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HISTORIC STRUCTURES REPORT

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NARBONNE HOUSE

Salem Maritime National Historic Site

Essex County

Salem, Massachusetts

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I. SUMMARY OF THE EVOLUTION OF THE STRUCTURE

A. EARLIEST HOUSE

1. Surviving original northern portion of house

The earliest house consisted of the cellar, the north second floor large room, the chimney bay, a leanto (not the present one) extending to the east, and apparently, an extension southwards (not the present one) consisting of a first and a second floor room. The only portions of the house remaining from the original period are the cellar, the north first and second floor rooms and the chimney bay. These can be dated in the late 1660's or 1670's by several forms of evidence. First, there is ample structural evidence of the period of these portions. The roof framing (Drawing 8) is of the principal and common rafter system rather than the rafter and purlin system which prevailed after the 1670's. On the other hand, the fact that the common floor joists are set into open notches in the main floor girders (as opposed to being secured by mortise and tenon joists) indicates a probable date not before about 1665 (Dwg. 7,a). Other structural features are highly characteristic of the period 1665-1680. Cuts and splices in the roof boarding and framing system of the west slope of the main house roof indicate that originally there was a projecting front gable, as would be typical of a seventeenth century house, (Dwg. 8,a; Dwg. 5).

The original stylistic details of the earliest surviving portion of the house are also characteristic of this period, for example the chamfered and decoratively stopped posts and

beams seen throughout, most notably the posts in the large first floor room with their chevron ornamentation, (Photograph 29).

Except for later inserted fireplaces and a rebuilt portion above the roof, the present chimney stack is also highly characteristic of the late seventeenth century and must be original to the structure, (Dwg. 4). The overall configuration of the chimney, the shape and size of its original fireplaces now filled in with later ones, and the existence of a decorative pilaster on the west face as seen from inside the attic, (Dwg. 8,b), are among the indications of the early date of the chimney.

Documentary evidence is consistent with a date in the 1670's, although deeds in themselves only serve to date the house before 1690. Before 1690, certain deeds to the property were not recorded in the registry of deeds, so that there is no record of whether or not a house existed on the land. In 1690, however, Thomas Ives mortgaged the property, and the mortgage deed was recorded. It specifically mentions the "Dwelling house shop Barne and all other houseing and outhouseing there upon".¹ Thus by 1690 there was definitely a house on the property.

As first built this northern portion of the house would have looked quite different from its present appearance (Dwg. 5). We have already alluded to its front (west) gable, large open fireplaces, and exposed decorated frame. In addition, it would have had the leaded casement windows

typical of its period. Interestingly, it had plaster ceilings, since above the present ceilings (which are presumably eighteenth century) is very early lath and plaster applied directly between the joists to the undersides of the boarding overhead. This is found in houses of the middle and late seventeenth century where some additional insulation or embellishment could be afforded.

2. Missing portions of original house: southern extension

The original configuration of the house is suggested by the 1695 inventory of the estate of Thomas Ives, who had recovered his mortgage.² This inventory lists the following rooms:

"Northern room below" with fireplace equipment

"Chamber of the Northern End" (i.e., a room above the "northern room below")

"Southern lower room"

"Southern Chamber" (i.e., a room above the "Southern lower room")

"Kitchen" with fireplace equipment

"Kitchen Chamber" (i.e., room above the kitchen)

"Shop"

How does this listing of rooms fit the building now known as the Narbonne House?

The present northern first floor room and the chamber above are clearly earlier than 1695 and must be those referred to in the inventory. The present gambrel addition to the south, however, cannot possibly be as early as 1695 and thus cannot be the southern room and second floor chamber referred to in the

inventory: every feature of the design and construction of the present gambrel ell indicate a date after about 1725, as we shall see below in the discussion of this portion of the building. However, the existence of a previous extension to the south, in the location of the present one, is made clear by certain items of architectural evidence.

The first architectural item suggesting an original extension to the south is the existence of a large seventeenth century-type fireplace behind the present later fireplace in the south first floor room (Dwg. 4,a; Photograph 30). This large fireplace appears to be original to the chimney stack, which, as we have seen, is clearly of the seventeenth century. This original large fireplace must have faced into a first floor room where the southern gambrel ell is now.

Apart from the evidence of the chimney itself, the structural bay in which the chimney stands is of a width (6'-9" between the posts) suggesting a large chimney with fireplaces facing both north and south (Dwg. 7,b). There is no evidence that the framing of this chimney bay is anything but an original portion of the original house frame.

Further evidence that an original southern extension of the house existed in the location of the present gambrel ell is the fact that the post immediately to the south of the west (front) door of the house has as its bottom the remains of a tenon extending to the southernmost surface of the post (Dwg. 7,c; Photograph 3,a). This tenon would have fitted down into a mortise in the original sill. Although the

original sill in this area no longer survives, the fact that the tenon extended across the full width of the post is significant. This detail is characteristic of posts at intermediate points along a sill. If the original sill had ended here, the mortise in it would not have reached all the way to the southern end of the sill, and thus the tenon in the post would not have extended to the southern face of the post.

As a final item of evidence, there is early lath and plaster behind the eighteenth century finish woodwork of the north wall of the first floor room of the present gambrel extension (photograph 30). This lath and plaster is on the original studs (and remnants of original braces) in the wall which forms the south side of the chimney bay. This wall (Dwg. 7,d), is not part of the present gambrel addition, but rather is an integral and original part of the frame of the first house. Thus, if the present interior first floor finish woodwork was installed in the present gambrel ell at the time it was added to the house, there must have been a previous plastered room before the present gambrel ell..

There are two points of confusion regarding the hypothesis of an original extension to the south. One is the fact that the original framing of the wall along the south side of the chimney (Dwg. 7,d) would allow no space for any doorway between the northern and southern parts of the house. As we have noted, both the chimney and the wall along its south side date from the earliest period of the house.

Their configuration allows for doorways directly connecting the north and south parts of the house only in the area of the front entry on first and second floors, where doorways now exist (Dwg. 3,a and b). The problem is that at both levels are the sawed-off ends of falling braces (braces from the post down to the floor) which would have blocked any original door openings. In addition, there are mortises for studs directly where the doors now exist. The studs must have been removed and the braces cut through to accommodate the present doorways. At this time the chimney girt in this wall was substantially cut up into to make enough headroom for the doorway installed at first floor level (Dwg. 7,e; Photograph 32). At second floor level a re-used stud was installed as a brace following the line of the present gambrel roof, set into one of the earlier stud mortises (Photograph 27).

This evidence suggests that as originally built the house had a southern extension with no direct internal connection to the northern part of the dwelling. Was this southern extension some type of work area, perhaps associated with Thomas Ives' trade as a slaughterer?

A second point of confusion about the configuration of a presumed original southern extension is the fact that the original wall running along the south side of the chimney (Dwg. 7,d; 8,c) is studded right up through the attic to roof level. This strongly indicates that the roof of the presumed original southern extension was not simply a continuation of the gable roof which exists over the north part of the house.

Indeed, on the south side of the studs in the attic (Dwg. 8,c) are hand wrought nails and disused nail holes for clapboards or sheathing, now removed, which had existed at a lower level than that of the present gambrel roof. Thus at one time this entire studded wall in the attic must have been exposed to the exterior, whereas now only the portion above the adjoining gambrel is so exposed.

This evidence might suggest that the original southern extension had a leanto roof (Dwg.5). If so, the chamber (second floor room) here would have been rather small. This is consistent with the fact that there is no original fireplace at second floor level on the southern side of the chimney. The resulting configuration would have been the same as that of the 1660's Gedney House on High Street in Salem. The first floor joists of the present gambrel ell are re-used seventeenth century framing timbers which may have come from the demolished original southern extension (Dwg. 9,a; Photographs 12, 13).

3. Missing portions of original house: leanto

What of the "Kitchin" and "Kitchen Chamber" listed in the 1695 inventory? Architectural characteristics of every kind indicate that no portion of the present leanto along the east side of the house could possibly be as early as 1695, as we shall see later in our discussion of this area. Yet architectural and archaeological evidence made it clear that an original eastern extension of the house did exist.

First, archaeological excavations (carried out under separate contract) have revealed the existence of an earlier

foundation than that of the present leanto, extending about 2' further east than the present one (Dwg. 5). Along the north-south axis, the foundation for this leanto was clearly seen to begin at the southeastern corner of the surviving original portion of the house (Dwg. 3,c). The foundation remains began to peter out toward the north, and it could not be determined whether the foundation had continued all the way to the northern end of the house.

Among the architectural evidence for an earlier leanto is the fact that the eastern flue of the surviving seventeenth century chimney (Dwg. 4,b; Photograph 37), is clearly original to that chimney, the bricks being of the same type as the rest of the chimney and bonded in without any sign of disturbance to the adjoining bricks. This flue is extremely large and leads upward from a seventeenth century-type fireplace of unusual size concealed behind the present later fireplace in the leanto. This was probably the "Kitchin" with fireplace equipment listed in the inventory.

Further proof that a leanto to the east existed is the fact that in the chimney bay of the house there are no studs or evidences of studs in the plate or girt which run north-to-south at the juncture of the leanto and the main roof (Dwg. 7,g). Thus, since all the other original exterior walls are studded, there cannot have been an exterior wall in this area and must always have been a second floor room where the leanto second floor room is now.

Yet more evidence of an early leanto is found in the wall which divides off the northern first floor room of the house from the northern portion of the present leanto (Dwg. 7,h; Photograph 40). The eastern face of this wall (facing into the leanto) exhibits eighteenth century clapboards and behind them, horizontal boards, since for some period of time there was no leanto extending this far north and this was an exterior wall (see Section D, which describes the present leanto). Behind these clapboards and boarding is hand-split lath. This must indicate a plaster surface of very early date serving as the west interior wall surface of an original or very early leanto.

Yet more descriptive information about the previous leanto is revealed by archaeological excavation. This has revealed a brick floor approximately two feet below the present leanto floor. An interior bulkhead stair of uncertain date (Photograph 36) leads from the leanto into the cellar under the southern part of the house. These arrangements may relate to Thomas Ives' activities as a slaughterer.

4. Shop

What of the "Shop" included in the 1695 inventory. No evidence has been found as to where this might have existed in the house. Indeed, the 1690 mortgage deed from Ives to Redford referring to a "Dwelling house shop Barne" suggests that the shop may have been a separate building.

B. PRESENT GAMBREL ELL

In the foregoing discussion we have constructed from the earliest documents and architectural evidence a probable original configuration of the house as shown on Drawing 5. What can be learned in a similar way about the configuration at later dates? The present gambrel ell represented a major change in the configuration.

The ell is securely datable by architectural features as a structure postdating by a wide margin the period of the 1695 inventory. The lack of decorative elaboration of the frame and the general outline of the roof are examples of such evidence. What is perfectly clear is that the the gambrel ell was constructed previously on some other site and was moved up and attached to the northerly portion of the house. Evidence for this includes the fact that at its north end the gambrel has its own corner posts placed side by side with those of the northern part of the house, (Dwg. 7,i, 9,b; Photograph 3,b). If the ell had been built new as an addition to the older house, it would probably have shared the existing older posts with the rest of the house. More conclusive is the fact that along its northern wall (Dwg. 9,c), the ell has sheathing boards which are nailed to the north side of the timbers where no space now exists to swing a hammer. This is seen from inside the attic of the main house. These boards had to have been nailed into place before the juxtaposition of the two buildings.

Another important piece of evidence is the fact that the western sill of the gambrel ell extends several inches farther

north than the northern corner post which stands upon it (Dwg. 9,d, 7,j; Photograph 3,c). The sill has been roughly cut off, presumably at the time the ell was moved. This indicates that the ell had been part of another building which, in this area, had extended beyond the post.

The documents do not indicate clearly when the ell was moved up. However, one does note that the first deed indicating a possible increase in the value of the property (and thus possibly major improvements) is dated 1729. Up until then the documents reflect a stable price. Thomas Ives mortgaged the property in 1690 for £85³; the value of the property at the time of Ives' death in 1695 is given at £95⁴; his heirs redeemed the mortgage in 1696 for £95⁵ and sold the property to Deacon Simon Willard in 1699 for £95⁶. In 1729, however, Deacon Willard sold the property to his son, Josiah, for £170⁷. Does this indicate that by 1729 the house had been improved by the substitution of the gambrel ell for the previous southern extension? Not necessarily. The £170 does not necessarily reflect an increase in value, since as the deed states, it was paid in the greatly deflated "province bills", as opposed to the "lawful money" and "current money" in which previous transactions had been made. Also, the price included an addition of land which Willard had purchased for £12 current money.

Perhaps the son, Josiah, enlarged the house. We are reminded of the Reverend William Bentley's diary entry of October 16, 1812, recording a conversation with some elderly women in the community "who have passed fourscore", by which

he determined that the Narbonne House had been Deacon Willard's and in which he says "the old house enlarged by the son."⁸

Some doubt is cast on this possibility by the fact that during Josiah's short ownership the value of the property does not seem to have increased. In 1729 he sold the northern part of the house to his brother Richard for exactly half what he had paid his father (L85 province bills)⁹ and, at Josiah's death in 1731 the value of the southern half (which he had retained) was also given at £85 in the inventory of his estate, (form of currency not given).¹⁰ This inventory significantly refers to the southern half of the house as "half a Dwelling house purchased of his Father" which suggests that there had been no change. It is possible that the southern half was enlarged during the period 1731 to 1750 when it was owned by Josiah's heirs.

Joseph Hodges might well have enlarged the house after his purchase of both the southern and northern halves in 1750 and 1757 respectively. Hodges paid £60 lawful money for the northern half,¹¹ (which Richard Willard's heirs had lost through a foreclosed mortgage to Richard Ellis) and an undetermined amount for the southern half (then in the hands of Josiah Willard's heirs).¹² When Hodges sold the reunited property to Jonathan Andrew in 1780, the sale price of £200 lawful money does seem like a large increase over previous values. A date after 1780 for the addition of the ell seems most unlikely on the basis of architectural evidence. The north (fireplace) wall panelling of the first floor room in the ell (Photograph 30) presumably dates, at least in part,

from the time the ell was joined to the rest of the house, since it is so arranged that the space for the fireplace is in the correct location to fit the pre-existing chimney and fireplace. Except for the Federal period mantel, there are no respects in which this panelling is stylistically suggestive of a date after 1780.

In any event Capt. Joseph Hodge's acquisition of the property in 1750 and 1757 marks the beginning of a two-century continuity of ownership in the same family. While the descent of title is by no means from father to son, a distinct family relationship can be traced among all the successive owners until the acquisition by the Park Service. This is a fact of major significance in regard to the interpretation of the property. The fact that the house was in one family for over two centuries is a strong historical mandate for the preservation of all architectural and decorative changes in the building, since they represent the visual expression of a historical continuum unusual in America's highly mobile society.

C. EIGHTEENTH CENTURY ALTERATIONS TO SURVIVING ORIGINAL
PORTION OF HOUSE

1. Chimney

The south side of the original chimney was altered to conform to the present gambrel addition. At first floor level, the large square seventeenth century fireplace was filled-in with a later, smaller one which conforms with the smaller fireplace opening in the panelling of the north wall

of the added room (Dwg. 4,c). Since the panelling (except for the Federal mantel) is of a relatively early character, this change probably dates back to the addition of the ell, (Photograph 30).

At second floor level, where no fireplace had previously existed, a new fireplace and flue were built onto the south side of the existing chimney (Dwg. 4,d). This probably occurred at the time the gambrel ell was moved up. The added flue does not project through the roof but rather cuts through into the earlier flue below roof level. The fact that the newer flue is not bonded to the older chimney stack is evidence that it is not original to the stack.

2. Front Staircase

The present front staircase clearly dates from long after the construction of the original house, probably from the date the gambrel ell was added. The sheathing which encloses the stair at first floor level is not of a seventeenth century character (Photograph 33), although at second floor level one sheathing board, possibly re-used, is of the first period (Photograph 35,a). Further evidence of the altered character of the stairs is the existence of a seventeenth-century-type shadow-moulded door at the top of the stairs, (Dwg. 3,d). This door is covered on its north side by the eighteenth century fireplace wall panelling of the north second floor room (Dwg. 3,e). The door does not fit the present stairs but may have fit the earlier ones. In addition, the staircase as a whole extends too far south to have fitted against the west face of the chimney as

originally built. In Photograph 34 a vertical strip of brickwork (a) is noted which is easily seen to be an addition to the original chimney stack; the present stairs conform to this widened dimension of the chimney. This widening of the chimney and alteration of the stairs may date with the other chimney alterations made at the time the ell was added. Finally, in the cellar stairway one can see that the present stairs from first to second floor are built on top of lath on the south wall surface of the stair hall, (Photograph 34,b). It is likely that these lath date from the time of an earlier stair arrangement.

3. Other eighteenth century alterations

Throughout the surviving original portion of the house, both externally and internally, are alterations dating from the eighteenth century, some probably from the date of the addition of the gambrel ell. The window casings and sash, similar to those of the ell, are eighteenth century replacements for the leaded casement windows which must have existed previously. The interior shutters found in both the original portion of the house and the ell, are fine examples from the eighteenth century.

The remaining areas of fireplace wall panelling in the first and second floor north rooms, like that found in the ell, is good material from the eighteenth century (Photograph 14, right side). That in the first floor room probably dates to the installation of the second of the three successively smaller

fireplaces found here, the third and smallest fireplace being associated with the still later (Federal) mantel.

Eighteenth century panelled doors of several types are found in the north part of the house, as in the ell. Beam casings similar to those of the ell are found enclosing several of the posts in the original north part of the house.

In the first floor north room is a good eighteenth century corner cupboard (Photograph 14, left side) similar to that in the ell (Photograph 31). (Both corner cupboards have glass-panel doors dating from the nineteenth century.) The exterior enframing of an eighteenth century arched cupboard survives in the fireplace wall panelling of the north second floor room, filled in with much more recent matched boarding to enclose a toilet (Dwg. 3,f). Cornice mouldings and plaster ceilings installed below the joists also date from the eighteenth century and resemble those in the ell.

D. PRESENT LEANTO

The present leanto is clearly divided into three sections, the center one being the earliest. We have already seen that the house must have had an east (rear) leanto as originally constructed c.1670. The earliest, center, section of the present leanto is not that original leanto. It has no features suggesting anything earlier than an eighteenth century date: the frame is composed of members too small to suggest a seventeenth century date; the design of the framing joints suggests an eighteenth century date, as do the trim elements. Excavation also uncovered the foundation of an earlier leanto,

as we have already described (Section A,3). Evidence of very early lath and plaster at the north end of the present leanto (described in Section A,3) indicates that the original leanto extended farther north than the earliest, center portion of the present leanto.

That the earliest portion of the present leanto did not extend all the way across the rear east wall of the house is indicated by many items of evidence, of which only the most obvious and conclusive need be mentioned here. The northern limit of the earliest portion (about 6' south of the present north end of the leanto) is clearly shown by the survival of early clapboarding now covered in by the short addition made toward the north. At second floor level (in the leanto attic) this clapboarding exists on what had been the north end wall of the leanto (Dwg. 3,g) and on what had been a 6' length of the east wall of the original main body of the house (Dwg. 3,h). At first floor level, only the eastward-facing clapboards survive (Dwg. 3,i; Photograph 40), the former northward facing end wall of the leanto having been removed, but the scribe marks for the missing end wall clapboards are clearly seen where they had joined those on the main house (Dwg. 3,j; Photograph 40).

At the south end of the present leanto, at second story level in the leanto attic, exactly the same type of evidence establishes the location of the former exterior end wall of the center section of the leanto. The second story portion of that wall, complete with unpainted clapboards and a window casing painted red, survives intact facing south into what is

now the south end of the lengthened leanto, (Dwg. 3,k). What had been the eastward-facing exterior wall and roof of the gambrel addition is seen in this same area, including fragments of roof shingles (Dwg. 3,l). The leanto end wall and the gambrel roof meet at the original southeast corner post of the house, where the leanto clapboards were carefully scribed over the gambrel's shingles, and the shingles were canted upward to meet the clapboards in such a way as to cause water to run down the gambrel roof a few inches away from the joint between clapboards and shingles. Thus the portion of the present leanto running along the east side of the gambrel ell is clearly later than the gambrel ell and the center portion of the leanto. The relative dates of the gambrel ell versus the center portion of the leanto have not yet been positively established. Archaeological excavation revealed portions of a cobblestone walk beneath the foundation of the added southern portion of the leanto (Photograph 43).

All three sections of the present leanto exhibit fully hand wrought nails in their framing and in the early portions of their trim. Thus even the additions at the north and south ends almost certainly predate 1820. Throughout all three portions of the leanto are early hand-planed woodwork items nailed with handmade nails (clapboards, interior sheathing, doors, door and window casings and other items), (Photographs 38 and 39). Among these relatively early features are the staircase in the center portion (Dwg. 3,m; Photograph 39), and in the southern portion, a cupboard door of which one of the hinges

is a seventeenth-century-type cock's head hinge, perhaps re-used from another location (Dwg. 3,n).

The broad "shop" door in the north exterior end wall of the leanto is in the Federal style and probably dates from the early nineteenth century (Photograph 41; Dwg. 3,o).

Side by side with the earlier woodwork items in the three sections of the leanto are large areas of late-nineteenth-century or early-twentieth century beaded matched boarding, secured in some cases with cut nails and in other areas with wire nails (Photographs 38, 42). This matched boarding and other late features in the leanto, such as utility sink under the stairs (Dwg. 3,p) clearly date from the latter years of ownership by the relatives and successors of Captain Joseph Hodges. Thus, as expressions of the natural growth of the building and as part of the pattern of continuous ownership by one family, these late features deserve preservation.

E. NINETEENTH AND TWENTIETH CENTURY ALTERATIONS IN ORIGINAL PORTION OF HOUSE AND GAMBREL ELL

We have referred to nineteenth and twentieth century alterations in the leanto. The original northern portion of the house and the gambrel ell also exhibit late alterations. All four mantelpieces in these two portions of the house are of a late Federal style, dating from well into the nineteenth century, and superimposed on eighteenth century panelling and sheathing which show the outlines of previous fireplace openings (Photographs 14, 30). In the north first floor room (Photograph 14), the furring, lath and plaster directly

behind the mantel are of the same period as the mantel. The glass-paned doors in the corner cupboards in both the north and south first floor rooms are of about the same period, (Photograph 14, left side; Photograph 31). The front doorway was remodelled in the Federal period (Photograph 1).

As in the case of the leanto, there are not only Federal style alterations but also changes dating from around the turn of the present century, most notably the toilet room adjacent to the second story bedroom in the original northern part of the house (Dwg. 3,f). The narrow, beaded matched boards which enclose this closet-sized space are visible from inside the bedroom, since they have been used to block off an arched opening in the eighteenth century fireplace wall panelling of the bedroom. This arched opening, as described in Section 3, is of an early character and, probably once served as the enframing for an eighteenth century cupboard.

As in the case of recent alterations in the leanto, those in the front portions of the house represent the recent years of the family which owned the house continuously from the 1750's.

F. RECOMMENDATION FOR FURTHER STUDIES

It is anticipated that as the building is opened up for repairs, more data will become available leading to further conclusions about the building's development. Our

first recommendation for future studies is that an architectural historian be closely involved in the repair process to seek out, observe, record, and interpret such evidence.

Secondly, a detailed paint color chronology for the entire house should be undertaken for the sake of the color record itself and as a means to obtain yet more information as to the history of alterations of the woodwork and other features of the building.

II. EXISTING CONDITIONS AND RECOMMENDED TREATMENTS

A. EXISTING PROBLEMS

1. Moisture penetration into the wood fabric

This problem is discussed first because it is the cause of several of the other problems described below. Moisture is gaining access to the building in the following ways.

a. Roof: The present roof covering is asphalt felt roll roofing. It is leaking in so many places in the leanto as to soak large areas of the roof boards there. Leaks specifically noted are along the joint between the leanto and the front portions of the structure (Dwg. 2,a); at the dormer in the leanto (Dwg. 2,b); and at the dormer in the gambrel addition to the south, (Dwg. 2,c).

Many of the roof boards in the leanto are soaked through, although the vast majority, if not all, are still serviceable.

b. Wetting of frame at foundation level: In most areas around the perimeter of the house, especially around the southern half, rain water from the roof and walls is wetting the sills and other woodwork of the lower portions of the walls. This is occurring in several ways:

- The soil level around the southern end of the house is so high that the lower parts of the sills are actually below grade along most parts of the south wall and at the south end of the east wall (Photos 7-11). This is probably due to a gradual rise in the soil level.

- In many places the grade does not slope away from the house steeply enough to lead away readily the rain water which has run off the roof.
- The soil directly adjacent to the sills absorbs water and holds it long enough to aggravate the wetting problem. In the areas where the sills are not raised above grade, and where rain water saturates the soil, the sills (or their remains), and the lower portions of posts, studs, sheathing and other woodwork become extremely moist in wet weather. Along the southern portion of the east wall the wetting reaches up in this manner about 2' above the sills. (Photographs #7, 8; Dwg. 2,d).
- There are no rain gutters.
- Even on the northern part of the west wall, where the sill is raised fairly well above grade on a brick-topped stone foundation, roof water is moistening the sill through splashing off the paving here and/or through rising damp in the brickwork. (Photograph #2; Dwg. 2,e).
- Along the southern half of the east wall (Dwg 2,e) concrete has been poured at some previous time outside and under portions of the sill in an effort to keep water away from the sill. This concrete has failed to keep the sill dry. No proper flashing or other waterproofing device has been inserted at the point where the upper surface of the concrete butts against the sheathing. Also, the concrete appears

to be relatively porous and probably has drawn water into the sill by capillary action.

c. Crawl spaces: The leanto and the 18th century gambrel ell stand over unexcavated soil. The heavy floor joists of the southern addition rest partially on soil, (Photographs 12, 13). The leanto also lacks an adequate crawl space. The soil under the gambrel ell appears to be extremely sandy and rather dry. Perhaps for this reason the joists there have suffered surprisingly little, (Photographs 12, 13). The very damp conditions of flooring in the leanto may be due largely to the penetration of rain water into the soil and woodwork along the east wall as described above, rather than primarily due to the lack of an adequate crawl space. Thus it is likely that if this rain water were largely excluded from all foundations, the absence of a crawl space would not be inconsistent with the long term preservation of the building.

d. Atmospheric humidity throughout house: All the aforementioned sources of moisture, plus the presence of a relatively impermeable asphalt felt paper roof, have created a generally humid condition of the air throughout the house. With changing weather conditions there is frequent condensation on all cold surfaces. Existing louvered ventilators in cellar windows and several other windows in the house are not adequate to cope with the present conditions of dampness.

2. Insect and fungus infestation

In the cellar and in the moist parts of the walls and flooring along wetted sills, large areas of woodwork are infested with fungus producing white fruiting bodies, (Photographs 7, 8).

In addition, in several places around the house, there are signs of active infestation by wood-boring beetles. Although this insect infestation is not especially widespread, it requires treatment.

3. Rotting of wooden frame

Entry of water and the activity of fungus and insects have caused severe rotting as noted below:

- On the east wall the entire sill from the south end of the wall about 25' toward the north is completely rotted away, (Photographs 7, 8). Mostly as a result of this the east wall has settled and has acquired a considerable slope (pushing out at the bottom).
- Above this length of rotted sill, the south post, the studs, and the exterior sheathing boards are so badly rotted as to have lost almost all structural strength for the first 18" above the sill. The interior boarding here is also damaged by a rot fungus. (Photographs 7, 8).
- The sill of the south wall is slightly rotted at both ends, (Dwg. 2,f, 2,g).
- The bottom of the corner post over the west end of this sill is partially rotted and, although pieced

out at some previous time with new wood, now needs further repair, (Photograph 6; Dwg. 2,f).

- The sill of the west wall is in reasonably good condition except for a point directly under the southwest post of the original house, at the joint between the original house and the addition to the south (Dwg. 2,h; Photograph 2). Here the sill seems to have been the victim of both rot and inept or incomplete repairs. In any event this post is unsupported by the sill. It apparently derives some imperfect and indirect support from a number of adjacent framing members, such as the interior door frames of the house and the nearby post of the addition to the south. In any event, it has probably settled and may account in part for the forward lean of the west wall of the house near the door.
- One major bridging joist of the ground floor framing is partially rotted at its west end where it rests on the cellar wall; it requires additional support (Dwg. 1,q).

4. Foundations (other than chimney)

The foundations of the original and later portions of the house are of rubble laid in earth mortar. Those under the original portion of the house extend about 6' below grade and form a cellar. As revealed by archaeological excavation, the foundations of the gambrel addition to the south end of the leanto to the east are very shallow, extending only about 1'

below grade. Along the west wall of the southern addition the foundation is in good condition (Dwg. 2,i). Along the east (rear) wall of the leanto, several limited areas were found to have collapsed directly beneath the sill; here small amounts of topsoil and plant material occupy the space vacated by the topmost foundation stones, (Dwg. 2,d).

- At the northeast corner of the leanto the low rubble foundation is shifting and settling and needs repair or rebuilding (Dwg. 2,j). It is allowing the rear (east) leanto wall to drop and to push out (eastward) at the bottom. The corner post resting on this portion of wall has moved about 1" to the north (toward the street) at its bottom, carrying with it a small portion of the north wall of the leanto.
- The settling of the entire north wall of the house appears to have been remedied long ago, perhaps when the granite foundations were inserted. Interior plaster shows minimal cracking; 19th century photographs show the room distortions very much as they are now; most of the clapboards are the same ones as in 19th century photographs and show no vertical distortion; at roof level the shimming done to compensate for settling of the wall appears to be an old repair.
- Likewise no evidence has been found for active settlement of the west wall of the addition to the south, where a curbed or bulged appearance seems to pertain partly to the adaption of this structure to the larger original house, (Photograph 1).

- It is hard to estimate the degree of general settling caused by frost movements in the soil. It is likely that the sandy soil drains well enough to minimize this.

5. Chimney and chimney foundation

a. Foundation: The chimney foundation appears to consist of a north wall of rubble masonry (Photograph 22; Dwg. 4,e), a west wall of rubble masonry (Photograph 23; Dwg. 4,f), and an in-fill of sandy soil and apparently miscellaneous stones and bricks contained by these two walls. Voids appear to exist in the foundation, judging by probes made with a thin metal rod. The soil core of the foundation is likely never to have been fully excavated. There are probably no excavations or stone foundation walls under the east and south sides of the chimney.

The weight of the chimney is borne partly by the west wall of the chimney foundation and partly by the soil contained by the chimney foundation walls. Perhaps because this sandy soil is behaving somewhat like a fluid, it appears to have translated the vertical pressure imposed on it by the brickwork into a horizontal pressure on the foundation walls. This pressure, combined with the vertical load of the west face of the chimney, has caused the west foundation wall to bulge out severely, (Photographs 23, 24). The downward movement of the west face of the chimney as a whole is indicated by the sloping of the steps in the stairways from the first to the second floor and

and attic: each step slopes downward considerably from the west to the east. Floors in several parts of the house also slope downward toward the chimney. Plumbing pipes (perhaps fifty years old) running north to south along the west face of the chimney foundation have been bent several inches to the west by the increasing bulge in the wall (Photograph 25).

The movement of soil within the chimney foundation has allowed some parts of the chimney to drop, other than just the west wall. Settlement is most severe in the western half of the north first floor fireplace (see section on north first floor fireplace). In the north and south rooms on both floors the hearths slope downward from front to back.

b. Deterioration of bricks: Between grade level and the roof the chimney is made of soft underburned bricks and an earth mortar having an unusually sandy character (Photograph 26). Because of their poor quality and probably also because of moisture movements and other causes of deterioration, the bricks in some areas are so soft as to be easily crumbled in the hands. In the worst places the brick work has crumbled away. This condition is especially severe in and above the north first floor fireplace and in the portions of chimney exposed in the attic (Photographs 21, 26).

c. North first floor fireplace: Settlement and failure of the brickwork is most severe at the north first floor

fireplace (Photographs 15-21), (Dwg. 3,t; Dwg. 4,c). Here the original fireplace has been filled in with two successively smaller ones; the jambs and many other portions of all three fireplaces survive. The western jamb of the original fireplace is the western face of the chimney structure. Thus the western jamb of the original fireplace has moved down along with the rest of the western chimney face. The western jambs of the two inserted fireplaces (Photographs 20, 21) have moved down even more than the original because they were built not over the northwest corner of the chimney walls but over the soil contained by those walls. This soil has moved so as to open up voids directly beneath the brickwork.

The stresses imposed by this settlement have been particularly destructive because the fundamental weakness of the brickwork was compounded by the removal of the original lintel when the earlier of the two later fireplaces was inserted. Taking the place of the original lintel are apparently 6 courses of single wythe brickwork in earth mortar which apparently formed part of the chimney breast of the earlier of the two inserted fireplaces (Photograph 21). Supporting these courses of brickwork are 6 more which appear to have been laid at the time the third and smallest fireplace was built. These 12 courses in turn derive their support by resting precariously on four courses of brickwork which span the third and smallest fireplace

opening. These four courses are supported by an iron band 1-3/4" x 1/4" which spans the small fireplace opening. The iron band is not tied in to a concealed wooden lintel, as is sometimes the case, and has bent drastically under the load. The four courses of brickwork resting on it carry not only the other brickwork just mentioned but also a single wythe immediately behind the wooden panelling (Photographs 15, 18, 19). This wythe appears to date from the same time as the third and smallest fireplace. It has been numbered brick by brick and removed to make possible inspection and repair of the older brickwork behind (Photograph 21), its mortar is largely intact on the bricks, since the cracks of settlement permitted easy removal in sections.

In short, no adequate lintel or arch exists to carry the loads originally carried by the 17th century lintel. Since the western side of all three fireplaces has settled (especially the latest fireplace) the front face of the latest fireplace has dropped out from under the older brickwork which it had once supported, several sections of which had collapsed, leaving holes. A good many original bricks from beneath the hearth on the second floor and from above the original first floor fireplace lintel location have fallen into the area which had been the original smoke chamber and were removed and labeled "found loose in central cavity". Twenty-one bricks about

to fall out of position were removed, labeled and have now been replaced by temporary wooden supports located so as to allow one to reach through the holes into the fireplace opening. A large amount of soot, dirt, earth mortar, and brick dust was removed from the chimney throat by vacuuming and screened: it contained no artifacts except small particles of the masonry. This removal was stopped short when the writer felt that dirt about to be removed was possibly preventing some areas of brickwork from collapsing.

d. Chimney top: Now covered by a protective wooden box, the chimney top above the roof is seriously deteriorated. Flue dividers have collapsed due to erosion of both bricks and mortar, and the mortar of the exterior chimney walls has eroded away almost entirely. These exterior walls, like the flue dividers, are only one brick wythe in thickness. The chimney top does not appear to date from the 17th century; rather the brickwork seems more characteristic of an early rebuilding - perhaps two hundred years old. There is a badly deteriorated exterior coat of stucco.

6. Sash and other trim

The sash and other trim items are generally in good condition, requiring repair and conservation. The sash have suffered from two fairly common problems. Rain water and indoor condensation have been soaking quite a number of the muntins, rotting some fairly badly, especially at the joints; deteriorated

exterior putty and bedding putty have aggravated this. Secondly, many panes of glass have moved outward as the exterior putty deteriorated and fell out and debris fell into the space occupied by the bedding putty. In some cases the exterior projection of the muntins beyond the glass is no longer sufficient where the glass has moved and the muntin has weathered. The 18th century sash typically had a rather small muntin projection in the first place. Dissassembly of many sash will be needed to repair rotted joints and to move the glass back into place.

7. Decay of exterior surfaces of building

- a. The roof, as mentioned previously, needs replacement.
- b. Many clapboards are split or otherwise broken on the east and south walls. Some of these clapboards, like almost all of those on the north and west walls, are early, with beveled ends and early nails. Others are of a relatively late date, being circle-sawn, with butt ends, and secured with some wire nails and some cut nails. Even these later clapboards are probably the same ones as in the old photographs. Many of the earlier clapboards are of interest because of their unusually wide exposure - more like that of clapboards after about 1840. On the east wall many of these early clapboards are partially rotted and would require extensive conservation work in order to become serviceable again.

c. Sheathing: The exterior sheathing (behind the clapboards) of the east wall was found to be rotted to pulp in areas just above the sill (Photographs 7-11; Dwg. 2,d). Farther up the wall the sheathing boards are probably still serviceable.

8. Interior wall surfaces, ceiling and floors

Due to the very damp conditions in the house, much interior woodwork suffers from extensive paint peeling. This almost entirely takes the form of peeling between layers of paint, rather than peeling of all the layers down to bare wood. This is to be expected, since the earlier paints would typically contain more oil and would thus be more flexible and more securely bonded than the later layers. The topmost paint coats which are peeling off are of rather recent date and, in this writer's opinion, of little intrinsic historical value. They are important, however, as evidence which would be compiled as part of a paint color history of the building.

The wood trim itself is not severely damaged in any way except in some places along the east wall of the leanto where there have been leaks (Photograph 42):

The floorboards in the original house and gambrel addition to the south are in good condition although somewhat worn and in need of paint. In the leanto there is fairly extensive rot damage to the floorboards.

The painted plaster surfaces throughout the house are dirty or stained or are suffering from peeling paint (Photograph 35). Wallpaper is present on the plaster and on wood sheathing in a

number of the rooms and is dirty, stained or peeling in some places, and almost completely deteriorated in others (Photographs 14, 29, 31, 41, 42). The wallpapers are mostly of the late 19th and early 20th centuries, in some cases being present in several layers, later applied over earlier. They form part of the pattern of architectural and decorative changes made by the family which owned the house from its acquisition by Joseph Hodges in the 1750's for more than two hundred years. Thus they have historical value as part of a complete archaeological historical exhibit.

The most important plaster problem is the loss of key of the plaster in a number of areas, especially the ceiling of the second floor room in the gambrel addition to the south, which is ready to fall off the lath and is bulging away from the lath in some places. Some plaster has fallen down entirely in various locations in the building (Photograph 14).

B. RECOMMENDATIONS AND SUGGESTIONS

A broad recommendation applying to all work proposed in the following Sections 1 through 5 is that full photographic and written records be kept of all repairs, and that all new materials used in the repairs be permanently marked.

1. Moisture penetration into the wood fabric

a. Roof: Wood shingles should be applied as shown in photographs of the late 19th and early 20th centuries. The photographs suggest that different areas of the house were re-roofed in wood at different times, as needed. Accordingly it appears from the photographs that there

may have been some variation in the exact nature of the wood shingling on different parts of the house at different times. For example, some shingles appear to have been thicker than shingles commonly available today, while others do not so appear. Ideally, an effort could be made to reproduce shingling exactly as seen in certain of the photographs, with respect to width, butt thickness, degree of rectangularity of the shingles, wood type and grain, type of saw marks, weather, and so on. On the other hand, the application of commercially available cedar shingles would not, in the opinion of this writer, create a visual picture varying widely from the appearance of the house in old photographs. The shingles in the old photographs all appear to be sawn, and although probably not rejoined and rebuted, are still rather rectangular. The wood could have been cedar, and those few wood shingles remaining on the south gable end wall of the original house might suggest whether the roof shingles were more probably red or white cedar (Photograph 1). An advantage of using red cedar in the restoration is that the white cedar commonly available in New England today generally does not have as straight a grain as the red. The inches of weather on the various parts of the roof may be reproduced as shown in any of the old photographs and the shingles made long enough to assure at least a triple thickness at all points. We specifically recommend the use of Koppers fire retardant #1 red cedar shingles. Although the long-term fungicidal

property of these treated shingles is perhaps subject to doubt, they do lessen the fire risk to the house itself and to neighboring buildings. It is further recommended that no asphalt felt or other paper be used beneath these shingles, so as to maximize breathing through shingles, roof boards, and roof structure.

b. Water entry at foundations and sills: Although past photographs of the house show no eaves gutters, the Park Service may elect to dispose of rain water by this means, if necessary equipping the gutters with heating cable to control ice backup. A gutter is recommended for the rear wall since, as a result of the wall's slope, roof water flows down the clapboards.

Whether or not gutters are used, water at the foundation level must be led away from the house in some more satisfactory way. Since the soil is sandy and absorbent it should be possible to protect the sills from excess water simply by lowering the grade enough around the south end of the house to raise the sills above grade. The grade should be made to slope away from the house, although re-grading should not be so drastic as to change materially the past appearance of the house as seen in photographs or to expose significant portions of the earth mortar in the foundation walls. Since the east foundation wall requires some rebuilding of its upper portions, the very top could be laid in cement/lime mortar, and the soil could be lowered a little more on this account.

It is not recommended that an especially fast-draining material be used to backfill the present archaeological trenches: water flowing too quickly down through a material such as crushed rock could erode away the earth mortar of the old foundation walls below grade. Rather it is suggested that the same type of sandy soil be put back, since its draining rate has proven good for the foundations. Just below the topsoil a sloping layer of non-draining soil could possibly be used to carry water away from the foundation.

Readjustment of the soil level is mandatory for the preservation of the building and need not be so drastic as to disturb the more important archaeological evidence which lies well below grade. Only the topmost (and most recent) soil layers need to be disturbed. The area sloping away from the house need only be about 6' wide; beyond this the land can slope up again so that the surrounding lawn as a whole need not be disturbed.

All the new sills should be of pressure-treated lumber. We recommend that the concrete poured around the east sill be removed. A vapor barrier or damp-proof course should be inserted directly beneath the sills wherever the performance of repairs to the foundation or sills gives access to this point. Downspouts from gutters should be led into dry wells or onto concrete drainage pans on the surface of the ground.

Since parts of the east wall of the leanto have probably settled due to rotting of the sills there, and also due to the collapse of small areas of the foundation wall, repairs to this wall may entail some jacking up of parts of the sill to more nearly the original locations. If this is so, the sill as restored might be very slightly higher than at present, thus reducing the amount of re-grading necessary.

c. Crawl spaces: In the areas under the leanto and the gambrel addition to the south the upper surface of the soil should be readjusted just enough to eliminate contact between the soil and the floor timbers.

d. Archaeological excavation: Since even the minimum changes in the grade outside the house or in the crawl spaces will disturb soil having some archaeological significance, the current archaeological project outside the house has been most valuable. If there are to be slight readjustments of the soil in the crawl spaces, test pits should be dug there; a major deepening of the crawl spaces might require full archaeological excavation there.

e. Heating and dehumidification: The cellar may require an automatic dehumidifier even if ventilated in summer and heated in winter. If needed this can be installed at any time, although if major excavation is done near the house it is suggested that a cellar drain be provided, into which the dehumidifier can empty automatically by means of a garden hose connected to the hose fitting provided on some

dehumidifiers. If legal in Salem, the dehumidifier could more easily be drained into the main soil pipe of the house, which passes out of the cellar at approximately cellar floor level.

With a new furnace, the existing heating pipes and radiators could probably be used if reconditioned. This would entail less disturbance of the interior woodwork and appearance of the rooms than any other heating system and would be one of the more economical ways of heating the house.

On the other hand, the use of any type of furnace requires that there be a working flue in the chimney. Given the extremely fragile condition of the entire chimney, the installation of a flue liner with appropriate means of bracing it in position would greatly complicate the preservation of the chimney. A major problem would be the fact that the top of the chimney could not be completely capped, which, given the condition of the bricks would be advisable in order to preserve the chimney.

Accordingly, if the Park Service can tolerate an expensive heating method, we recommend the installation of electric heating units.

As discussed in B, 1a, above, it is suggested that to assure maximum breathing, no insulation, and no tar paper or other vapor-impermeable material, be used in walls or roof. Ordinary kraft paper may be used behind clapboards merely to block the wind.

2. Insect and fungus infestation

Treatment of the rather widespread fungus infestation in the ground floor structure will require complete opening of the floors over unexcavated ground. The most thorough approach recommended by some authorities for treatment of dry rot infestation entails cutting away of all infested wood. Since this might involve a significant loss of woodwork from the building, this writer entertains the hope that much infested wood may be left in the building and thoroughly toxicized. This could be determined only on opening the floors and attempting maximum penetration with fungicides.

Timber not now infested but near the ground should be treated as a precaution against infestation, as also should be any new timber installed in the course of repairs. New timber should be thoroughly seasoned or dried to assist penetration of the fungicides and to preclude fungal growth due to moisture in the new wood.

All soil and stone foundations in the unexcavated areas under the house should be sprayed with fungicide.

Although fungicide may be chosen which will also kill wood boring beetles, it may be more effective and economical to fumigate for the control of insects since spraying would require opening areas of the house not required to be opened for control of fungus. It is recommended that the soil beneath the house be treated for termites as a precaution against future termite infestation.

3. Repairs to wood frame

a. Sills: Considerable lengths of sills, especially along the east wall, will require complete replacement. Other portions, being only partly rotted, should be pieced-in with new wood, preserving, for historical reasons, as much of the old as possible. Where the outer face of a sill is rotted and the inner face solid, a cut should be made parallel to the grain of the wood so as to remove badly rotted wood along more or less rectangular lines, facilitating the insertion of new wood.

The small missing portion of the west sill, directly under the southwest post of the original house, should be filled in with a hollow block of wood inserted in sections so as not to require the cutting away of any old wood, (Photograph #3). Alternatively, some other method of reinforcing this area might be found. The loss of any old wood here would lead to the destruction of architectural evidence relating to the enlargement of the house to the south. The post above this point should be jacked up just enough to relieve the undue strain it is now placing on the other framing members and trim which support it.

b. Posts: Major posts, where rotted, should be pieced out at the bottom in the same way as the sills.

c. Studs: Rotted studs may be toxicized, left in place, and their structural function assumed by new studs placed adjacent to them. This is needed primarily on the

east (leanto) wall, where new studs would reach from the sill to the plate. Since this rear wall has settled and leaned considerably over the years, primarily due to rotted sills, the wall should be jacked up enough so that the leanto rafters and leanto attic floor joists will no longer tend to pull away from the front portion of the house.

d. Other framing members: It appears that minor repairs are needed to other framing members, such as the provision of floor jacks under the west end of the bridging joist in the cellar. Supplementary floor joists over the cellar area are probably advisable. One common rafter is cracked and needs a simple reinforcement.

e. Rafters: Over the years the leanto rafters have pulled away several inches from the original portion of the house, in some cases dropping down on the rear wall to a point lower than their original place of attachment. Various small brackets and other reinforcements have been added to prevent this movement from developing into a complete separation. After the east wall of the leanto is jacked and stabilized in one location it may be advisable to add some angle irons or other metal pieces to hold the rafter ends in place more securely.

4. Chimney foundation

The Society's first attempt to find a structural solution for the chimney was to engage a local structural engineer. His analysis of the chimney foundation as a continuous mass of rubble masonry does not appear to be correct. More

importantly, this writer feels that his structural solution for the support of the brick chimney stack by steel beams is probably unfeasible. The foundation is apparently such a loose mass of rubble, earth and voids, and the brickwork of the main stack is so weak that the provision of local support by needled beams will probably not stabilize unsupported masonry between the beams. This is to say nothing of the difficulty of getting the beams into place: as soon as a hole was dug for a beam, the surrounding masonry would fall into it. Platform-like support is needed.

The writer then arranged for a day's visit by Mr. Louis Dugas, Chief Restoration Engineer of the Technical Services Branch of the Canadian Department of Indian and Northern Affairs. Mr. Dugas had spoken at A.P.T. concerning the consolidation by cement grouting of the Quebec City walls, and is familiar with the most advanced methods of masonry conservation being developed and used on old buildings in Canada. His suggestions led to fairly extensive inquiry into the areas of masonry grouting and chemical soil consolidation, including a visit to the site by a leading practitioner of chemical soil solidification, Mr. Martin Riedel, president of the Chicago-based Chemical Soil Solidification Company. Finally, the soil engineering firm of Goldberg-Zoino and Associates of Newton, Mass., was engaged as consultant, and their recommendation is felt to be the most satisfactory in respect to long-term durability.

Accordingly, it is outlined below as the recommendation of the SPNEA for consolidation of the chimney foundation.

Voids in the interior of the chimney foundation should be filled with a Portland cement grout. This can be accomplished by means of a hollow pipe which is designed to function as a drill. Such pipe can be assembled in sections as each length is inserted into the soil, working from inside the cellar.

In addition to filling voids in the above manner, the west and north chimney foundation walls (Photographs 22, 23) should be tied back by steel plates on the ends of tie rods which will extend under the entire chimney to concrete anchors placed in the soil beneath the floorboards to the east and south of the chimney (in the leanto and the gambrel addition to the south). These tie rods can be inserted in sections by drilling from the cellar.

5. Brick chimney stack

The north first floor fireplace (Photographs 14-21; Dwg. 4,c) could be repaired using several possible methods, which are not mutually exclusive.

a. Steel lintels: First, we have tried to think of ways in which steel beams could be used to support collapsing areas of brick in the north first floor fireplace. A small steel angle iron should be let into the smallest and latest fireplace (Photograph 15) just below and behind the present flat iron lintel to support the brickwork immediately over that fireplace. The

vertical leg of the angle iron could be concealed inside the fireplace behind the brickwork which is carried on the horizontal leg. The insertion of this angle would require the removal and reinsertion of several bricks. The use of a large steel lintel to support the majority of collapsing brickwork in the north first floor fireplace does not seem to be the best solution for two reasons:

- The insertion of any large lintel would require dismantling virtually all of the bricks of the concealed wythe above, in, and below the location, of the seventeenth-century lintel (Photograph 21). Since this brickwork and its mortar are very fragile, disassembly would probably entail much disintegration, thus destroying much of the brickwork's value as untouched evidence of three periods of masonry; disassembly would probably also obliterate the remains of early plaster and other evidence on the face of the brick work.
- Secondly, no one steel lintel will support all the different areas of original brickwork collapsing behind the location of the original lintel (in the area of the original smoke chamber). Even if a network of small steel beams were so fashioned as to reach all parts of the collapsing masonry, the connection of these beams with each irregular brick would still have to be made with some kind of masonry material.

b. Repair using new bricks: Two difficulties apply to the use of new bricks to support any portion of the collapsing old brickwork.

First, since the collapse of the old brickwork is generalized over fairly extensive and very irregular areas, it is hard to see where any one brick wall, pier, buttress or other element could solve more than just a small portion of the problem.

Second, the installation of new brickwork in or behind the concealed wythe would require disassembling that wythe if only to get a workman into the space behind. The resulting destruction of evidence has already been discussed above in the section on steel beams.

c. Filling material: Given the importance of not disassembling the concealed wythe, and given the extreme irregularity of all the surfaces involved (those to be supported and those which could provide support), the writer feels that some type of fluid filling material may be the cheapest, most effective, and least destructive form of repair.

A fluid filling material would have the following advantages:

- It would establish nearly uniform contact with all the irregular surfaces in the masonry, filling the cavities into which the several areas of collapsing brickwork are falling.

- It could be inserted without disassembly of the concealed wythe.

So far the most promising material which has been considered is perlite concrete. This consists of a mixture of air-entrained Portland cement and expanded perlite aggregate. The latter is mined as a type of rock containing chemically combined water. It is then crushed. On heating to about 1500°F the silica melts and the combined water is driven off as steam, blowing up each particle of melted silica into a mass of tiny, thin-walled bubbles. The very high content of voids insures that concrete made with perlite is light, weak, and a good heat insulator. The Perlite Institute publishes recommended concrete formulas as light as 22 lbs./cu.ft. dry weight, which is obtained with a 1 to 8 mix by volume of Portland cement and perlite. The writer has found that a 1 to 6 mix (28 lbs./cu.ft. dry weight) appears to be satisfactory. The shrinkage of samples placed in small metal cans was found to be insignificant, although if used at the Narbonne House the perlite concrete could be applied in a number of pours, each filling any possible shrinkage of the last. By pouring into a small model of brickwork, the plasticity of the perlite concrete was found to be very high, even with a fairly low water content. This high plasticity probably results from the entrained air in Portland cement and the

roundness of the perlite particles. It would be of great benefit in filling partially inaccessible cavities.

The water/cement ratio of the perlite concrete is extremely high because of the small proportion of cement as compared to the amount of water required to wet the large amount of aggregate. For this reason, the General Manager of the Perlite Institute feels that there would be plenty of water to hydrate the cement even if the surrounding masonry is not wetted to retard drying of the concrete. It would be best not to wet the old bricks and clay mortar very much. Although the water/cement ratio is high, the absolute water content is probably low enough so as to cause no lasting moisture problem if the concrete is poured in successive stages, each allowed to dry out.

One of the most important advantages of the perlite concrete is its weakness and poor bond. Since it consists mostly of air spaces, it can easily be cut out with a sharp shovel or any other metal instrument. Very little binder comes in contact with the surrounding masonry, since the proportion of binder is not nearly enough to fill the spaces between the perlite particles. A water repellent sprayed onto the bricks before the pouring can also serve as a bond release. Admittedly, removal of the perlite concrete would require disassembly of the concealed wythe of bricks in order for a workman to enter the fireplace cavity; but this may never be necessary and probably would entail less destruction than

the installation of the steel beams or brickwork considered as alternatives above.

At the same time as being easily cut apart, the Perlite concrete is more than strong enough to prevent the chimney cavities from collapsing further. The 28 lb. mix made by the writer has an advertised compressive strength of 175 p.s.i. The writer has tested a 28-day-old sample (2" X 2" X 2" cube) and found it to withstand over 125 p.s.i. Hardly any strength at all is needed for the proposed application, since the bricks are now hanging in place over open air, demonstrating that the loads are practically zero.

The thermal coefficient of the perlite concrete (28 lb. mix) is $.48 \times 10^{-5}$ units/ $^{\circ}\text{F}$, which is between that of bricks (approximately $.32 \times 10^{-5}$) and that of ordinary concrete ($.65 \times 10^{-5}$). The thermal coefficient of the perlite concrete would result in an expansion of about 1/64" in 5' for a temperature rise from 20°F to 85°F . In most directions the proposed mass of concrete would only measure 1 or 2 feet, and only two sections reach a total length of 5'. The restraining effect of the surrounding brickwork would probably prevent much of this expansion, given the low modulus of elasticity of the perlite concrete. Some of the initial expansion would probably be cushioned by the collapse of the rounded perlite particles at the surface of the concrete. If special provisions are thought necessary to cushion the expansion, fiberglass cloth could be placed between two

or more successive pours to act as a cushion. Fiberglass is used as an expansion cushion for roof decks made with perlite concrete insulation. Further good features of the perlite concrete are its stable inorganic composition and its incombustibility.

d. Consolidation of spalling bricks: Several areas of spalling chimney bricks, at least below the roof line, may possibly be susceptible to consolidation with ethyl silicates. Mr. Norman Weiss has been engaged to test them in this respect. If they cannot be consolidated, some bricks in restricted areas may require replacement.

e. Rebuilding or reinforcement of chimney above roof level: There are two alternative recommendations concerning the chimney top above roof level. One is to rebuild it using the original bricks. The other would be to attempt to strengthen it using reinforced adhesive stucco either on the inside, outside, or both. As an experimental process this would entail some risk of failure but, if successful, would result in less drastic intervention into this early element of the building.

A reinforcing stucco would consist of lime, a small proportion of cement, sand, and either a non-rusting wire mesh or glass fibers as used in the new surface-bonded concrete block masonry. An acrylic emulsion masonry bonding agent would be added to the mix to insure a good waterproof bond to the bricks.

The first step would be to rake out all joints on the inside surfaces of the chimney walls to a depth of 1" (one half of the width of the bricks). The bricks would then be repointed and reinforced adhesive stucco applied to the inside surfaces. After this has set, the same process could be repeated on the outside. Alternatively, the outside surface could simply be repointed. Thus, if the process were successful, all the mortar would be replaced without moving any bricks and reinforcement would be placed on one or both sides of the brickwork. The use of stucco on the outside of the chimney is historically in keeping with the more recent history of the house, as shown in photographs postdating about 1900.

If the chimney top is rebuilt, reinforcement of some kind, perhaps as described above, would be needed to compensate for the fact that the flue dividers have collapsed and no longer tie the chimney top together. To rebuild the flue dividers would probably be impractical since they have collapsed for a considerable distance below roof level, and what remains of them below that is in such poor condition as not to be able to carry load.

After the chimney top is rebuilt and/or reinforced, it must absolutely be capped, since its brickwork below roof level is not durable enough to stand wetting, and it would not be wise to accumulate water in the perlite concrete recommended for filling the north first floor fireplace.

6. Repairs to exterior covering

a. Roof: As discussed under B, 1a, above the roof needs replacement. It may be added here that if a wood shingle roof is used, special care should be taken in the leanto to nail roof boards tightly against the purlins, since the boards are vertical here and any movement may crack shingles at the joints between the boards. If it is found that the boards or the upper surfaces of the purlins are too badly softened to hold nails well, the Society would recommend an expedient it has used on one of its own houses. Rather than destroy old boards and purlins, we have strapped the roof horizontally over the boards before applying the wood shingles. For each course of shingles there is one lath, tapered down at the edges of the roof.

b. Sheathing and clapboards: Considerable amounts of sheathing along the east wall will require replacement. Clapboards on the north and west walls require little treatment. Along the east and south walls some of the clapboards can probably be saved by a combination of methods. The clapboards could be removed, backprimed with paint, and the wall made tight by the application of flashing behind cracked clapboards. Badly broken clapboards can perhaps be strengthened with epoxy resins, perhaps with fiberglass on their backs, or by other means. Clapboards beyond repair should be replaced in kind. Even the relatively recent clapboards appear to be sawn more or less radially out of the tree, so that similar edge-grain clapboards should be used in restoration. Radial-

sawn clapboards are available from Ward Properties, Box 506, Moretown, Vermont, 05660.

c. The Society has developed the following procedure for restoring deteriorated sash:

- First, the sash is removed from the window frame.
- Then, wherever putty has to be removed for any of the other repairs listed below, this is done by scraping or by heating with an electric putty torch. The latter can be done without breaking the glass if the glass is shielded from the heat by a reflector, and if the glass is evenly warmed from the opposite side to prevent differential expansion along the one edge where putty is being removed.
- All defective paint is removed, using scrapers or water-washable organic solvent paint remover.
- The sash is disassembled enough to permit carpentry repairs to all rotted muntins, especially at the joints.
- All the bare wood is dipped for three minutes in a 4% solution of pentachlorophenol with added water-repellent (Woodlife or similar). The wood is left to dry for at least 48 hours.
- The bare wood is all primed. This is done while the sash is still apart, thus protecting the joints internally.
- The muntins are reassembled, using the original pins where possible.

- The sash is painted a second coat of paint to fill the joints and give full protection to the wood beneath the putty.
 - The glass is then mounted in glazing compound.
 - The sash is then painted a full gloss topcoat.
- d. Other trim: A few items of trim require toxicizing of partially rotted wood and in some cases a piecing-out with new wood. The east and west doors and their frames, should be given this sort of conservation at their bottoms, the west door being the same one as appears in old photographs. The bulkhead should be extensively repaired with new wood. Some eaves boards and corner boards need repair or selective replacement.

7. Interior wall surfaces, ceilings and floors

The first step to be taken with regard to interior paints on both wood and plaster surfaces is to carry out a thorough paint color chronology of the entire house. In the course of this study samples should be taken from each area and preserved.

Once a paint color chronology for the building has been developed, the loose paint can be scraped off, rough edges feathered down with knives or sandpaper, and the interiors repainted. The colors chosen would be based on the paint chronology. We recommend that care be taken not to damage the earlier and more valuable layers of paint any more than is necessary to achieve a reasonably smooth finish. Where scraping and sanding are ineffective, for removing badly cracked upper layers, organic solvent paint remover can be used carefully without affecting the earlier layers.

After paint color study of the floors, these can be repainted. The floor in the leanto, having been taken up to permit lowering of the soil there, will be only partially salvageable: a significant number of new boards will be needed to replace rotted ones. The early floorboards in the gambrel addition to the south have been taken up intact, stored with their original hand wrought nails, and should be replaced in their original locations.

Areas of wall and ceiling plaster which are missing entirely should be replaced with new plaster having surface texture matched to that of the old. Old plaster which has lost its key and is about to fall should be readhered to the lath. This can be accomplished by injecting or pouring an adhesive or adhesive-modified plaster into the space between the loose plaster and the lath, or by pouring adhesive-modified plaster over the tops of ceiling lath so as to form a continuous new key adhesively bonded to the old, broken keys. If felt necessary, wire mesh can be laid over the lath before the back-plastering is poured in order to act as reinforcement. Since the most extensive areas of loose plaster are in the second floor room of the gambrel addition to the south, easy access can be gained to the back side of the lath by removing a number of roof boards when the roof is replaced. In a few small locations in the building access to the back of the lath may be difficult: In cases such as these it is usually possible to inject an adhesive through holes drilled in the plaster.

Depending on the conditions of application, the viscosity and other properties of the adhesive used will have to be varied on the job. Lime, perlite, and emulsions of acrylic or polyvinyl acetate resins are common materials used to make adhesives and adhesive-modified plasters for exactly these applications.

The existing wall papers, as previously pointed out, have intrinsic historical value as part of the pattern of architectural and decorative changes made by the family which owned the house continuously from the 1750's for more than two centuries. Accordingly, the SPNEA recommends their preservation. Conventional wallpaper paste can be used to reattach loose sections. In some rooms where only fragments survive, such as the second floor room in the gambrel ell, these fragments can perhaps be trimmed to a more regular shape, and reattached. A complete interpretive program would include labels explaining the wallpapers and wallpaper fragments as part of the history of the house.

Cleaning the wallpapers would require supervision by a paper conservator and should be done when this cost can be afforded.

III. RECOMMENDATIONS FOR USE OF STRUCTURE

It is recommended that the Narbonne House be used as an architectural/historical/archaeological exhibit. There are essentially two reasons for this recommendation.

A. ARCHITECTURAL/ARCHAEOLOGICAL JUSTIFICATION AS EXHIBIT

The first reason why the Narbonne House should be used as an exhibit is that it has major importance as a document in the history of New England architecture, as we have seen in the architectural/historical portion of this report. Its importance derives from three factors. First, it retains a large number of original, unaltered seventeenth-century features, as outlined in Section I, A, 1, of this report. Its date of around 1670 makes it particularly important, since the far greater majority of seventeenth-century houses date from nearer the end of the century.

Second, it has importance as a house continuously owned by one family from the mid-eighteenth century for over two hundred years, as explained in Section I, B, of this report. The result is a continuum of architectural and decorative changes all historically united by family continuity over a length of years quite unusual in America's mobile society.

Thirdly, and very significantly, the house entirely escaped the heavy-handed period restoration to which almost all first period houses have been subjected, many in the first half of this century. Such restoration usually entailed much falsification of early material, such as leaded casement

windows, and the obscuring of much early evidence. The Narbonne House is exceptional in having escaped this.

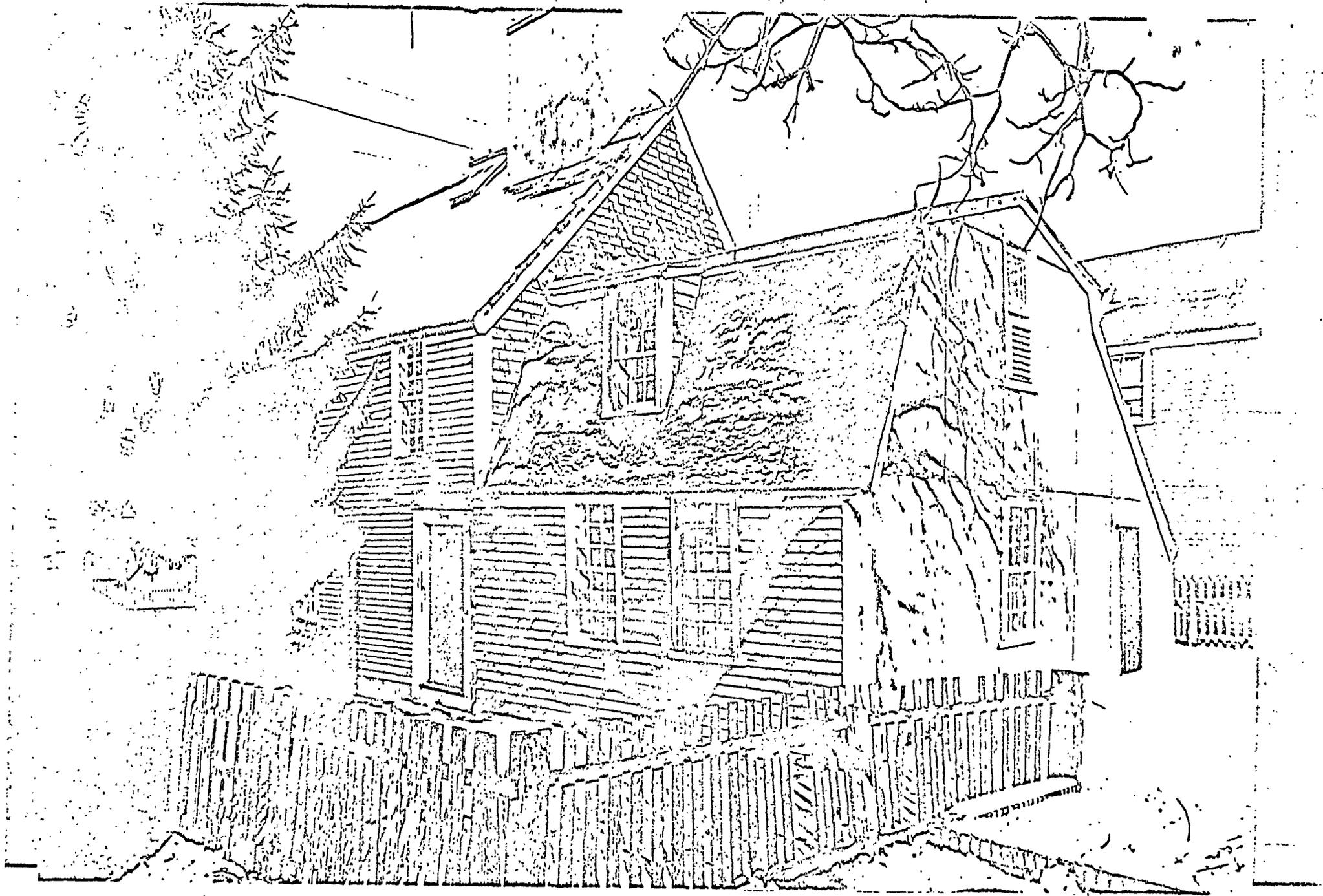
Given these reasons for the importance of the structure, it is clear that scholars and students will continue to find the Narbonne House an important documentary resource and that the house is of display quality. It probably has less popular appeal than some heavily restored early houses and may remain a display intended for the more serious viewers. Large numbers of students now taking courses in architectural history, and preservation, as well as many knowledgeable amateurs, would wish to study this building as a museum object. Later alterations should be left intact to maintain the historical completeness and undisturbed character of the building. Related archaeological findings (derived under separate contract) should be incorporated into the eventual display system.

B. DIFFICULTY OF ADAPTING TO RESIDENTIAL USE

Given the importance of the structure and the fact that it has escaped the ravages of over-restoration the most desirable course of action is to intervene as little as possible into the building as it now stands. Adaptation for any practical use, such as a dwelling, would entail severe intervention. A kitchen would be required, a new bathroom, new wallpapers, and many other items which would destroy or obscure what now exists. Only use as a display is compatible with the preservation of the building as it now stands.

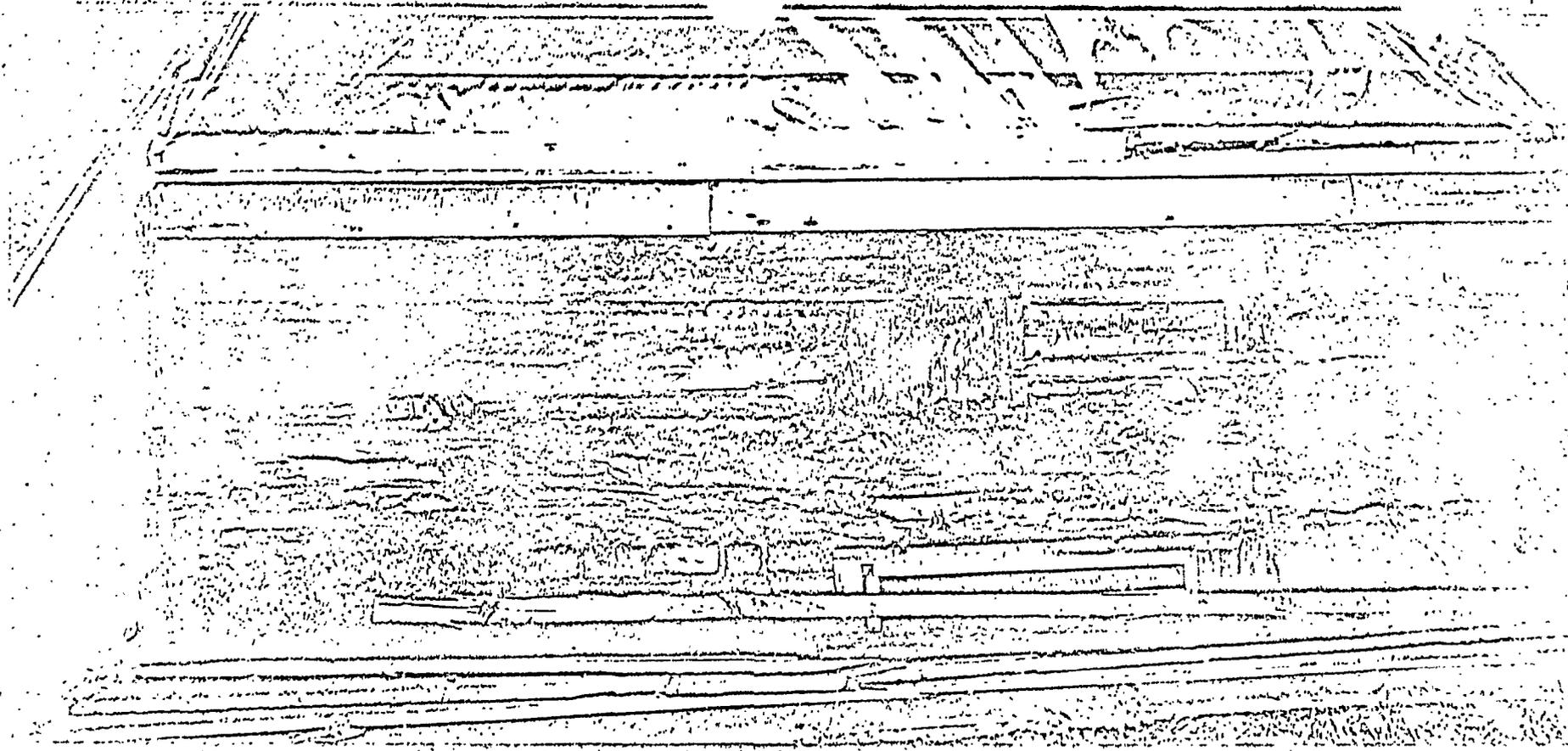
FOOTNOTES

1. Essex County Deeds, Vol. 9, p. 252.
2. Essex County Probate Records, Docket #14656.
3. Essex County Deeds, Vol. 9, p. 252.
4. Essex County Probate Records, Docket #14656.
5. Essex County Deeds, Vol. 12, p. 97.
6. Essex County Deeds, Vol. 31, p. 152.
7. Essex County Deeds, Vol. 46, p. 269.
8. The Diary of William Bentley, Salem, 1905-14; Vol. IV, p. 122.
9. Essex County Deeds, Vol. 55, p. 42.
10. Essex County Probate Records, Docket #29947.
11. Essex County Deeds, Vol. 103, p. 236.
12. Essex County Deeds, Vol. 94, p. 248; Vol. 96, p. 22.



1. Narbonne House, Salem, Mass. Contemporary view of exterior from the southwest.

Neg A 27339

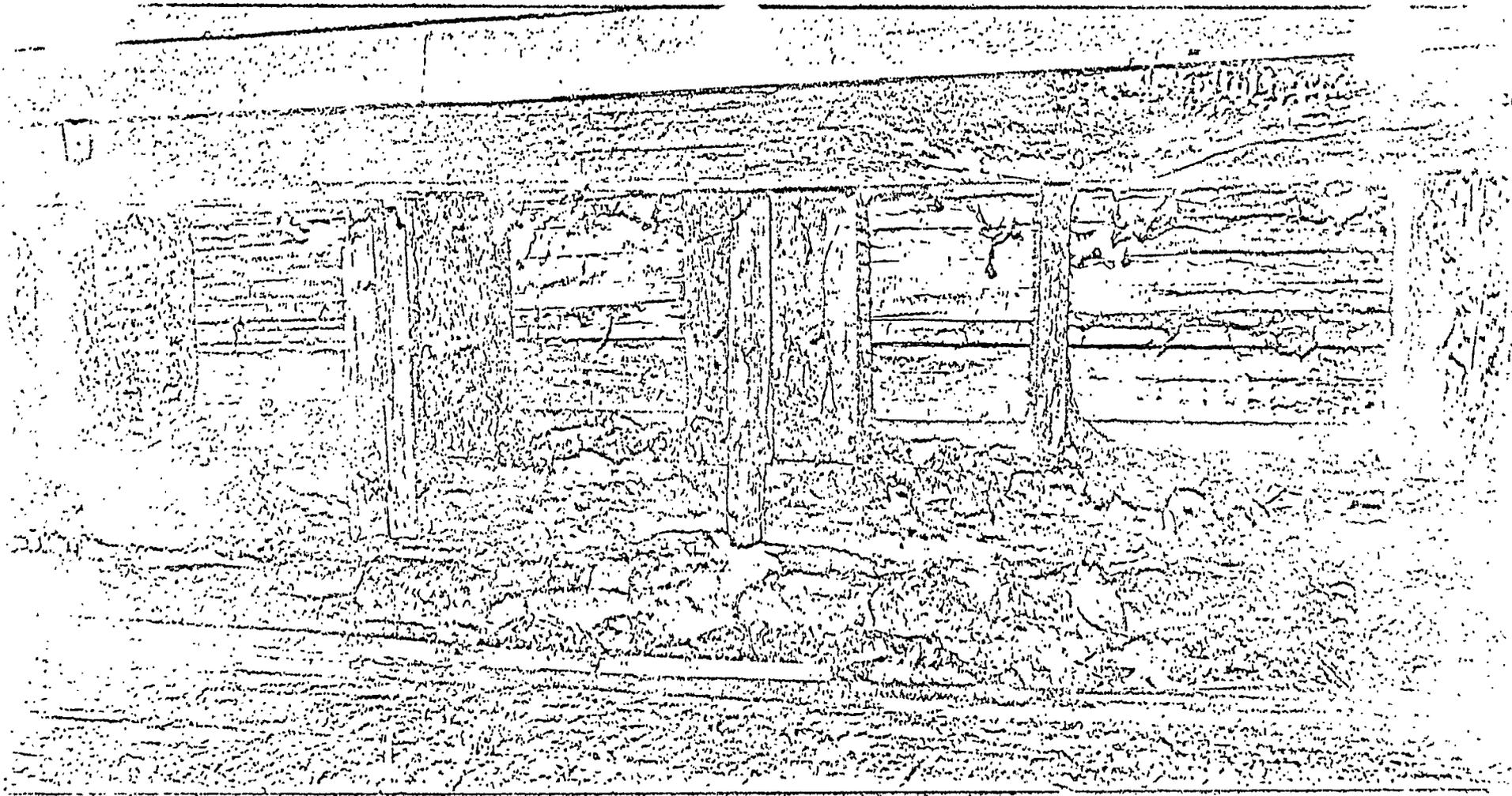


2. Narbonne House, Salem, Mass. Detail of west wall at ground level, adjacent to bulkhead with clapboards removed. Partially decayed sill rests on brick surfaced foundation.

MS
27387

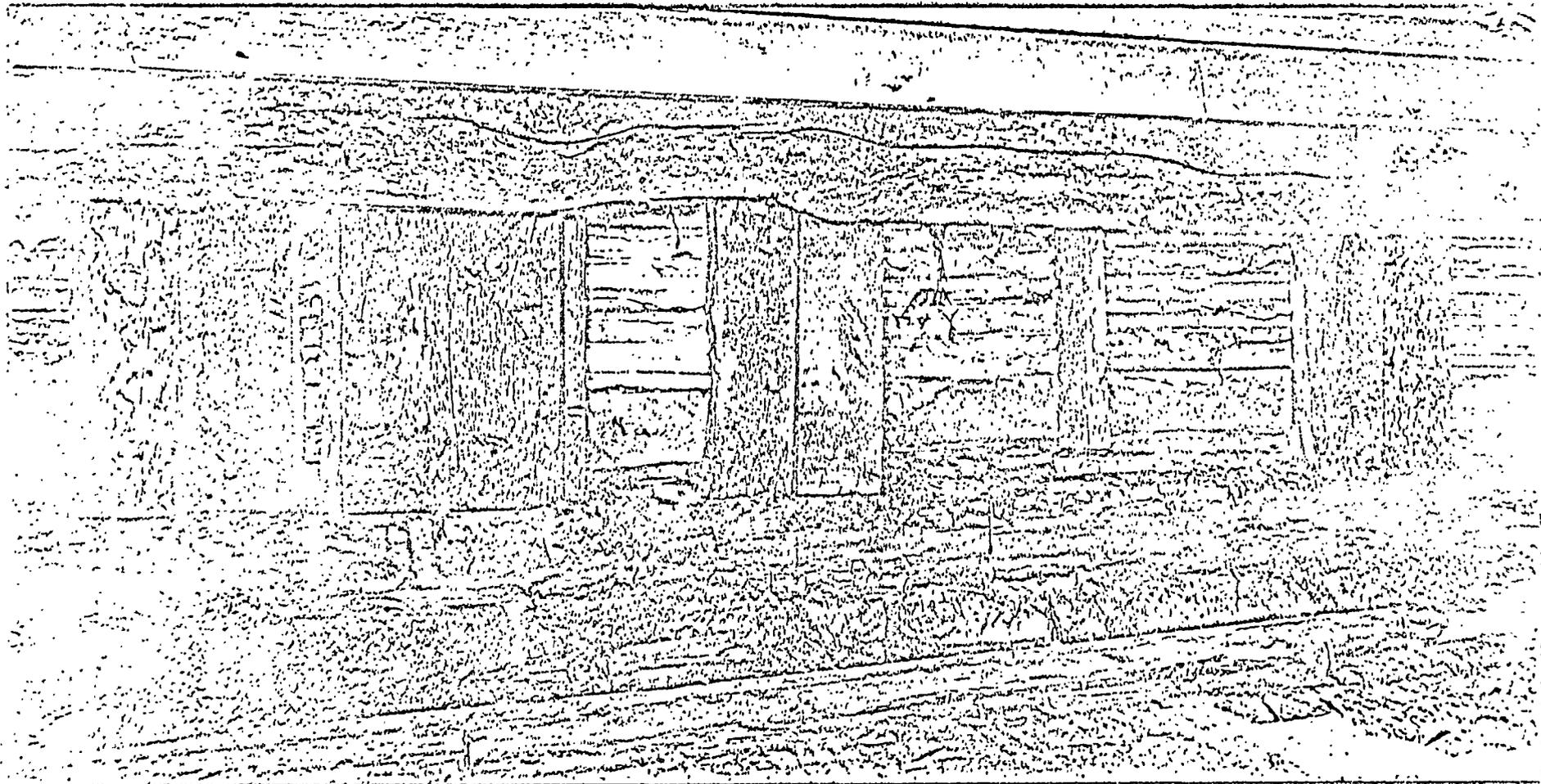


3. Narbonne House, Salem, Mass. Detail of west wall showing
unsupported post (left center) of early structure at junction = 27388



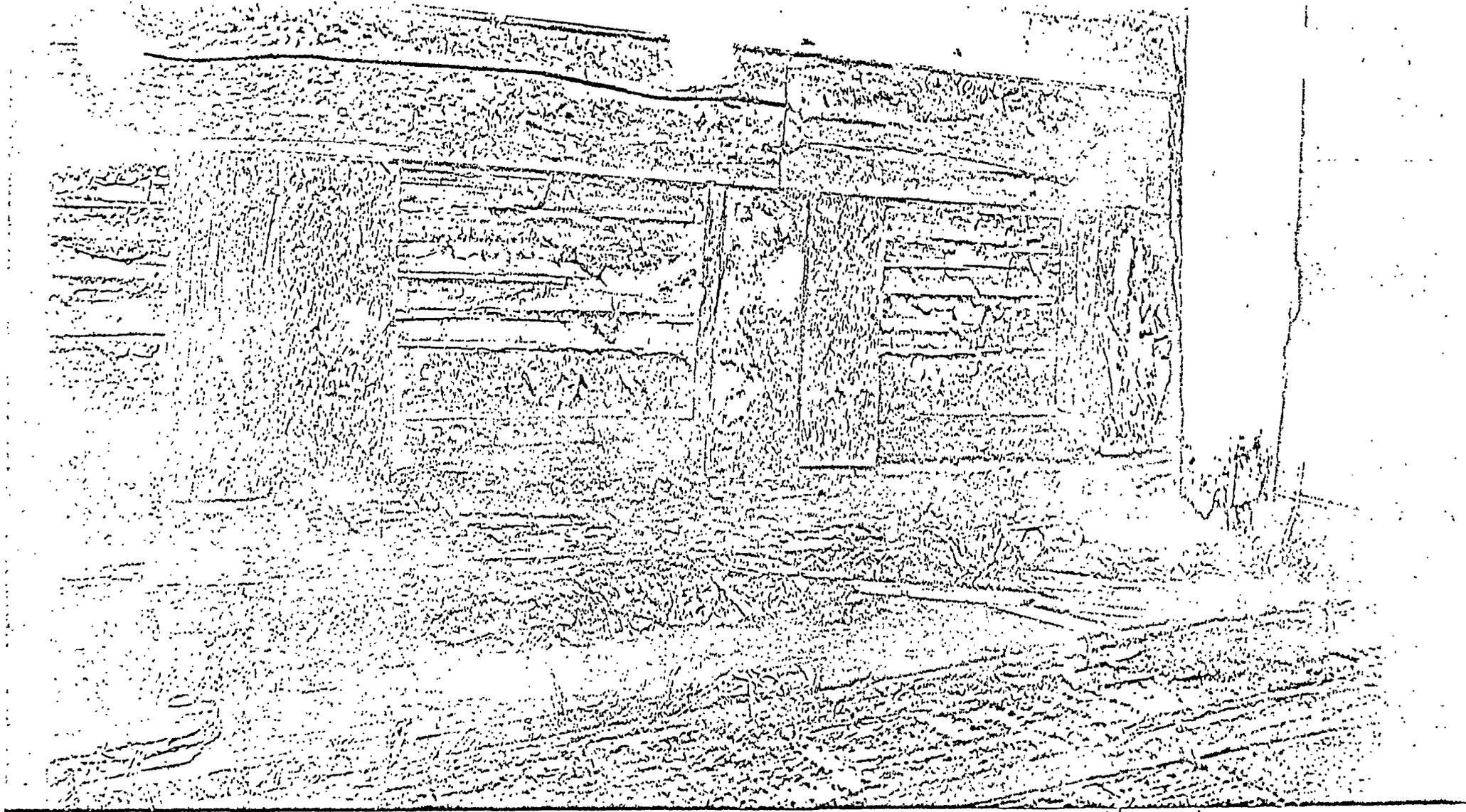
4. Narbonne House, Salem, Mass. Detail of west wall showing decay in sill of later ell.

Neg # 27477



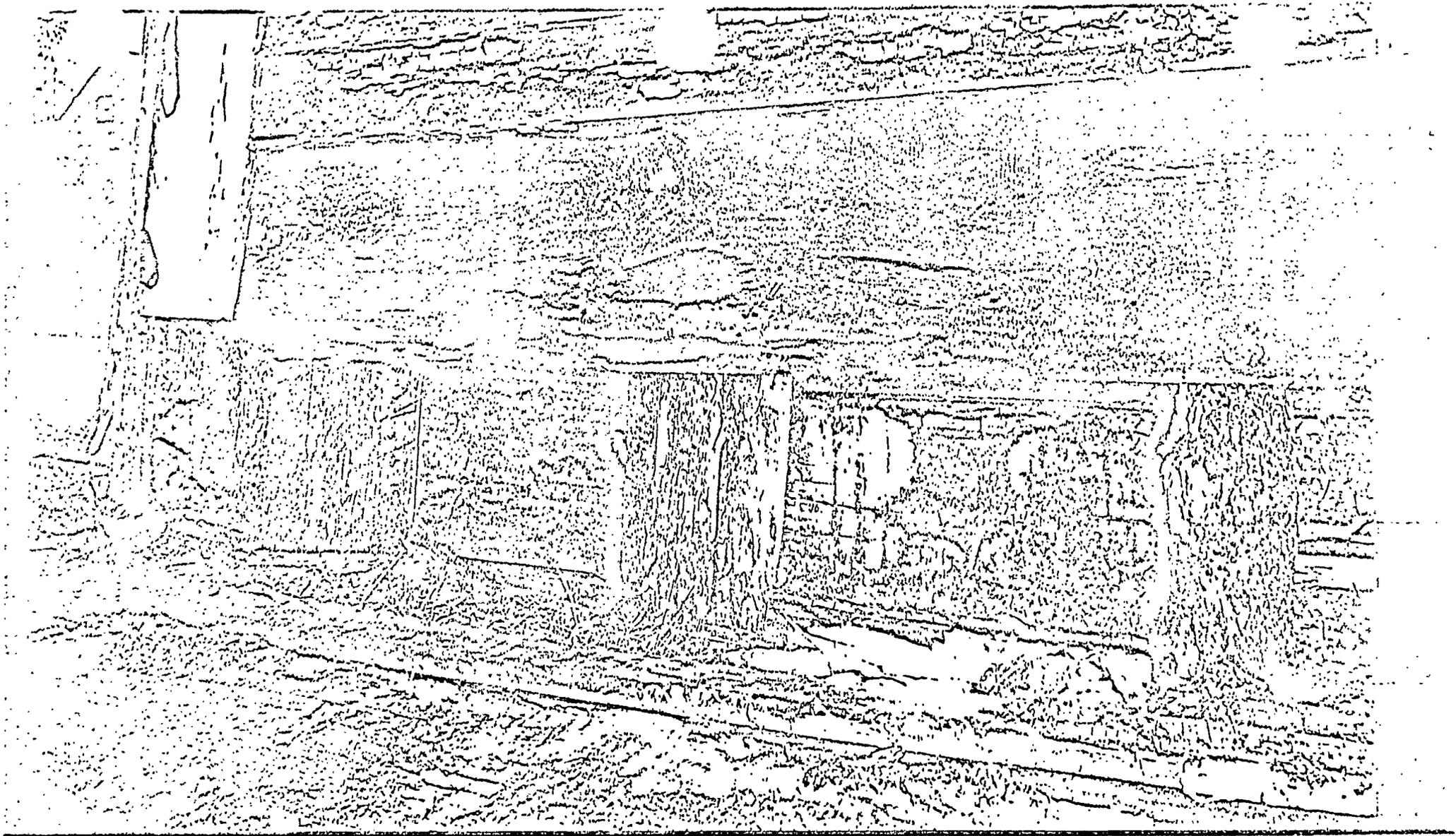
Neg A 27390

5. Narbonne House, Salem, Mass. Detail of west wall showing decay in sill of later ell.



Neg. A 27391

6. Narbonne House, Salem, Mass. Detail of west wall at southwest corner. Sill rests directly on a very low course of small stones which in turn rest on the soil. The end of the sill of the south wall is visible at the far right, resting on the ground.



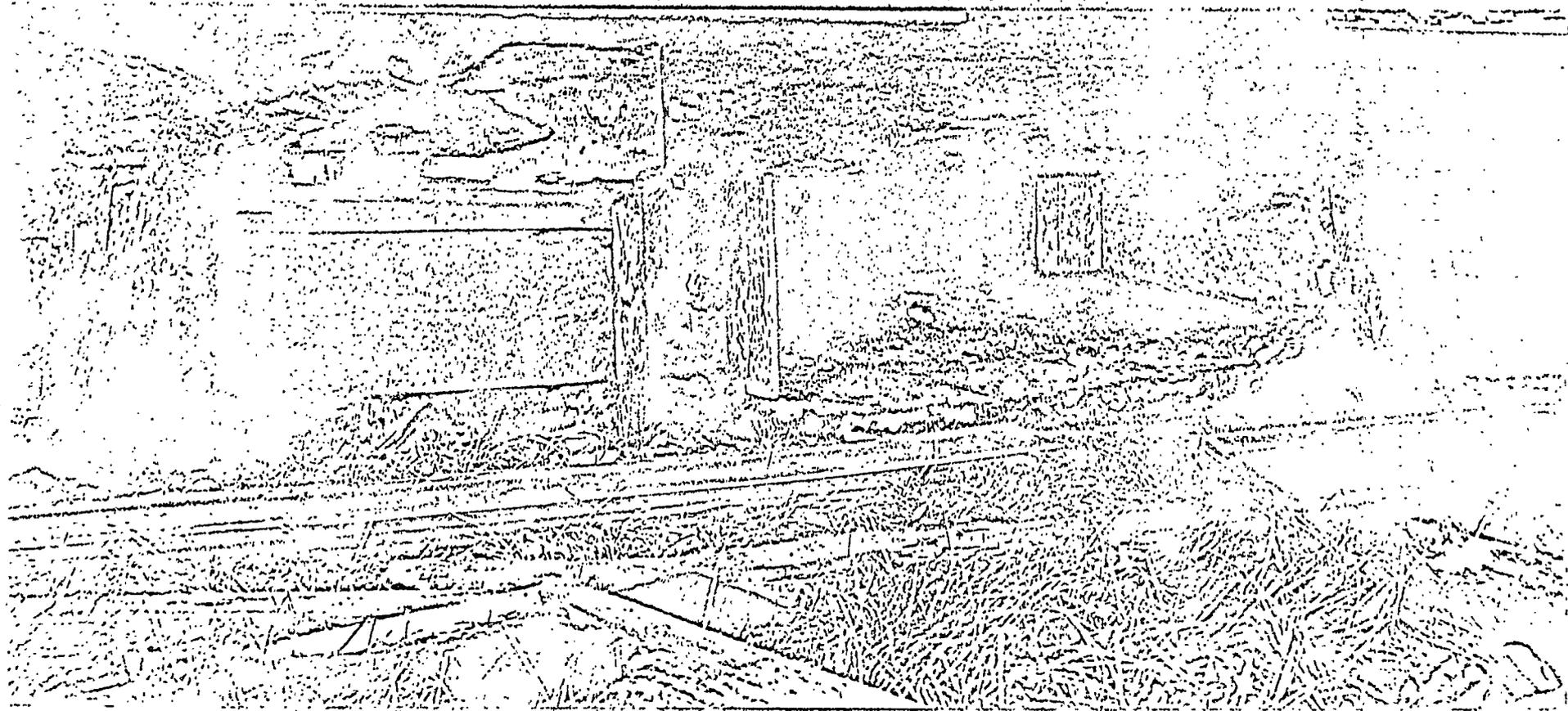
Wsg # 27372

7. Narbonne House, Salem, Mass. Detail of east wall with clapboards removed at southeast corner. Posts and studs extend below grade and sill has completely deteriorated. Representative of area along three walls recommended for archeological excavation where earth must be disturbed for work on structure and lowering of grade.



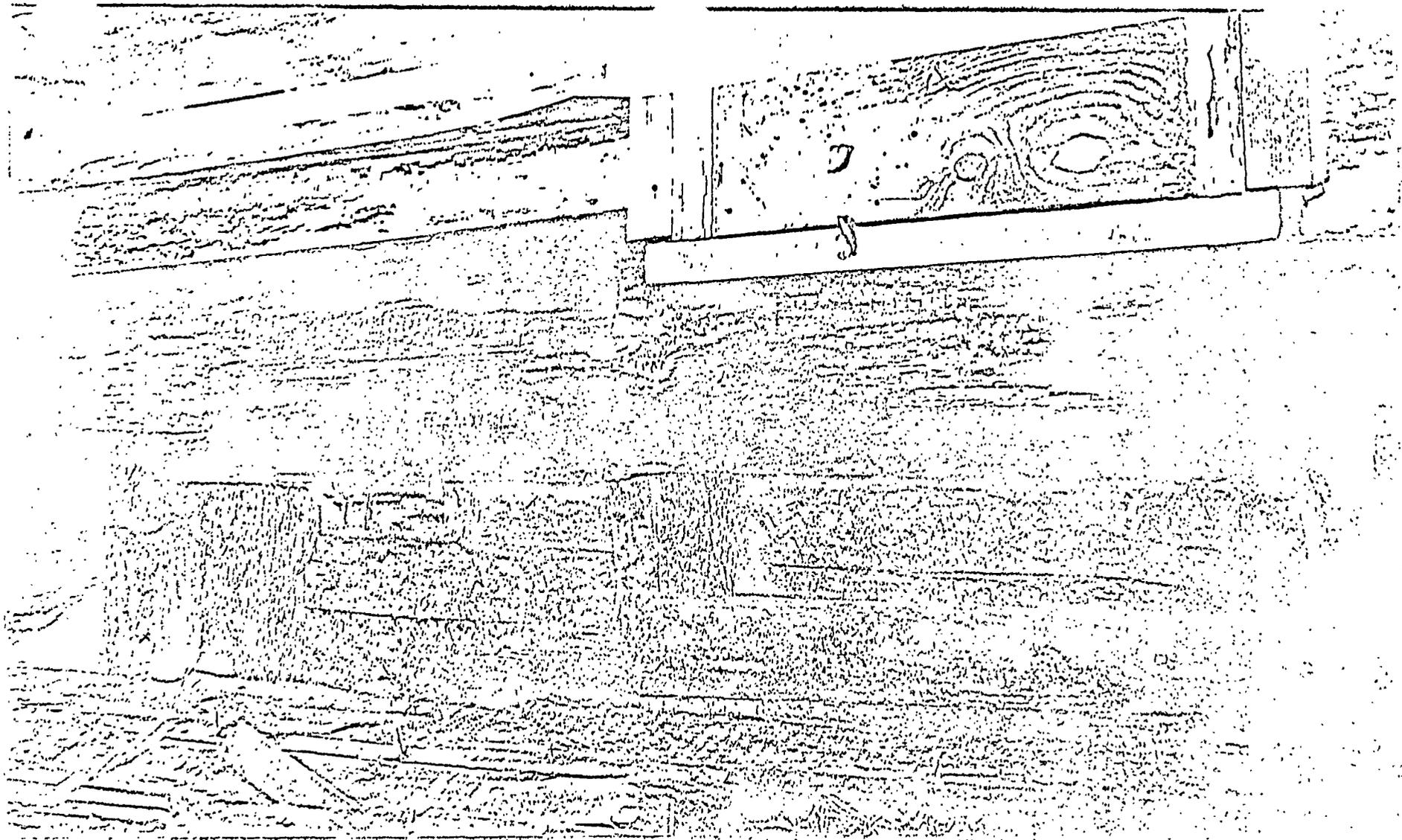
neg # 27393

8. Narbonne House, Salem, Mass. Detail of east wall. Note the extensive deterioration due to dry rot at the lower ends of the framing members.



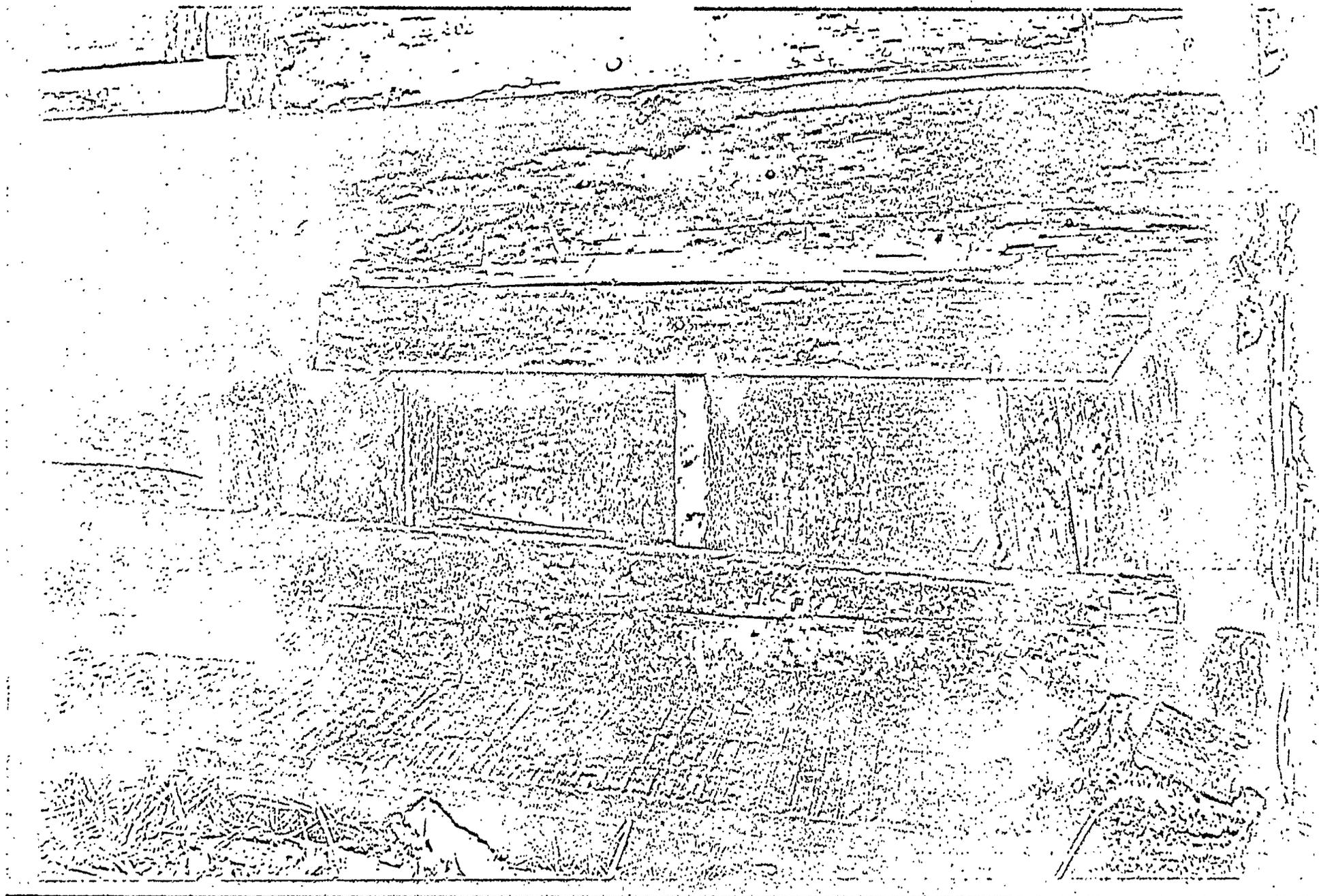
9. Narbonne House, Salem, Mass. Detail showing conditions along east wall.

Neg A 2-1394



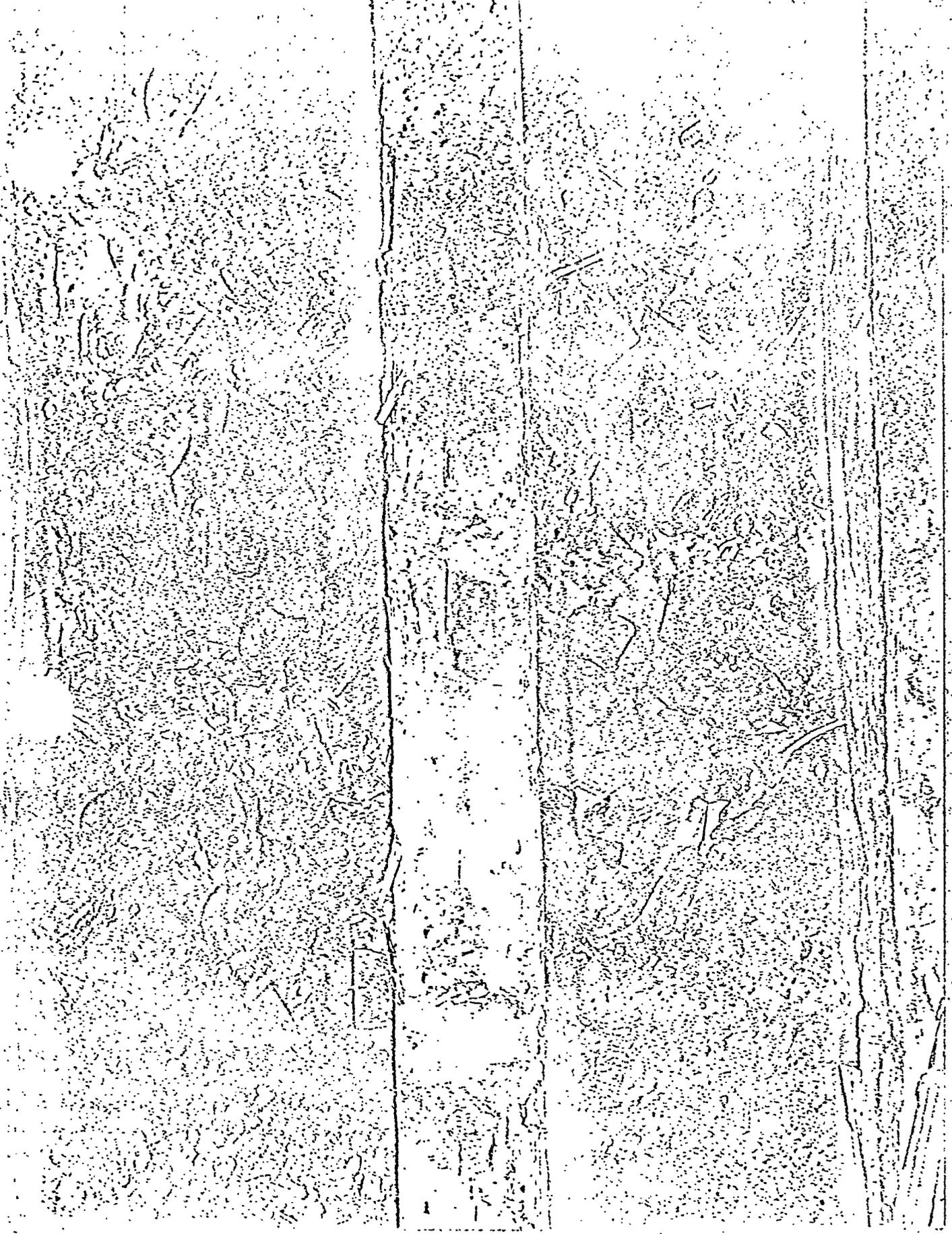
10. Narbonne House, Salem, Mass. Detail of east wall.

Neg. A 27395



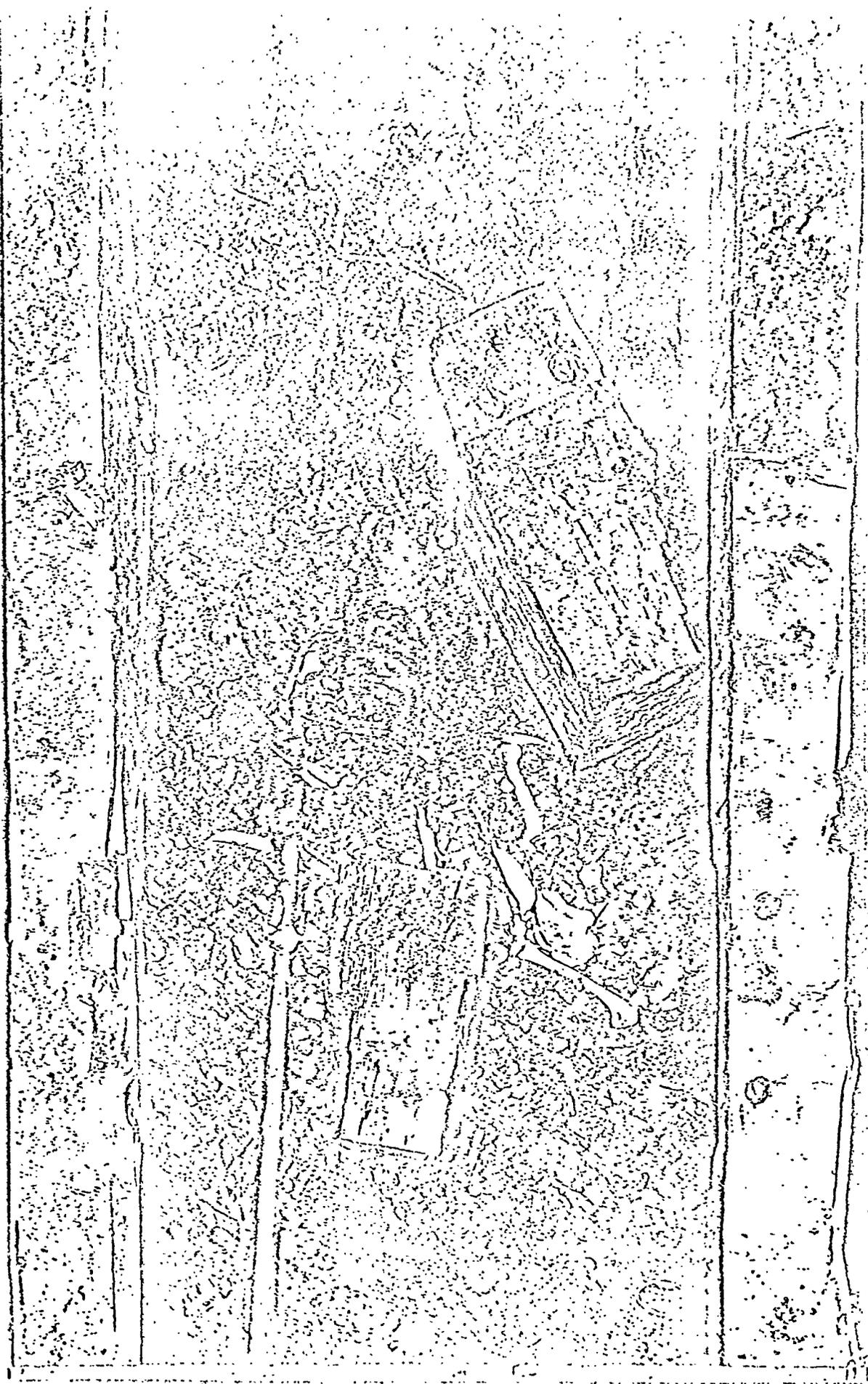
11. Narbonne House, Salem, Mass. Detail of east wall.

neg # 27396



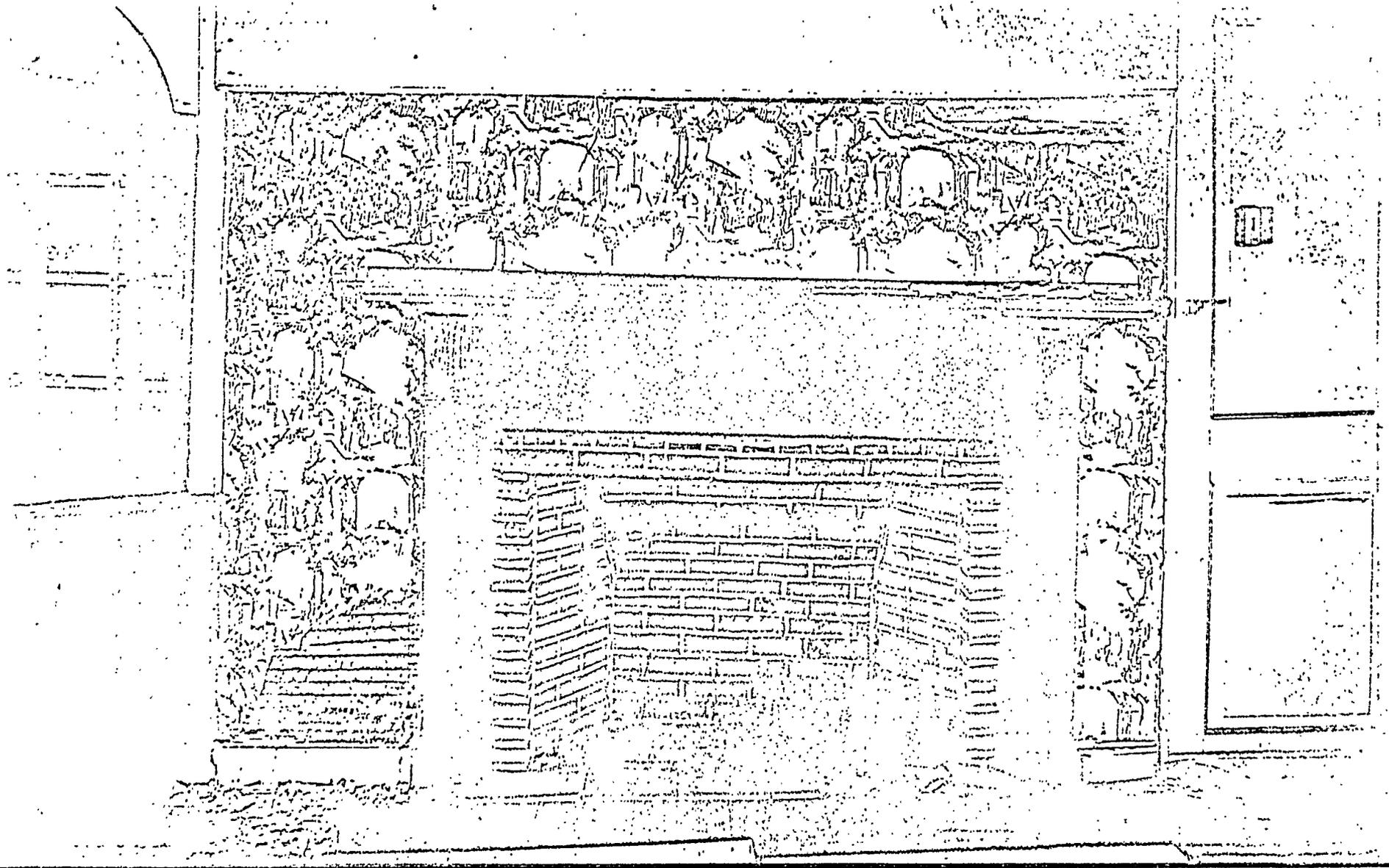
12. Narbonne House, Salem, Mass. Detail of unexcavated area
beneath later ell showing the joists almost in contact with

N. A. 27397



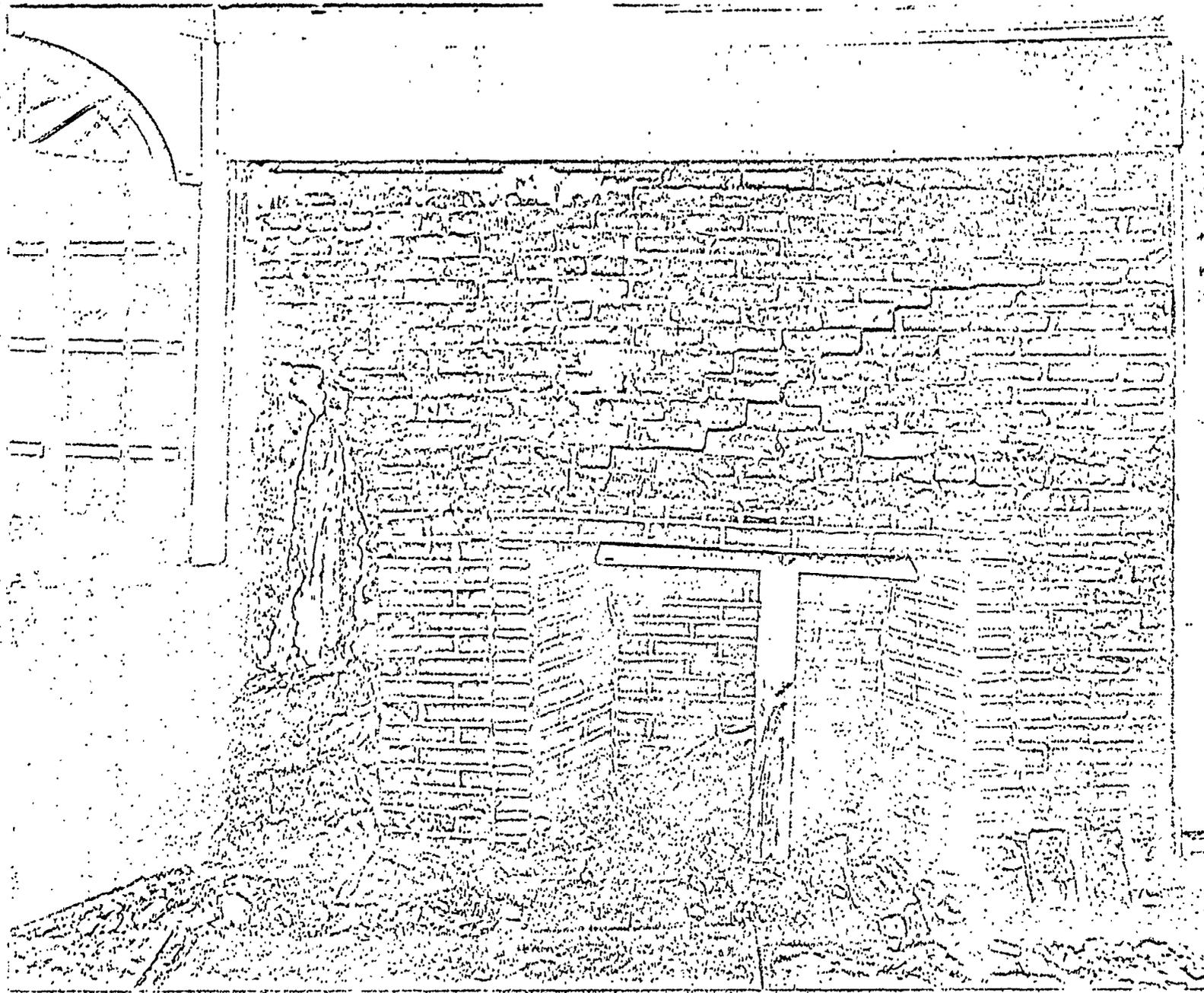
13. Narbonne House, Salem, Mass. Detail of first floor joists

Fig # 27401



log # N 27402

14. Narbonne House, Salem, Mass. Fireplace in north room, first floor before removal of mantel, lath and plaster. Settlement of northwest corner of chimney has caused fireplace to sink several inches (lower right).



Neg # 27403

15. Narbonne House, Salem, Mass. Fireplace in north room, first floor after removal of mantel, lath and plaster showing condition of the brickwork. The lath and plaster wall surface was removed in one piece, complete with furring strips, and can be reinstalled intact with



16. Narbonne House, Salem, Mass. Detail of fireplace in north room. Note old plaster which pertains to an earlier fire-

Neg. No. 27404



17. Narbonne House, Salem, Mass. Detail of fireplace in north room showing bricks numbered for record purposes.

log # 27405



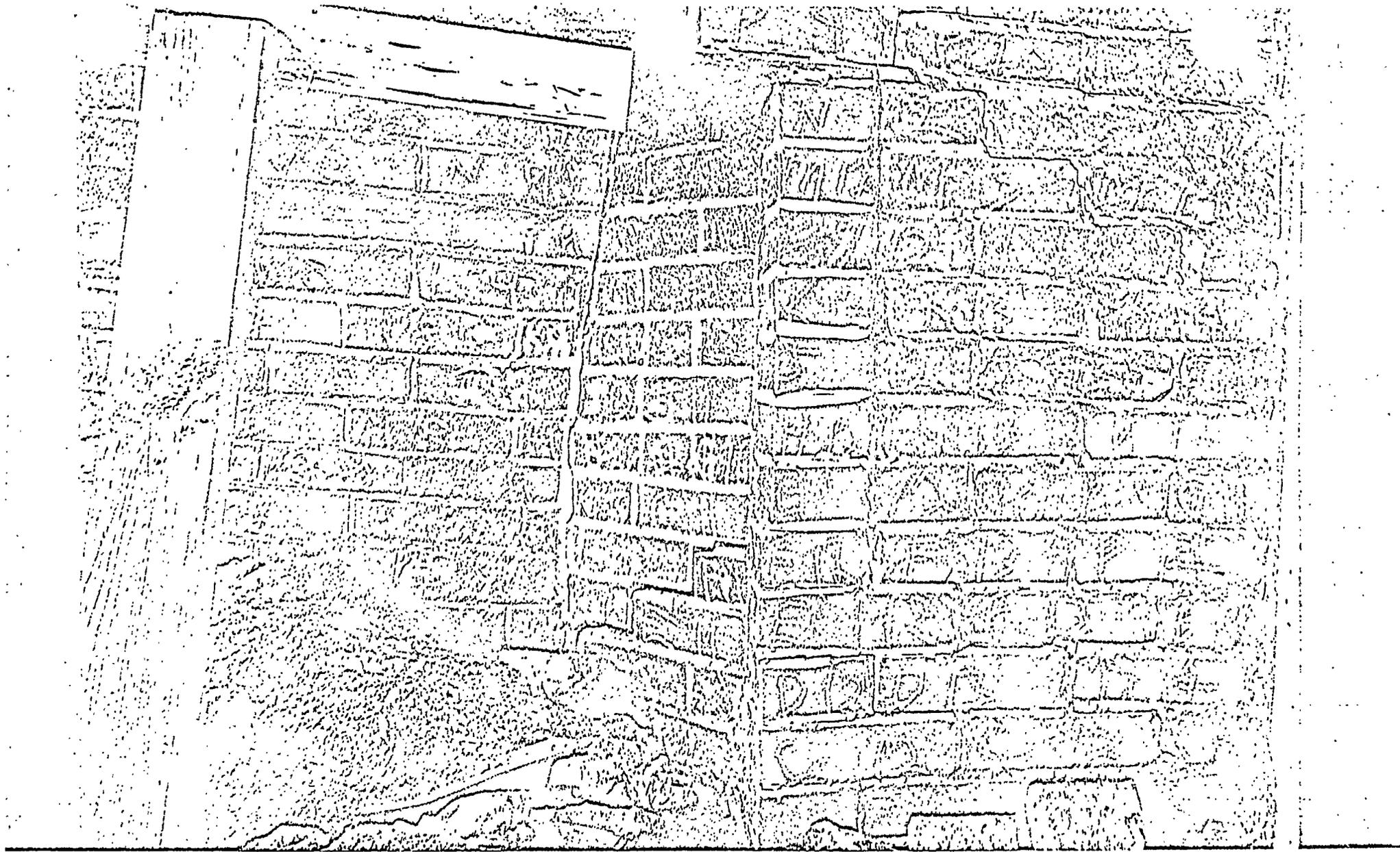
18. Narbonne House, Salem, Mass. Detail of fireplace in north room. Record photograph of numbered bricks in upper left corner before their removal.

Usgy to 27413



Mag A 27406

19. Narbonne House, Salem, Mass. Detail of fireplace in north room. Record photograph of numbered bricks above lintel before their removal. Cracks are the result of continuing settlement at the northwest corner of the chimney.

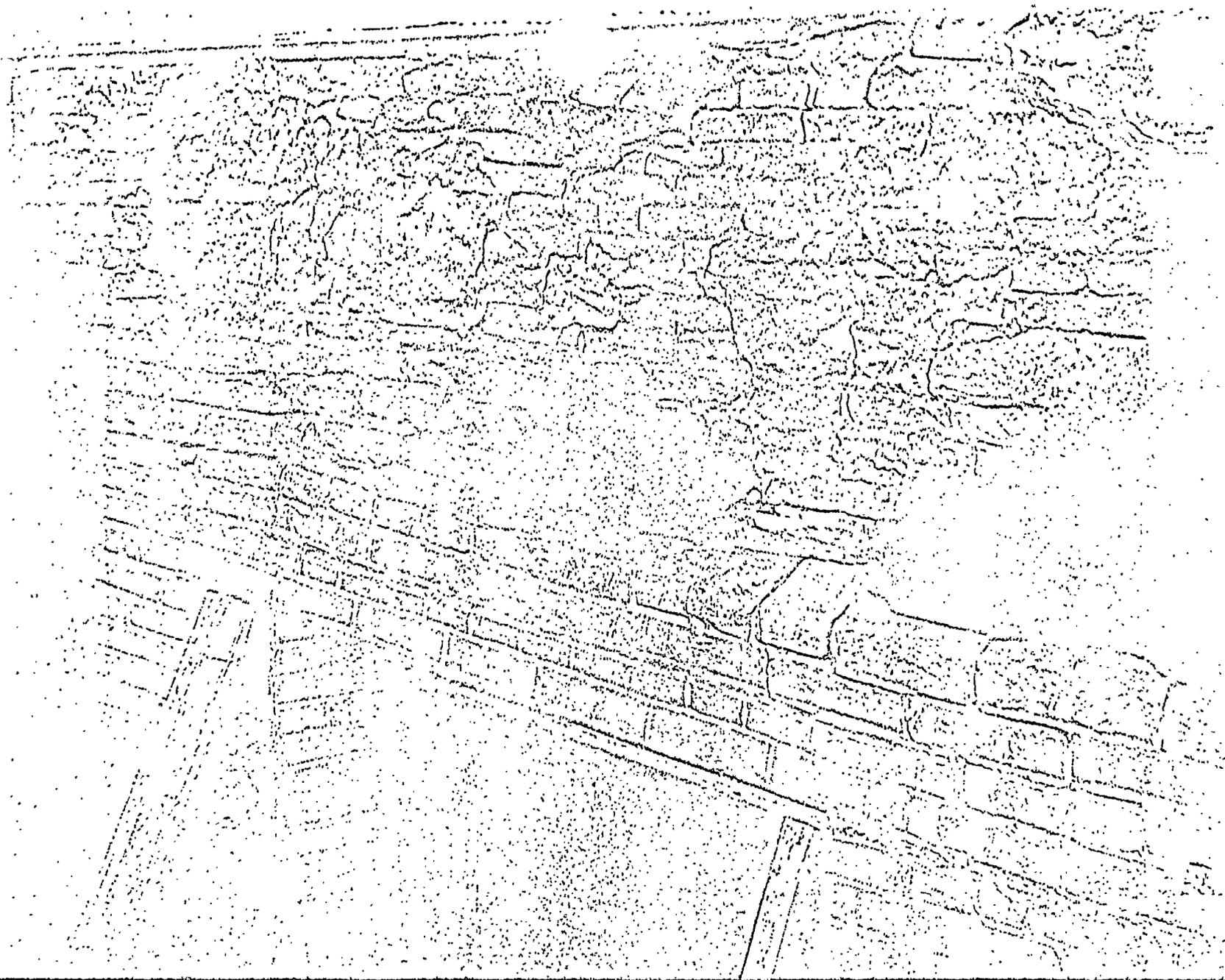


20. Narbonne House, Salem, Mass. Detail of fireplace in north room. Record photograph of bricks in lower right corner.

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21. Narbonne House, Salem, Mass. Detail of fireplace in north room. Condition upon removal of bricks showing evidence of earlier fireplace.



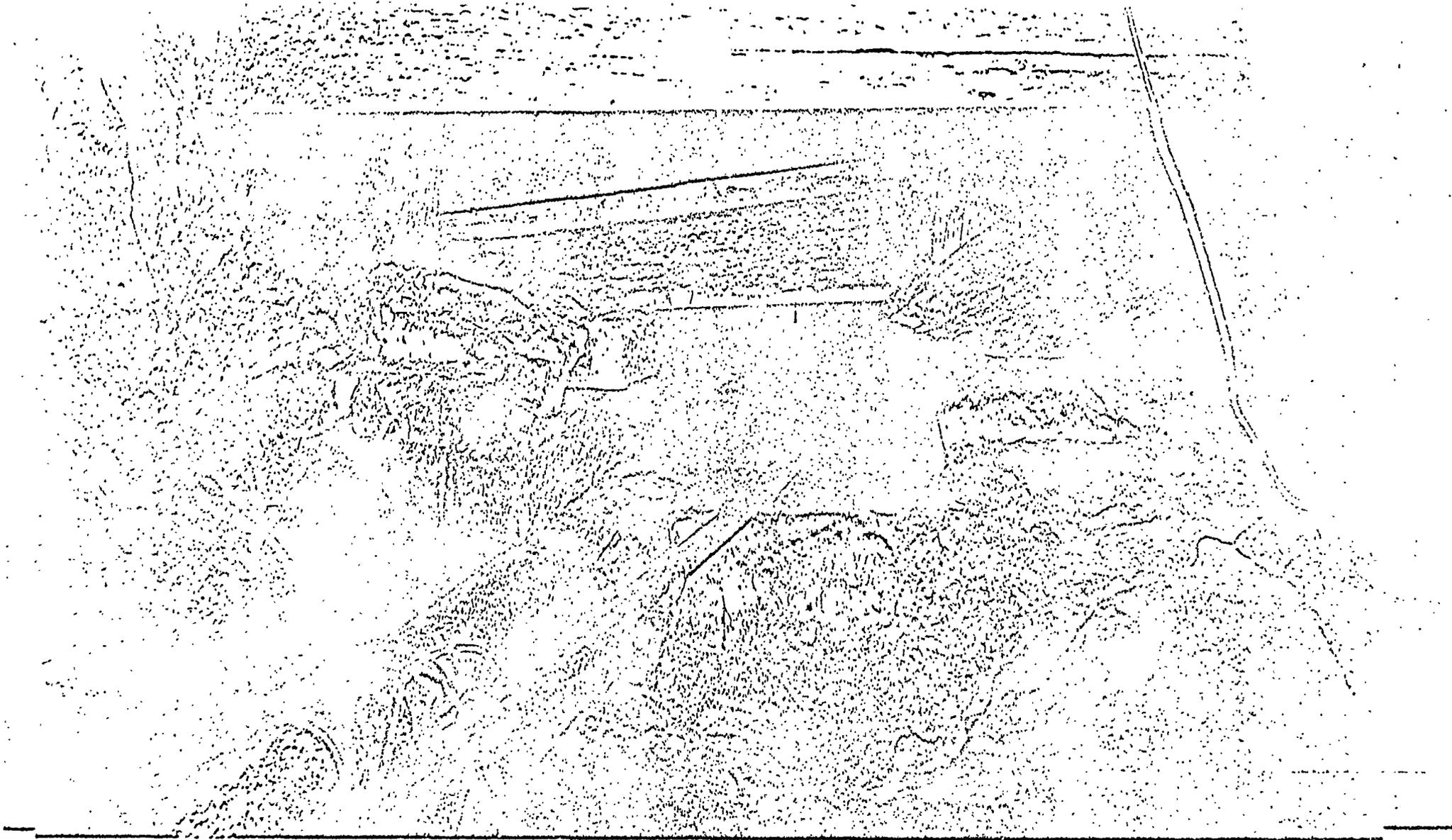
22. Narbonne House, Salem, Mass. Detail of north foundation

log A-27407

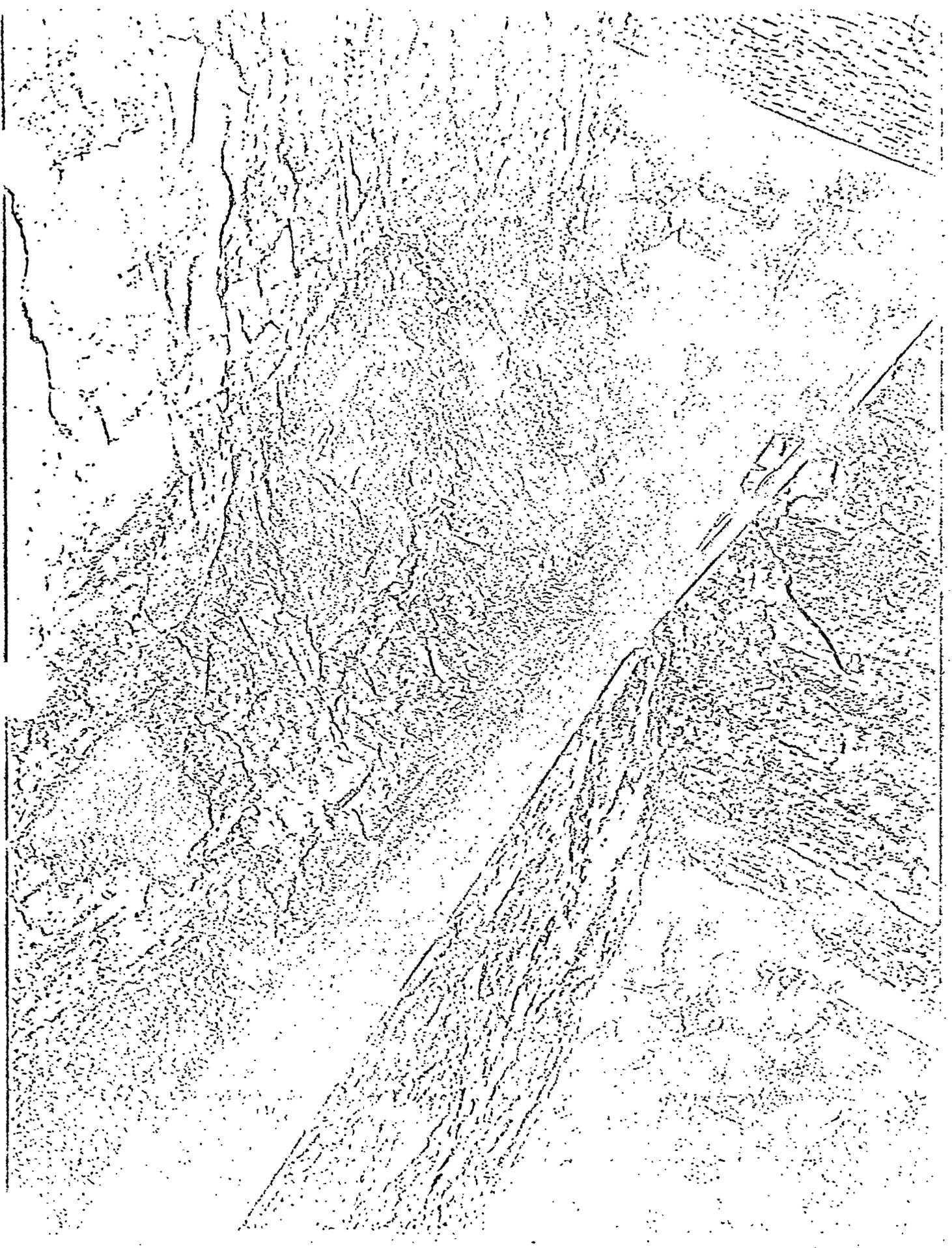


Ug A 27410

23. Narbonne House, Salem, Mass. Detail of bulging west foundation wall of chimney in basement. Cellar stairs can be

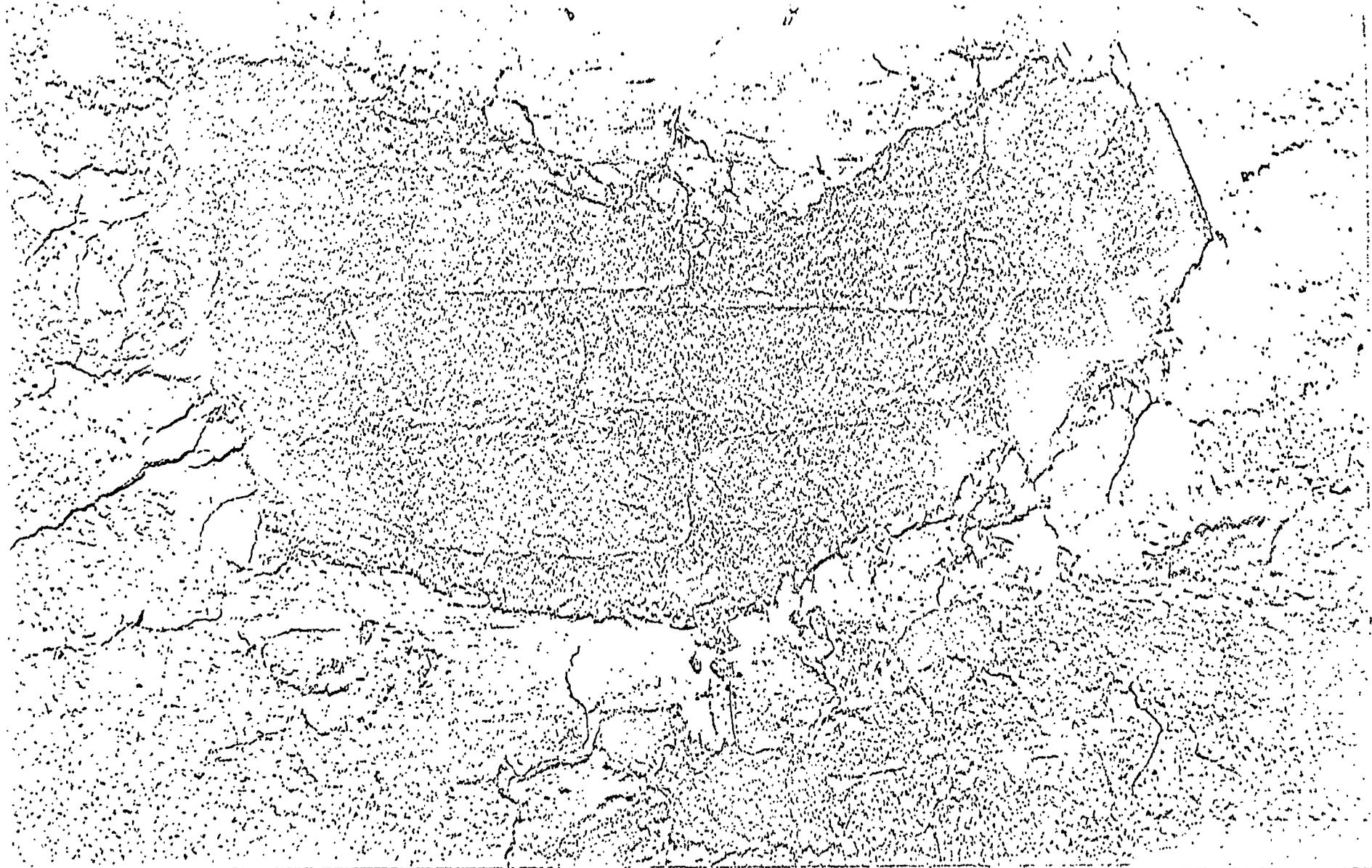


24. Narbonne House, Salem, Mass. Detail showing settlement resulting from missing sill between original structure and later ell, adjacent to bulging west foundation wall. *Acc. A 27411*



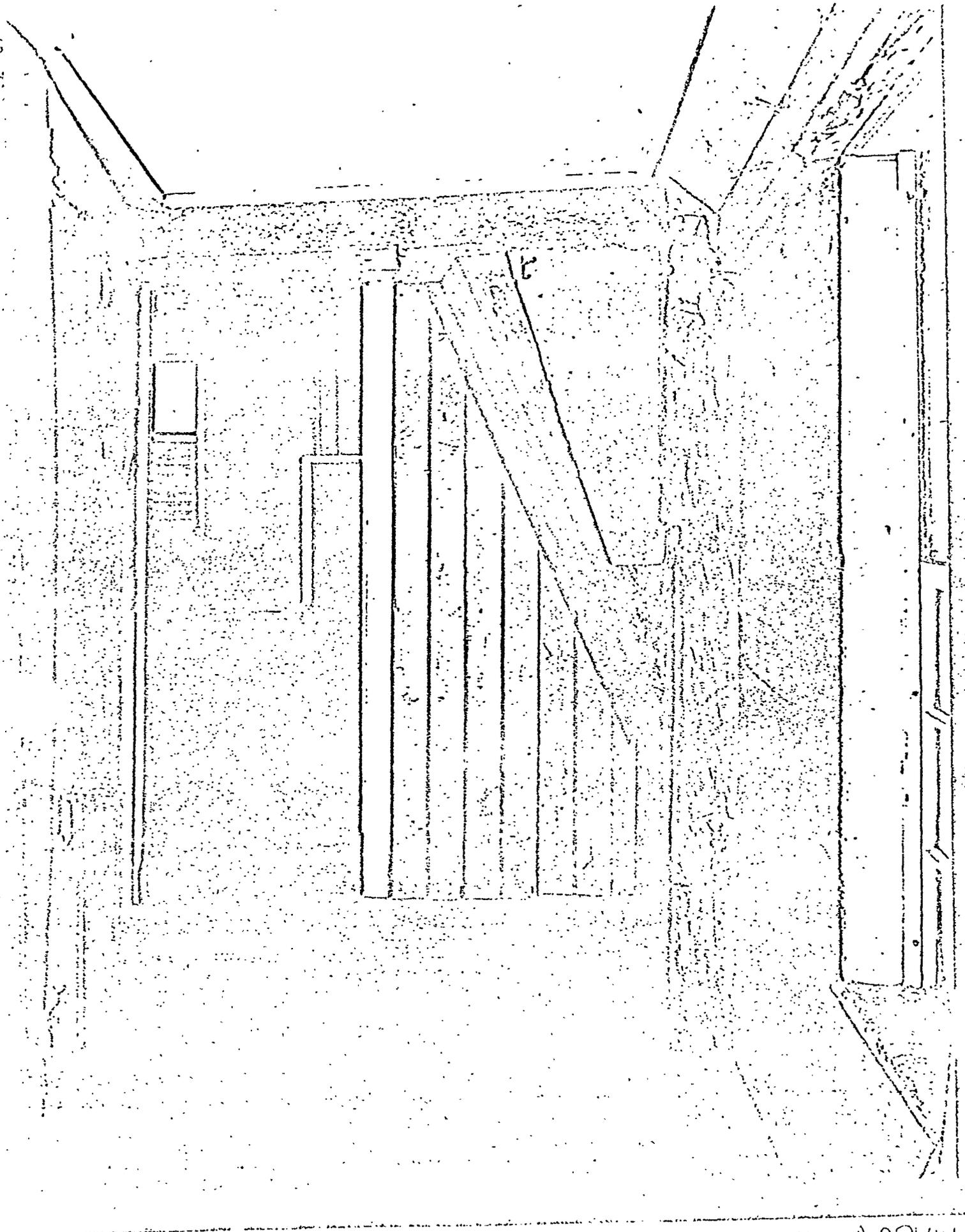
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25. Narbonne House, Salem, Mass. Detail of bulging west



Wey 27413

26. Narbonne House, Salem, Mass. Detail of early brickwork and mortar of west chimney wall in staircase between the first and second floors.



Dec. 27 1914

27. Narbonne House, Salem, Mass. Second floor hall showing juncture of original structure with later gambrel roof

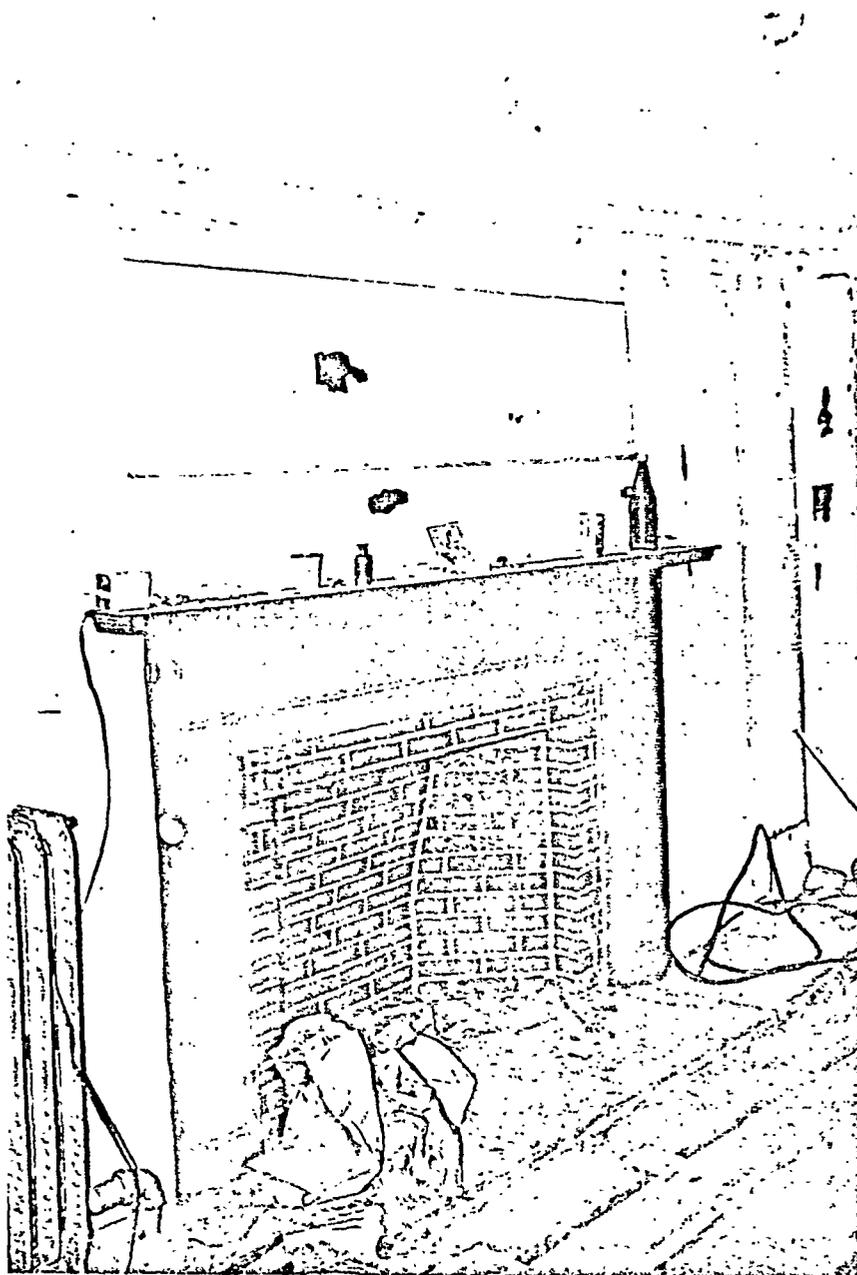


No. A 27415

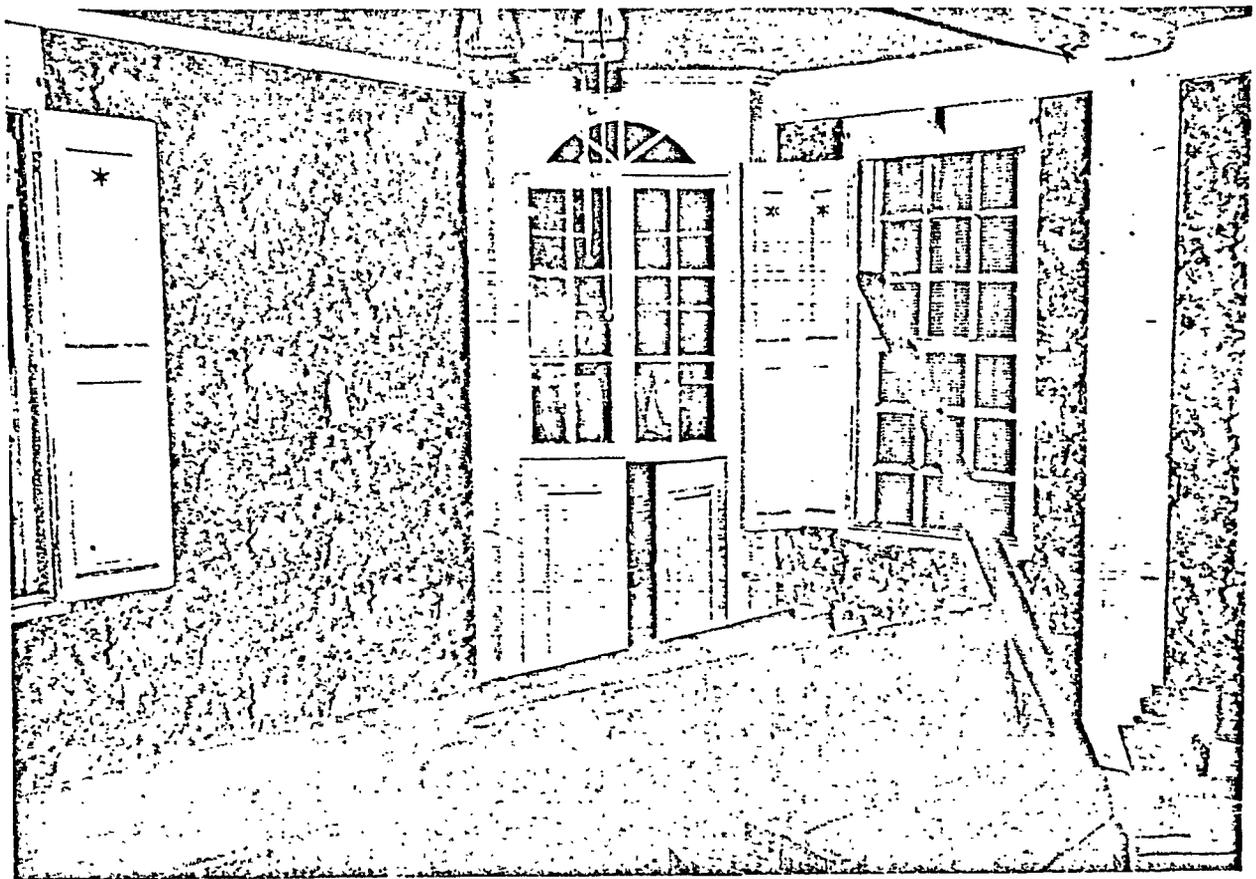
28. Narbonne House, Salem, Mass. Detail of deteriorating



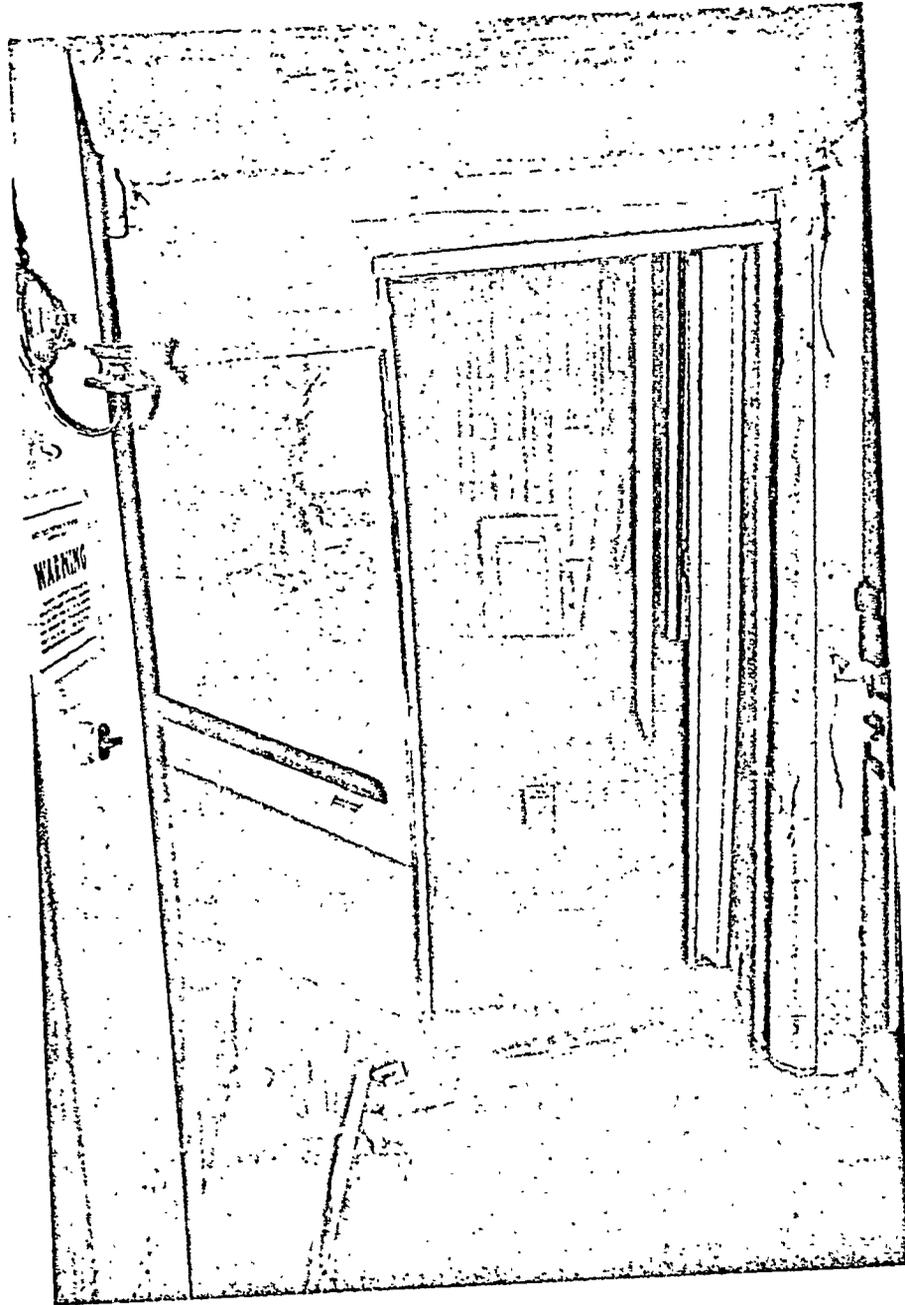
Photograph 29: East wall of first floor north room showing Federal mantel temporarily detached from fireplace. Decoratively carved summer beam and post are important seventeenth century features of the house.



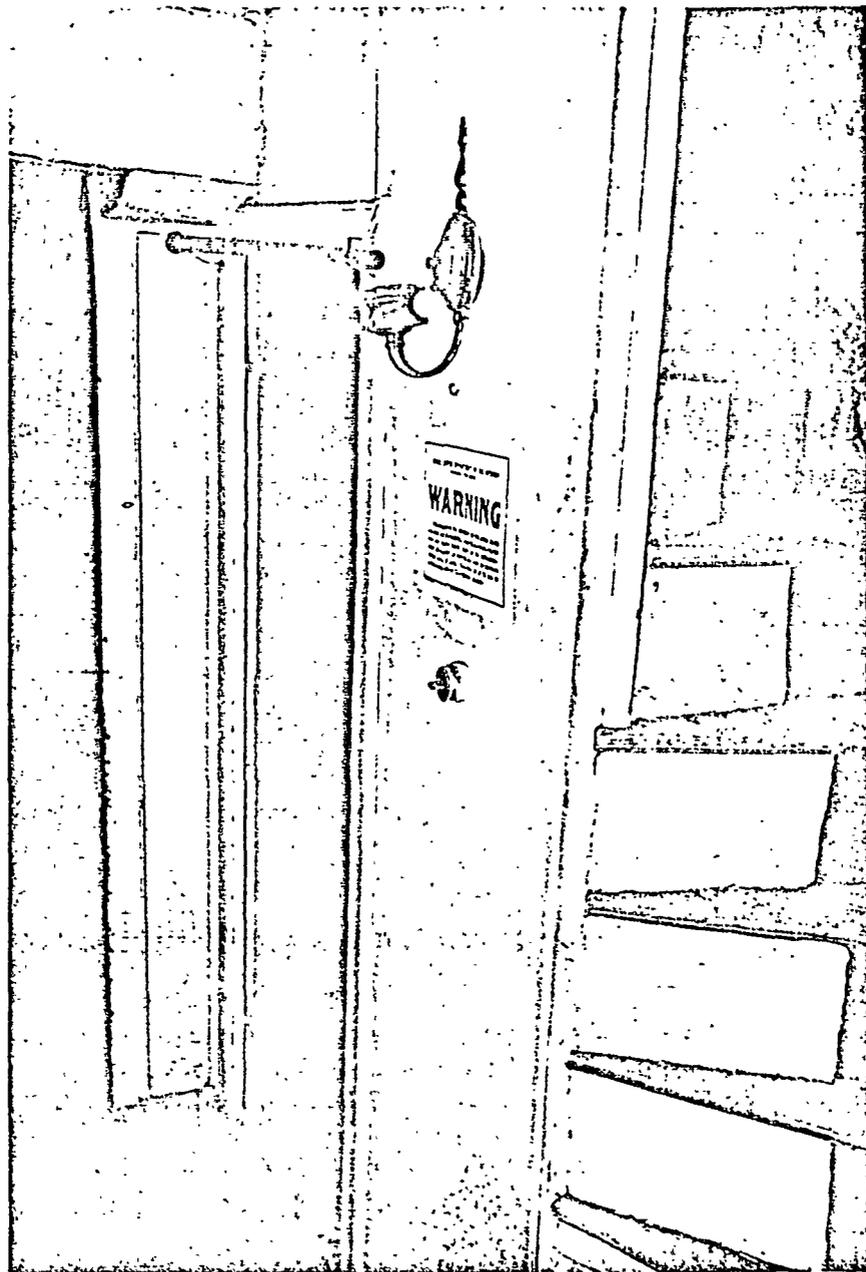
Photograph 30: North wall of first floor south room (in gambrel ell). Federal period mantel is filled against eighteenth century sheathing, which, in turn, covers earlier lath.



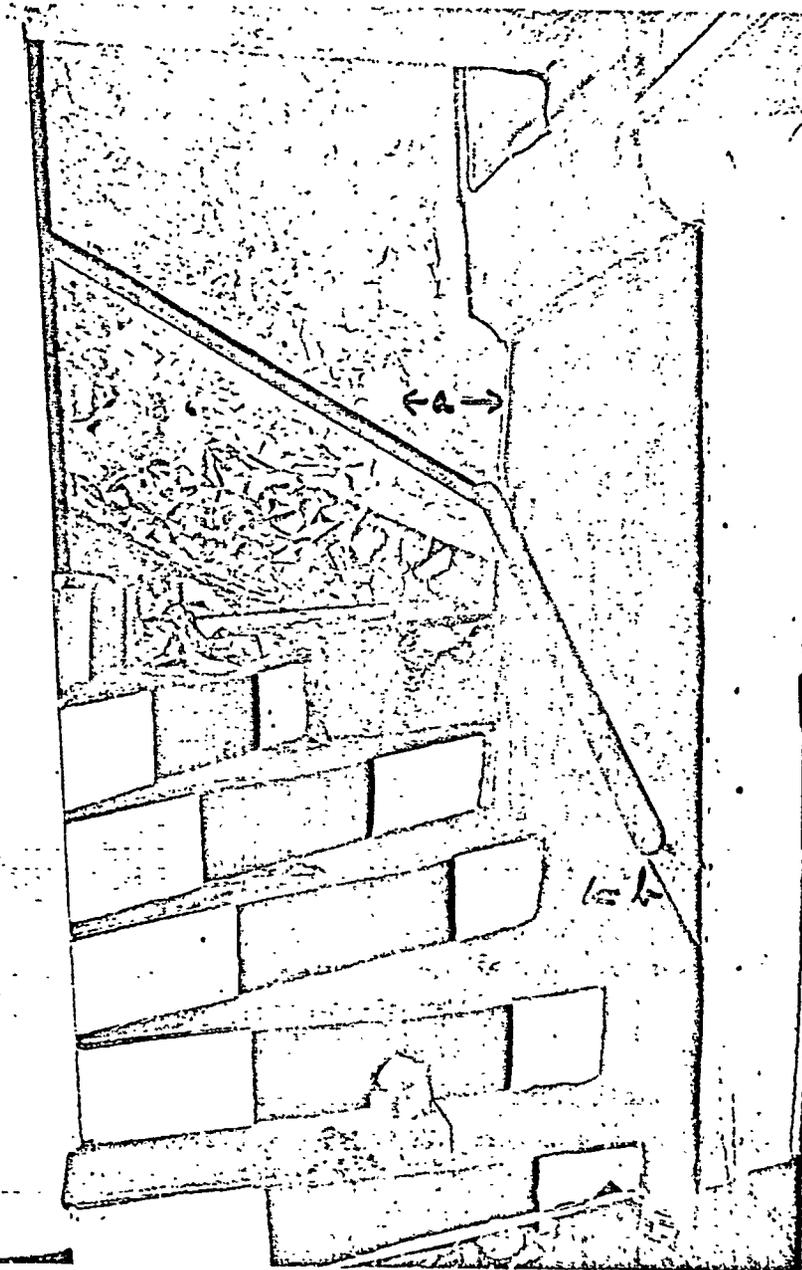
Photograph 31: View toward southwest in first floor room of gambrel ell. Beam casings, sash and shutters, and corner cupboard (except for glass doors) typical of eighteenth century cupboard.



Photograph 32: View toward south in first floor front (west) entrance hall. Chimney girt has been substantially cut to make headroom for door.



Photograph 33: View toward northeast in first floor front (west) entrance hall. Sheathing is not of a seventeenth century character.



Photograph 34: View of front (west) stairs at first floor level. Area "a" is a vertical strip of brickwork added to the south side of the chimney, probably when the gambrel ell was attached. The plaster in area "b" passes behind the steps, as can be seen from below the staircase.



Photograph 35: Looking down front (west) stairs. At "a" is shadow-moulded seventeenth-century-type sheathing board, probably reused.



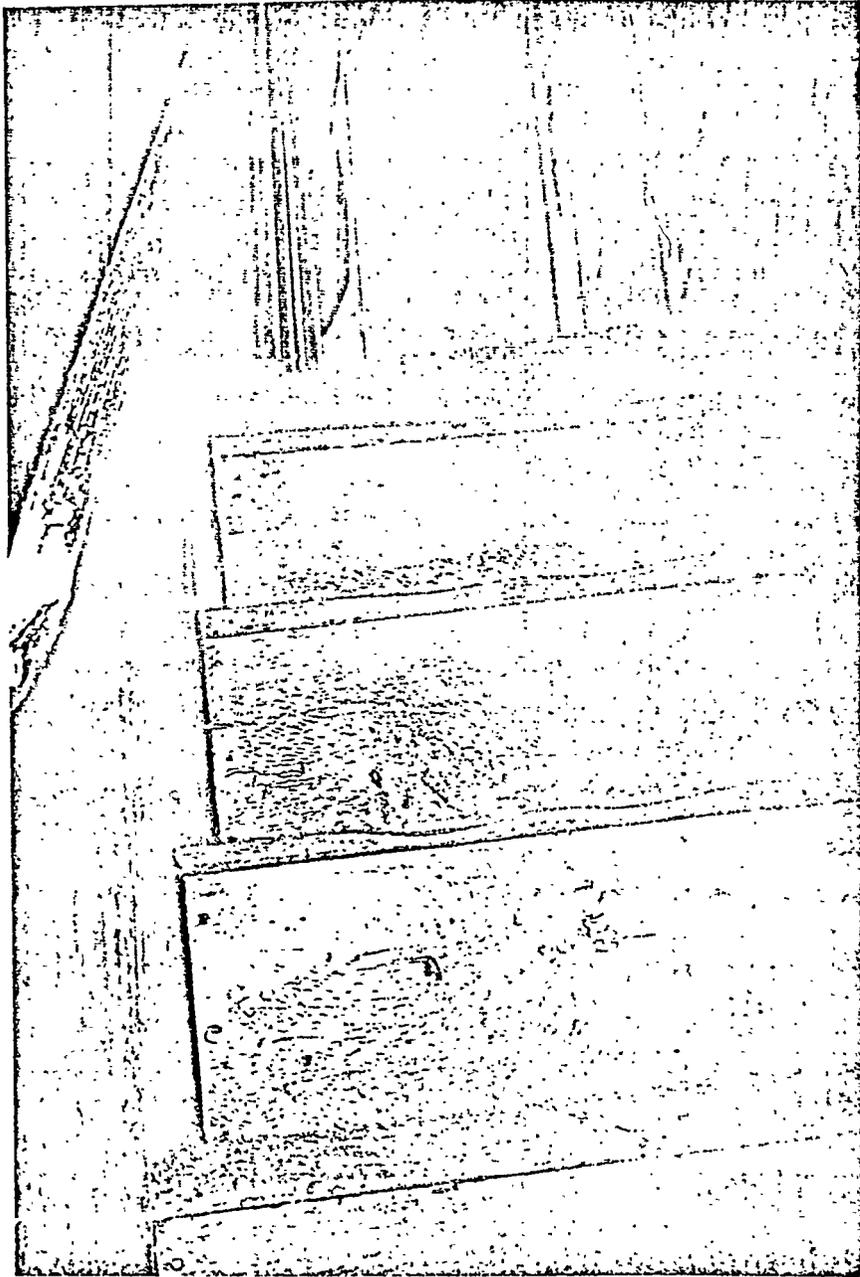
. Photograph 36: View of east wall of cellar, showing bulkhead which leads into leanto.



Photograph 37: Original eastern flue of chimney stack, as seen in attic.



Photograph 38: View to the south in central (earliest) portion of leanto. Wall sheathing is early (hand planed boards secured with handmade nails). Matched boards on ceiling are much later.



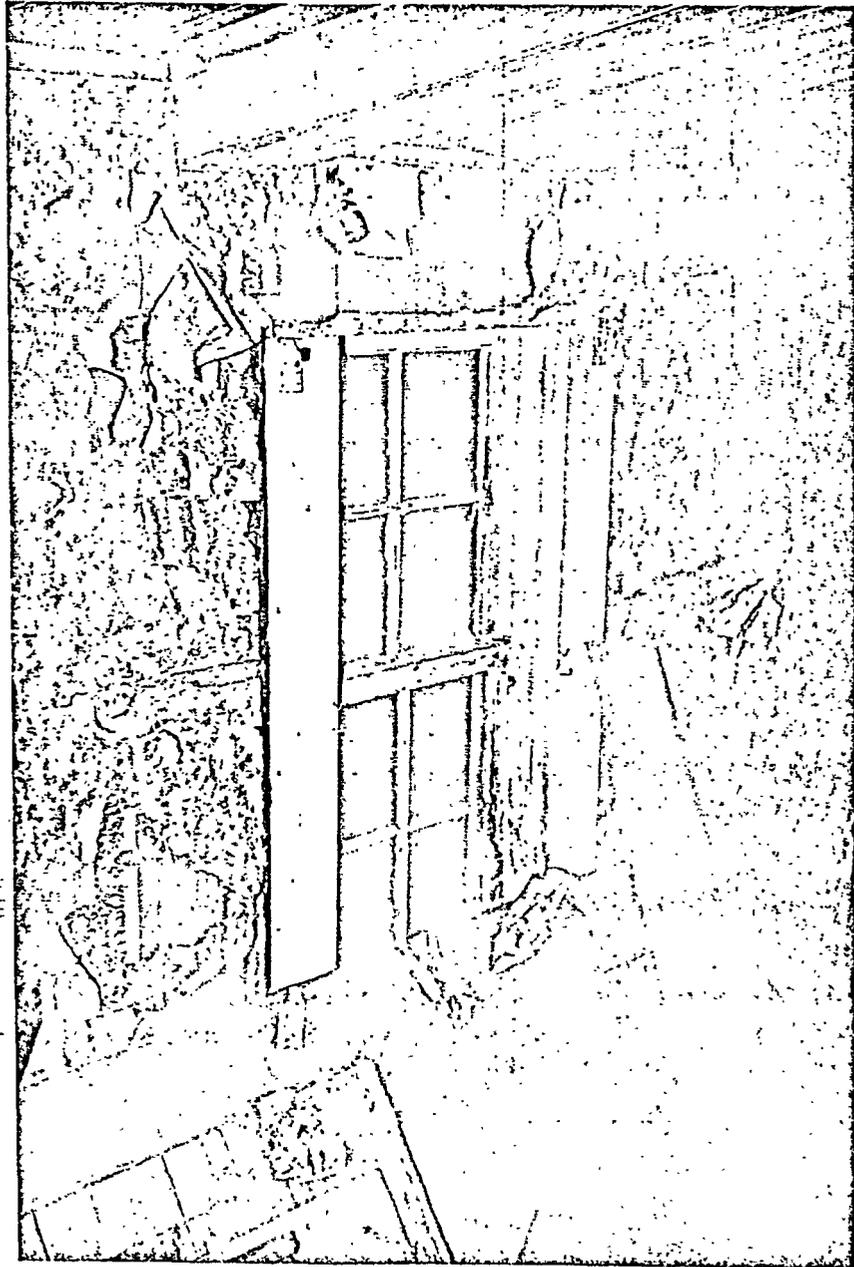
Photograph 39: View to south looking up rear (eastern) staircase.



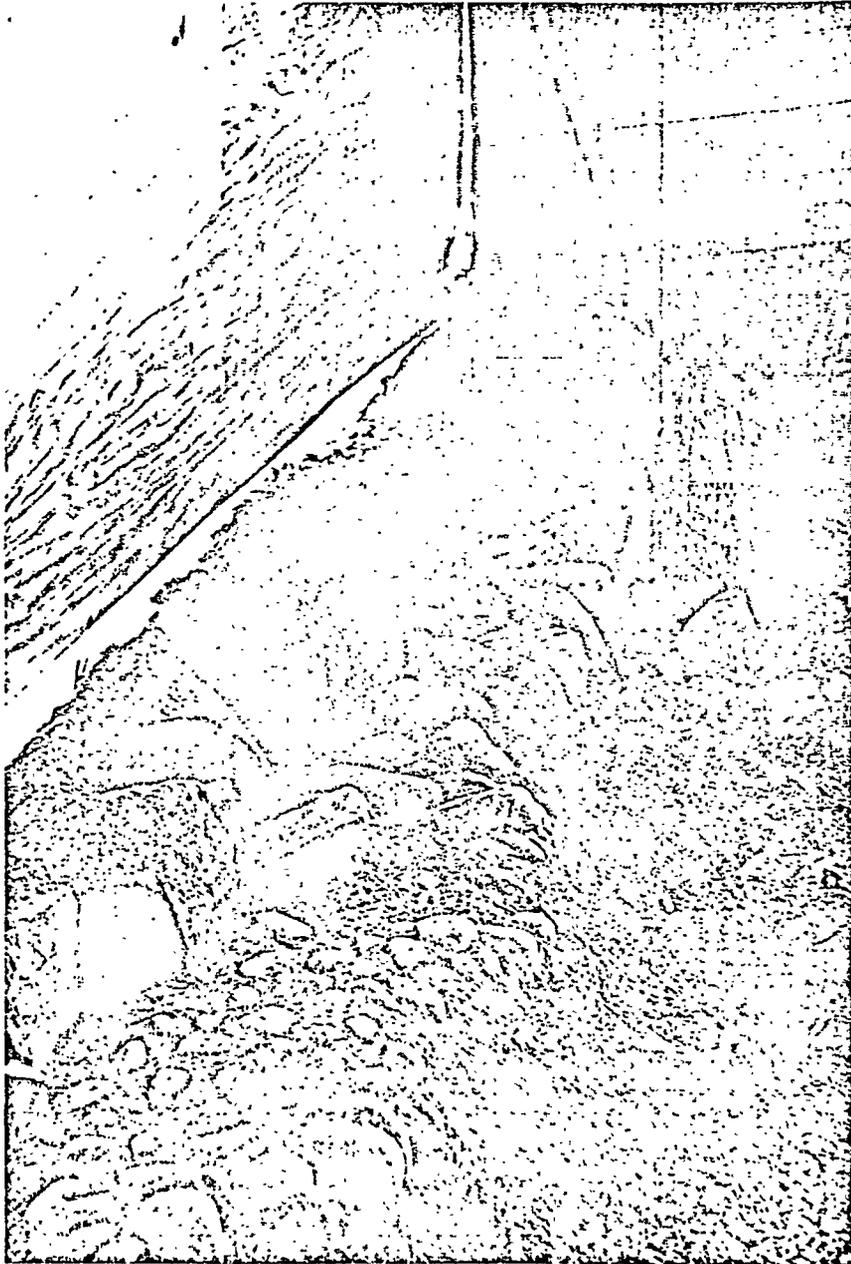
Photograph 40: Clapboards on east wall of main house now enclosed by northern extension of leanto. Clapboards are secured with handmade nails.



Photograph 41: Interior view of shop door in northern extension of leanto. Wallpaper at right is on east (rear) wall of leanto.



Photograph 42: Wallpaper on east (rear) wall of leanto.



Photograph 43: Remains of cobblestone walk beneath foundation of southern extension of leanto. Walk was uncovered during archaeological excavation.