The Fort Davis National Historical Site
Post Hospital Restoration Program
2008

COMPLETION REPORT

PREPARED FOR THE NATIONAL PARK SERVICE
BY
THE SCHOOL OF ENGINEERING
UNIVERSITY OF VERMONT

July 2009

revised December 2009

FORT DAVIS NATIONAL HISTORIC SITE
POST HOSPITAL RESTORATION PROGRAM
2008

COMPLETION REPORT

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EXECUTIVE SUMMARY

In 2005, Fort Davis National Historic Site (FODA) obtained a Save American's Treasures grant to assist with preservation and partial restoration of the Post Hospital. The Post Hospital is an adobe complex consisting of a central administration building and north and south wards, connected by a surrounding porch. The complex was constructed over a period of several years, with the administration building and north ward constructed during the years 1874-1876; the south ward was added in 1884. Up until the Post was abandoned in 1891, the hospital was considered one of the most up-to-date medical facilities in the southwest. In 2005, the National Park Service (NPS) undertook preservation / partial restoration of the Steward's Office and Hallway of the Administration Building in order to provide safer access to the building and to improve visitors' experience of the resource through interpretation of a larger portion of the building.

Under the terms of Modification 01 to the original CESU Task Agreement (Cooperative Agreement # H8W07060001; Task Agreement # J9W88050012), the project was expanded in 2006 to include the Surgeon's Office (Administration Building) and North Ward. The scope of work included reinstatement of wood floors, conservation of period lime plasters, application of compensating plaster to infill losses and protect the adobe substrate, and reconstruction of windows and doors to complete the building envelope and improve security. The policy of partial restoration adopted by NPS entailed conservation of early and characterizing elements.

The project was again expanded in 2007, under the terms of Modification 02. Continuing the work begun the previous year, the scope of work in 2007 included fabrication of adobe bricks to infill areas of significant loss, further conservation of period lime plasters and application of compensating plaster, as well as continued window and door reconstruction and reinstatement of a variety of millwork elements in the North Ward.

A third expansion in 2008, under the terms of Modification 03, included in its scope continued conservation of period lime plasters; chimney survey and preliminary flashing designs; completion of millwork begun in previous projects, such as the casing of door

openings in the Surgeon's Office, Kitchen and North Ward and installation of venting window screens; construction of an adobe test wall; and a public training workshop on traditional adobe construction and repair.

The project was organized as a field training session by the National Park Service, the School of Engineering at the University of Vermont (UVM), and Cornerstones Community Partnerships (a non-profit committed to assisting New Mexico communities with rehabilitation of their adobe churches). Project participants included UVM staff, interns, and graduates seeking advanced training in architectural conservation, as well as interns from Columbia University and the School of Architecture and Urbanism at the University of Sao Paulo, Fort Davis staff, NPS personnel from several regional parks, Cornerstones staff, and local volunteers. This latest phase of the project occurred between July 7 and August 2, 2008. A multi-phase project, it is anticipated that the scope of work will be expanded in the future.

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PROJECT NARRATIVE

INTRODUCTION

The rehabilitation and partial restoration of the Post Hospital at the Fort Davis National Historic Site was begun in 2005 as a cooperative effort involving park staff and the University of Vermont. The ongoing effort has been focused on building envelope repairs and improvements, including installation of windows and doors; installation of floors in the North Ward and in the hallways, Steward's Office and Surgeon's Office of the Administration Building to facilitate interpretation of those spaces; conservation of surviving historic plasters; and application of a compensating layer of lime plaster over bare adobe walls.

Projects have been organized as a series of field schools for historic preservation, engineering and architecture from several universities, park facilities staff, NPS Vanishing Treasures Program staff, recent graduates of the University of Vermont seeking advanced conservation training and local volunteers. Training activities have been focused on adobe conservation and repair, reattachment and conservation of historic lime plasters on earthen substrates, traditional plaster and limewash techniques, and the replication of period millwork.

The scope of work for the 2008 project included chimney survey and preliminary flashing design, continued conservation and repair of period lime plasters in the Administration Building, completion of millwork begun in previous projects, such as the casing of door openings in the Surgeon's Office, Kitchen and North Ward and installation of venting window screens; construction of an adobe test wall; and a public training workshop on traditional adobe construction and repair.

CHIMNEY FLASHING DESIGN

During the course of the previous project, leaks had been discovered around the six chimneys of the North Ward and the Administration Building. The impact of this water infiltration, most notable during heavy rainstorms, was the erosion of the historic adobe and plasters below. Of special concern is the Kitchen chimney, which appears to include early (possibly 19th century) brickwork. In 2008 the goal was to survey these chimneys and begin to design flashings capable of halting the water infiltration and subsequent destruction. Flashing design was derived primarily from two sources, "Standing Seam Roofing" (Follansbee Steel) and "The Architectural Sheet Metal Manual" (Sheet Metal and Air Conditioning Contractors' National Association, Inc.), and is represented in a series of site-drawn sketches (see Appendix I).

PLASTER CONSERVATION

Plaster conservation in the Post Hospital involves reattachment of lime plaster fragments; graffiti remediation, edging and filling of losses. In addition, compensating lime plaster is applied over bare adobe walls to protect the substrate, stabilize edges of surviving fragments and facilitate interpretation of the rooms. In order to call attention to the differences between compensating and historic plasters, compensating plasters are left with a course texture, are held back approximately 1/8" from the finished wall plane, and include blue blast media as a marker.

During the 2005 Post Hospital Restoration project, plaster treatments were limited to the Steward's Office and Hallway of the Administration Building. Hallway compensating plasters had been installed during a campaign in the early 90s. The plaster conservation treatments in the Post Hospital were implemented as part of a workshop organized under the auspices of the National Park Service's Vanishing Treasures program.

As a continuation and expansion of the historic plaster stabilization workshop held in 2005, field schools supervised by Karen Fix (Conservation Artisans) were held in 2006, 2007 and 2008 as part of the larger Hospital Restoration Project. Interns Ana Gonsalves (School of Architecture & Urbanism, University of Sao Paulo) and Ioannis Avramides (Columbia University), participated in this year's plaster program which focused on the Administration Building.

The 2006 work of conserving plasters in the North Ward and Surgeon's Office was emergency in nature. Limited time and resources available allowed for only the most critical aspects to be treated. The 2007 project reviewed and assessed these walls in order to facilitate conservation completion. Those compensating plasters not finished in the Surgeon's Office had developed fine cracks and completing the work started in 2006 was determined to be a high priority. Environmental factors in 2007 delayed conservation of plasters in the Kitchen and Dining Room of the Administration Building to 2008. Deteriorated plaster fragments in the Dispensary were also addressed. A narrative

account is given here of the installation of compensating plaster - a full account on the 2008 plaster conservation, prepared by Karen Fix, is included as an appendix to this report.

COMPENSATING PLASTER

Following completion of conservation treatments of the original plaster fragments in the North Ward and the Surgeon's Office, exposed portions of the adobe walls were covered with a compensating lime plaster. The new lime plaster was applied by a team of craftsman associated with Cornerstones Community Partnerships, a New Mexico-based non profit organization dedicated to providing technical assistance to communities engaged in the repair and rehabilitation of New Mexico's adobe churches.

Prior to the application of any compensating plaster the substrate surfaces were prepared to promote the adhesion of the plaster. Dust and debris were removed from the adobe surfaces using dry brushes and trowels. The smooth surfaces of concrete bond beams installed during an earlier exterior restoration project in the late 1960s were scored using a 4" grinder with masonry cutting diamond discs. Galvanized nails were used to attach wire lathe to wooden lintels above each door and window opening. In wall areas with substantial adobe losses, new adobe bricks were "laced" into existing work. Where previously replaced adobes were substantially out of plane with respect to historic wall finishes, wall surfaces were built up using new adobe infill or stone *rajuelas* adhered with mud.

The substrate surface and any adjacent edges of original plaster fragments were moistened, either by misting or by splashing with water applied by a brush. Throughout the plastering process, additional water was applied to the substrate to prevent premature absorption of the mix water in the plaster.

Lime plaster for the scratch coat consisted of 3 parts coarse red sand to 1 part hydrated lime putty (by volume) and contained blue polycarbonate blast media (one cup per five gallons of rough plaster) as a modern marker to allow for the future identification of the new lime plasters. The plaster was applied to the adobe walls using traditional techniques developed in Mexico and the American Southwest: trowels full of plaster were flung at the adobe substrate with quick flicks and subsequently smoothed. Throwing the plaster helps to prevent detachment from the adobe surface. The adobe walls are damped off with water either sprayed on or thrown on with lime wash brushes. Once an area of wall had been covered with thrown plaster, the plaster surface was leveled by running a darby over it. The leveling was carried out in a simple skimming motion to avoid smoothing out the surface of the scratch coat, which was intended to have a rough texture. Excess plaster removed by the darby was re-thrown at areas of the wall requiring more building. The processes of leveling and building were repeated until the surface of the scratch coat reached the desired level (in this case, roughly one-quarter of an inch below the surface plane of the original plaster fragments). When applying scratch coat plaster to areas adjacent to fragments of original plaster, a trowel was used to

key the scratch coat plaster behind the edges of the original fragments, and then the surrounding plaster was thrown.

Once application of the new plaster was completed, the scratch coat was permitted to dry. During the first part of the drying period the surface of the scratch coat was periodically wetted (using spray bottles and garden sprayers) in order to prevent the plaster from drying too rapidly, producing a soft, powdery surface. Cracks that appeared in the scratch coat during this time were pressed closed using a margin trowel in a way that retained the rough texture of the scratch coat surface.

After the scratch coat had sufficiently dried, the brown coat was applied. The lime plaster mixture used for the brown coat was identical to the coarse mix used for the scratch coat (in order to further differentiate the compensating plaster from the original plaster fragments). Prior to application of the brown coat, the scratch coat was dampened with water using misters and lime wash brushes.

The brown coat plaster was applied over the scratch coat by throwing or by troweling. Once on the surface of the wall, the brown coat plaster was broadly leveled by skimming with a large darby. Using steel plasterer's trowels and *planas de maderas* (traditional Mexican trowels of wood), the surface of the brown coat plaster was then smoothed to a level approximately one-eighth to one-sixteenth of an inch below the surface plane of the original plaster fragments. Since a somewhat sandy surface was desired (to help differentiate compensating plaster from historic plaster), care was taken to avoid over-working of the brown coat plaster surface. Once applied, the brown coat was permitted to dry, although the rate of drying was slowed through the occasional damping of the brown coat with water from a garden sprayer.

CONCLUSION

In addition to meeting high priority construction and conservation goals, the 2008 Post Hospital project resulted in training opportunities for the students and volunteers involved. Project teams included team members representing several skill levels. Each team was led by accomplished craftspeople. By grouping trainees with skilled craftspeople, trainees received instruction while a high level of workmanship was maintained.

During the course of the four-week training project two student interns, facilities staff at FODA, and local volunteers received invaluable training in architectural conservation and traditional trades practice. In addition, staff members from NPS and UVM were able to improve their conservation skills as a result of cross-mentoring opportunities created by the project.

Future conservation work at the Post Hospital will be determined following an assessment of the 2008 project.

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Appendix I

CHIMNEY FLASHING DESIGN

Field Sketches (prepared by James Duggan)

Standing Seam Roofing (Follansbee Steel)

Plates from Architectural Sheet Metal Manual (Sheet Metal and Air Conditioning Contractors' National Association, Inc.)

FODA Post Hospital Chimney Flashing Details

7.14.08

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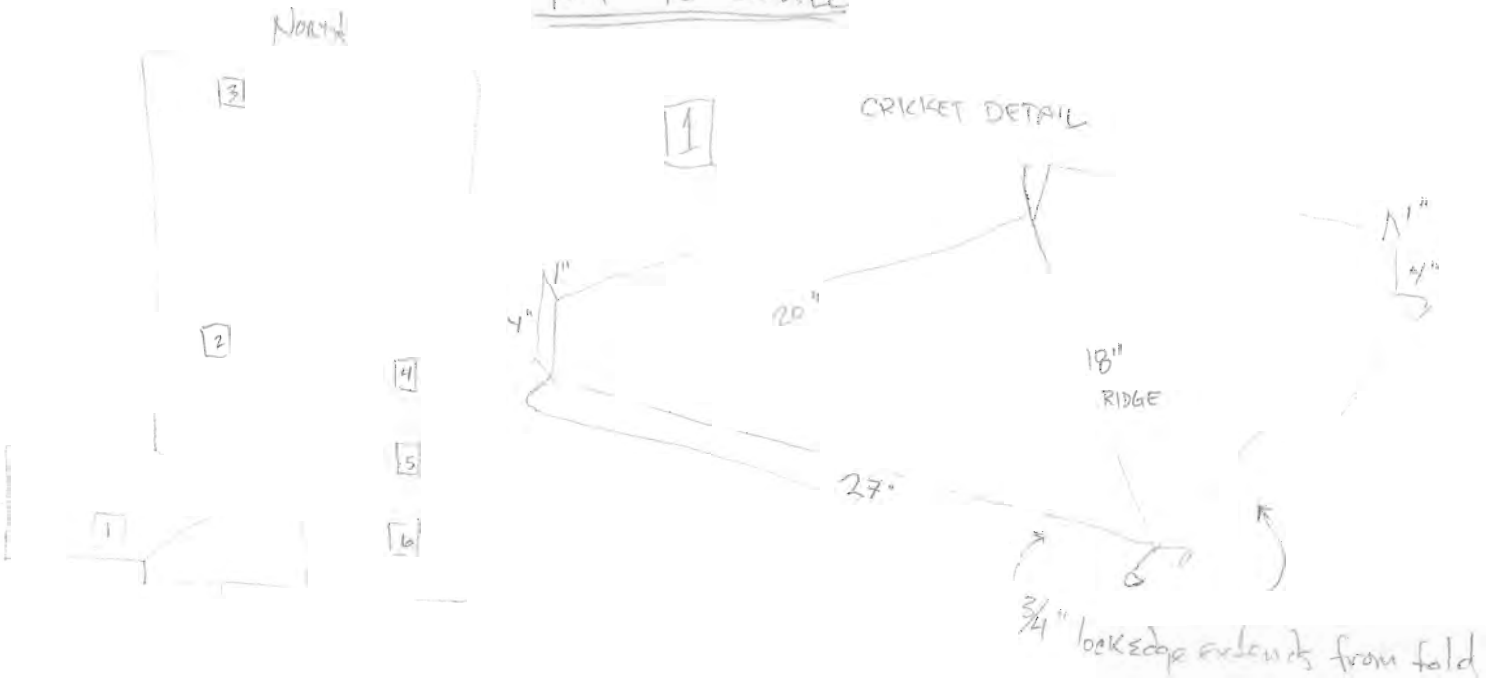

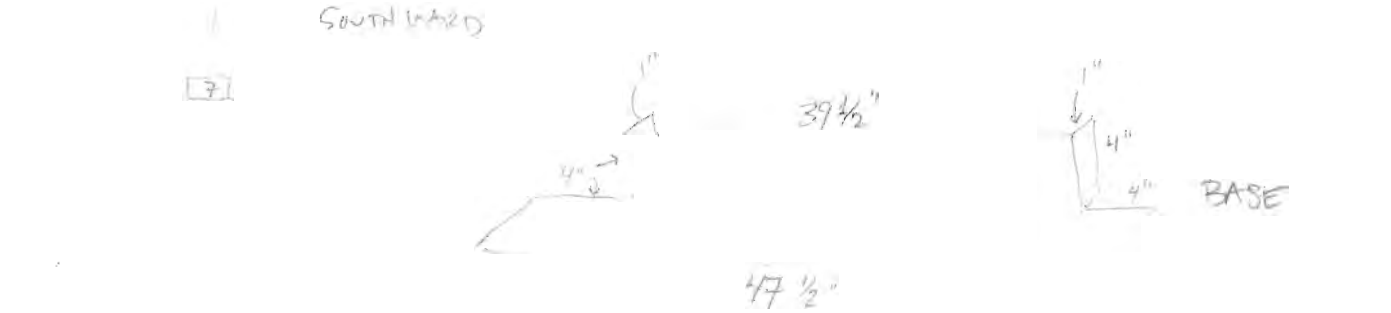

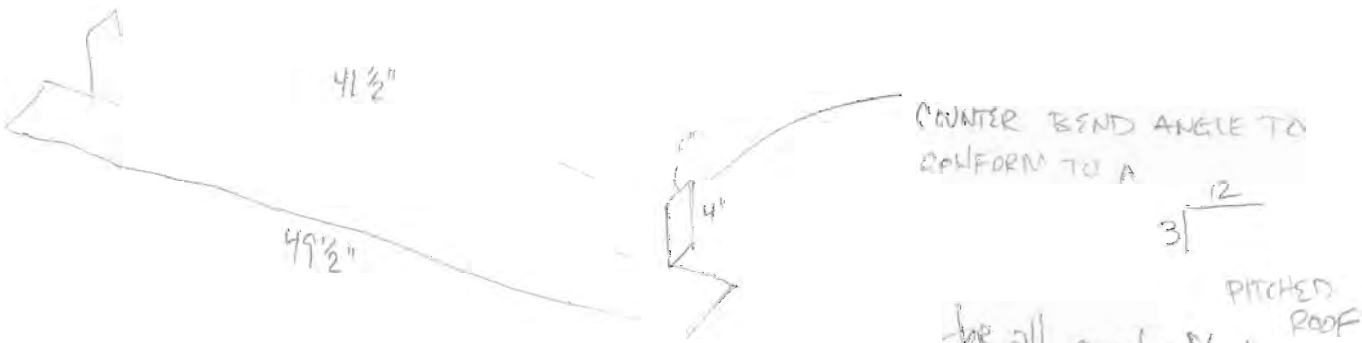

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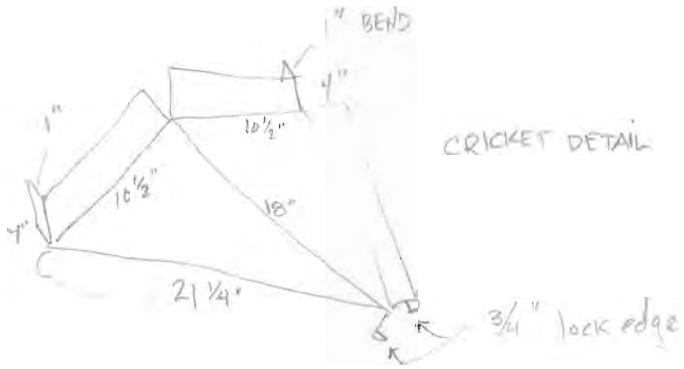

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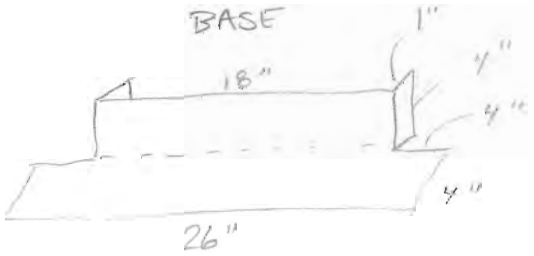

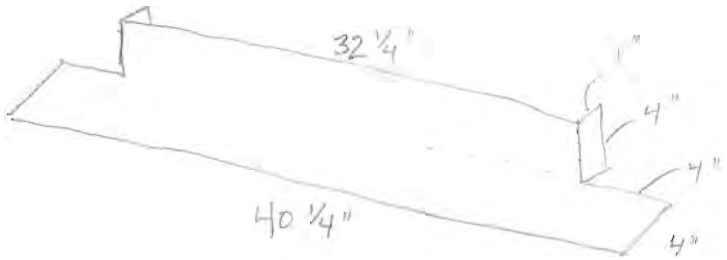

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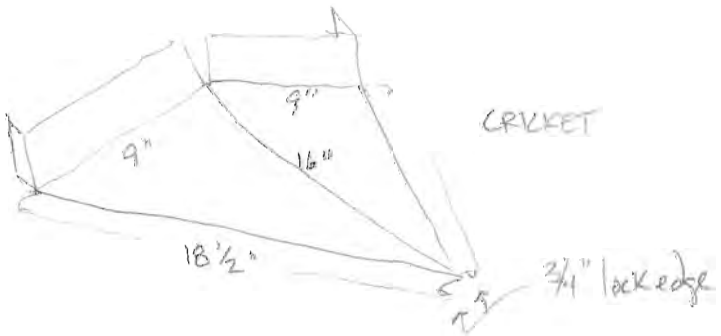

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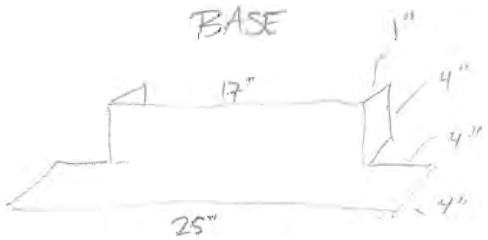

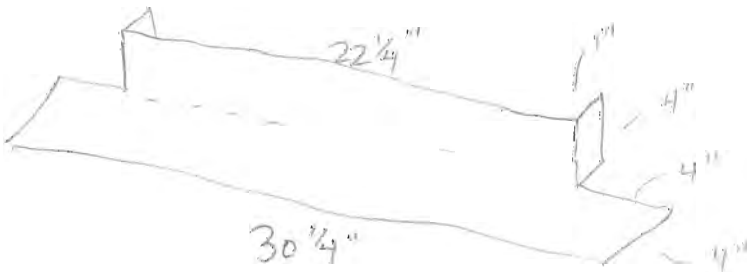

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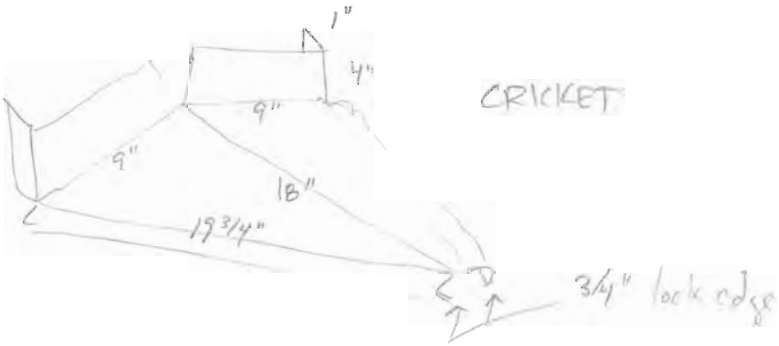

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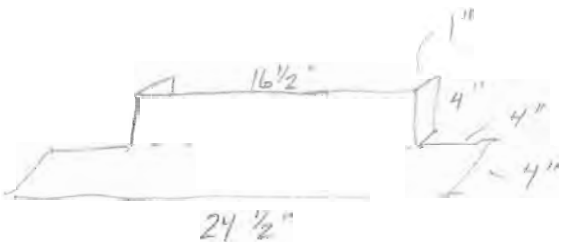

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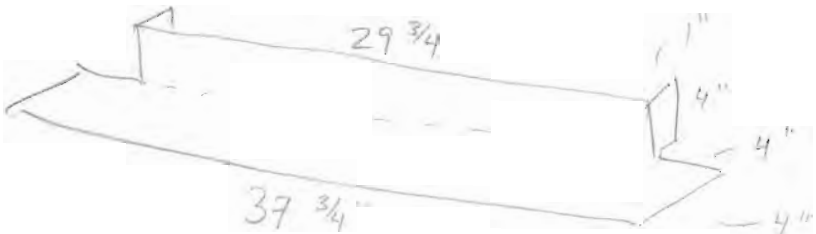

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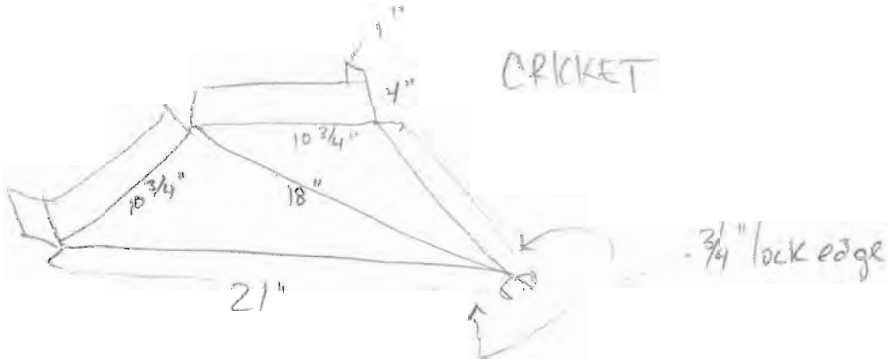

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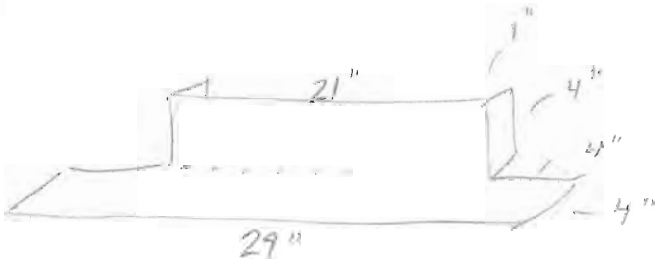

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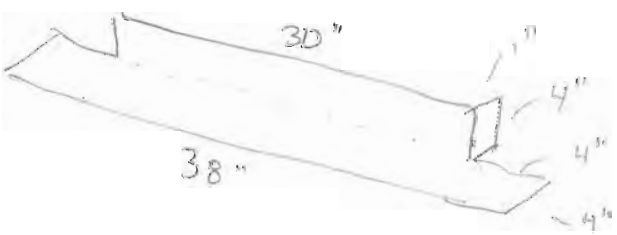

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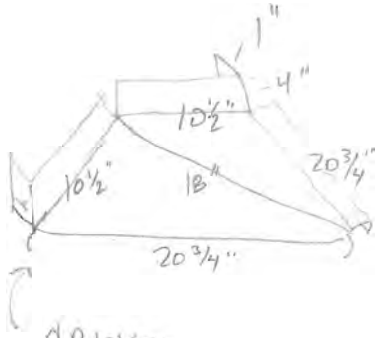

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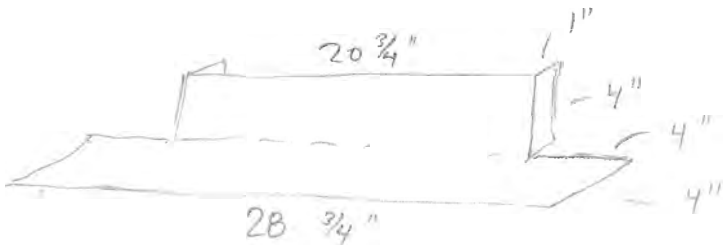

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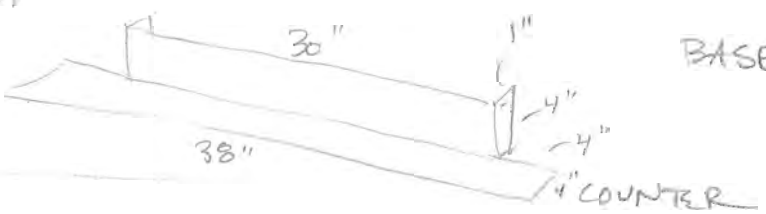

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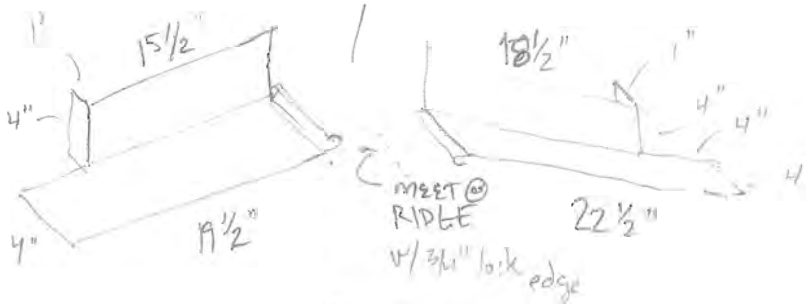

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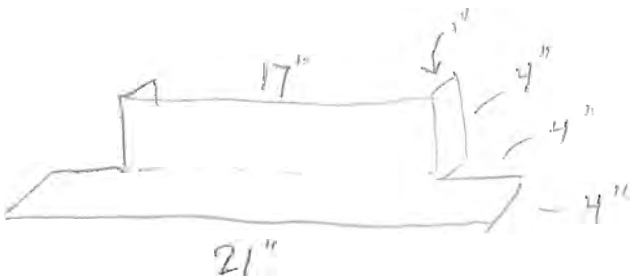

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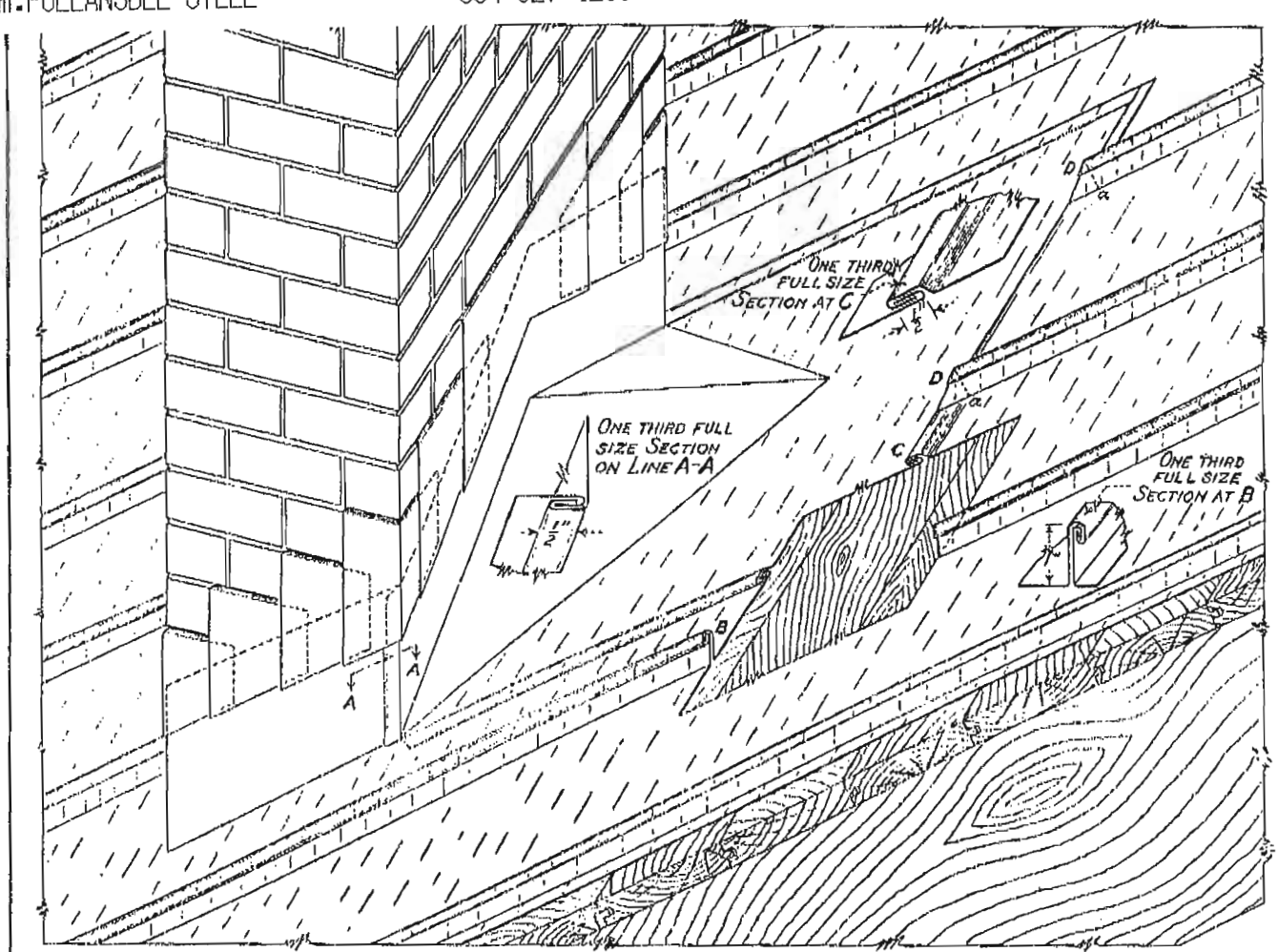


FIG. 11 FLASHING SADDLE AND CHIMNEY ON PITCHED ROOF COVERED WITH STANDING SEAM ROOFING

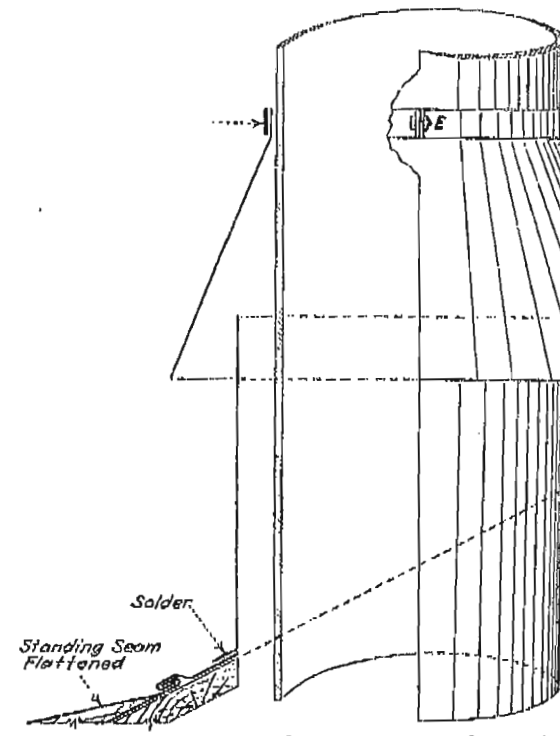


FIG. 12 FLASHING ROOFING AROUND SMOKE STACK

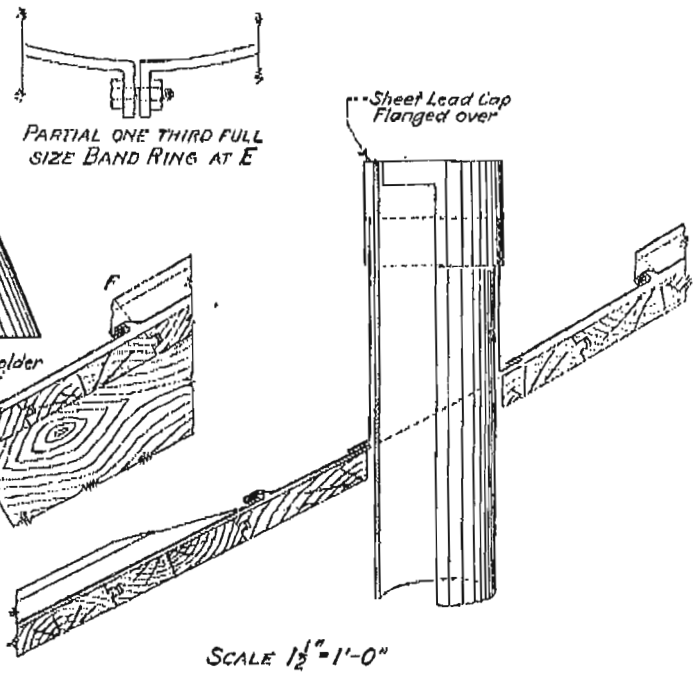
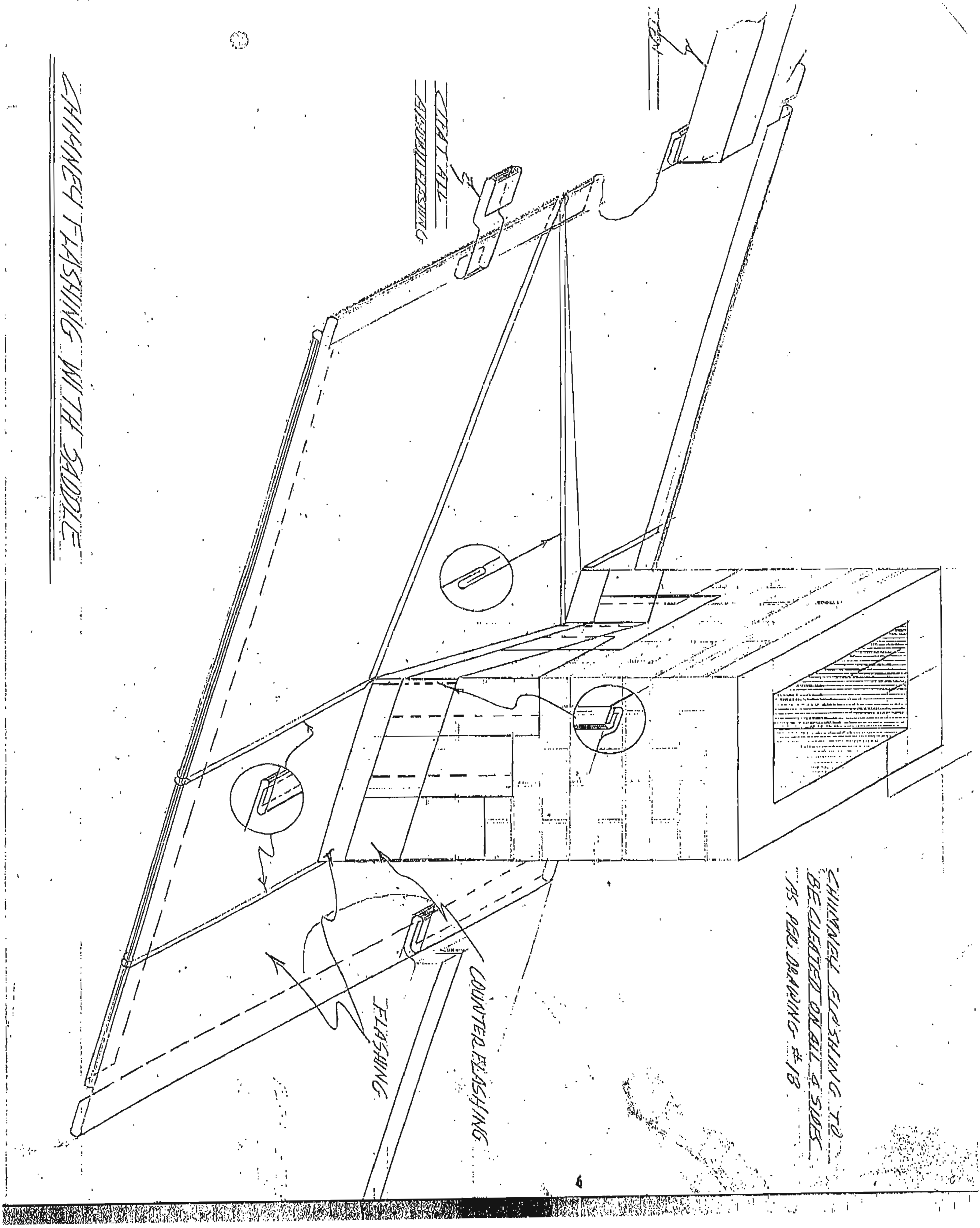
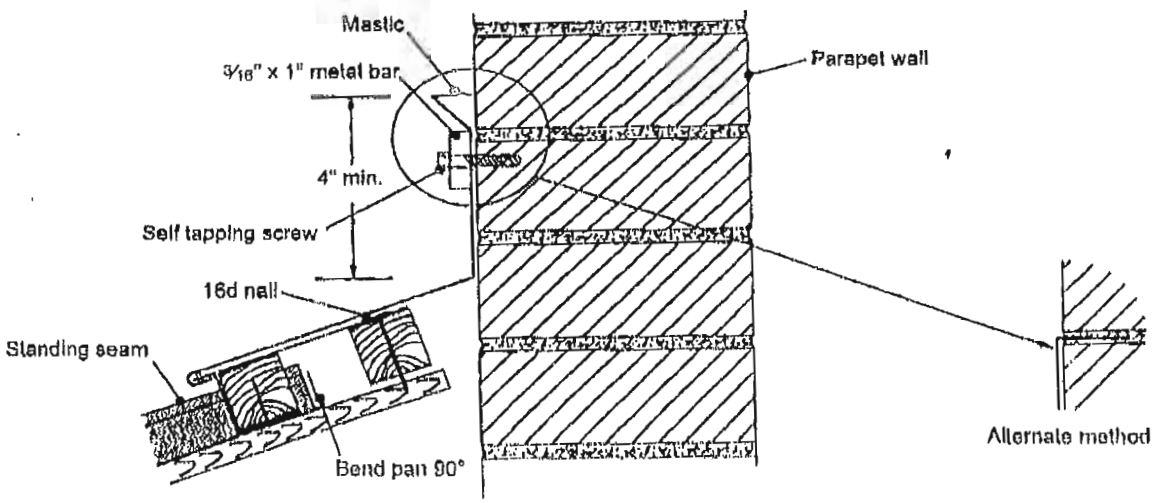


FIG. 13 FLASHING ROOFING AROUND IRON VENT. PIPE

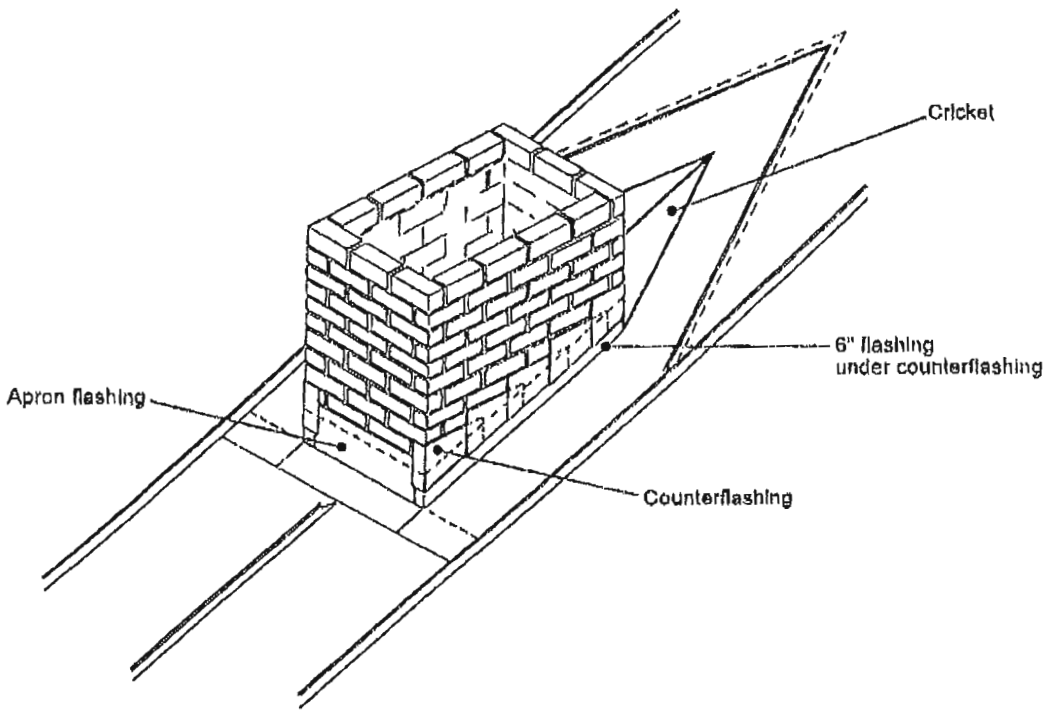
TRADE DEVELOPMENT COMMITTEE National Association Sheet Metal Contractors	STANDING SEAM ROOFING	DRAWING NUMBER 55B


CHIMNEY FLASHING WITH SADDLE
CLEAT ALL
COUNTER FLASHING
FLASHING
CHIMNEY FLASHING TO BE CLEATED ON ALL 4 SIDES AS PER DRAWING #18



Courtesy of Follansbee

Figure 9-19 Flashing at a wall



Courtesy of Follansbee

Figure 9-20 Chimney flashing

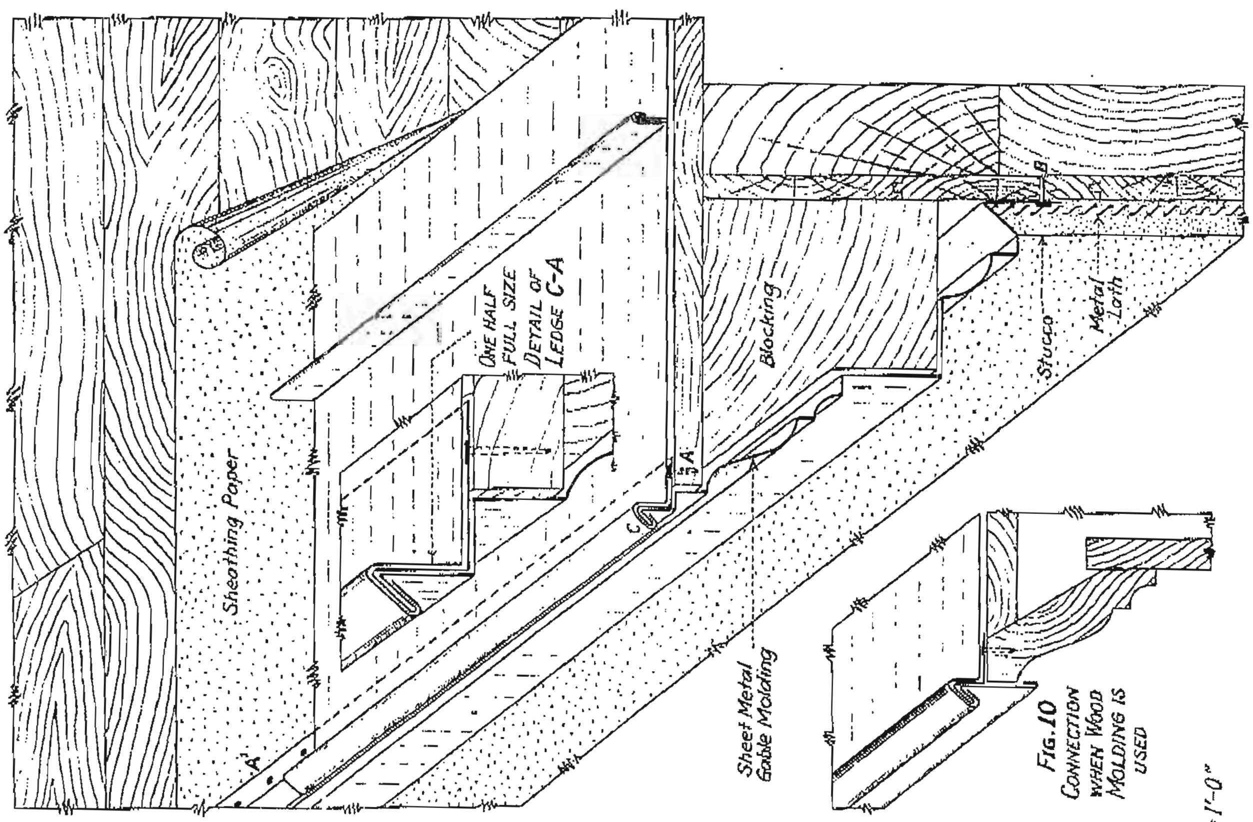


Fig. 9 Roofing connected to Metal Gable Molding

Fig. 10 Connection when Wood Molding is used

Scale $1\frac{1}{2}$" = 1'-0"

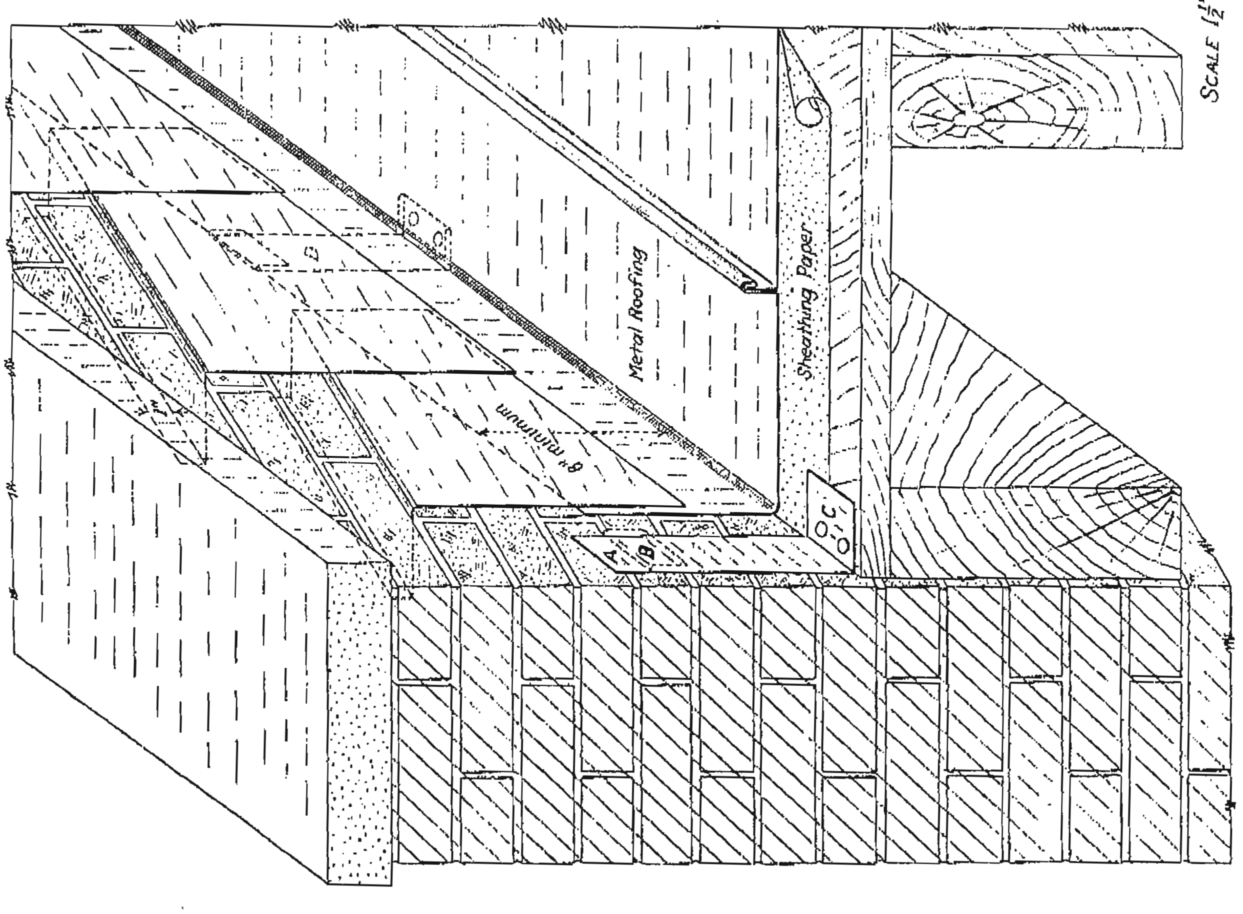


Fig. 8 Base and Cap Flashings joining Brick Wall or Chimney on Pitched Roof

TRADE DEVELOPMENT COMMITTEE National Association Sheet Metal Contractors	STANDING SEAM ROOFING	DRAWING NUMBER 55A

Drawings No. 55-55A-55B-55C—(Continued from page 91)

above a stucco wall. When the molding has little height and projection, wood blocking is employed for fastening. Note the form of the upper verge strip which is double bent and nailed at *A* to the sheathing boards and further indicated at *A'*. At the bottom of the metal mold the flange is nailed to the wall sheathing at *B*, over which the metal lath and stucco is applied. The standing seam roofing is turned up in the usual manner, but locked to the verge at *C*.

When the gable mold is of wood, as partly shown in Fig. 10 the verge strip is formed as shown, nailed at *D* and allowed to project below the ogee to form a drip. Over the double bent edge at the top, the roofing is locked.

In Drawing No. 55B are presented the methods of flashing the chimney, smoke stack and iron vent pipe in connection with standing seam metal roofing. Fig. 11 shows how to properly flash a brick chimney. To allow for expansion and contraction the base and cap flashings are set separately, flashed up against the wall not less than 8 in. and then capped by the cap flashing which overlaps the base flashing not less than 3 in. If convenient, the cap flashings are built in as the masonry progresses, the cap flashing bent up 1 in. behind the first brick. Usually in work of this kind, the cap flashing is stepped after the roof flashing is in place. In that case, the brick joints are dug out to a depth of 2 in., the cap flashing inserted and secured with lead plugs about 1 in. wide to the full depth of the raggle and the balance of the raggle filled in its full depth with elastic cement.

The broken portion in the illustration shows the various locks required in joining the roofing to the saddle plate. One-third full size sections are shown on the line *A-A*, also at *B* and *C*. Where the roofing locks to the top of the saddle plate at *C*, the standing edges are turned over at the lower end as at *D* and soldered on the opposite side as *D-a*. If the chimney is of stone, terra cotta or stucco covered, the explanation on flashings given in connection with the previous drawings is applicable also to a chimney.

Fig. 12 shows a half elevation and half section of flashing the metal roof around the smoke stack. A collar is first placed around the stack, flanged out at the bottom and soldered to the roofing, the collar being carefully flanged under the metal at the high point and over the metal at the low point. This is accomplished by cutting a slit equal in width to the flange in the center of the sheet adjoining the middle of the stack. Over the collar another tapering collar is placed, a watertight joint secured with the stack by the use of a band ring bedded in red lead, as shown in the section, and the ring drawn taut by means of the bolt at *E*. A detailed sectional plan view is shown at the right.

Where the standing seams meet the stack at the bottom, the standing seam is flattened down and locked to the stack plate or the standing seam remains in an upright position, with the ends turned over and soldered, as shown, in the upper connection at *F*. When possible, the lower collar and plate are double seamed.

Fig. 13 shows the method of procedure when an iron vent pipe is to be flashed. Here the collar is fitted snugly around the pipe and the upper part capped with a sheet lead capping flanged over on the inside. Over the vent pipe a strainer is placed. When the vent pipe projects a great distance above the roof line and no capping is in place, a slightly tapering joint acts as a cap flashing and is secured to the pipe with a band ring as explained in connection with Fig. 12.

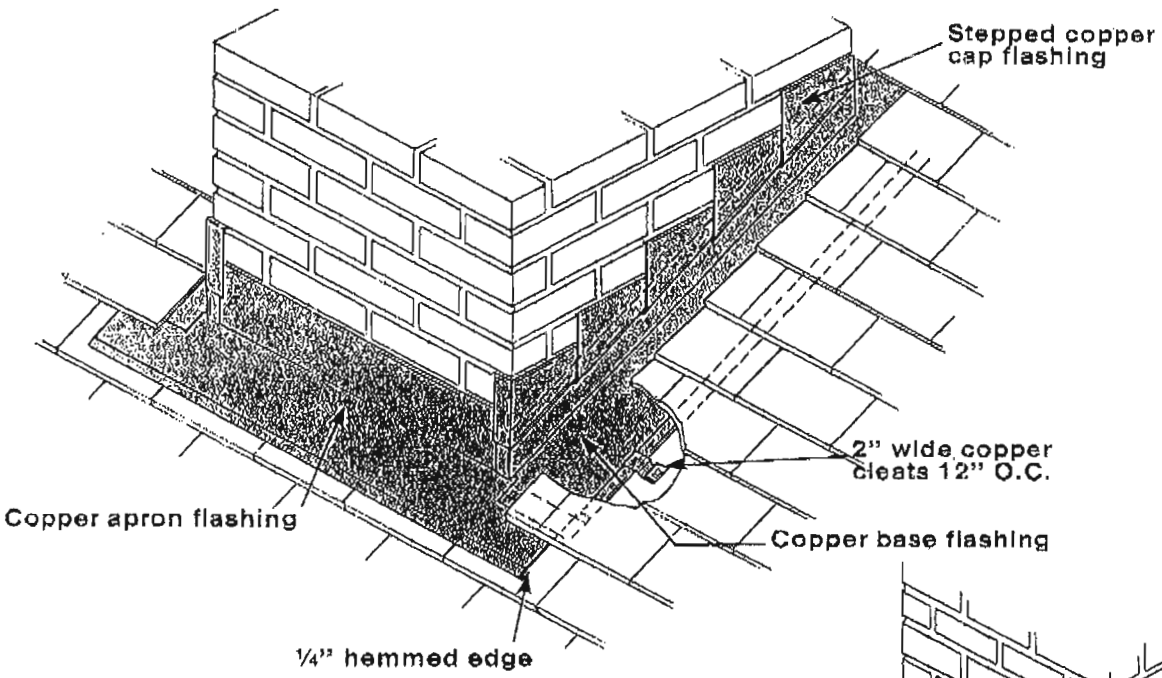
Drawing No. 55C shows the methods of making a watertight finish at the ridge and valley of a standing seam roof. In Fig. 14 to 18, inclusive, are shown the progressive steps in forming the standing seam at the ridge and hip of a roof.

Fig. 14 shows the first operation with the sheets turned up vertically ready for making the single edge shown in Fig. 15. When this edge is tightly closed, the double seam is made as shown in Fig. 16, which represents the completed standing ridge and hip. If desired this standing ridge may be turned down as indicated in Fig. 17. In laying the two slopes of the roof, care is required to avoid the double seams meeting at the ridge seam, making it necessary to start the opposite slope of the roof with a specially cut half width course of sheet metal. What has been said about the ridge also applies to the hip.

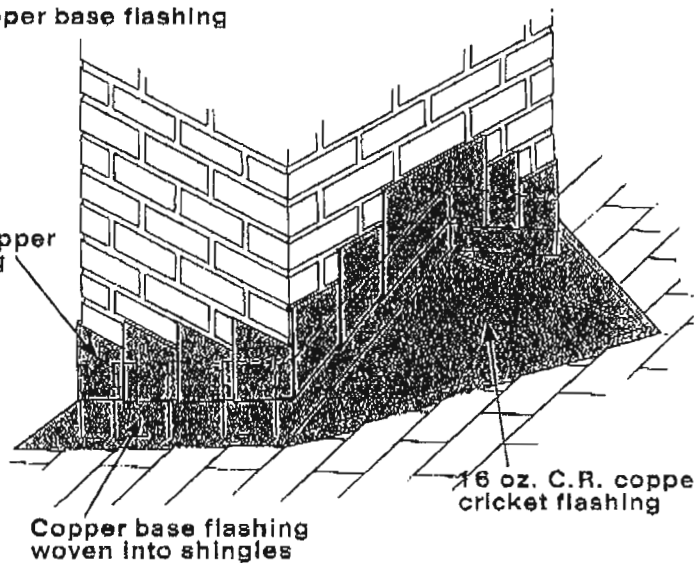
Fig. 18 shows the appearance of the standing seam on one slope of the roof when the standing seam is flattened down at the ridge and double seamed into the standing ridge. As already mentioned, the standing ridge may be turned down, with the lock on the under side, as shown in Fig. 17. Fig. 19 shows the connection between the standing seam roofing and valley. The bend in the valley is not sharp but slightly rounded, as shown. Half inch lock edges are turned as shown at *X* and *X'* which are secured to the roofing boards by means of cleats spaced about 10 in. apart. The cleat is first nailed as at *B*, then the end turned over to cover the nail heads as at *C*. The standing seam roofing is connected to the valley lock as shown at *X* and the butts of the double seam at *A* turned down as indicated by *a-b-c*, the butts carefully soldered from *a* to *b* to *c*. If desired, the butt end of the

(Continued on page 97)

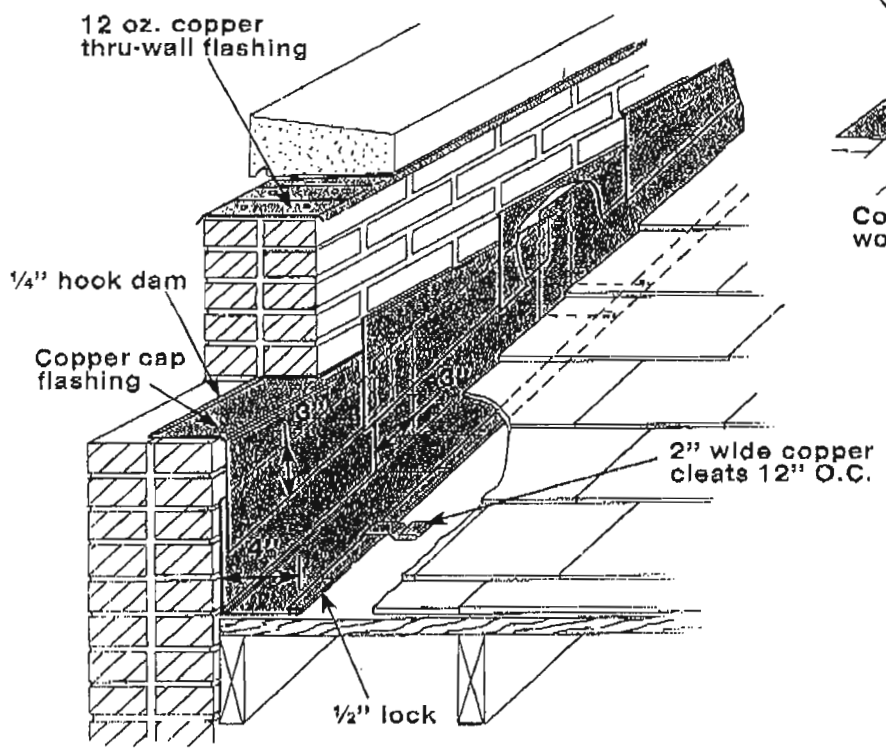
STEPPED & CHIMNEY FLASHINGS (CONTD.) SECTION 4C



DETAIL A



DETAIL B



DETAIL C

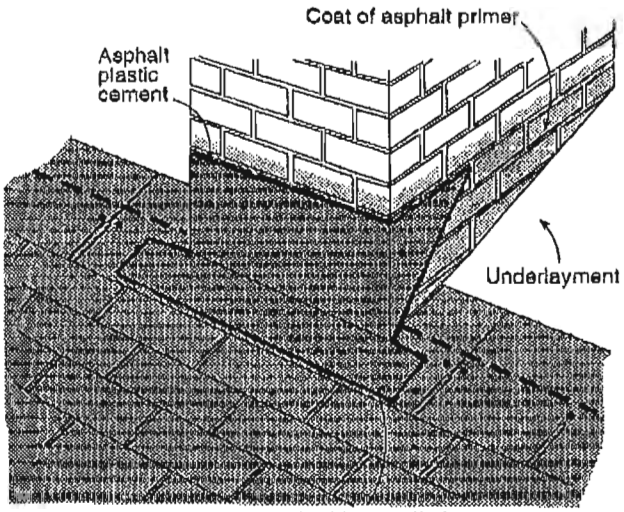


Figure 4-53 Application of base flashing at front of chimney

Apply asphalt shingles up to the lower edge of a chimney before you install any metal flashing material. Then install the base flashing on the down-slope face of the chimney (Figure 4-53). Make this piece so the lower part goes at least 4 inches over the shingles and the upper section goes at least 12 inches up the chimney face. See Figure 4-54. Apply a bed of asphalt plastic cement over the shingles and masonry and set the entire flashing in it. Drive only enough nails through the flashing into mortar joints to keep the flashing in place until the cement sets. Apply a coat of asphalt primer to any masonry surface before you apply roofing cement. That seals the masonry and provides good adhesion between the cement and the masonry.

You can buy special flashing cements you can use at all temperatures and on wet or dry surfaces. This cement comes in one-gallon cans or five-gallon pails.

Install metal step flashing (baby tins) and shingles at the sides of the chimney, as shown in Figure 4-55. Step flashing installation is discussed in greater detail below.

Install the base flashing at the rear of the chimney and over the cricket, as in Figures 4-56, 4-57, and 4-58. Extend the flashing at least 6 inches onto the roof sheathing and 6 inches up the chimney.

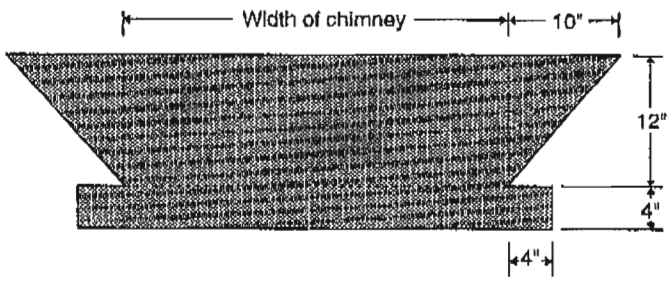


Figure 4-54 Pattern for cutting front base flashing

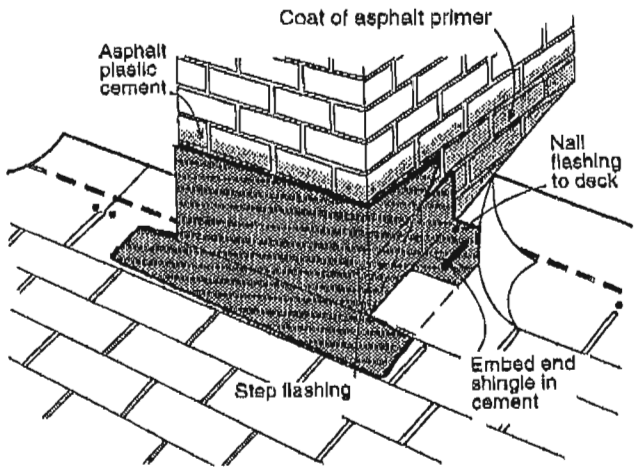


Figure 4-55 Application of base flashing at side of chimney

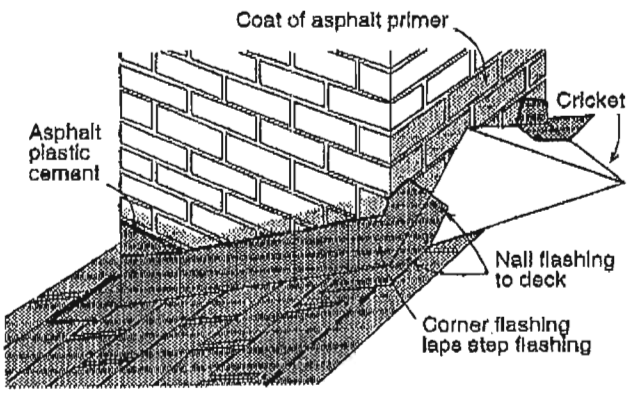
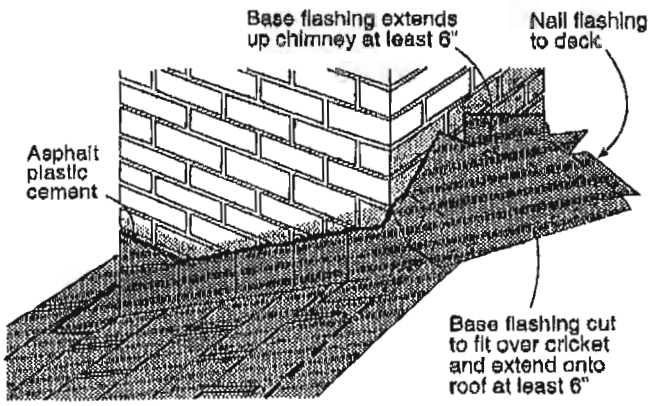
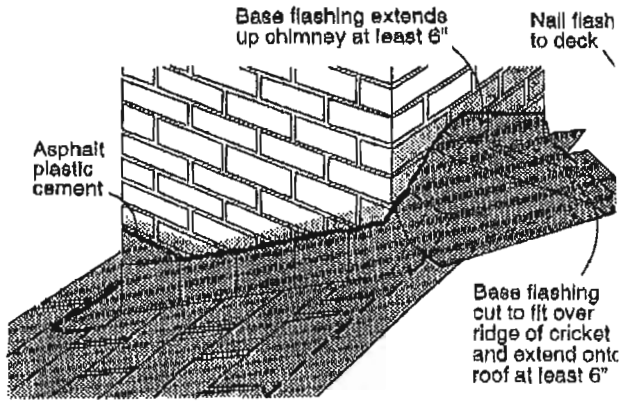


Figure 4-56 Application of corner base flashing at rear of chimney



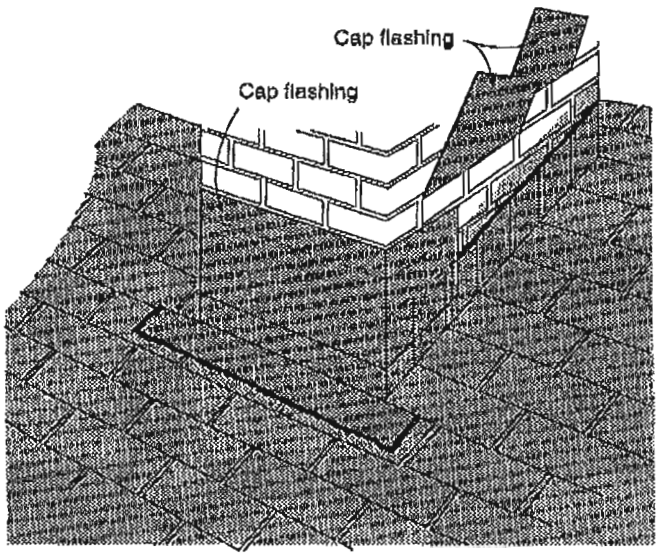
Courtesy of Asphalt Roofing Manufacturers Association (ARMA)

Figure 4-57 Application of base flashing over cricket



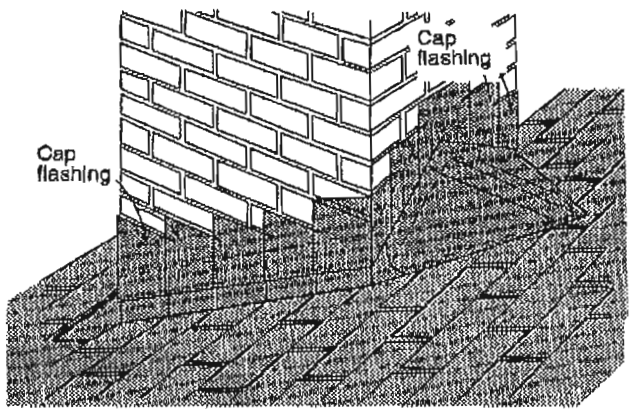
Courtesy of Asphalt Roofing Manufacturers Association (ARMA

Figure 4-58 Application of base flashing over ridge of cricket



Courtesy of Asphalt Roofing Manufacturers Association (ARMA)

Figure 4-59 Application of cap flashing at front and side of chimney

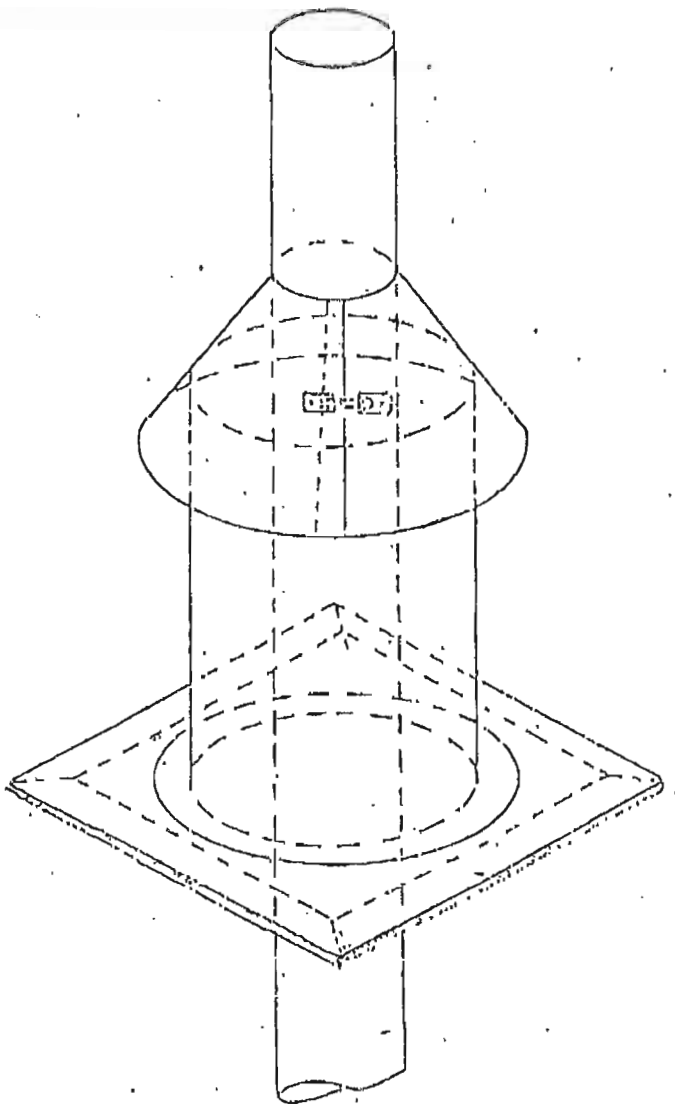


Courtesy of Asphalt Roofing Manufacturers Association (ARMA)

Figure 4-60 Application of cap flashing at side and rear of chimney

Install shingles over the cricket, or up to the cricket valleys. Install any shingles you apply over the cricket in a bed of asphalt plastic cement. You don't have to install shingles over a metal cricket if you can't see it from the ground or surrounding viewpoints.

Install metal cap flashing as shown in Figures 4-59, 4-60 and 4-61. Chisel and rake clean the mortar joints to a depth of 1½ inches before you install the cap flashing. Make some mortar that's 1 part portland cement and 3 parts fine mortar sand, and refill the joints with it. Wet the joints before you apply the fresh mortar.



Page 25

Sketch 25

This sketch shows a typical method of flashing roof penetrations. The angle on the bottom of the circular cover is cut to the pitch of the roof and soldered in place in the shop. The lengths of this cover must be long enough to prevent any build up of snow or rain to enter the top. A cone cover is secured to the pipe, or other penetration, and extends over the circular cover, as shown.

The flashing must be soldered to the metal covering of the deck. Pop rivets may be used to hold this flange tight against the roof for soldering. Since no pressure is exerted against this soldered joint by movement of the metal roof, sufficient protection is provided.

ARCHITECTURAL SHEET METAL MANUAL

FOURTH EDITION, 1987

SHEET METAL AND AIR CONDITIONING
CONTRACTORS' NATIONAL ASSOCIATION, INC.
4201 LAFAYETTE CENTER DRIVE
CHANTILLY, VIRGINIA 22021-1209

CHIMNEY FLASHING

PLATE

Plate 69 illustrates a flashing system for a chimney penetrating a sloping roof.

In Fig A apron flashing is installed after the course of shingles immediately below the chimney is in place. The sides of chimney are flashed using pieces of base flashing installed with each course of shingles. The upper edge of each piece of flashing should extend 2 in. above each course of shingles. The lower edge should be ½ in above the butts of the shingles forming the next course. The base flashing must extend up the wall and onto the roof a minimum of 4 in.

The counter flashing is installed in a raggle left by the mason in steps as shown. Lead wedges or tension forming shapes are used to hold the flashing in place and raggle is filled with a sealant.

The length of each piece of counter flashing will vary with the slope of the roof but no step should be more than 3 bricks high. The width will vary but should always be wide enough to cover 4 in. of the base flashing.

Detail 1 shows a type of base flashing that must attached to the roof before the shingles are stalled. The roof portion of this runner flash has been formed with a hook edge and is cle on 12 in. centers. The base flashing is extended the wall a minimum of 4 in. The counter flash is installed in a flashing receiver (see Fig A, P 55).

Fig B shows a saddle flashing (cricket) in place the back of a chimney. Saddle flashings help divert rain and snow away from the chimn The cricket for Fig B is shown made in two pie but may be formed in one piece (Detail 2). joints in saddle flashings must be soldered.

Saddle flashing must be flanged 4 in. up the of chimney and 4 in. onto roof. It is cleated to roof deck on 12 in. centers using cleats of the sa material as the saddle. Step counter flashing installed in a raggle as shown or may be instal in a flashing receiver.

These details are acceptable for shingle, slate tile roofs.

PLATE 69

CHIMNEY FLASHING

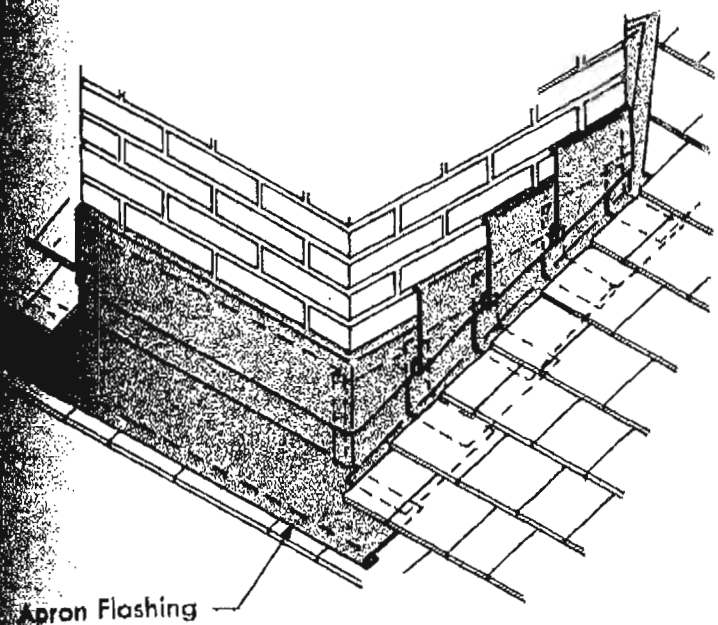
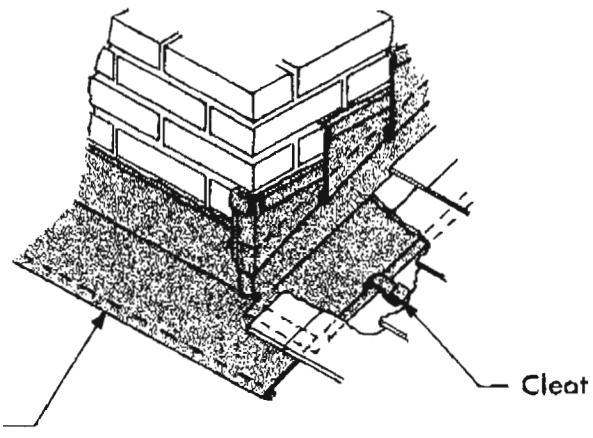


FIG A



DETAIL 1

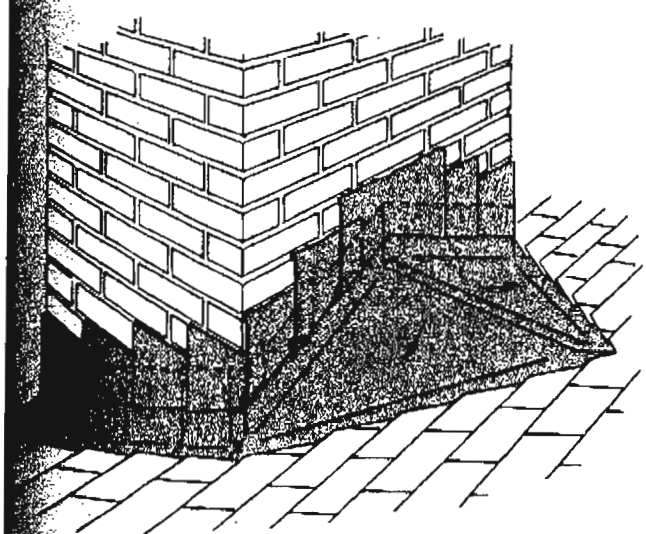
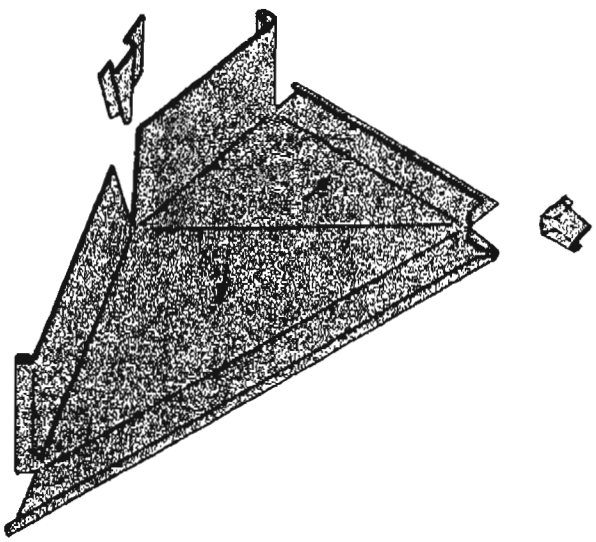


FIG B



DETAIL 2

CHIMNEY FLASHING (STUCCO)

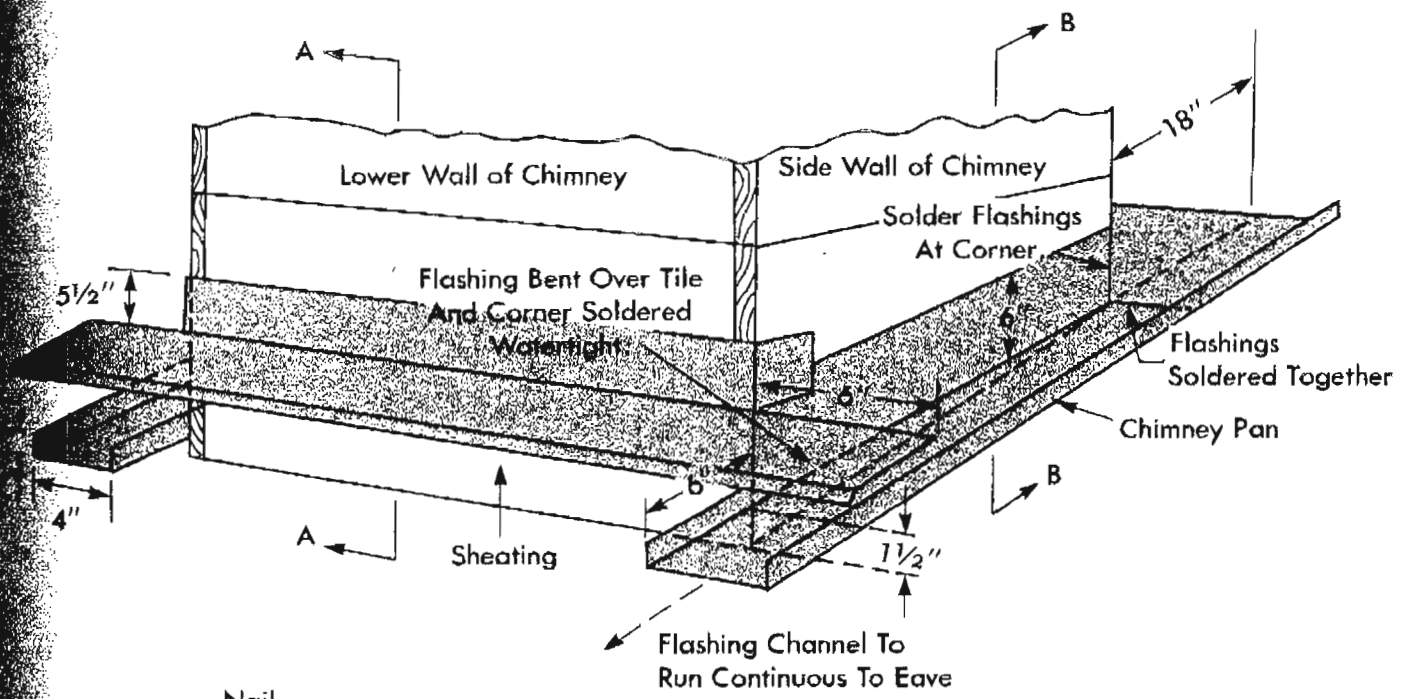
PLATE

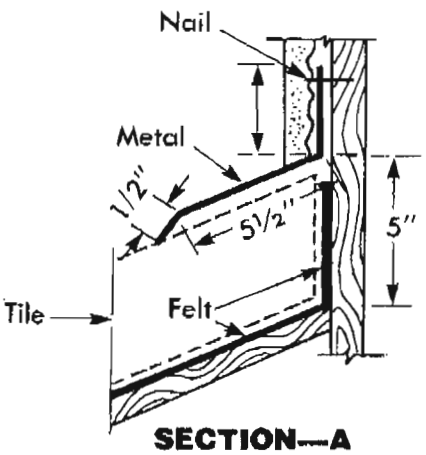
Plate 70 shows a method of flashing a stucco chimney in a tile roof. Tile manufacturers may have specific requirements or recommendations that deviate from these details. Modification would be necessary for any area with more than light snow accumulation.

Flashing pieces must be assembled in a wa proof manner. A cricket would be needed fo wide chimney and top side details would be mo ified accordingly. Pans that run by sides of ch neys must continue to the eave. Building pa present on the chimney would lap over the m flashings.

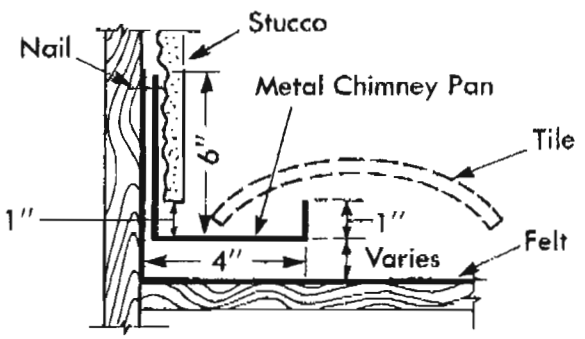
PLATE 70

CHIMNEY FLASHING (STUCCO)

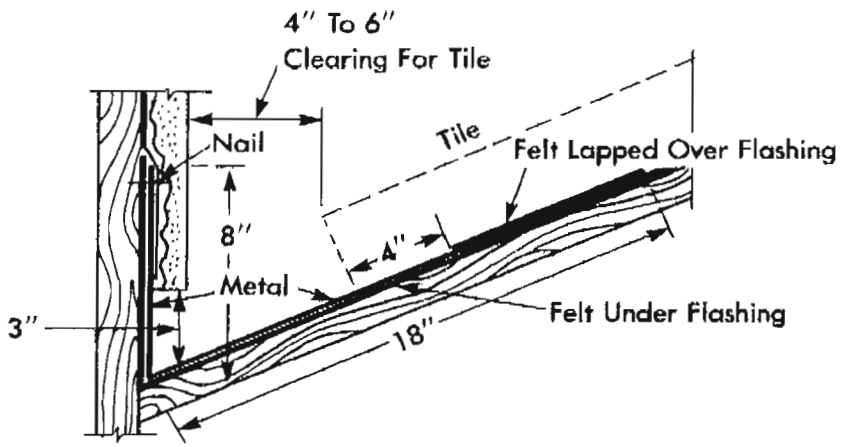




SECTION—A



SECTION—B



SECTION AT TOP OF SIDE OF CHIMNEY

PLATE 114

ROOF PANEL PENETRATION

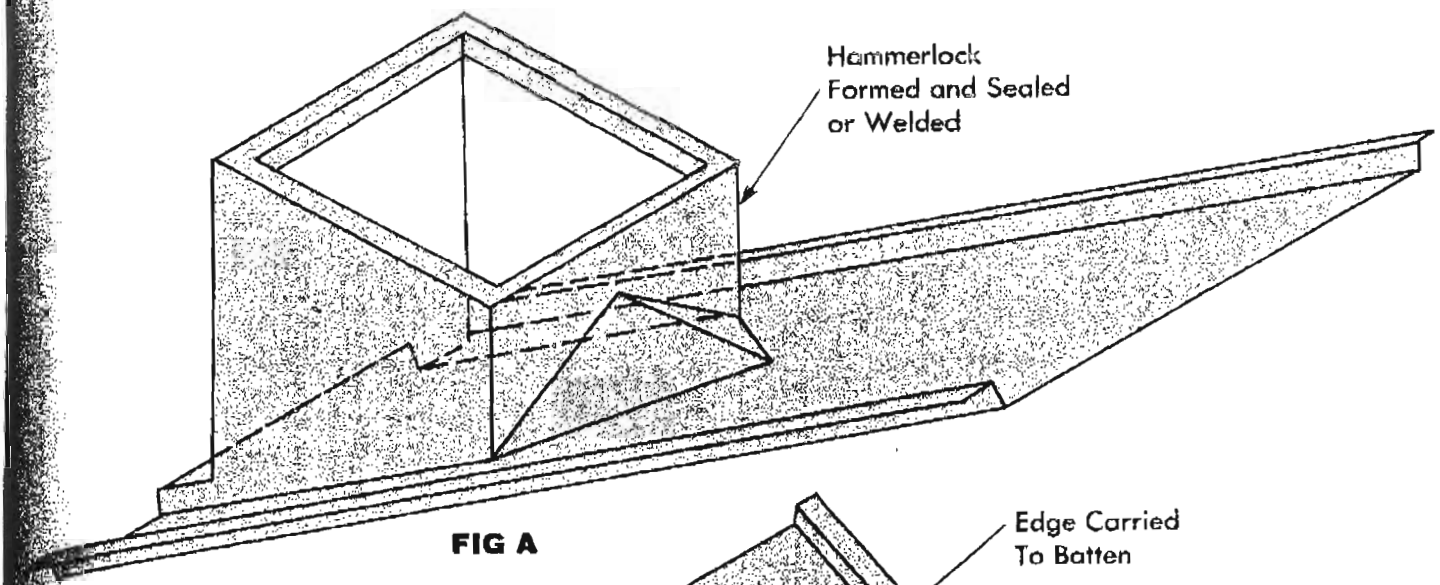


FIG A

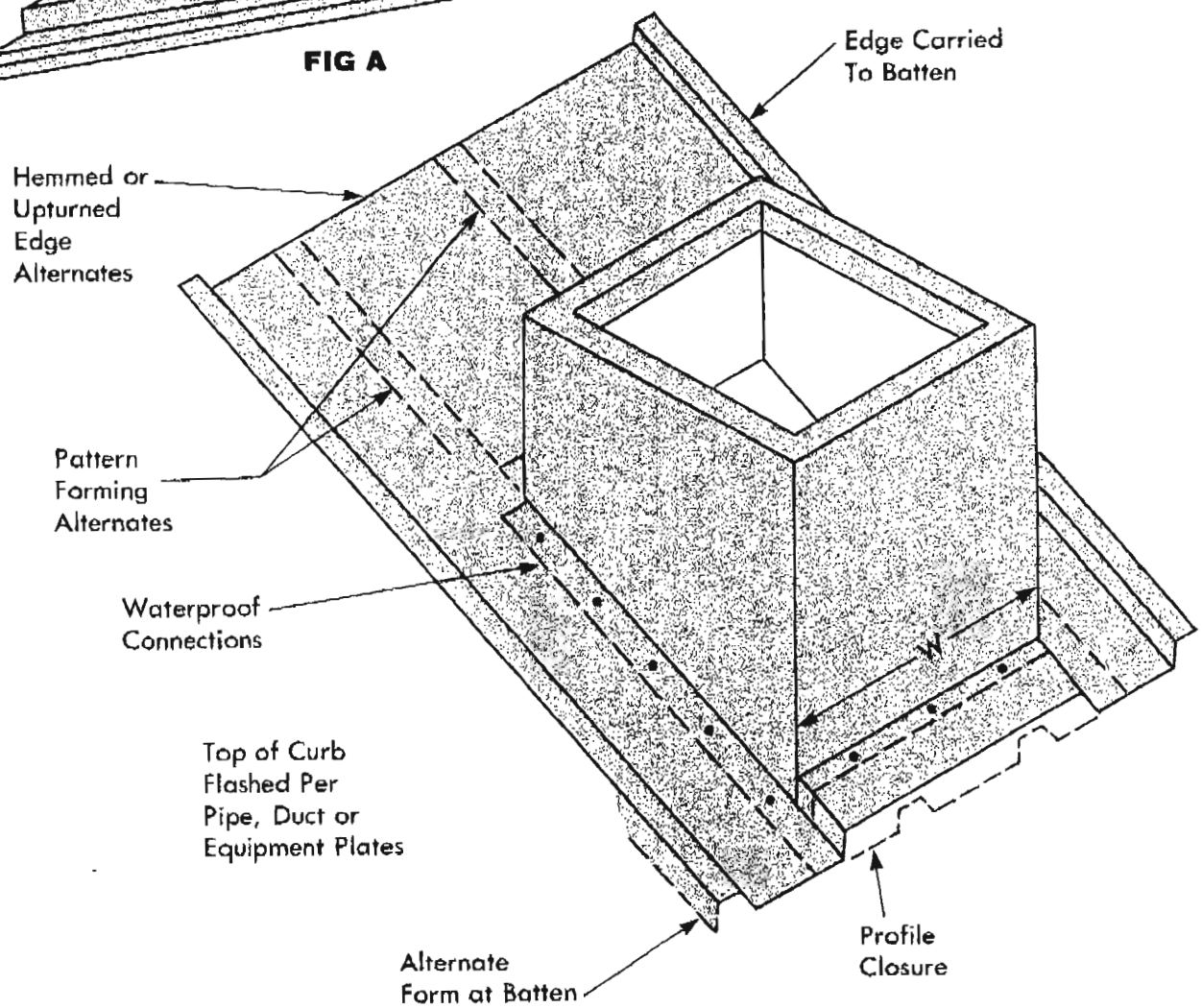
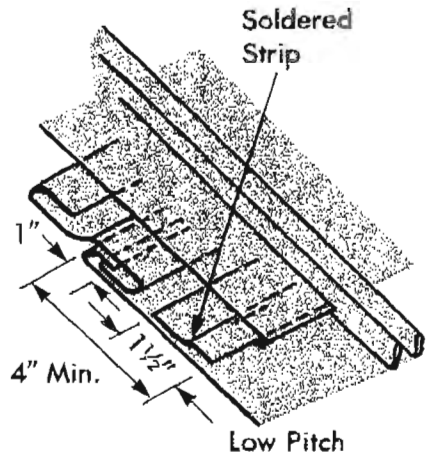


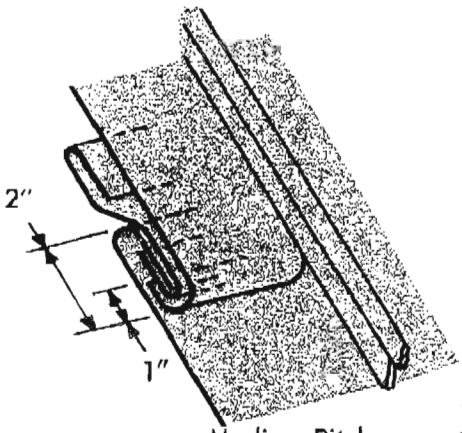
FIG B

PLATE 121

STANDING SEAM ROOFS

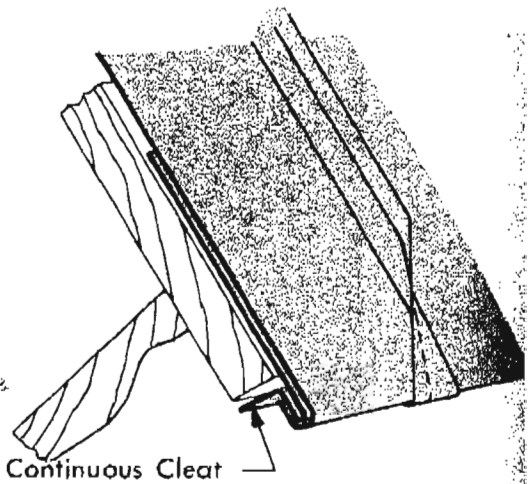


Low Pitch
(1:12 to 3:12)
A



Medium Pitch
Over
(3:12 to 6:12)
B

TRANSVERSE SEAMS
DETAIL 3



AT EAVE
DETAIL 4

OPTIONAL FORM 99 (7-90)

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Fax # 432-426-3122	Fax #

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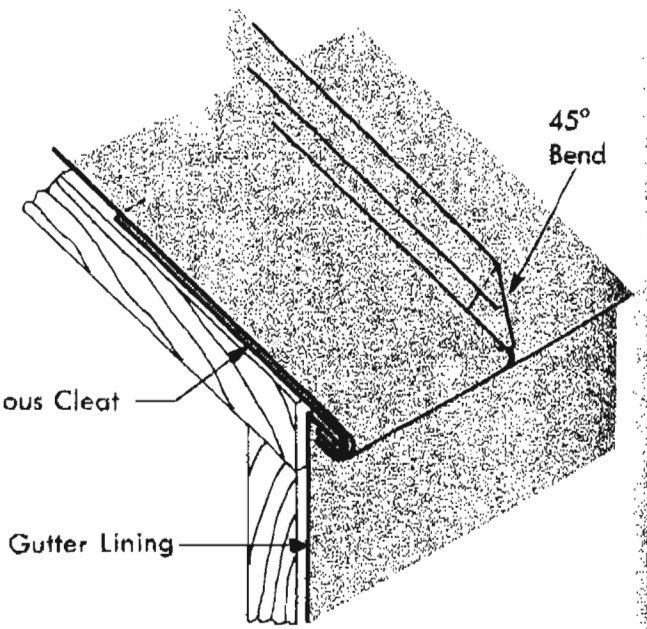
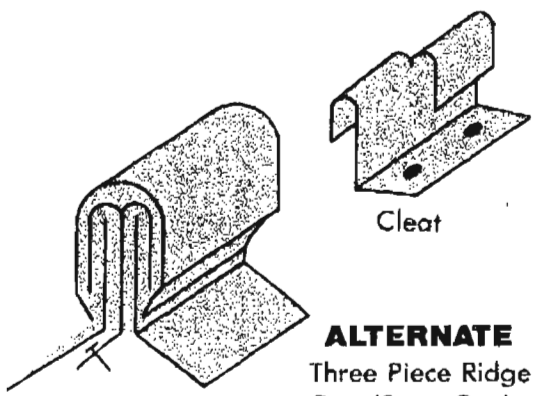
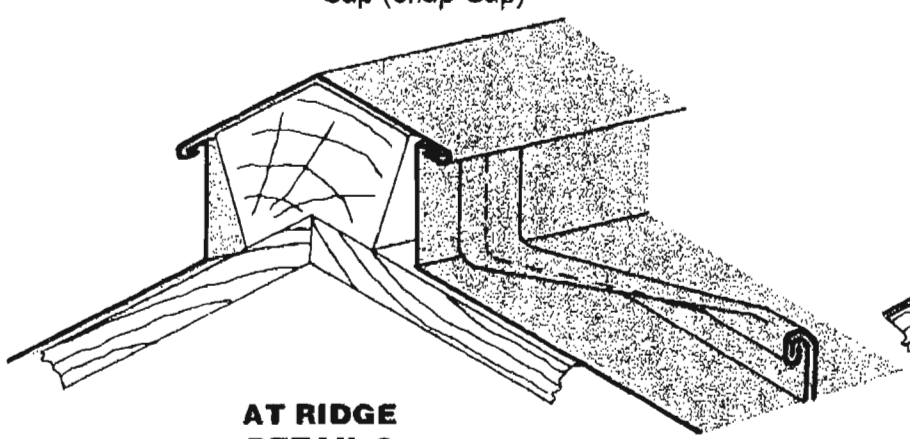


AT BUILT-IN GUTTER
DETAIL 5

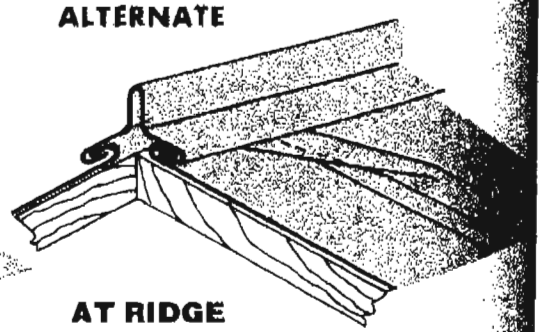


ALTERNATE
Three Piece Ridge
Cap (Snap Cap)



AT RIDGE
DETAIL 6

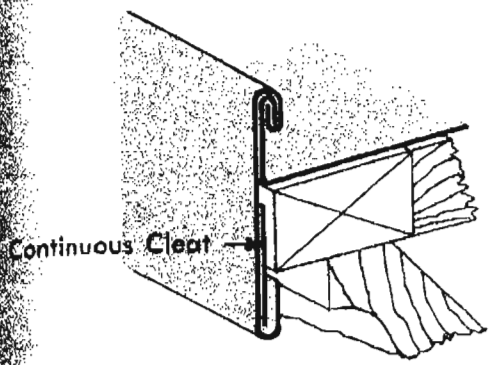
ALTERNATE



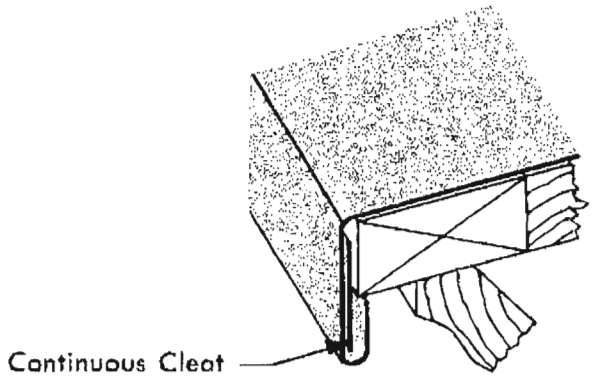
AT RIDGE
DETAIL 7

PLATE 122

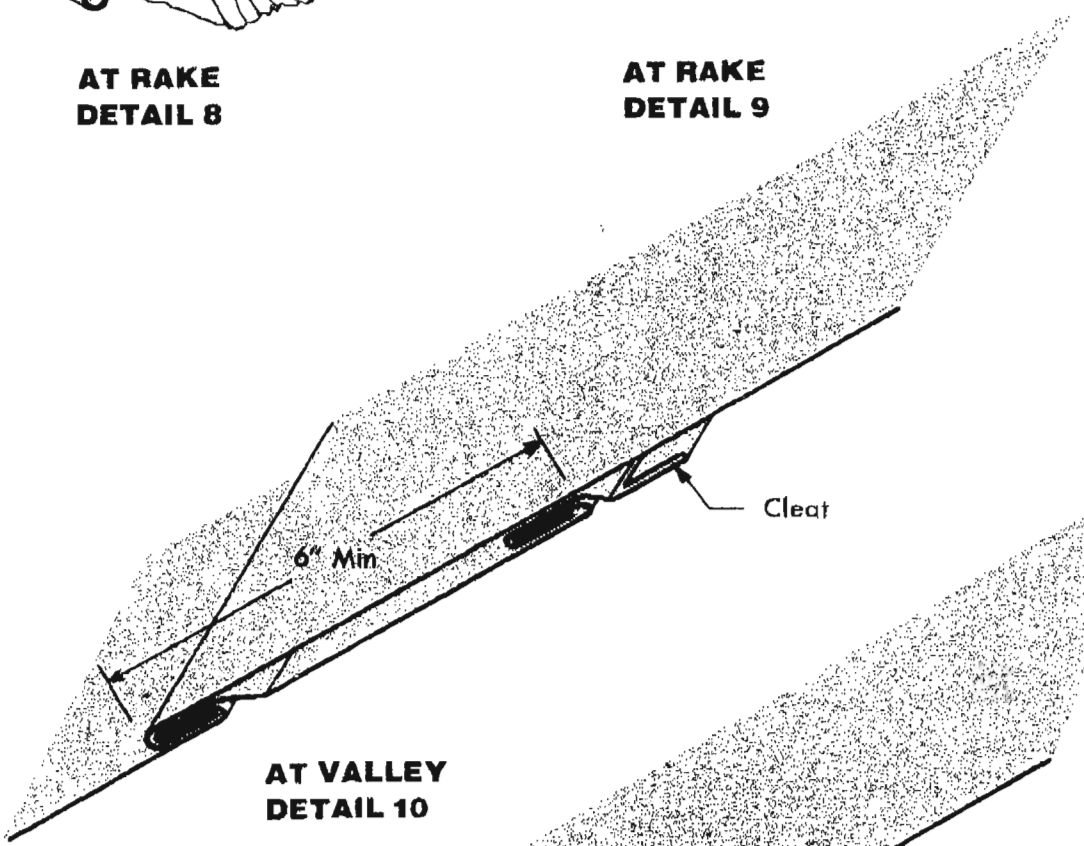
STANDING SEAM ROOFS



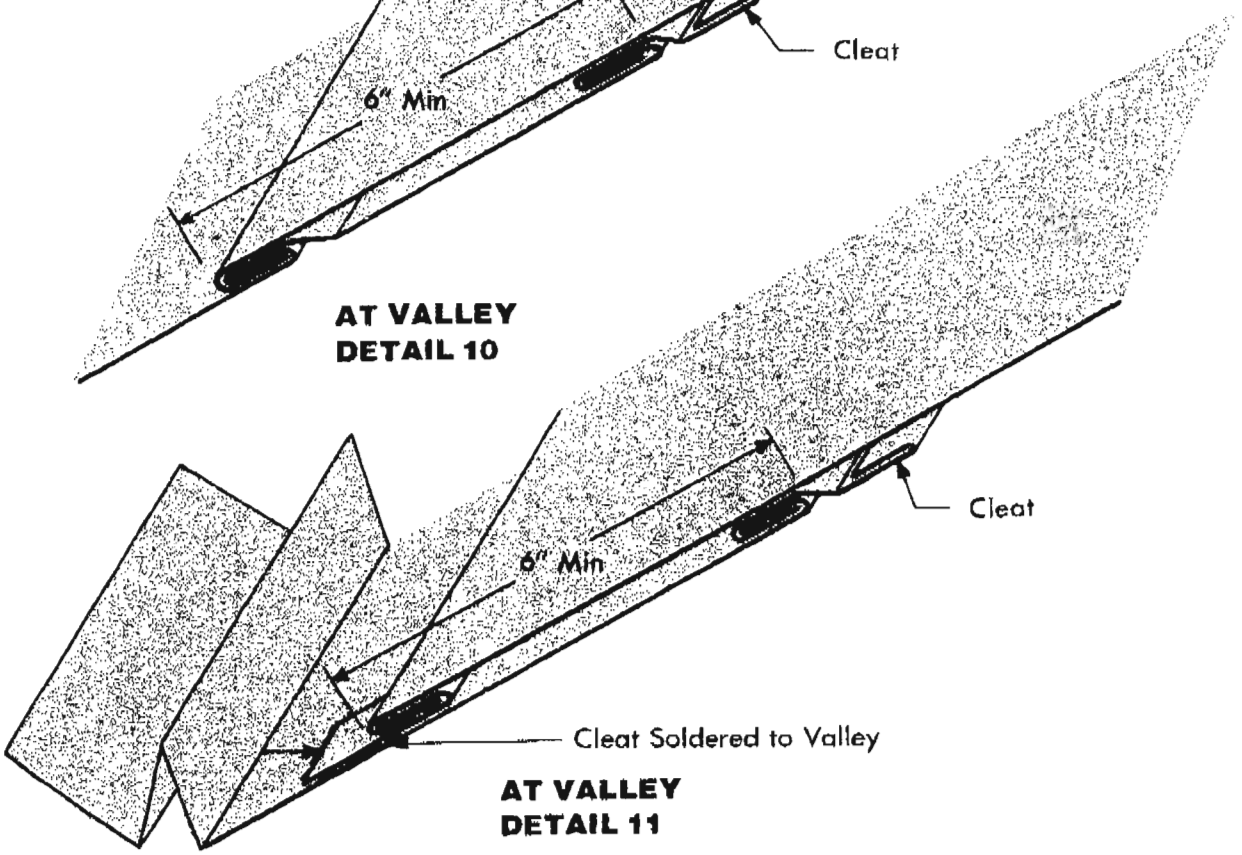
AT RAKE
DETAIL 8



AT RAKE
DETAIL 9



AT VALLEY
DETAIL 10



AT VALLEY
DETAIL 11

The Fort Davis National Historical Site
Post Hospital Restoration Program
2008

COMPLETION REPORT

Appendix II

PLASTER CONSERVATION

Prepared by Karen Fix, Conservation Artisans

Historic Plaster Fragment Stabilization

Expanding upon the work begun in 2005, and continued in 2006 and 2007, a session on plaster conservation was held in July 2008 as part of the larger Hospital Restoration Project at Fort Davis, Texas.

Work was curtailed during the 2007 field school due to some wildlife issues, leaving the plaster project unfinished in the Kitchen and Dining Room. Therefore, this year's immediate task was to complete those items. Once that was carried out, the Dispensary fragments were addressed.

Interior plaster is normally applied in two to three layers. A thick scratch coat is followed by a leveling brown coat, and a final thin finish coat. Edge detachment is the condition in which the plaster scratch coat and, in some cases the brown coat as well, has become detached from the adobe substrate along the perimeter, thereby leaving the fragment vulnerable to loss. This condition is readily apparent as the plaster fragment is left "hanging" in the air and exposed. In some cases, a portion of the adobe substrate is lost as well. The conservation treatment for this condition is to inject a lime-based fluid mortar into the void to re-establish structural adhesion of the plaster to the adobe wall, then to seal the remaining edge with a drier lime mortar mix that mimics the content and appearance of the original plaster scratch coat.

An informal condition survey was conducted, reviewing the fragments in the Dining Room and Kitchen to see where conservation treatments had been left incomplete during last year's field school. A microspatula or bamboo skewer was gently inserted along the perimeter of the fragment and debris and crumbling adobe was removed from any voids by loosely pushing and gently blowing. The area was generously flushed with water to facilitate further removal of debris and to prewet the adobe and plaster surfaces so that the moisture of the grout is not quickly sucked out and into the plaster/adobe through capillary action. The outside surface of the plaster fragment was also sprayed with water because weather conditions were excessively dry. As a precautionary measure, the adobe substrate adjacent to the perimeter of the plaster fragment was moistened with water from a spray bottle so that any grout spills could be easily cleaned up.

The fragment perimeter was dammed with rolled cotton so that the liquid grout would be kept contained within the fragment and braced until it was semi-hard. By twisting a piece of cotton so that it fills the gap between plaster and substrate, but keeping its depth into the interior of the plaster to a minimum, you allow room for as much grout to fill the void as is possible. This ensures that the grout reaches as near to the outside edge of the fragment as it can and, thus, provides extra stability. The cotton was gently pushed into the gap using the bamboo stick, leaving an opening at the top of the area of edge detachment. A variety of sizes of syringes, needles, and plastic tubing were used, but primarily a 60cc syringe was then fitted with a plastic tube of whatever length was necessary to reach to the interior depth of the detachment.

The grout mix consisted of two components: dry and wet. The wet component was a 5% solution (by volume) of a 100% acrylic admixture, El Rey Superior Additive 200, in water. The acrylic improves the bond of the grout components to the adobe and plaster. The dry component was a premix (by volume) of 4 parts St. Astier Natural Hydraulic Lime (grade 3.5), 1 part fine white sand, and 4 parts Z-light ceramic microspheres. The lime

is the binder and the sand adds strength to the mix. Microspheres are tiny glass spheres which provide bulk without adding much weight, and add plasticity to the grout mix which in turn reduces shrinkage. The ratio used was a 1:1 (dry to wet) ratio, which was blended for approximately one minute with a handheld drink blender. Approximately ½ liter was made at a time as this was the most that could be made and injected before the grout hardened and became unusable.

The detachment was filled with grout, using the syringe and rubber tubing, until it was visually apparent that the void was now filled, or the grout overflowed. Overflows and spills were quickly cleaned up with a wet sponge while attempting to avoid over-cleaning any spills that occurred on the plaster finish coat (leaving a bright white spot on an otherwise 'dirty' plaster surface). Some larger voids required a stepped application, where a small amount of grout was injected then allowed to harden slightly before injecting again. This allowed the grout to create a dam which subsequent grouting could build upon, working upward to fill the void. Cotton dams were removed once it was apparent that the grout had hardened sufficiently to remain in place (the cotton must be removed before the grout has completely hardened otherwise the cotton is sealed within the grout). The surface of the fragment was periodically sprayed with water to keep the plaster moist and allow the grout to cure without losing moisture and drying too quickly, which would cause cracking in the body of the grout. Any cracks that did occur, and were accessible, were later injected with a 20% solution of El Rey in water.

Fragments which were extremely unstable were braced with pieces of plywood which were screwed into the adobe wall along the perimeter of the fragment. Strips of cheesecloth were laid tight across the face of the fragment and also screwed into the adobe in case the pressure introduced by the grout caused the fragment to completely detach. After the grout hardened, this was all removed.

On a few fragments with detachments along the top edge it was found that the adobe substrate was extremely crumbly and continually became loose, then falling into the gap between plaster and substrate. The area was pre-wet with water then a 25% solution of El Rey in water was injected into the gap, aiming towards the adobe substrate so as to consolidate the surface. This was repeated several times until it became apparent that the adobe was holding together. After allowing the surface to dry overnight, this void was then grouted.

Holes in the plaster body were filled with a 3:1 ratio of course red sand to lime putty, with enough water to provide workability. The hole was sprayed with water and the mix was then pushed into the hole with a plastic artist palette knife. The fill was brought to a level slightly below, but in plane with the plaster finish coat so that it was distinguishable as a treated area. The perimeter of the fill was kept at a 90° angle to the plaster finish coat.

Once all grouting was complete and was given time to harden, this same mix of sand and lime putty was used to create an edge along the outside perimeter of the fragment. The mix was packed against the new grout and brought up to a 90° edge to the plaster finish coat. The mortar edge was made to visually blend in with the adobe by creating a mix of water and dirt (taken from the floor of the building and sieved to remove organic material) and applying it with a thin paint brush after the mortar had hardened slightly. These three rooms would not be receiving an application of new compensating plaster as was done in previous field schools. Therefore, mortar edging was applied along the

entire perimeter of all plaster fragments. The edging acts in concert with the grout application to provide adhesion and strength to the fragment.

Digital photos of the fragments were placed in acetate overlays and marked with Sharpie pens to indicate where grouting was carried out. This information was translated into a computer graphic and these annotated images are included as an appendix to this report. Images showing a red striped graphic indicate an area where injection grouting was performed; although not indicated with graphics, all fragment perimeters were mortar edged.

A variety of pigmented limewash mixes (dry iron oxide pigment mixed with lime putty) were tested on the compensating plaster in the Steward's Office which had been applied in 2005. The objective was to find a color which gave a 'warm' feeling to the room and which was a subtle enough match to the color of the historic fragment to make the new plaster discernable from the historic fragment but allow it to 'fade' into the background and keep attention focused on the historic sections. The dry pigments were mixed in a small container of water first, then put into a 5 gallon bucket of lime putty and mixed repeatedly with a wooden paint stirrer. The mix had was repeatedly stirred in order to keep the color dispersed. Each person removed a small amount of the mix and everyone painted in the same direction, using a wide chip brush and being careful not to overlap with anyone else's strokes. Once the first coat was dry, a second coat was applied in a perpendicular direction. This process was repeated until all areas were covered at least 3 times.

Digital photographs were taken of fragments in the Isolation Room, Store Room, and Linen Room in anticipation of and preparation for future conservation treatment. These are included on a CD with this report.


Dispensary East Wall
RALPH
FLOYD


Dispensary East Wall


Dispensary East Wall


Dispensary East Wall


Dispensary North Wall


Dispensary South Wall


Dispensary West Wall


Dispensary West Wall


Dispensary West Wall


Dining Room East Wall


Dining Room East Wall


Dining Room East Wall


Dining Room South Wall
WACO
SCAFFOLD DECK
OSHA
MADE IN U.S.A.
6053-10


Dining Room South Wall


Dining Room Southwest Wall


Dining Room West Wall


Dining Room West Wall
WACO
SCAFFOLD DECK
OSHA
MADE IN U.S.A.
6053-10


Dining Room West Wall


Dining Room West Wall


Kitchen East Wall


Kitchen East Wall


Kitchen East Wall


Kitchen North Wall


Kitchen South Wall


Kitchen South Wall


Kitchen Southwest Wall


Kitchen West Wall


Kitchen West Wall


Kitchen West Wall

The Fort Davis National Historical Site
Post Hospital Restoration Program
2008

COMPLETION REPORT

PHOTODOCUMENTATION

Figure 1.

Ventilating screens were fabricated and installed in several window openings, including in the Kitchen shown here.

Figure 2. On the exterior of the Kitchen window, a new drip cap was installed.

Figure 3. Several remaining door casings were completed, including this one on the north wall of the Surgeon's office in the Administration Building.

Figure 4. Construction of an adobe test wall.

Figure 5. Participants in a workshop, led by Pat Taylor of Cornerstones Community Partnerships, learned about traditional adobe construction and repair.