should be protected from rain erosion or other damage. Animals are attracted to them as well as children. After a week to 10 days of drying on edge, they should be strong enough to be stacked and covered for protection. Breakage from cracks should not exceed 10% and it can be scored, split, and used. A two-man crew can make approximately 500 adobe units per day, about a 25% savings if on site.

An alternate is use of a portable adobe machine, which is available in Denver, Gallup, New Mexico, and Santa Fe, New Mexico. These form one unit at a time from a mixer hopper, with applied pressures. This is particularly helpful for stabilized adobe units.

OTHER SOURCES

The closest off-site source is the Sangre de Christo Center at San Acacio in San Luis Valley, about 150 miles from the site. This is an alcoholism rehabilitation program and the bricks are made by hand by the primarily Chicano residents. These are asphalt emulsion units, and probably have a color difference. The large brick unit has been priced to us at 18 cents plus loading and shipping, which gives us a back-up source if not on-site.

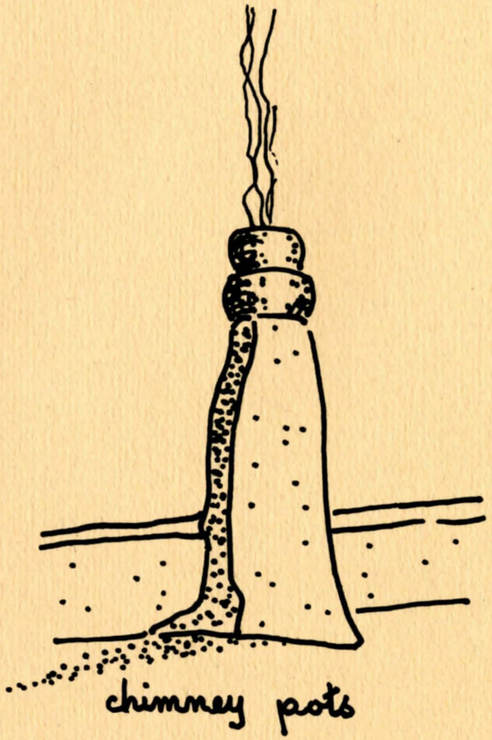
INSTALLATION

Adobe bricks are layed similarly to regular masonry, however the authentic appearance should be somewhat irregular rather than true & refined. Mortar is of the same mix as the brick, only smaller sand particles. The corners would be bonded with headers every 3rd course. There would be ties between wythes and ladder reinforcing in every 6th course of the stabilized bricks. All of the wall is tied into one mass. About 1 foot of row is layed per day, allowed to dry to avoid excessive slump, averaging about 500 bricks. A horizontal bond beam should be under the ends of the vigas, forming a bearing point and lateral brace. The exterior walls slope back for stability.

RECOMMENDATIONS

As discussed under Section G, Program, the reconstruction should be of historical appearance with concealed engineering modifications.

- *All exterior adobe walls would be one wythe of unstabilized adobe brick & mud plaster, allowed to erode and weather. Straw would be added to mud plaster for appearance.*
- *The maintenance & interpretive programs would be combined so that repair of the mud plaster would happen each summer as a visitors' attraction.*
- *The interior finish walls, bearing & non-bearing would have stabilized adobe brick wythes and plaster. It will probably be soil cement, dependent on results of sample tests. This would provide the sound concealed structural system, and avoid dusting and transfer to visitors' clothes.*
- *A few walls, like the Bastions, are shown with exposed unstabilized adobe interior walls without mud plaster. This is for contrast where we have a roof shelter and erosion would not occur or require repair.*
- *The foundations would be concrete, below the 3' frost line. Stones would be used up 8" at the bottom of exterior wythe of brick to prevent effects of splash and capillary action.*
- *Top of copings would be stabilized adobe for horizontal tie and reduce effects of rain.*



ARCHITECTURAL

The Floor Plans, Framing Plans, Elevations and Details along with Room Schedules, visually indicate the preliminary design. Shown are some of the special pits, wells, cellars, stairs, ladders, fireplaces, counters, benches, etc. Others will be developed during the contract drawings. The framing of the vigas & posts are shown to indicate the architectural appearances and will be modified by engineering design. The room schedule shows floor, wall, and ceiling finishes.

ADOBE WALLS

See Section H.

ADOBE FLOORS

These will be authentic adobe mud placed over the concrete slab containing the radiant heating. Rigid insulation below & waterproof membrane will resist heat loss to the ground and prevent capillary action. The adobe floor will receive an oil & turpentine finish for sealing & hardening of the surface.

ROOFS

These are a composite system: starting with vigas supporting latias & straw; flexible form; structural light weight concrete slab; insulation; roofing; adobe; and gravel topping.

CEILINGS

Where there is another room above, the composite system is modified to accommodate the radiant heating: vigas; latias & straw; membrane; insulation; concrete slab with radiant pipes; and adobe floor.

FIREPLACES & CHIMNEYS

As discussed elsewhere, these will be of 2 types—Spanish corner and American wall. The chimneys are adobe with some having the chimney pot extensions. These should be made by an Indian woman who is the most qualified. A concealed damper will be installed to prevent draft, although the fireplaces will have live fires in the winter and exhaust in the summer.

VIGAS & POSTS

These will be of rough hewn native wood, stripped of bark, with adz marks & axed ends. All wood should have aged appearance, particularly exterior surfaces, either naturally weathered or treated with wire brush, mild acid etch and bleach. All as approved by sample submission. They will be spaced irregularly, from 2'-6" to 3'-0" with a 2'-8" average and projecting ends will vary in distance. Extra posts will be added under some beams to indicate typical repair

procedure. All members are round, except at the Council Room No. 108, Trade Room No. 109, and Dining No. 110, which will be rectangular, with a plank ceiling deck. Wood will also receive a fire-retardant preservative treatment.

STAIRS & LADDERS

Include squeak in wood, where feasible. Stairs with appropriate period handrail for safety, ladders O.K. elsewhere for visitors, however, rungs can be spaced for comfortable use. Not required to provide access to 2nd floor for handicapped persons.

WINDOWS

Historical data indicates Susan's Maggafin's room had a glass window, others not definitely determined. However, for temperature control through all seasons, all windows must have glass or appropriate historical substitute (possibly simulated translucent animal hide).

DOORS

These are all wood, but of many different types depending on location and use. The main gate and the east corral gate have an exterior metal protective covering with stud nails. These would have the wood pintel pivots, others have strap metal hinges.

CABINET WORK

All the wood built-ins will be hand made by craftsmen familiar with the Southwest furnishings techniques.

METAL & HARDWARE

Again, these will be hand made by specialists in historic restoration.

STRUCTURAL

DESIGN LIVE LOADS

Roofs	*25 psf*
Public rooms & corridors	*100 psf*
Small quarters	*50 psf*
Wind	*30 psf*
Seismic	*Zone 1*

SYSTEMS

The foundation is continuous reinforced concrete, with gravel for drainage adjacent to foundation and under the reinforced mesh concrete floor slabs.

Stabilized adobe masonry walls with horizontal concrete bond beams and wood posts form the support system.

The roofs and second floor system consist of the wood viga beams, latias deck, and light weight concrete deck . . . forming a diaphragm bracing of the walls.

Door and window lintels will be rough hewn wood anchored into the masonry.

CODES

Applicable Codes of ACI, UBC, and AISC will be complied with.

MECHANICAL

HEATING

In order to have a concealed source at the historical areas, heating will be accomplished with a radiant floor system. Low temperature hot water will be circulated in a sinuous piping system located in the floor slab. The operational fire places will be used as a supplemental heating system. Temperatures are shown on the schedule, but generally are 60° design temperature in order to have less differential with the outside for visitor comfort and authenticity.

Piping will be schedule 40 standard iron pipe with all welded fittings tested at 150 PSIG pressure. It will be completely embedded in concrete used as part of the floor structure. The piping will be installed from 6" to 18" on centers, depending on the loads of each area. The heating water will be circulated at approximately 140° F. or less with a maximum floor temperature of 85° F. and a 10° F. temperature drop. Thermostats will be concealed.

The radiant system at the administrative area will be supplemented by a coil located in the air handling unit supplying the administrative areas.

VENTILATION & EXHAUST

The Audio-Visual rooms will be provided with exhaust fans to provide ventilation at a minimum rate of 15 CFM per occupant, also permitting use of natural fireplaces. The fans will be installed in locations which conceal them from the public, possibly in the fireplace flues. The equipment will also be installed to operate at minimum noise levels, and switched for optional use . . . probably only needed in the summer.

The toilet exhaust systems will provide 2 CFM/ft.^{2} of exhaust. The equipment will be installed to operate at minimum noise levels, and will exhaust thru an adobe chimney.

AIR CONDITIONING

The administrative areas will be provided with air conditioning designed to maintain temperatures of 72° F.

The equipment will be a complete package unit located in the mechanical equipment room, with a duct system to distribute air to occupied areas. Ventilation of equipment will be from semi-concealed slotted openings along wagon shed roof and exhausted thru adobe chimney.

HUMIDITY CONTROL

Humidity control facilities will be installed in Artifacts Room No. 124. The humidification systems will be separately controlled. The equipment will be designed to maintain a space relative humidity of 55% or as established by N.P.S.

PLUMBING

The fixtures will be white flush valve fixtures with elongated rims. The fixtures quantities will be as listed below:

Women Public	*(3) Water Closets (1 for handicapped)*
	(3) Lavs.
Men Public	*(2) Water Closets (1 for handicapped)*
	(2) Lavs.
	(2) Urinals
General Administration	*(1) Electric Water Cooler*
	(1) Water Closet
	(1) Lav.
Utility	*(1) Janitor's Sink*
	(1) Clothes Washer
	(1) Clothes Dryer
Curator	*(1) Double compartment stainless steel sink with drain boards.*

Also include: floor drains at public toilets and mechanical room, and exterior hose bibbs.

MECHANICAL EQUIPMENT

Boiler—sectional cast iron hot water boiler with associated accessories and controls.
Pumps—heating water pump with standby. Pumps will be base mounted with controls, valves, and accessories.

Domestic Water Heater–electric fired water heater.
Air Conditioning Unit–air cooled self-contained unit with duct connections to the outside for heat rejection.

The combustion air & ventilation air shall be provided through openings in the outside wall & roof which will conform to the Architectural design, such as a slot concealed in the wagon shed roof and adobe chimneys.

ELECTRICAL

GENERAL

The electrical installation will be somewhat different from a typical electrical installation in that the supply wiring and lighting must be compatible with the appearance of the original Fort. Of course, the original Fort had no electricity so the lighting must simulate candles or lanterns. All wiring should be concealed and outlets as inconspicuous as possible. The installation must be in accordance with National Electrical Code and OSHA requirements.

POWER SUPPLY & DISTRIBUTION

Power Supply: *Power will be supplied from the local utility company primary system through a utility owned and installed transformer.*

The secondary power will be at 120/240 volts, single phase.

Power Requirements: *A maximum demand of 75 KVA at 120/240 volts, single phase is estimated.*

Service: *Main service to the building will be 120/240 volts, single phase, installed underground to the service entrance equipment.*

Service Entrance: *The panelboard will be rated and labeled as service entrance equipment with the main circuit breaker serving as the service disconnecting means.*

All branch circuits will be protected and supplied from this panelboard. The panelboard will be installed in an area not accessible to the public.

WIRING METHODS

All wiring will consist of copper conductors installed in approved raceway or cable system. Exposed conduit or cable will be utilized only in equipment rooms or other areas not accessible to the public. All wiring methods will be designed and specified to be installed in full accordance with the applicable provisions of the National Electrical Code.

Outlets for lighting fixtures and receptacles will be selected and located so as to be as inconspicuous as possible. Receptacles in areas open to the public will be one per each room for maintenance tasks and will be located in such a manner as to be hidden by furnishings, in corners or covered by wall decorations.

LIGHTING

Lighting fixtures in the administrative areas will be conventional Spanish incandescent fixtures with local switching.

Lighting in other areas will simulate candles and lanterns or will be as inconspicuous as possible, compatible with safety requirements, switched from central control panel, grouped by circuits with 3-4 rooms each. Fixtures furnished by N.P.S.

Exterior lighting will be provided for safety and general illumination of the area within the enclosure.

Concealed portable floodlights will be provided for illumination of the plaza.

AUDIO-VISUAL

Each of the assigned audio-visual rooms will be provided with a color television receiver operating over a closed circuit system. Each of the AV rooms would receive a different program from TV tape units located in the AV equipment room.

General Contractor will connect and provide wiring for AV equipment furnished by N.P.S.

The Plaza will have provisions for operating projection equipment at the approximate center of the area with a screen and speakers at the south side. A concealed power outlet and a junction box for audio and control connections will be provided at the projector location. Two 1" conduits will be run from this junction box to outlet boxes for the speaker and screen.

Details are now being determined by N.P.S.

COMMUNICATIONS

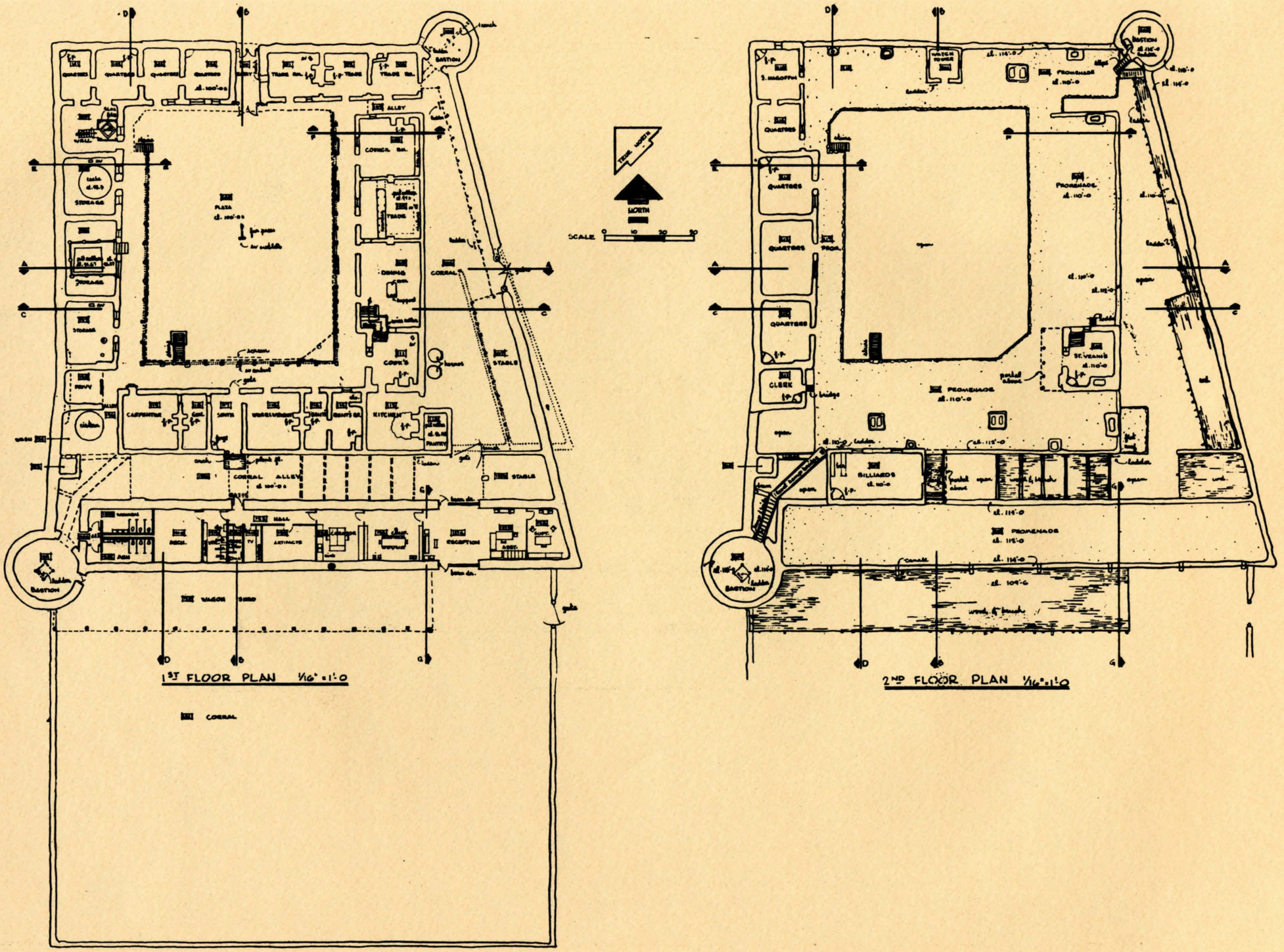
Commercial telephone service will be provided in the administrative areas. A public telephone will be at the parking entrance.

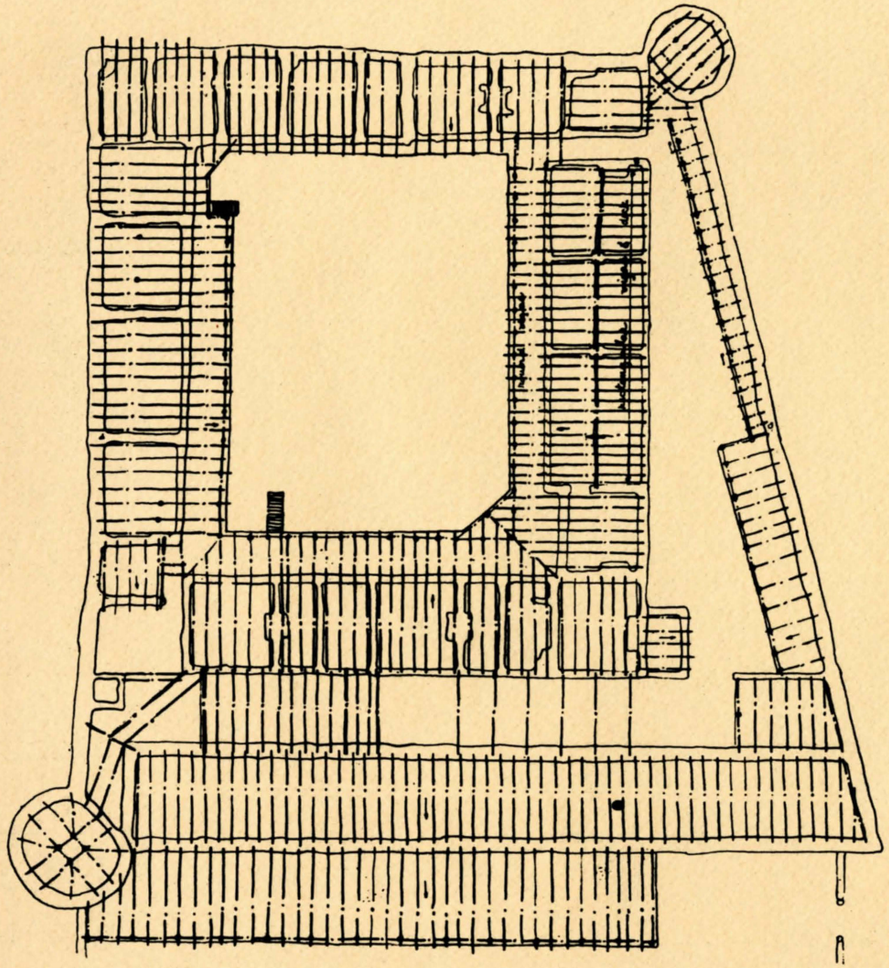
FIRE DETECTION

A fire detection and alarm system will be provided. Complete coverage for all rooms will be provided by means of heat detectors. A local alarm system, audible throughout the area will be provided with provisions for transmission of an alarm signal to a remote location.

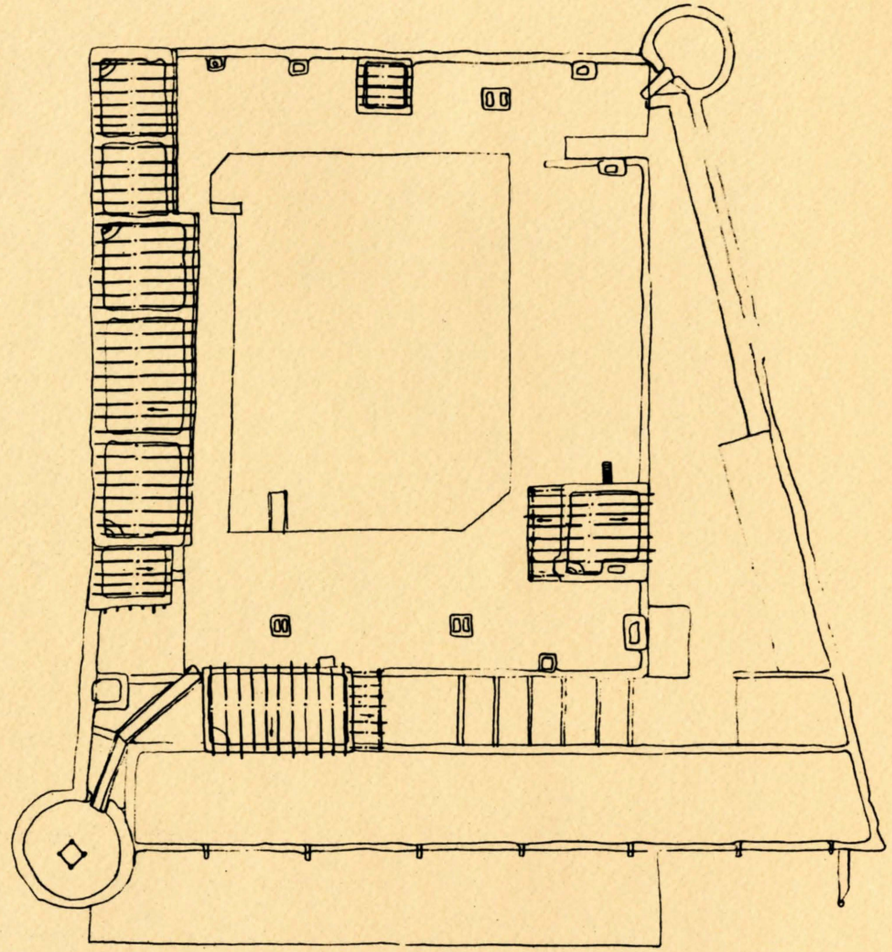
BURLAR DETECTION

The requirements are now being determined by N.P.S. and will be incorporated in the final design. A protective watch dog at the Fort site along with some mechanical devices sending a signal to the remote location may be used.

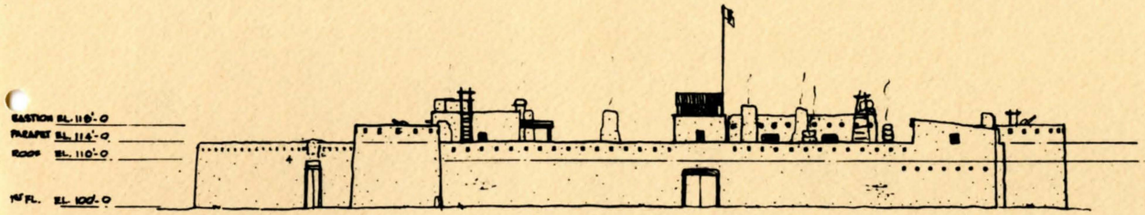

TRUE NORTH
NORTH
SCALE 0 10 20 30
1ST FLOOR PLAN 1/16"=1'-0
2ND FLOOR PLAN 1/16"=1'-0
PLAZA
COVERED WAY
COVERED WAY
COVERED WAY
TRADE RM.
TRADE RM.
BASTION
ALLEY
STORAGE
STORAGE
STORAGE
DINING
COMM'D'S
KITCHEN
PANTRY
STABLE
CORRAL
CORRAL ALLEY
CARPENTER
SMITH
WHEELWRIGHT
HALL
RECR.
ARMORY
TV
EXCEPTION
ASST.
WAGON SHED
CORRAL
QUARTERS
WATER TOWER
S. MAGAZINE
PROMENADE
ST. VEANNE
CLERK
BILLIARDS
PROMENADE
PROMENADE
BASTION



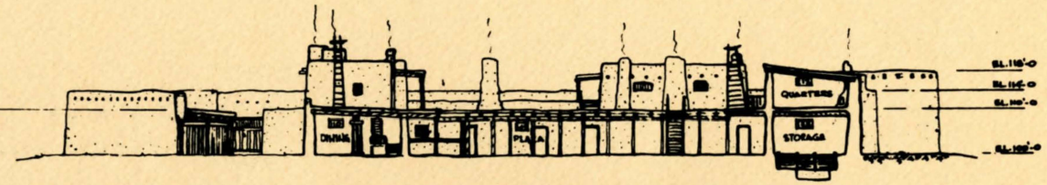
ROOF FRAMING 1/16"=1'-0" all round wigan & panels, except as noted.



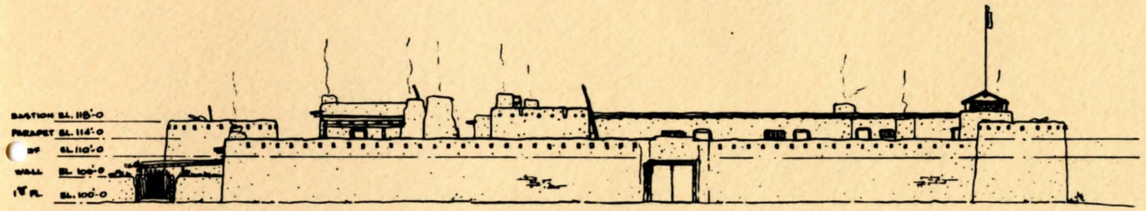
UPPER ROOF FRAMING 1/16"=1'-0



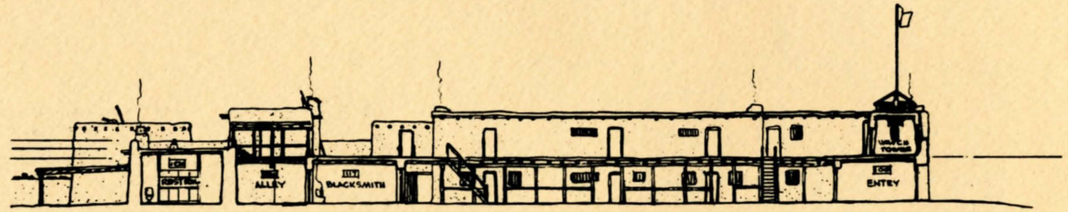
NORTH ELEVATION



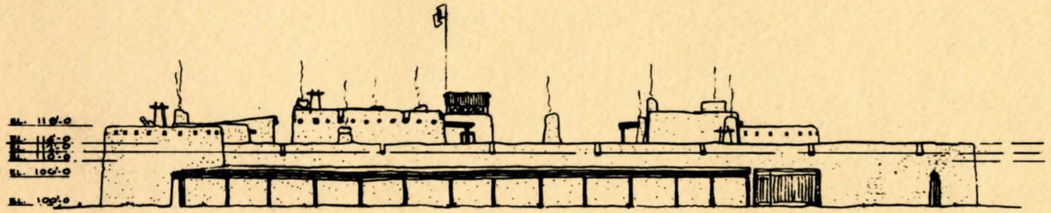
SECTION A-A



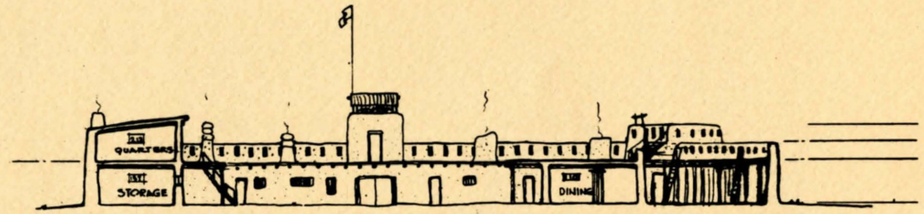
EAST ELEVATION



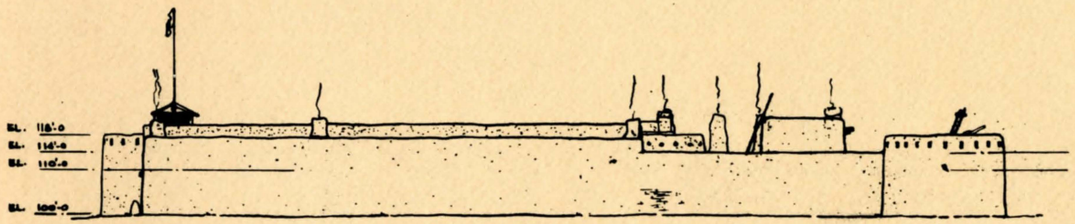
SECTION B-B



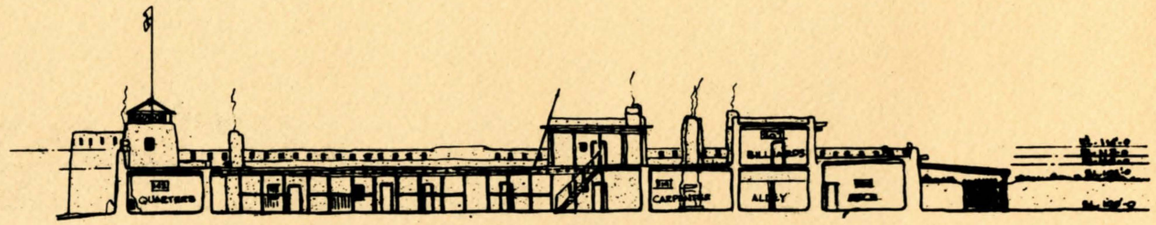
SOUTH ELEVATION



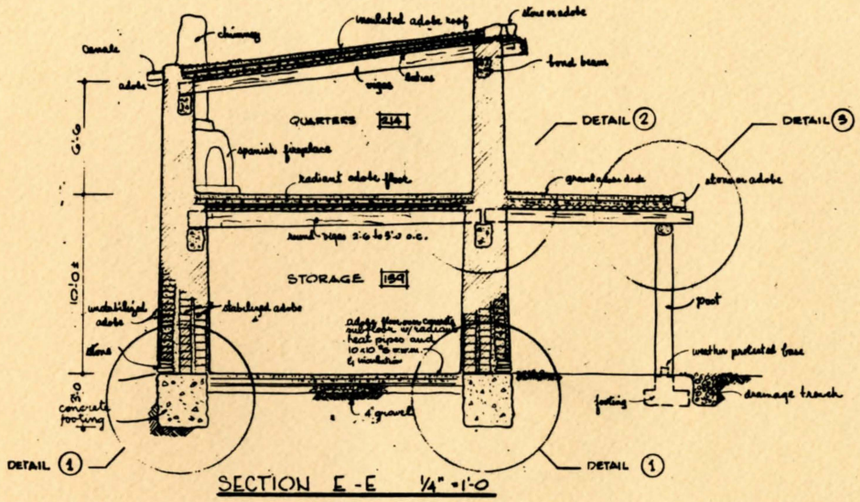
SECTION C-C

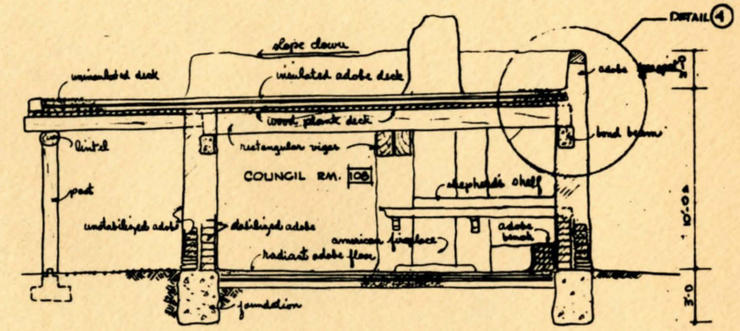


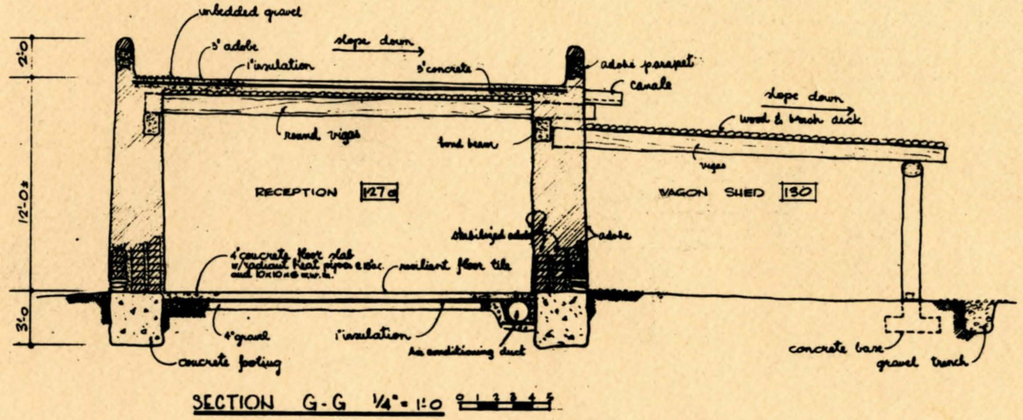
WEST ELEVATION

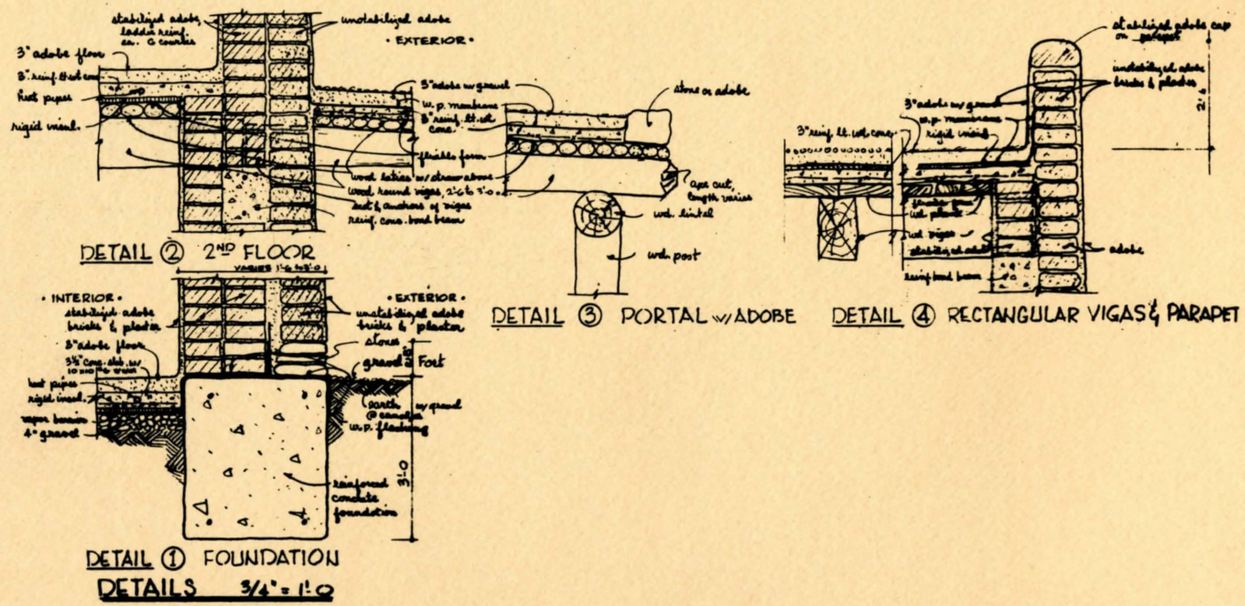


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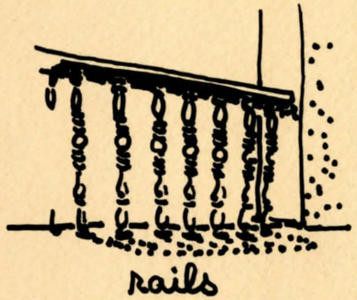

chimney
insulated adobe roof
stone or adobe
canale
adobe
vigas
lintels
tend beam
QUARTERS 146
DETAIL 2
DETAIL 3
spanish fireplace
radiant adobe floor
grade plan deck
stream adobe
round vigas 2'-0 to 5'-0 o.c.
STORAGE 149
post
undistinged adobe
distinged adobe
adobe floor over concrete subfloor w/ radiant heat pipes and 10 mil "6 mem. & membrane
waste painted base
drainage trench
footing
4" gravel
concrete footing
DETAIL 1
DETAIL 1
SECTION E-E 1/4" = 1'-0


slope down
DETAIL 4
uninsulated deck
insulated adobe deck
adobe parapet
wood plank deck
lintel
rectangular vigas
tend beam
COUNCIL RM. 106
post
shephelds shelf
undistinged adobe
distinged adobe
adobe bench
radiant adobe floor
foundation
SECTION F-F 1/4" = 1'-0


unbedded gravel
5" adobe
1" insulation
slope down
5" concrete
adobe parapet
canale
round vigas
tend beam
slope down
wood & branch deck
vigas
RECEPTION 127a
WAGON SHED 130
stabilized adobe
adobe
4" concrete floor slab w/ radiant heat pipes & elec. and DX10-18 mm. ft.
resilient floor tile
4" gravel
concrete footing
1" insulation
air conditioning duct
concrete base
gravel trench
SECTION G-G 1/4" = 1'-0


stabilized adobe, ladder reinf. ea. 6 courses
unstabilized adobe
• EXTERIOR •
3" adobe floor
5" reinf. ft. wk. conc.
kraft paper
rigid insul.
5" adobe w/ gravel
w. p. membrane
8" reinf. ft. wk. conc.
flexible foam
wood lintels w/ channel above
wood round vigas, 2'-6 to 3'-0 o.c.
knot & anchors of vigas
reinf. conc. tend beam
stone or adobe
cave out, length varies
wk. lintel
wk. post
DETAIL 2 2ND FLOOR
• INTERIOR •
stabilized adobe bricks & plaster
• EXTERIOR •
unstabilized adobe bricks & plaster
5" adobe floor
3 1/2" conc. slab w/ 10 mm "6 mem
stone
kraft paper
rigid insul.
vapor barrier
4" gravel
gravel
Footing
earth @ canales
w/ gravel
w.p. flashing
reinforced concrete foundation
3'-0
DETAIL 1 FOUNDATION
DETAILS 3/4" = 1'-0
DETAIL 3 PORTAL w/ ADOBE
DETAIL 4 RECTANGULAR VIGAS & PARAPET
adobe
2'-6

DIVISION 1
GENERAL REQUIREMENTS



01010 SUMMARY OF WORK

1. *All work including structural, architectural, mechanical and electrical to be completed under a single contract, unless otherwise specified.*

2. *Items provided by the Owner:*

   a. *Audio-visual equipment.*

   b. *Historically authentic light fixtures.*

   c. *Blacksmith Forge.*

   d. *Furnishings.*

3. *Applicable Codes: Work shall conform to the Uniform Building Code unless otherwise shown or specified.*

4. *Qualification of Contractor and sub-contractors.*

5. *Minority labor (Mexican, Indian).*

01300 SUBMITTALS

1. *Construction schedules.*

2. *Progress reports.*

3. *Survey Data: Architect will establish at the site 4 corners of a grid network as shown on construction drawings. All dimensions and measurements during construction shall be established from this grid.*

4. *Shop drawings, project data and samples as required under various sections of the specifications.*

5. *Operation and maintenance data.*

6. *Construction photographs.*

01500 TEMPORARY FACILITIES

1. *Temporary sanitary facilities.*

2. *Temporary utilities.*

3. *Temporary heat and ventilation.*

4. *Temporary enclosures.*

5. *Temporary fences.*

6. *Temporary field office.*

01600 PRODUCTS

1. *Domestic source.*

2. *Quality standards.*

01700 PROJECT CLOSEOUT

1. *Cleaning up.*
2. *Project record documents.*
3. *Lubrication and start-up.*
4. *Touch-up and repair.*

DIVISION 2
SITE WORK

02010 SUBSURFACE EXPLORATION

1. *Soils Investigation: report has been prepared by Materials & Substructures dated 9/14/73, on file in the Architect's office.*

02100 CLEARING

1. *Clearing and removal of rock, organic material, debris and other foreign matter as required for new construction.*
2. *Protect designated portions of existing ruins as shown. Protect existing structures as required by the Owner.*

02110 DEMOLITION

1. *Demolish and remove existing ruins except for designated portions to be incorporated into new construction.*

02200 EARTHWORK

1. *Excavation for Structure: to depth shown for bearing on undisturbed soil. Where unsuitable material is encountered, excavate below grade shown, and replace with suitable backfill material compacted to approved density.*

2. *Backfill: Use clean suitable material free of foreign matter. Place and compact in 8" layers compacted thickness, each layer compacted to specified density.*

3. *Finish Grading: as required to blend disturbed ground with undisturbed surrounding ground, and provide surface drainage away from structure at all points.*

4. *Trenching and Backfill: for underground piping, conduits and related work, performed by respective trades installing such work.*

DIVISION 3
CONCRETE

03100 CONCRETE FORMWORK

1. *Foundation Forms: wood or metal, straight and free from warp, of sufficient strength to resist springing from imposed loads.*

03150 EXPANSION & CONSTRUCTION JOINTS

1. *Location: slab-on-grade.*

2. *Perimeter Joints: premolded expansion joint filler strips, ½" thick, 4" deep.*

3. *Construction Joints: at 40' maximum intervals.*

03200 CONCRETE REINFORCEMENT

1. *Materials:*

   a. *Reinforcing Bars: ASTM A615, Grade 60.*

   b. *Ties & Stirrups: ASTM A615, Grade 40.*

   c. *Welded Wire Fabric: ASTM A185.*

2. *Fabrication & Installation: in accord with ACI 318.*

03300 CAST-IN-PLACE CONCRETE

1. *General: normal weight concrete at footings and slab-on-grade; lightweight concrete elsewhere.*

2. *Materials:*

   a. *Portland Cement: ASTM C150, Type I or Type II.*

   b. *Normal Weight Aggregate: sand and gravel, ASTM C33.*

   c. *Lightweight Aggregate: ASTM 330.*

   d. *Water: clean, free from deleterious amounts of acids, alkalies or organic materials.*

3. *Concrete Strength: 3000 psi minimum compressive strength at 28 days.*

DIVISION 4
MASONRY

04100 MORTAR

1. *General: cement-lime mortar for laying stabilized adobe brick; mud mortar for laying regular adobe brick.*

2. *Basic Materials:*

   a. *Portland Cement: ASTM C150, Type II.*

   b. *Hydrated Lime: ASTM C207, Type S.*

   c. *Sand: ASTM C144.*

   d. *Water: clean, free from deleterious amounts of acids, alkalies or organic materials.*

3. *Cement-Lime Mortar: proportioned by volume as follows:*

   1 part portland cement
   1 part hydrated lime
   6 parts sand
   add water for desired consistency

4. *Mud Mortar: same mix as adobe brick (see Section 04200). Add water for desired consistency.*

04150 MASONRY ACCESSORIES

1. *General: joint reinforcement in stabilized adobe joints only.*

2. *Joint Reinforcing: 9 gauge truss type wire, width approximately 1 inch less than stabilized adobe wall thickness.*

3. *Placement*

   a. *Embed continuous reinforcing in every sixth course.*

   b. *Place reinforcing in first and second joints above lintels and below sills at wall openings, extending 2 feet beyond jambs in second joint.*

04200 ADOBE MASONRY

1. *General: final material proportions as approved by the Architect. Tests shall be made from samples as necessary to determine proper mix.*

2. *Basic Materials: as specified in section 04100.*

3. *Adobe Brick: mix of 55% to 75% sand and 25% to 45% clay and silt by volume. Add water as approved.*

4. *Stabilized Adobe Brick:*

   a. *Stabilizer Mix: 1 part portland cement, 2 parts hydrated lime, 12 to 14 parts sand.*

   b. *Add 1 part stabilizer mix to approximately 10 parts adobe brick mix.*

5. *Manufacture: air cure masonry units approximately 7 days.*

04550 REFRACTORIES

1. *Fire Brick: live fireplaces with an approved fire brick layed in special high-temperature resistant mortar.*

2. *Flue Lining: conventional type.*

3. *Fireplace Construction: historically authentic except as specified above.*

DIVISION 5
METALS

Not used for this project.

DIVISION 6
WOOD

06100 ROUGH CARPENTRY

1. *General: All structural timbers shall be Southern Pine, or other selected wood meeting stress requirements.*

2. *Materials:*

   a. *Vigas (floor & roof beams): of shape (round or rectangular), size (in general 8" to 12" diameter) and spacing (average 2'-6") as shown. Minimum allowable stress, 1600 psi in bending.*

   b. *Latias (poles over vigas): approximately 2" diameter placed tight together. Minimum allowable stress, 1000 psi in bending.*

   c. *Girders (supporting vigas) & Lintels: rectangular, of size shown. Minimum allowable stress, 1600 psi in bending.*

   d. *Pole Columns: approximately 8" to 12" diameter. Minimum allowable stress, 1500 psi in compression.*

e. *Studs (for drywall partitions): regular sawn lumber. Minimum allowable stress, 1500 psi in bending. Some partitions constructed to be demountable for future moving.*

3. *Preparation of Timbers: hand stripped, hand shaped, kiln dried to produce surface cracks (if not preseasoned to similar condition).*

06200 FINISH CARPENTRY

1. *General: of same material as structural members, kiln dried, hand cut and shaped to rough finish.*

2. *Items Include:*

Windows
Doors
Trim
Railings
Stairs
Ladders
Shelving

3. *Construction: by historically authentic methods, as detailed.*

4. *Administrative Area: hardwood door frames, softwood shelving for artifacts and office supplies, finished to modern standards.*

06300 WOOD TREATMENT

1. *General: all structural timbers surface impregnated with a clear, colorless fire retardant coating, before other finish is applied (see Section 09900).*

2. *Material: equal to Flamort WC, as manufactured by Flamort Chemical Company.*

3. *Application: by immersion or spray.*

DIVISION 7
THERMAL & MOISTURE
PROTECTION

07100 WATERPROOFING

1. *Location: at all roof areas including walking decks exposed to weather.*

2. *Material: a self-adhering cold-applied waterproofing membrane equal to Bituthane, as manufactured by W. A. Grace & Co.*

3. *Application: over rigid insulation protected by 1/8" hardboard covering.*

07150 VAPOR BARRIER

1. *Location: under concrete slabs-on-grade.*

2. *Material: 4 mil polyethylene sheet.*

07200 INSULATION

1. *Roof & Floor Insulation (above 1st Floor): a rigid roof insulation board equal to Fesco Board, as manufactured by Johns-Manville. Apply in at least 2 layers with joints staggered.*

2. *1st Floor Slab Insulation: equal to Styrofoam SM as manufactured by Amspec.*

3. *Wall Insulation: rock wool or fiberglass batt insulation provided as required between furring or framing members at administrative area.*

07500 ADOBE MUD & GRAVEL ROOF

1. *Location: at all roof areas including walking decks exposed to weather.*

2. *Materials:*

   a. *Adobe Mud: same mix as adobe brick (see Section 04200) with final proportions as approved by the Architect.*

   b. *Gravel: from local approved source.*

3. *Application: Apply mud over waterproofing membrane. Embed gravel in surface of mud after initial set for rough protective surface.*

07600 FLASHING

1. *Location: thru-wall flashing and other concealed locations as required.*

2. *Material: not less than 26 gauge galvanized steel, or flexible vinyl flashing.*

07900 CAULKING & SEALANTS

1. *General: caulking at interior joints, and sealant at joints exposed to weather.*

2. *Materials:*

   a. *Caulking Compound: a one-part oil-base compound, or (where joint is to be painted) a one-part latex base compound.*

b. Sealing Compound: equal to Pecora Synthacalk GC-5.

c. Joint Back-up: premolded polyethylene foam rod.

3. Color: match adobe color, unless otherwise specified.

DIVISION 8
DOORS & WINDOWS

08200 WOOD DOORS & FRAMES

1. General: Doors in administrative area as specified below. Remainder of doors, specified in Section 06200.

2. Panel Wood Doors: 1¾" thick hardwood panel doors of approved standard design with stained finish.

3. Wood Frames: See Section 06300.

08700 FINISH HARDWARE

1. Administrative Area: commercial quality, master keyed.

a. Locks and Latches: bore-in cylindrical type equal to Corbin.

b. Closers: equal to LCN Closer Co.

c. Hinges: equal to Stanley.

2. Other Areas: specially designed period hardware, authentic if available.

3. Special security and exit hardware as required.

08800 GLAZING

1. *Window Glass: artisan sheet glass made by the cylinder or crown method.*

DIVISION 9
FINISHES

09100 MUD PLASTER

1. *Interior Mud: same mix as stabilized adobe brick (see Section 04200) with final proportions as approved.*

2. *Exterior Mud: same mix as regular adobe brick (see Section 04200) with final proportions as approved. Add short lengths of chopped straw to mix in approved amounts.*

3. *Application: by hand. Always apply interior mud to stabilized brick, and exterior mud to regular brick.*

09250 GYPSUM WALLBOARD

1. *Materials:*

   a. *Gypsum Wallboard: recessed edge board conforming to ASTM C36, Type X, 5/8" thick.*

   b. *Water-resistant Wallboard: backing for ceramic tile.*

   c. *Joint Treatment Materials: joint tape and compound conforming to ASTM C475.*

   d. *Screws: self-drilling type as recommended by manufacturer.*

e. *Accessories: corners, casing beads and control joints fabricated from hot dip galvanized steel of standard design.*

2. *Ceiling Suspension: Suspend 1½" channels @ 4'-0" O.C. Fasten ¾" furring channels perpendicular to suspension channels at 2'-0" O.C.*

09310 CERAMIC TILE

1. *Setting Materials:*

   a. *Floors: dry-set portland cement mortar, ANSI A118.1 - 1967.*

   b. *Walls (gypsum board backing): organic adhesive, ANSI A136.1 - 1967.*

2. *Ceramic Tile:*

   a. *Floor Tile: 1" x 1" x ¼" unglazed ceramic mosaics.*

   b. *Wall Tile: 4¼" x 4¼" x ¼" matte glazed wall tile.*

3. *Grout:*

   a. *Floors: one part portland cement to one part fine sand by volume.*

   b. *Walls: white dry-set portland cement grout.*

09660 RESILIENT TILE FLOORING

1. *Standards: floor tile, FS SS-T-312A Type IV; wall base, FS SS-W-40A, Type II.*

2. *Materials:*

   a. *Vinyl Asbestos Tile: 12" x 12" x 1/8" gauge. Alternate material, resilient sheet flooring.*

   b. *Vinyl Base: premolded cove base, 1/8" gauge, 4" high.*

09700 MUD FLOORS

1. *Materials: same mix as regular adobe brick (see Section 04200) with final proportions as approved.*

2. *Finish: Trowel mud to smooth texture. Finish with 1 coat linseed oil, and 2 coats mixture of linseed oil and turpentine.*

09900 PAINTING

1. *Interior Surfaces - Administrative Area:*

   a. *Drywall:*
   1 coat interior primer sealer (tinted)
   1 coat interior flat latex
   or
   1 coat semi-gloss enamel

b. *Hardwood Doors & Frames:*
Stain as directed
1 coat sealer
1 coat satin varnish

c. *Softwood Shelving:*
1 coat primer
2 coats semi-gloss enamel paint

2. *Surfaces - Other Areas:*

a. *Interior Adobe: "whitewash" as directed with an approved water-soluble paint.*

b. *Interior and Exterior Wood: coat with an approved combination stain & wood preservative compatible with fire retardant coating. Color for natural aged appearance.*

3. *Colors: as selected by the Architect.*

4. *Samples: Furnish samples for all surfaces coated. Some surfaces may require a series of samples before desired results are achieved.*

DIVISION 10 SPECIALTIES

10150 COMPARTMENTS

1. *Metal Toilet Partitions & Urinal Screens: headrail braced, baked enamel finish, with coat hook and paper dispenser, equal to Sanymetal Academy type.*

10400 IDENTIFYING DEVICES

1. *Plaques: for toilet room doors.*

10800 TOILET ACCESSORIES

1. *Quality: equal to Bobrick Dispensers, Inc.*

2. *Accessories include:*

   Mirrors with shelves.
   Feminine equipment dispensers & disposals.
   Soap dispensers.
   Hand dryers or towel dispensers.

DIVISION 11
EQUIPMENT

11630 LAUNDRY EQUIPMENT

1. *Washer: heavy duty, 18 lb. capacity, equal to General Electric.*

2. *Dryer: heavy duty, 18 lb. capacity, equal to General Electric.*

DIVISION 12
FURNISHINGS

Not used for this project.

DIVISION 13
SPECIAL CONSTRUCTION

Not used for this project.

DIVISION 14
CONVEYING SYSTEMS

Not used for this project.

DIVISION 15
MECHANICAL

15010 GENERAL PROVISIONS

1. *Work accomplished in accordance with all applicable codes and ordinances.*

2. *Contractor to arrange for and pay for all permits, licenses and fees.*

3. *Project includes all mechanical systems to five feet outside building line.*

15400 PLUMBING AND PIPING

1. *Site Utilities: includes water, gas, sanitary sewer and foundation drainage to five feet outside building line.*

2. *Plumbing Fixtures: flush valve type designed for public use.*

15550 FIRE PROTECTION

1. *Chemical type fire extinguishers appropriate for each specific use.*

15800 HEATING VENTILATING AND AIR CONDITIONING

1. *Piping: Radiant floor heating piping schedule 40 standard weight steel with welded fittings. Piping completely enclosed in concrete slab.*

2. *Ductwork: as recommended by Sheet Metal and Air Conditioning Contractors National Association Manuals. Ductwork completely lined with one inch duct liner.*

3. *Equipment:*

   a. *Hot water heating boiler and associated controls.*

   b. *Heating water pumps, base mounted type.*

   c. *Air cooled self-contained air conditioning units for administrative areas.*

   d. *Ceiling type exhaust fans.*

DIVISION 16
ELECTRICAL

16010 GENERAL

1. *Scope: All electrical work for complete power, lighting and communication systems.*

2. *Codes and Standards:*

   a. *National Electrical Code*

   b. *Underwriter's Laboratories, Inc.*

3. *Coordination: required between trades.*

4. *Standard Products: all equipment and materials.*

16100 BASIC MATERIALS AND METHODS

1. *Raceways: Electrical metallic tubing, plastic conduit.*

2. *Supports: in accordance with NEC.*

3. *Conductors: TW insulated copper.*

4. *Wiring Devices: specification grade switches and receptacles.*

5. *Motors: specified under other sections of the specifications.*

6. *Motor Control: specified under other sections of the specifications.*

16400 SERVICE AND DISTRIBUTION

1. *Power Supply: by Southeast Colorado Power Association at 120/240 volts single phase.*

2. *Service Entrance: underground to main disconnect.*

3. *Service Equipment: panelboard with main circuit breaker.*

4. *Panelboards: circuit breaker type.*

5. *Transformers: none required.*

16500 LIGHTING

1. *Fixtures: All units at Administrative area UL listed, complete with mounting hardware. Authentic units in interpretive areas provided under separate furnishings contract, but wiring in this contract.*

2. *Lamps: furnished and installed by Contractor.*

16600 FIRE DETECTION AND ALARM SYSTEM

1. *Scope: complete coverage of building for detection and alarm.*

2. *Detectors: fixed temperature, rate of rise type.*

3. *Alarm: bells or horns, audible throughout facility with provisions for remote alarm.*

4. *Manual Stations: in administrative area only.*

16700 COMMUNICATIONS

1. *Commercial telephone raceway system and outlets. Wiring by telephone company.*

2. *Audio-visual System:*

   a. *Install 120 volt power supply outlets in areas indicated on Drawings for audio-visual closed circuit television systems. In addition, install an outlet box in each audio-visual room with conduits extending to the audio-visual control room.*

   b. *Install power outlet and conduit system in the plaza area for power and control at projection equipment.*

   c. *All conduits, direct buried or concealed in structure.*

CONTRACTORS

There are no apparent contractors in the La Junta area who are either large enough or experienced to handle this project. A contractor interested in and experienced with adobe southwest architecture is required. There may be some in southern Colorado and a number in New Mexico. A qualification of general contractors and subcontractors should be established in order to obtain specified quality of construction.

LABOR

The use of local, native area labor may be encouraged to help the local economy. The use of Mexican and Indian labor is recommended to provide the most qualified adobe construction techniques and fulfill government minority requirements. An Indian woman is considered to be the only one able to correctly build the adobe fireplace. This authentic labor would also be an attractive feature of the interpretive program.

CONSTRUCTION

Presumably, the construction site would be protected by a construction fence, however a park feature would permit visitors to observe the historical reconstruction procedures.

MATERIALS & SAMPLES

Some materials will require special treatment, on site testing, and samples approved before proceeding. Some change orders may result from the tests in order to accomplish the best methods.

COMPETITIVE BIDS

Where feasible to obtain more than one equal material or source, competitive bids will be obtained. However, if only one source is available, it will be specified after obtaining a firm cost.

CONTRACTS

The special nature of this work suggests exploring alternative methods of contracting other than an open competitive bid. Some form of negotiated contract may result in better quality and less cost than conventional bidding.

SUMMARY



Sitework	$ 48,056
Concrete	83,679
Adobe Masonry	357,338
Carpentry & Millwork	215,608
Moisture Prot. & Thermal Insul.	50,770
Doors, Hardware, Glass	33,003
Adobe Plaster & Adobe Floors	65,577
Misc. Interior Finishes	11,034
Painting	22807
Misc. Specialties	3,131
Special Construction	15,000
Mechanical	70,925
Electrical	71,296
Total Direct Cost	$1,048,224
General Conditions and Field Overhead	90,000
Profit and Overhead	50,000
Probable Cost of Orthodox Project	$1,188,224
Add:	
Scare Factors:	
If adobes, vigas and latias, etc. are prepurchased, delivered to jobsite and approved by Federal Government	100,000
	$1,288,224
If adobes, vigas and latias are NOT prepurchased (additional)	75,000
Total Maximum Probable Cost	$1,363,224