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Pelham's Historic Town Center Buildings:

Study Reports

Thomas Paske

(This study was undertaken during the summer of 1990 to assure that repairs to halt the physical deterioration of the Pelham, Massachusetts meetinghouse, or Town Hall, and Congregational Church, now Historical Society Museum, would be planned with consideration for their historical character, fabric and construction. The study was sponsored by the Pelham Historical Commission and Pelham Historical Society and funded by the National Trust for Historic Preservation, the Town of Pelham, and the Pelham Historical Society. Other parts of the study under separate cover are historic reports by Ann Grady and Peter Benes and a report by engineer John Brennan.)

This report was prepared for the Pelham Historical Society and the Pelham Historical Commission. The purpose of this survey is to describe the structures' present condition, locate damage and outline repair procedures.

The physical description is based on an onsite investigation made by myself and Jim Kules during the winter and spring of 1990-1991. Specific dates concerning the Meetinghouse are based on a chronologically organized list of references provided by Peggy Hepler. Other historical information was based on old photos from the Pelham Historical Society's archives.

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Westfield, Ma.
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THE PELHAM MEETINGHOUSE

NATURE OF CONSTRUCTION

The Pelham meetinghouse as seen today (photo 1) represents 250 years of changing technologies, resources, religious practices and governmental structure. Within its walls can be seen a cycle of growth and neglect illustrating on community's changing social priorities and its financial equilibrium.

Begun in 1741 its frame represents building techniques common in 18th Century New England. The majority of the framing elements are nicely hand hewn; some smaller secondary elements are vertically sawn.

The longer and larger framing members were generally hewn due to limitations in early saw carriages. Smaller members were more difficult to hew accurately, (note the finish on the large timbers compared to the smaller ones in the loft). The finish of the frame parts vary considerably according to the visibility of their location. Gallery joists meant to be seen were planed smooth while floor timber visible only from the crawl space consist of roughly halved logs and split joists.

The material used in the frame consists for the most part of four species, red oak, white oak, chestnut and yellow pine. Most of the smaller elements (diagonal braces studs and rafters) are oak. Many of the long elements

(sills, tie beams, primary plate) are yellow pine, probably due to the tree's general shape, straightness and lack of butt swell. The remaining elements, post, purlins, principal rafters and joists are chestnut and oak. Some changes in wood selection are seen in the porch addition of the 1790's; more chestnut and less yellow pine are used.

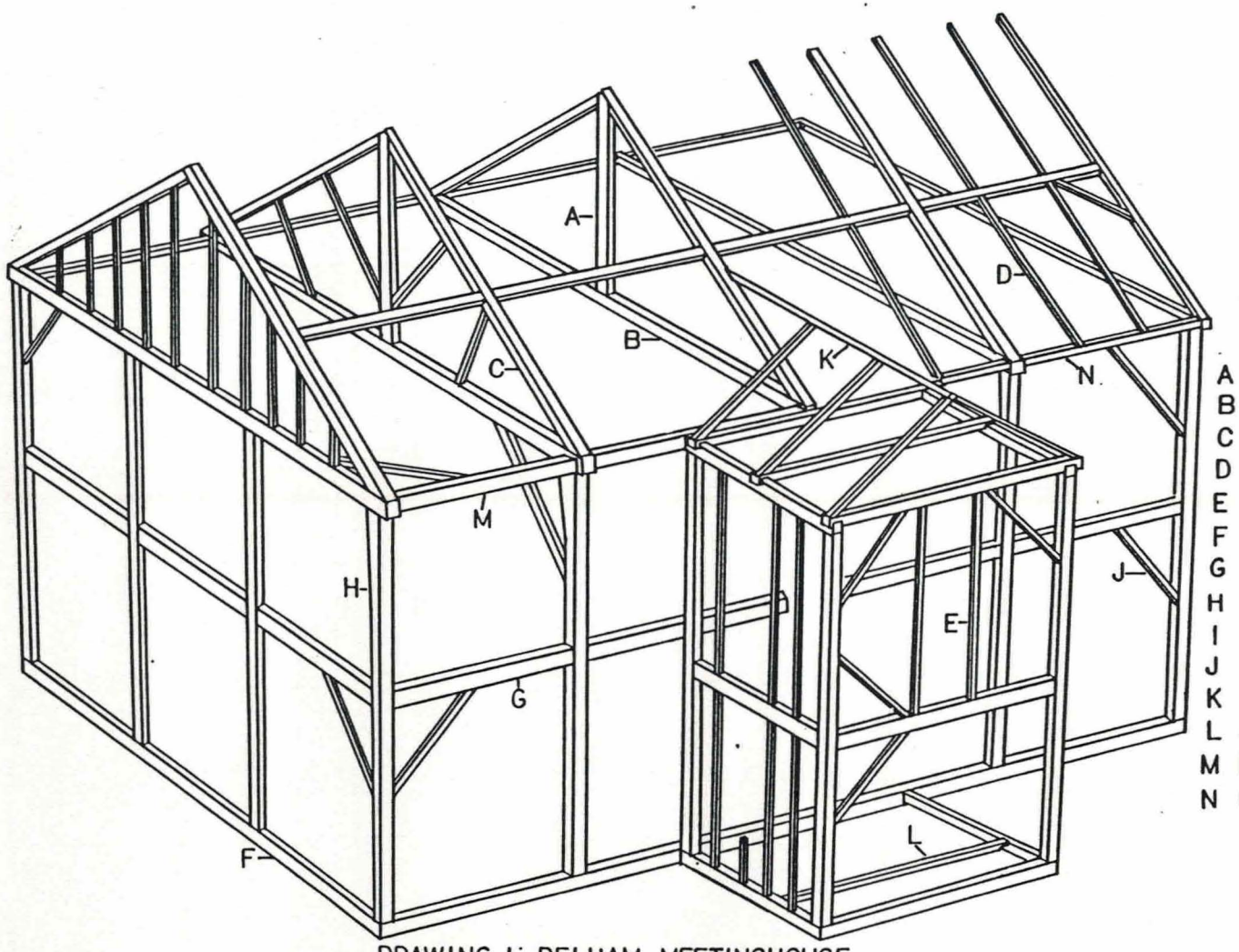
Studs, rafters and diagonal braces in the porch addition all vertically sawn.

Methods of timber preparation can be helpful in determining the chronology of this buildings' growth. In the original phase of building most timbers were hewn, and some secondary elements vertically sawn. Most secondary elements of the porch and gallery fill-in of 1845 are vertically sawn. However, the southernmost areas of the gallery fill-in are circular sawn, indicating that this is not contemporary with the rest of the work in the gallery. Larger timber cutting circular saw mills where not common in New England prior to the 1840's. Unfortunatly saw marks can be misleading. Very often salvaged materials are reused in a building. This reuse can be seen in the installation of planed gallery joists used as nailers in the west wall, and two vertically sawn rafters installed

in 1991 during roof sheathing. All timber used in the 1890's renovation are circular sawn.

The 1741 frame itself consists of (draw. 1) four bents, surmounted by five principal rafter trusses (photo 2). The center truss did not rest on posts; it is carried by the primary plate and stud wall below it. There is no ridge pole. Principal rafters are mortised into the kings posts. Secondary rafters are open mortised and pegged. Principal rafters are connected with separate purlins which in turn carry the secondary rafters. These secondary rafters consist of a lower rafter and an upper rafter both mortised into the purlin. The three central trusses consist of a tie beam, kings post, and two principal rafters braced both to the tie beam and kings post. The kings posts are mortised/half dove-tailed into the tie beam. Gable principal rafter sets have no kings post but are open mortised at the top and supported by 3"x 4" studs. King post and braces are not necessary because the end trusses are supported by medial posts, whereas the three center trusses span an open space. Each individual truss is connected with two purlins, two longi-tudal braces, primary and secondary plate.

End bents consist of four posts. These posts are



A KING POST
B TIE BEAM
C PRINCIPAL RAFTER
D COMMON RAFTER
E STUD
F SILL
G GIRT
H POST
I PURLIN
J DIAGONAL BRACE
K RIDGE POLE
L JOIST
M PRIMARY PLATE
N SECONDARY PLATE

DRAWING 1: PELHAM MEETINGHOUSE

connected at the top by an end plate and joined midway by segmental girts. These posts are diagonally braced to both end plate and end girt.

The two central bents contain only two posts, one at the north end and one at the south. They are connected at the top by a tie beam, and midway by a full length girt. Unlike house or barn central girts this girt is lower in height than front and end girts. This accommodated the sloping. gallery floor. The central girts support original gallery framing and also the later framing for the gallery fill-in. Posts in the center bents are diagonally braced to the tie beam.

All four bents are connected at their upper ends by a continuous primary plate and midway by separate front girts (the front girt center bay had been cut when the entry porch was built).

Below the building there is a front sill, rear sill and two end sills. Running between the front and rear sill are three main 9"x 10" timbers. Running between their timbers and the end sill are the joists that support the first floor flooring. The main building has had very little structural modification. Most of the framing appears to be original or at least 18th Century. The following materials were

installed in the 19th Century; framing filling in the gallery, north sill, and five joists in the northwest corner of the crawl space. Framing for the library and some of the second floor ceiling supports were added in the 1890's.

Entry Porch

Similar framing is found in the entry porch of c. 1800. This addition's frame consists of two bents topped by a large plate mortised into the plate of the main building. Resting on these two plates are tie beams connected with a two piece secondary plate. Common rafters rest on this plate and the sheathing of the main roof. They are mortised into a five sided ridge pole. Supporting the roof structure are four posts each connected midway with a large girt. The posts are diagonally braced to both the tie beam and south girt. Upper and lower studs are mortised into the girts as is the second level framing. Four posts rest on three large sills. Connecting the east and west sills are four joists. With exception of the south sill all framing in the entry porch appears to be original.

Exterior

Although little of the framing material has changed

over the years this can not be said of its exterior covering. Because of a long cycle of neglect and repair, physical evidence does not clearly resolve the exterior's history. Documented evidence is also fragmentary, not collaborating much of the existing features. Documentary evidence is sometimes inaccurate, leading to confusion in understanding a buildings chronology. This is illustrated by the specification in the 1741 building contract. It states, "to lay gallery floor duble". However looking at the surviving 18th Century gallery floor it is half-laped not double.

Roof

Applied to the top of the rafters was random width pine sheathing. Fastened in place by wrought nails, all of this sheathing was removed in the winter of 1990 during the application of the new asphalt roof. First reference to a shingle roof is in the town records of 1769. Likely remnants of this roof were discovered in situ under the protection of the porch roof (photo 3). These hand riven white pine shingles measure approximately sixteen inches in length, and were secured with hand wrought nails. Shingles of this type were a common roof covering in New England in the 18th and early 19th Centurys.

Physical evidence of two other wood shingles were also found.

Discarded chestnut shingles of early 19th Century manufacture were discovered laying above the entry porch ceiling. Judging by the nail holes these discarded sixteen inch shingles were probably held in place by cut nails. In rural New England cut nails were commonly available by about 1800.

Discarded wood shingles of later manufacture were also found. Measuring eighteen inches they were white pine and hemlock.

The building contract of 1741 calls for the installation of pine clapboards. No remnants of these clapboards were found. Early 19th Century clapboards with skived ends were found on the north side. Two other clapboard types of the 19th and 20th Century manufacture were also found. Traces of brown, white and grey paint were found on clapboards in various locations.

Beneath the clapboard random width pine sheathing is applied to the frame. Like the clapboards, many areas of this sheathing hve been repaired or replaced. An obvious example of this is in the loft. An eastern rafter and stud top show considerable charring while the sheathing applied to them does not.

Changes in the building fenestration occur throughout

its history. The 1791 building contract calls for,"ye two end doors to headed with common heading". These doorways were probably filled in in the 19th Century. Because of the eastern chimney no evidence of a doorway could be found. However, a large space between studs corresponds to the probable location of a doorway on the west side. Patches in upstairs interior sheathing behind the chimney indicate the early existence of center windows, and the movement of the two front windows apart. The lower window on the southwest side and the southern window on the west side have been moved downward. The pulpit window has been closed in. While the window to its east has been made into a fire escape door. The upper front center window has been closed in because of the porch addition. Earlier photos show a wide door in the southeast corner. This door eliminated one of the earlier windows. In the 20th Century this door was removed. A later window frame and a smaller door was installed in its place. No physical evidence reveals the configuration of the original window sash. However a turn of the century photo points to two earlier types; (photo 4) a twelve over twelve, and a 19th Century six over six predating the 20th Century 12 over 12 sash. All window frames except the eastern loft window and the lower south-east window frame are of the earlier "solid head" type.

Much of the trim and moldings appear to have been changed throughout the 19th Century. Various profiles are present representing different periods.. Even within individual assemblies (i.e. the main cornice, and front door trim) moldings of different profiles are present.

Foundation

The front and side foundation consists of large hewn curb stones laid on a ruble stone base. The back foundation is of random ruble laid without morter. Considering the building has been moved at least once I doubt that the curbing dated to the original erection of the building.

Interior

The interior finish of the meetinghouse has not undergone as many changes as its exterior covering. The original interior sheathing of the 18th Century is still mostly intact. Some areas have been replaced because of changes in the fenestration. Notice the areas ajoining the hearse door on the southeast side. Here the original featheredged and quarter-round sheathing has been replaced by plain horizontal sheathing. This repair also occurs on the second floor where windows were probably closed in in the 19th Century.

Accordian lath is is situ underneath the 20th Century

fiberboard on the walls and ceiling of the entry porch. This lath fastened with cut nails indicates these surfaces were plastered early in the 19th Century. Similar evidence of plastering exists on supports for the second floor match-board ceiling installed in the 1890's. Nail holes from previous lath are clearly visible in areas where boarding is missing. Except for areas in the western half of the building much of the early yellow pine, "duble floor" still survive. This flooring has been covered with tongue and groove flooring in the 20th Century. Interestingly replacement flooring of the ground floor and front section of the gallery fill in is supported by discarded clapboard subflooring. These skived end clapboards might have been an early covering of the meet-inghouse. Original gallery flooring still survive on the east and west side. The underside of this flooring and the joists supporting it were intended for view and has a nicely planed surface.

No evidence of the ground floor pews, pulpit or stairs were found. Pews on the west side of the second floor still exist. The previous location of the east side pews can be determined by patches in the interior sheathing.

CONDITION

Considering the evidence of past neglect this meetinghouse is in surprisingly good condition. Many of its most severe problems developed over one hundred years ago. In fact further deterioration in these areas are not progressing at this time. However much of this decay was repaired improperly; and the past repairs are beginning to show signs of failure. Several areas of active decay were found. These areas although small if left unattended will develope into major structural problems.

Most of this building deterioration is directly related to the intrusion of water. Elevated moisture levels (20%-30%) promote the development of severe decay mechanisms; fungi (brown and white rot) is responsible for most of the past and continuing decay found in the meetinghouse.

Excepting the limited presence of "powder post beetles" no other evidence of wood destroying insects (carpenter ants or termites) were found. Subsequent removal of actively decaying material might identify the presence of these insects.

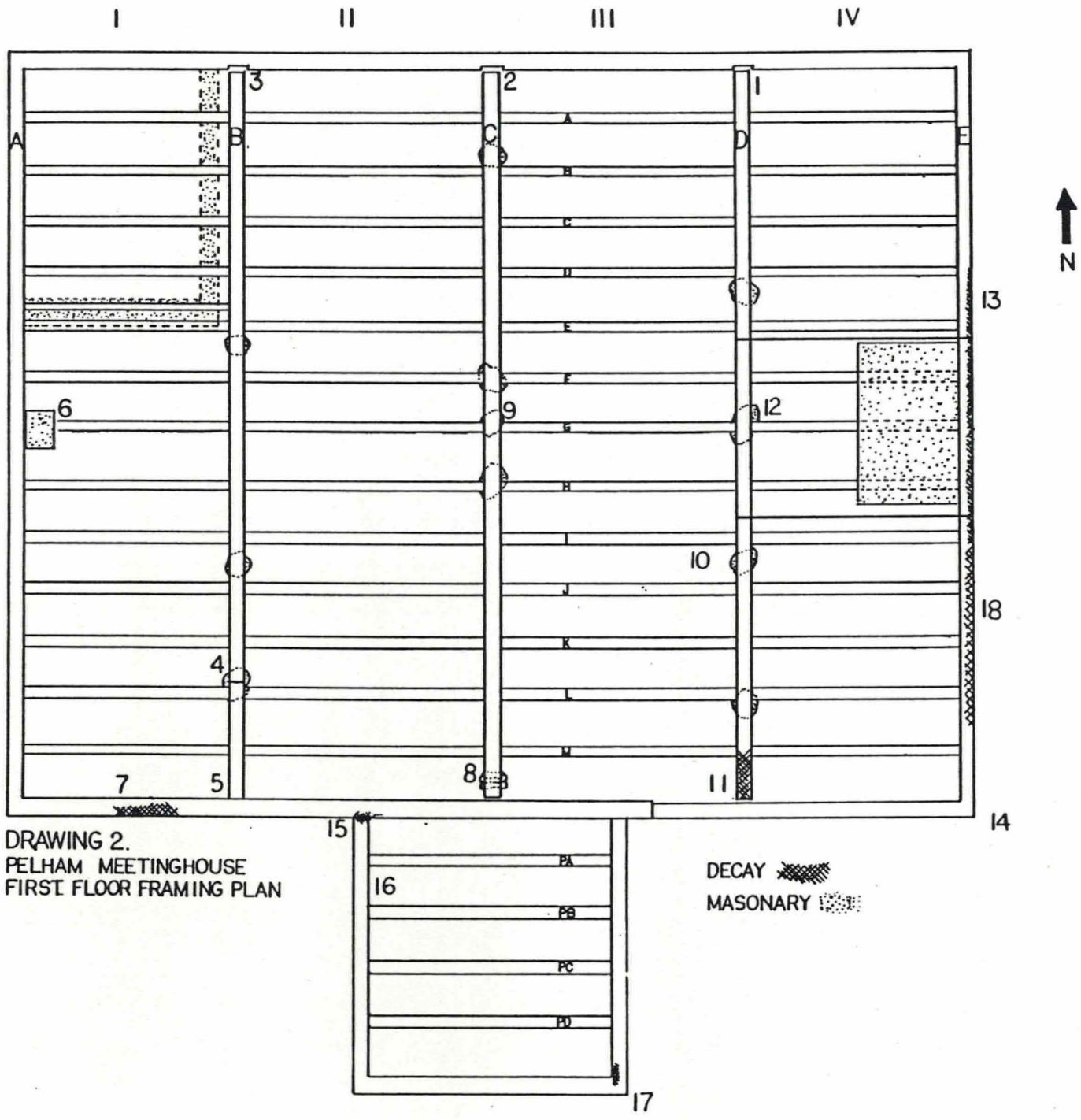
The following is a list of problem areas found. Areas of progressive deterioration will be designated with an asterisk *.

Crawl Space

Because of the presence of periodic standing water the overall sound condition of the lower frame is surprising. Under these conditions timbers of this age usually exhibit severe decay. For location of individual areas listed below refer to drawing 2.

1. North end timber D is not connected to the rear sill and is only supported by stone piers.
2. North end timber C is not connected to rear sill.
3. North end timber B is not connected to rear sill.
4. Timber B cracked through near joist L, but supported by stone pier.
5. Crack below tenon, south end of timber B, not adequately tied to sill.
6. Joist I-G is cut off flush with chimney and supported by a wooden prop (see photo 5).
* 7. Area of south sill under west door is badly decayed (see photo 6).
8. Timber C is disconnected from south sill and is being supported by a pile of decayed firewood. This timber is not supported by either front or rear sill only be stone piers (see photo 7).
9. Stone pier, center timber C is not making contact.

10. Stone pier, timber D between joist I and J is tipping. Looks like its survival as a support is transitory.
11. South end of timber D is badly decayed. This timber is only being supported by stone piers and is not tied into the front or rear sill (see photo 8).
12. Sill E shows signs of past eastward movement. Dovetail at the juncture of timber D and joist G has partially pulled out. Two east/west steel tie rods have been installed to counter this. The tie rods are showing corrosion.
13. Timber E shows decay where it is making contact with curb stones.
14. East sill E at south sill juncture has separated.
15. There is decay below mortise at the juncture of the south sill and the west entry porch sill.
16. Joist P-B split below tenon at its juncture with west porch sill.
17. Decay below mortise at the juncture of porch south sill and its east sill.
18. Some Powder Post Beetle damage in timber E between joists J and M.
19. Various joists in Bays I, II, and III are supported by wooden props just resting on the ground.



DRAWING 2.
PELHAM MEETINGHOUSE
FIRST FLOOR FRAMING PLAN

Foundation

20. Southernmost curb stone on west side is listing.

21. Northernmost curb stone exhibits movement since foundation was pointed last (see photo 9).

Wall and Gallery Framing

Because much of this framing is covered by exterior and interior finish treatment all wall and gallery framing could not be thoroughly inspected. Some covering material was removed where a potential for decay exists. However little decay was found except where noted below.

22. Southern end of east central girt has surface decay resulting from roof leak.

23. Exceptionally high moisture levels were found in the stud to the north of the west center window on the first floor.

24. Gallery joist has been severed because of the installation of west chimney. The gallery floor has separated from it.

Loft

Severe decay in the loft frame indicates many years of previous roof failure. Due to the installation of the new roof in 1990 the continued spread of decay has been arrested. Unfortunately some severely decayed framing members have completely lost

their structural integrity. Because of earlier decay in this area some of these structural elements were already removed, probably during the installation of the matchboard ceiling in the 1890's. Areas listed below can be located on drawing 3.

25. Diagonal brace connecting east plate and south primary plate is missing.

26. Diagonal brace connecting tie beam B and south plate Bay III is missing.

27. Diagonal brace connecting tie beam B and south primary plate has been cut at its jucture with plate, and has been toenailed to the top of the plate (see photo 10).

28. Diagonal brace connecting east plate and north primary plate Bay IV is missing.

29. Diagonal brace connecting tie beam B and north primary plate is missing.

30. South primary plate at porch west plate juncture Bay II is severely decayed.

31. South primary plate at porch east plate juncture Bay III shows decay.

32. Area of west plate, southern end shows advance decay (see photo 11).

33. North primary plate is severely decayed midway between tie beam C and east plate (see photo. 12).

34. North primary plate is severely decayed midway between tie beam B and C.

35. North primary plate at its connection with tie beam B is so severely decayed it no longer exists (see photo 14). Compare to healthy plate in photo 13.

Exterior

* 36. A defective threshold, west door south side allows water to collect on sill.

* 37. Main entrance step stone makes contact with trim under the door causing decay (see photo 15).

* 38. Stone makes contact with wood under east door on south side.

* 39. Clapboard at bottom east side entry porch is decayed and saturated.

* 40. Area below fire escape door on north side is not flashed thus allowing intrusion of water into wall cavity.

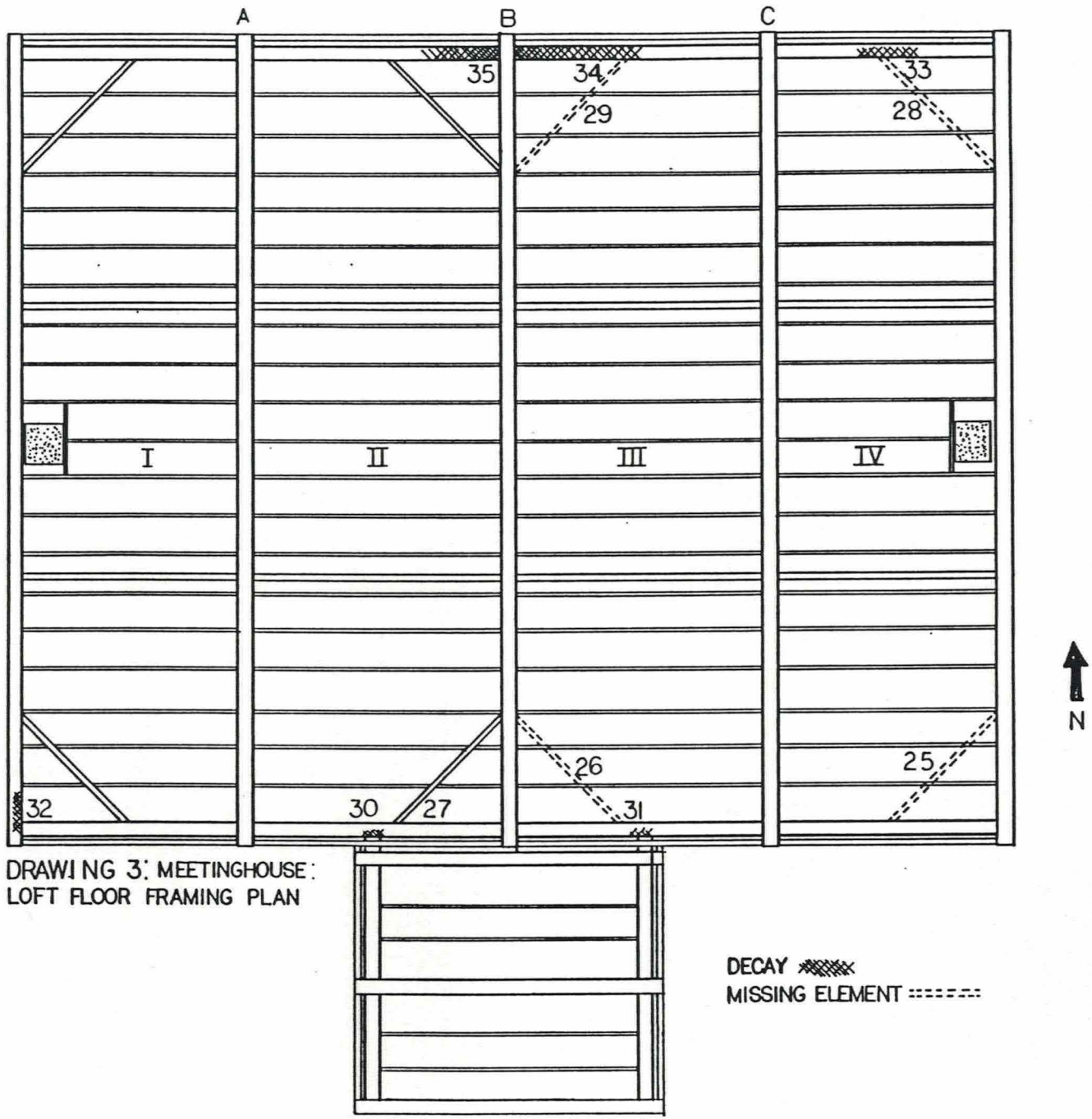
* 41. No drip cap on fire escape door. This area can collect water depending on wind direction.

42. Stone wall makes contact with clapboards.

43. There are split clapboards in various areas.

44. Insufficient clearance of left central front door causing bottom hinge to pull out.

45. Windows throughout need glazing repair.



DRAWING 3: MEETINGHOUSE: LOFT FLOOR FRAMING PLAN

REPAIR

The following is a list of possible solutions to the previously mentioned problems. Although all areas of deterioration might require attention, areas designated with an asterisk should be treated as a priority. The goal of these suggestions is to maintain as much original fabric as possible. However, financial realism must play a role in any preservation strategy. Using ones entire repair budget to maintain a single decay locus while other priority areas go neglected is foolhardy at best.

Numerical designation corresponds to the listing in the Condition section.

1. Timbers were not properly connected when rear sills were installed. It requires the installation of custom fabricated steel hangers as seen in drawing 4. Care should be taken to determine whether rear sill condition provides adequate support. Rear sill is segmental. Individual segments do not appear to be connected sufficiently. All metal hangers should be properly treated to protect them from corrosion (paint, galvanized).
2. See No.1
3. See No.1

4. Because the crack in this timber is supported by a stone pier the danger of downward deflection has been abridged. Therefore this supoort should remain in situ. Parallel flooring has reduced the potential of lateral movement. However the installation of a steel rein forcement would prohibit lateral separation.

5. Installation of steel timber hanger is required (see No. 1). Extra care should be used to assure split is arrested.

6. Much of the load here is transferred via the flooring to adjacent joists. However as the wooden prop decays downward movement can be anticipated. Due to the proximity of end grains to masonry, joist area should be treated with a preservative and secured with a custom hanger to the masonry. If condition of the mortar prohibits this installation a pressure treated prop at the west end will probably suffice.

* 7. Several options for repair exist here. Several feet of the decayed sill can be removed and replacement timber can be spliced into its place. If the areas removed support studs these studs should have ample support while the repairs are

made. Thin exterior sections of this decayed area of timber are intact making consolidation with an epoxy resin conceivable. This method allows for the retension of more original fabric. The practical use of epoxy consolidation is dependent on the type and extent of decay.

8. See No. 1

9. This timber has adequate support from piers. The gap under the timber can be filled with a stone shim.

10. Timber should be temporarily supported while stones in defective pier are shimmed or relaid. Modern building practice calls for proper concrete footing. Under the circumstances installation of concrete footings under any of the masonry piers is unrealistic because of the height restrictions of the crawl space. The labor involved in the excavation and transport of materials would not equal the benefits gained. Considering the longevity of the existing stone piers the traditional building practice of "chinking" up gaps as necessary is recommended. If additional support is required more modern masonry piers can be added between existing stone piers.

11. Timber D is likely the most difficult timber in the crawl space to repair. Once again no one solution

is the correct one. The extent of the decay however makes consolidation impractical. Additional dimensional timber can be added to the sides and end of timber D and attached to south sill with conventional metal hangers. This built up timber patch requires less cutting, and individual segments are easier to maneuver within the confines of the crawl space. However depending on how much of the decayed fabric has to be cut back this treatment might not provide adequate structural strength.

Another technique would involve the addition of solid timber section carefully spliced onto the end of timber D. This treatment requires the cutting back of timber D, and removing the decayed section (drawing 8). This is stronger than the above laminated repair but might be impracical due to the size of the patch, nine by ten inches, and the location in the crawl space. Either repair may necessitate removal of enough flooring to gain access. Removal of the 20th Century tongue and groove flooring would greatly alter repair strategy in the crawl space. Since flooring is laid perpendicular to the underlying flooring, localized removal of the flooring is not viable. With the tongue and groove floor removed individual sections of earlier flooring can be removed effecting access to repair areas.

12. Recent movement of east sill was not detected. The condition of the steel ties should be monitored periodically or replaced with ones having a decay resistant finish.

13. Decay is not serious but condition behind chimney could not be determined. As work is in progress removal of the lower clapboards and sheathing for inspection is suggested. Topical application of a wood preservative from the exterior might arrest further decay.

14. Past movement has separated south sill and east sill. Further movement can be retarded with the installation of a steel bracket through-bolted into each timber.

15. This decay is limited but separation in exterior trim indicates it might be progressive. Epoxy consolidation would work here.

16. This split can be arrested by installing a steel hanger to the porches west sill.

17. From the interior this timber shows only minor decay. However saturated bottom clapboard covering it suggests an unseen problem. When these clapboards are removed for replacement the bottom sheathing board should also be removed and the timber repaired. Nature of the decay suggests epoxy consolidation.

18. See No. 13

19. Wooden props are used throughout the crawl space. Most make contact with just the soil below. Thus as props decay support value is negated. Also insects such as termites can travel through these props infesting the the timbers above. Prop removal is suggested. If extant joists exhibit insufficient support additional joists of dimensional lumber can be added between joists. Standard metal hangers can be used to attach new joists to timber.

20. Installation of a simple glass telltale will determine if curb stones are still moving. At this time stone has not moved enough to merit removal and resetting.

21 See No. 20

22. Due to the dimension of this timber, (nine by fourteen inches) superficial decay of a dormant nature is not of great concern. The fruiting bodies of an inactive fungi can be chemically removed.

* 23. This moisture originates from the lack of flashing below the fire escape door. The fire escape should be temporarily disconnected at this point, and a pressure treated block with metal flashing should be installed here.

24. The end of the timber should be treated with a preservative and a fire resistant shim should be inserted to hold the joist in its correct position.

25. This diagonal brace probably has been missing for close to one hundred years, its indispensibility is in doubt. However since half of the corresponding loft's braces are also missing replacement would be preferred.

26. See No. 25

27. See No. 25

28. Similar to diagonal brace listed in number 25. This brace however should not be replaced until primary plate is repaired.

29. See No. 28

30. This area shows no movement at present. However, since two other connections that tie the entry porch to the main structure are also decayed installation of steel reinforcing rods would be recommended.

31. See No. 30

32. This timber has a deep decay pocket. Fortunately it is a timber of large dimension and therefore maintains its structural integrity. Epoxy consolidation is recommended.

* 33. Due to the subsequent installation of load carrying posts in the 19th and 20th Centuries central truss assembly is no longer primarily supported by the northern primary plate. Regrettably tops of the upper studs in Bay II are not directly tied into the superstructure of

the building. These studs and the upper section of the wall in Bay II are held in place by interior and exterior sheathing (drawing 8). The splicing in of new timber to reinforce the plate is recommended.

34. Location and severity of this decay requires the introduction of less material than in number 33. All material for splicing should be adequately seasoned. Similar wood species is preferred when possible.

35. See No. 34

36. Install treated threshold with at least a twelve degree slope. Threshold should extend under jambs to prevent intrusion of water. Caulk as necessary.

37. Move step stone southward one and one half inches to replace skirtboard with pressure treated material. Pitch top of the stone away from building to facilitate drainage.

38. See No. 37

39. Remove decayed clapboard and also lower sheathing board if necessary. Inspect and repair sill if needed. Install new treated sheathing and clapboards.

40. See No. 23

41. Install appropriate wood or metal drip cap, "lead coated copper" if preferred. The drip cap should tuck under adjacent clapboard.

42. Remove enough of the stone wall to eliminate contact with the clapboards.

43. Caulk of replace split clapboards where necessary.

44. Plane bottom of the door and install new screws in the hinges.

45. Remove cracked glazing. Rebed and glaze sash where necessary.

THE PELHAM CHURCH

NATURE OF CONSTRUCTION

Built is 1839 the Pelham Church manifests many of the changes in New England life since the first Meetinghouse was built nearly a century ealier. The fact that both relious services and government function no longer share the same space point to the transformation of people's lives in the second quarter of the 19th Century. Second only to those changes is the rapid development in building technologies during this period. These developments created an environment sympathetic to the rapid spread of a new style of church during the first half of the 19th Century.

Although both structures are built of the same material (wood) change in style and availability of resources forced builders to alter their framing traditions. These differences though more subtle than the highly evolved finish work represents considerable change in framing technique.

Unlike the first Meetinghouse most timbers in the Church are vertically sawn, only the largest elements are hewn (tie beam; plates, corner posts, kings post, purlins). The longest elements, the side sills and primary plates are spliced and do not run full length. Wall studs are very uniform,

oriented with their small dimension to the interior; opposite that of the earlier Meetinghouse. These two by eight inch studs run full length between sill and plate. Because of the dimension and orientaion of the studs, major framing members no longer project into the interior space. There are no girts or diagonal braces attached to them, but only a horizontal timber framed above and below each window. Diagonal braces connect posts to the sills and plates, and purlins to the principle rafters only. All diagonal braces are inlet into studs compared to the earlier practice of nailing conflicting studs to the diagonal braces. Medial wall posts are sawn and reduced in dimension to five by eight inches. These posts no longer directly support roof trusses. They are laid out uniformly regardless of truss location.

Roof framing consists of six sets of principle rafters, and four center roof trusses containing a tie beam supporting a kings post and two principle rafters. The kings post is connected to principle rafters with a diagonal brace. Central truss assemblies are supported by a primary plate. Between primary rafter sets common rafters are supported by a secondary plate and purlin. Unlike the first Meeting-house these rafters are not joined to each other at the top

but rest on a sawn rectangular ridgepole.

Joinery in the Church is less complex compared to the Meetinghouse. Although mortise and tenon joints are used thoughout, large iron fasteners connect some mortise and tenons instead of wooden pegs. Principle rafter/tie beam juncture and tie beam/kings post juncture are held together with iron bolts. Diagonal braces connecting kings post to principle rafters are mortise and tenoned with no pegs at all.

Belfry and steeple rest on the south wall framing and tie beam no. 2 (draw. 6) is additionally supported by two floor to ceiling octangonal columns. Main steeple framing consists of eight full length posts that converge at the top. Individual posts are connected along their length by 3x4s tenoned into them. The majority of the structural elements for the tower and steeple are hewn. Only the smaller dimensional stock is vertically sawn.

Framing for the first floor consists of four sills with four timbers connecting the east and west sill (see draw. 7). These east/west timbers support two and one quarter by eight inch vertically sawn joists. Central joists are blocked up above them. Major east/west timbers are supported by unfinished wooden posts, some with bark still on them.

Wood species encountered are similar to those found in the older Meetinghouse. However more chestnut was used in the Church. Unlike the Meetinghouse some white pine framing was used in the Church.

Exterior

Applied over the exterior framing is random width sheathing. Covering this sheathing on the north, east and west wall is sawn clapboarding. On the south side large pilasters and flush boarding add a more stylized protection from the weather. Both clapboard and sheathing are fastened with cut nails, no hand wrought nails were found in the Church. Trim at the base of the cone of the steeple was changed. Probably because of the damage done by the lightning strike of 1907. Compare photo no. 16 to photo no. 17.

The present roof is covered with asphalt shingles. Originally this roof was probably covered with sawn wooden shingles. Some period shingle are found in situ within the tower. Fragments of roof slate in the loft indicate the installation of a slate roof late in the 19th Century.

Unlike the Meetinghouse fenestration has not changed. The front door is probably original. The molding surrounding the panels match that of doors found in the basement. These doors were probably located in the vestibule wall before it was removed.

Interior

Interior treatments have undergone greater change than other parts of this building. The pulpit, side pews and the vestibule partition have been removed. Evidence in the loft, mortar marks on the kings post and a missing ridgepole point to the location of an earlier chimney. Drywall has been applied to the walls and ceiling. It is likely that the ceiling has been plastered twice. Accordian lath is found on the Church's walls while a more modern sawn lath is found on the ceiling. Areas of drywall and lath were not removed to determine earlier nail holes.

Wainscoting, flooring and trim appear to be contemporary with the church building. Flooring is double, a finish of yellow pine resting on a subfloor of chestnut.

CONDITION

Unlike the Meetinghouse, the present condition of the Pelham Church does not result from a cycle of neglect and repair. Most of the damage located is a result of stresses that were not anticipated by the original builders. The increased weight of the slate roof has led to fractures in several areas in the roof's superstructure. The severe damage in tie beam no. 5 (photo 18) might be a result of an incresed load due to the addition of an earlier chimney.

Removal of a bearing partition supporting the gallery has increased stresses on the framing in the tower base.

Damage from the 1907 lightning strike is evident in the framing of the steeple (see photo 17).

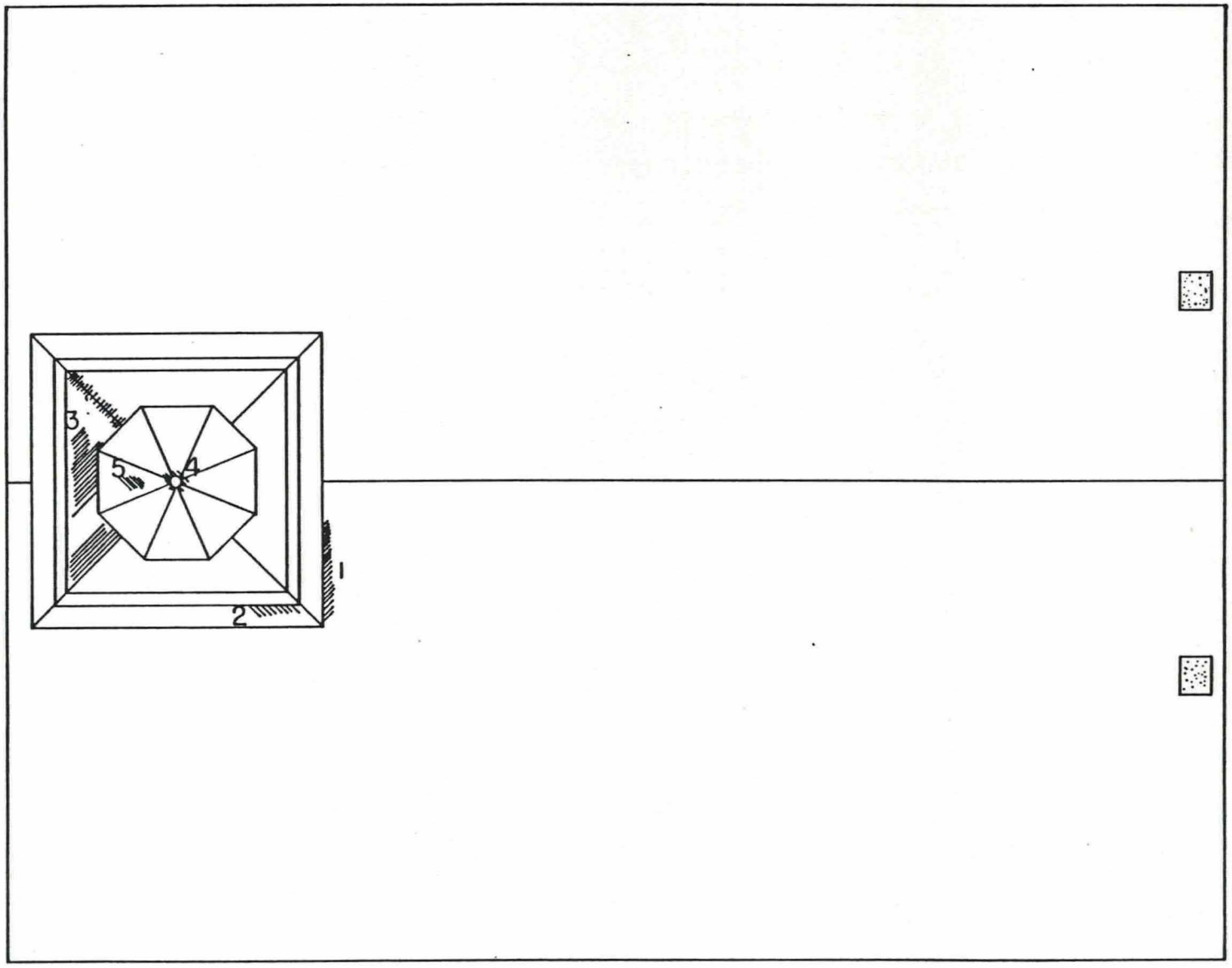
Very little decay was found during inspection. Unfortunately some of the problems encountered if left unattended will result in a condition of progressive decay.

The following is a list of areas of concern. Areas of a progressive nature are designated with an asterisk *.

Loft

Refer to drawing No. 4.

* 1. Roof leaks at tower base northwest side.
* 2. Roof leaks at belfry base east side.
* 3. Roof leaks at top of belfy south side (see photo 19).



DRAWING 4: PELHAM CHURCH
ROOF PLAN

LEAKING AREA ////

* 4. Steeple leaks at top.

* 5. Steeple leaks midway on south side.

6. Homosote panel restricts ventilation.

Refer to drawing No. 5.

* 7. Split in rafter feet at W2, W3, W4, W5, W9, W10, W14, W15, W17, W18, W22 (see photo 20).

* 8. Split is rafter feet at E2, E3, E4, E7, E12.

9. Split in principle rafter W1 at its juncture with purlin.

10. Split in principle rafter E26.

11. Fractured purlin between principle rafters W16 and W21 (see photo 22).

Refer to drawing No. 6.

* 12. Splice in east end of tie beam E has failed (see photo 18).

13. Splice in secondary plate northeast corner (see photo 21).

14. Split in east secondary plate at its juncture with tie beam B.

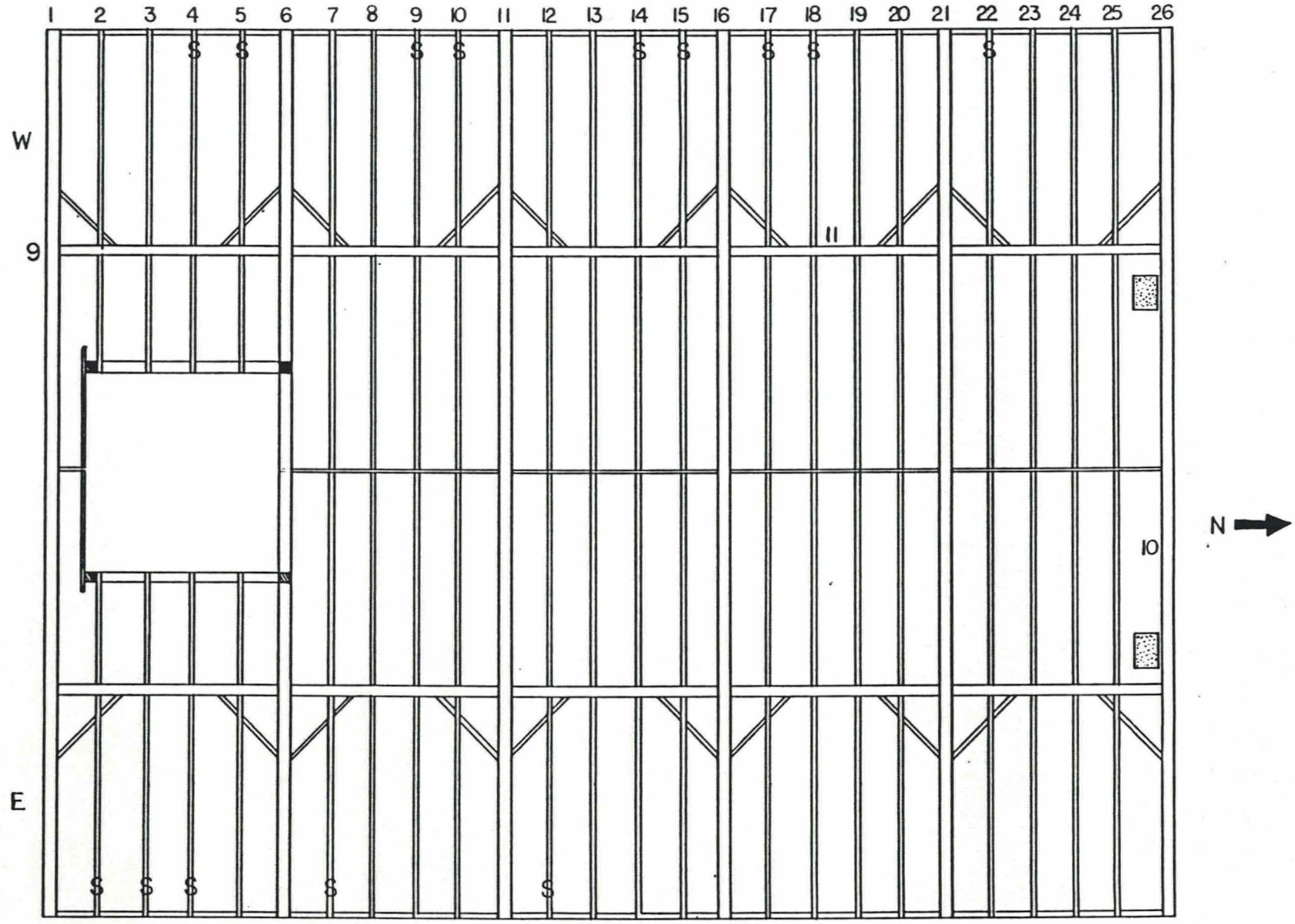
15. Split in east cradle supporting tower southeast side.

16. Tie beam E has a bad check in it.

Basement

Refer to drawing No. 7.

17. End split on joists A6, A7, A8, A9, A10, A13, A22, A23, B1, B8, B9, B10, B11, B12, B14, B15, B16, B17, B19, B22, C11, C14, C15, C16, C18, D7, D9, D11, D12, D16, D17, D18, E17, E21 (see photo 23).



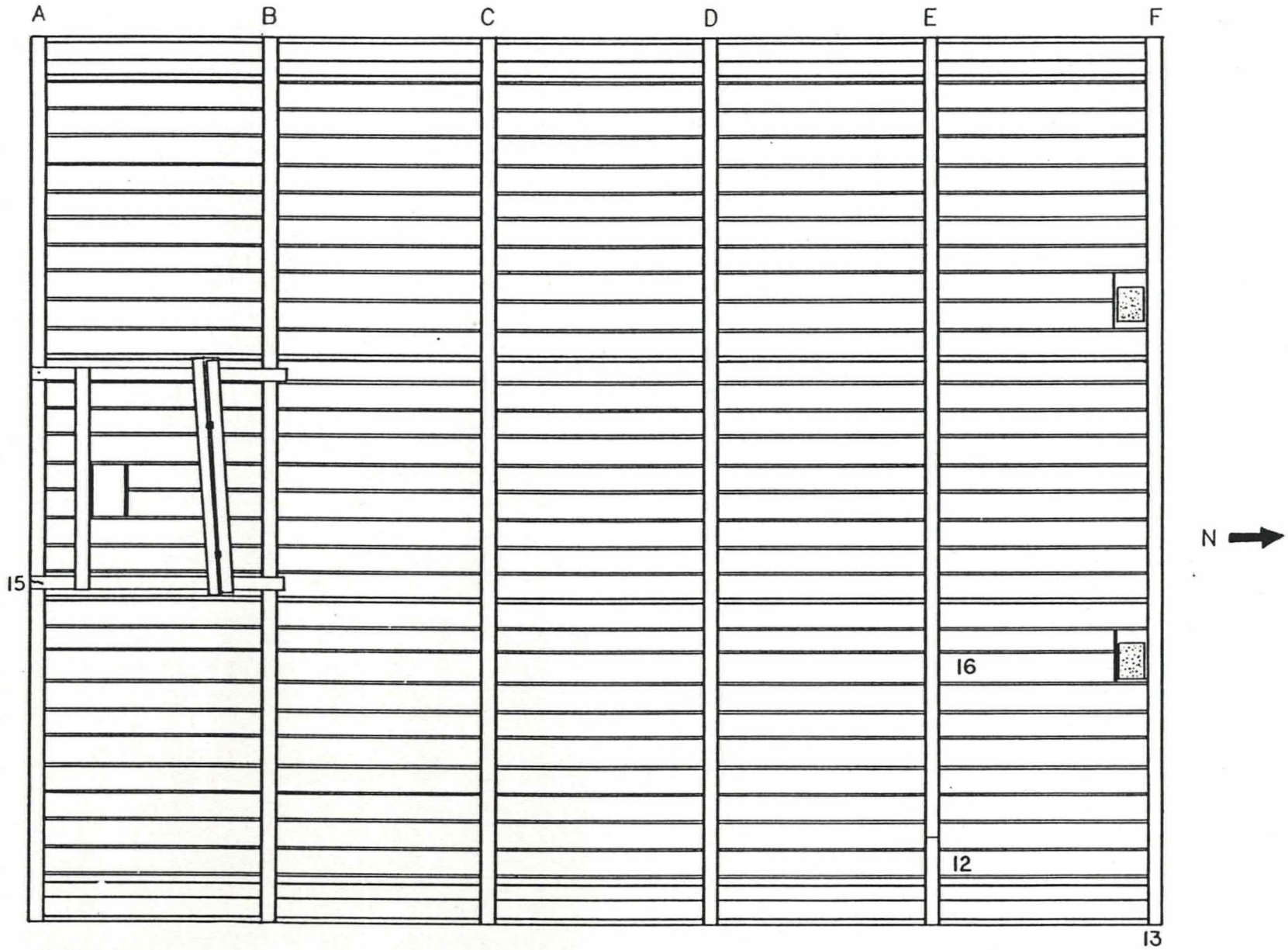
DRAWING 5: PELHAM CHURCH
ROOF FRAMING PLAN

SPLIT RAFTER – S

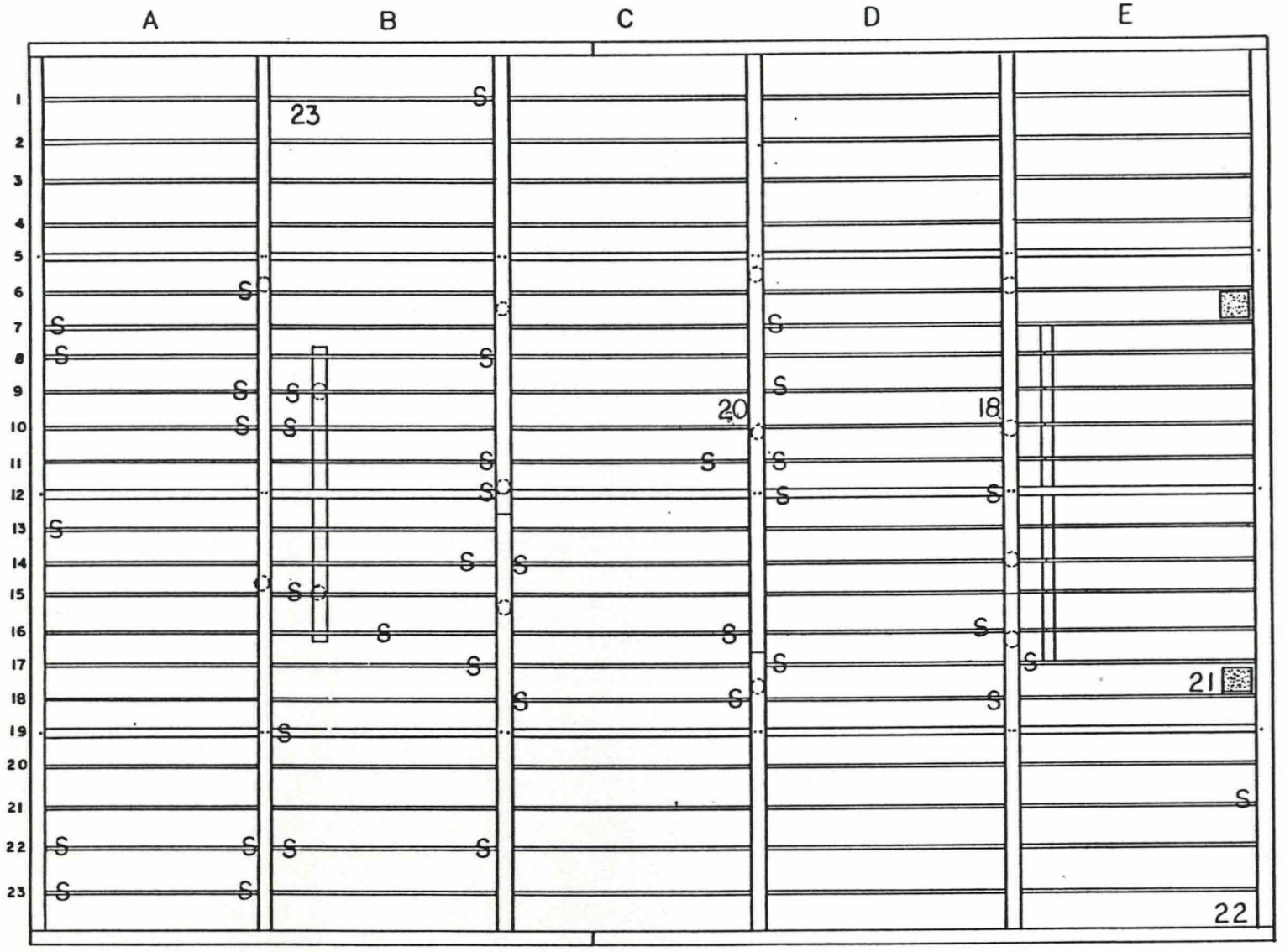
18. Birch supporting column is infected with fungi. Fungi is spreading to superstructure.
19. Decay in west sill south end.
20. Column slipping off stone.
21. Decayed brick east chimney base.
22. Cracked north sill east end.
23. Some wooden farm implements are infested with wood beetles.

Exterior

24. Bottom of clapboard on west side is decaying.
25. Area below the cellar door decayed.
26. Insulators on lightning rod cable has pulled out and is hanging on the edge of the roof.
27. Front door sticks badly causing the hardware to loosen.



DRAWING 6 PELHAM CHURCH LOFT FLOOR FRAMING PLAN



DRAWING 7: PELHAM CHURCH
FIRST FLOOR FRAMING PLAN

JOIST SPLIT - S

REPAIR

The following is a list of suggested repair solutions. Some of these items appear to be stable at the present. Attempts have been made to repair some areas in the past. Many of these previous repairs are of a temporary nature and should be replaced when time and funding permit. Items marked with an asterisk should be dealt with as a priority.

* 1. This is a result of improper flashing. Since this area is within the scope of the 1990 reroofing the contractor should do the repair.

* 2. This is also caused by improper flashing. Due to the age of some of the metal flashing encountered, areas in question should be replaced. I would avoid using common aluminum flashing. Because of its thin gauge it is subject to tearing. Also the contrast of new or oxidized copper tends to be a bit obtrusive. Avoid the use of roof cement if possible. Its longevity is insufficient. Due to the location of steeple repairs treatments requiring the least maintainance is preferred even if the technology is initially more costly.

* 3. See No. 2.

* 4. See No. 2

* 5. This leak is probably a result of a split in one of the steeple's vertical trim boards. If so, replace the

board. Due to this areas southern exposure just caulking a crack is not recommended. Although leaks in the steeple are not severe repair and replacement costs merit some attention sooner rather than later.

6. Removal of homosote panels will increase air circulation. This will speed up drying after rain storms thus inhibiting the growth of fungi.

7. Although these splits are not of recent origin and are probably a result of the slate roof installation, their repair should be attended to. The simple installation of custom steel brackets bolted into the secondary plate will arrest further movement (see draw. 9). Since most rafters are of similar dimension bracket fabrication can be accomplished economically.

8. See No. 7.

9. Principle rafters can be reinforced top and bottom with steel plates. Steel plates to be connected with carriage bolts.

10. See No. 9.

11. This is an old break. It has been reinforced with a bolted on 4x6. The repair is working. But stress on principle rafter at purlin juncture suggests additional reinforcement. The steel clamps mentioned above will serve the purpose here.

* 12. This damage is not of recent origin. It is probably a result of the earlier slate roof, and a previous chimney stack resting on the tie beam. It could not be determined whether recent movement has occurred. However, continued integrity of the two by six inch scab nailed onto the fracture is doubtful. Temporary support of the tie beam from below while adequate steel reinforcement is added is recommended.

13. Failure of this member has necessitated the installation of props under individual rafters. Although the load is now transferred directly to the primary plate reinforcement of the secondary plate is recommended in the future. Steel clamps similar to those that have been applied to kings post can be used to reinforce the secondary plate.

14. See No. 13

15. This is not a severe fracture, but patina suggests it is a result of recent movement. Conditions should be monitored. South end can be reinforced with a steel clamp.

16. As a result of internal stresses during seasoning all wooden timbers check to a certain degree. Normally these checks present no real reduction in a timber's strength. Due to the nature of the splice at the end of this timber severe checking can aggrevate attempts for a long lasting repair. Installation of several steel clamps along the split area is recommended.

Basement

17. This is a commonly seen failure in joinery of this type. However, the shear number of these defects in the first floor superstructure suggest over loading in the past. As one joist fails additional stress is placed on adjacent joists (see draw. 9). Installation of custom steel hangers is recommended.

18. Paper birch is not a decay resistant wood species. Because the fungi is spreading to the carrying beam the birch post should be removed and replaced with a post of another wood species. Treat the ends of the new post with a wood preservative.

19. Remove decayed material and splice in new material. Coat with a preservative.

20. Support the timber adjacent to the column and reset the column.

21. Remove decayed bricks and replace with sound material. Bricks closely resembling these discarded bricks can be found in various areas of the Meetinghouse site. Many bricks of this type can be found in the crawl space of the Meetinghouse. Since only a few are needed, supply is not a problem. Because of the location of the repair and the corbelled nature of the chimney stack extreme care must be taken when removing damaged brick. "Antique brick" generally are softer than modern brick. It is important to use a mortar mix that is not harder than the brick itself. A basic recipe is twelve of sand, three of lime to one part white portland cement.

22. This crack is probably a result of previous foundation settlement. It does not appear to be in danger of failure. If concerned, this joint can be reinforced with a steel bracket.

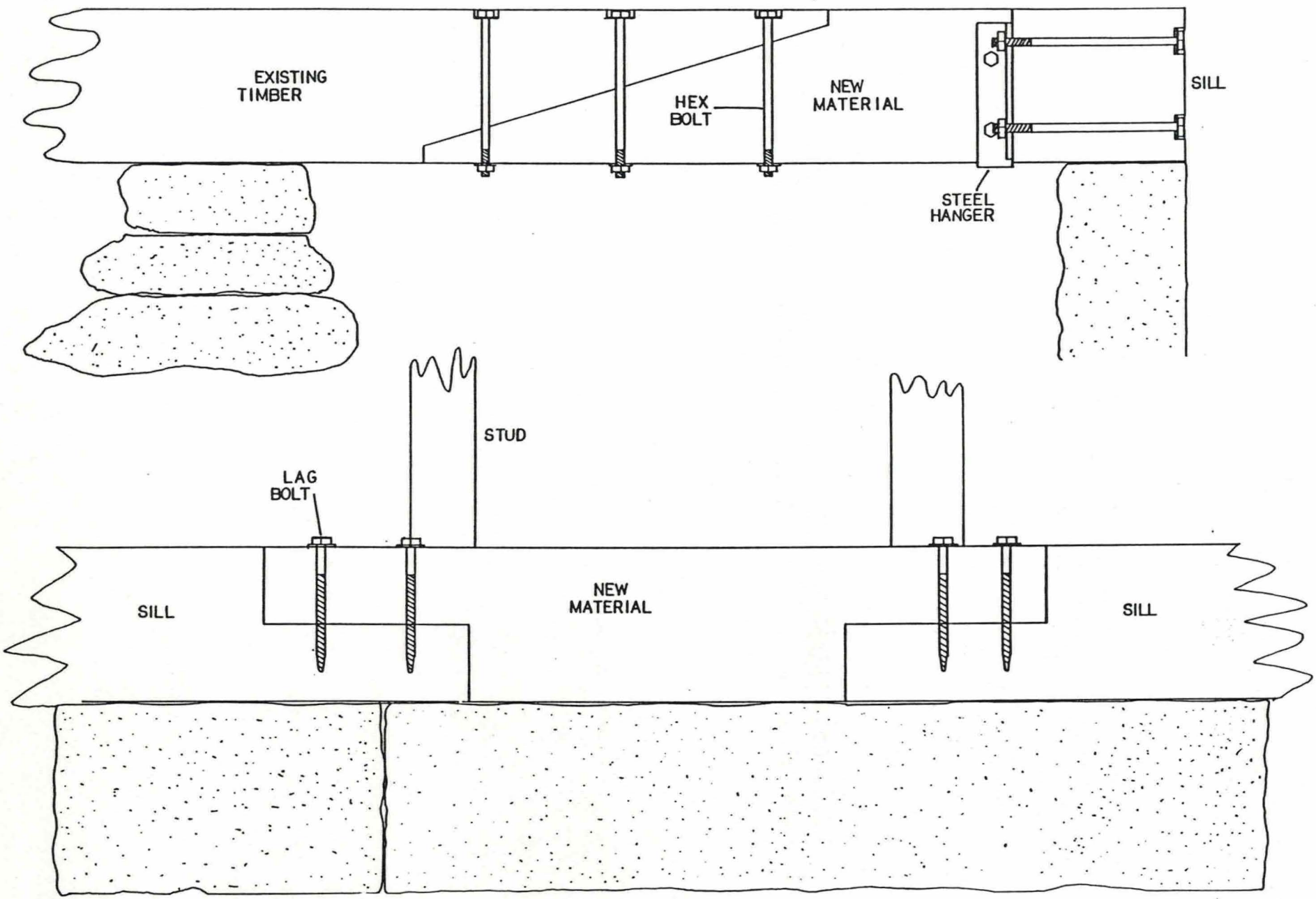
23. Very little insect infestation was encounter during the inspection of the Church. The amount of fress on or near some items stored in the basement indicates the presence of active wood borers (Furniture or Powder Post Beetles). In Order to preempt the spread of these borers into architectural fabric removal of stored wooden items is suggested. These items can be fumigated and returned to storage in a different location or discarded.

24. Remove the decayed clapboard and sheathing, and inspect the condition of the sill. Replace with new material and treat with preservative.

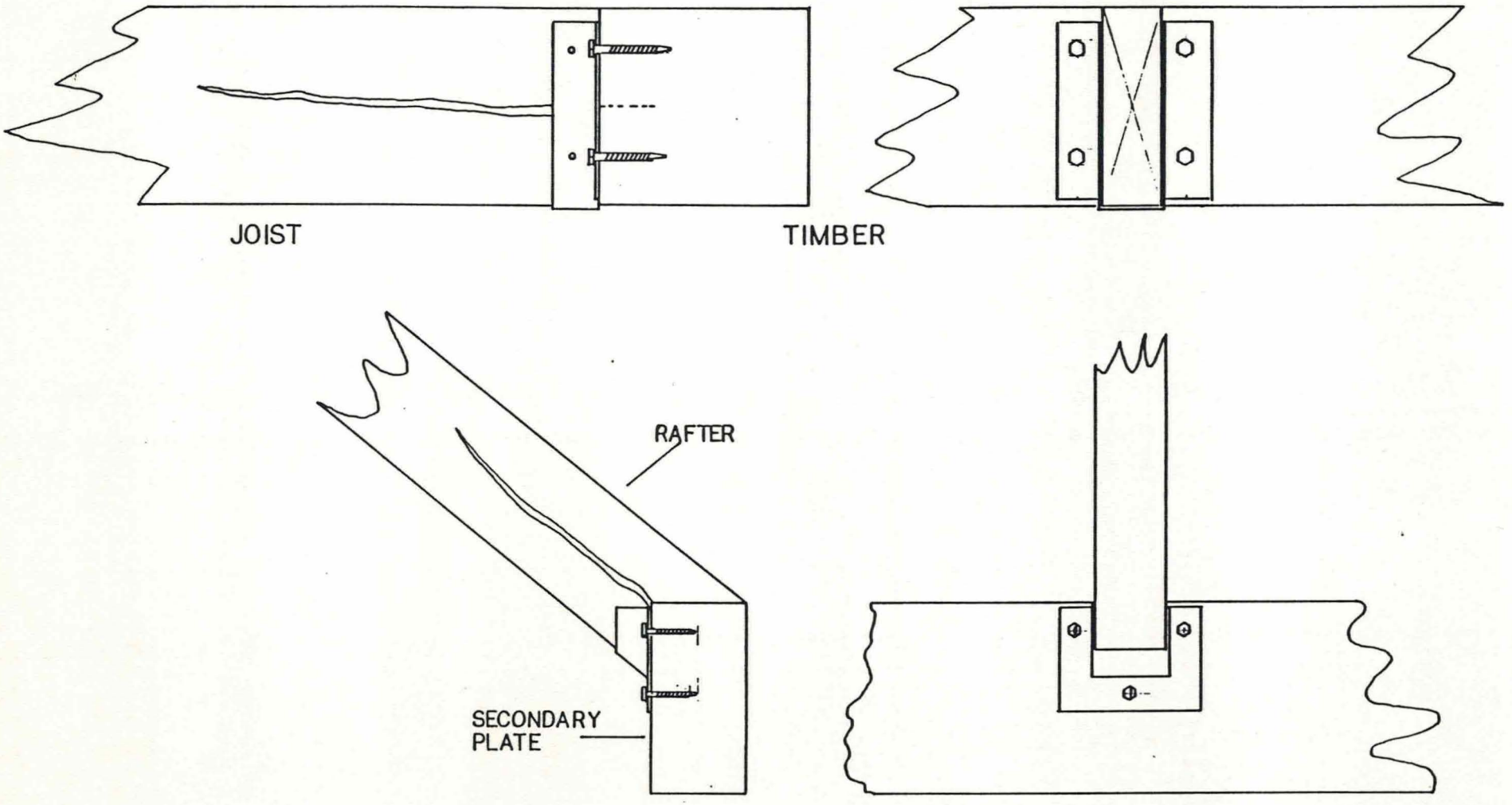
25. Repair the area in conjunction with the repair of item 19. Replace with new material and treat with preservative.

26. Improper installation of lighning rod and grounding cable can contribute to additional damage if lightning strikes the building. Have qualified personnel inspect and repair system where necessary.

27. Plane to relieve stress on door and its surround.



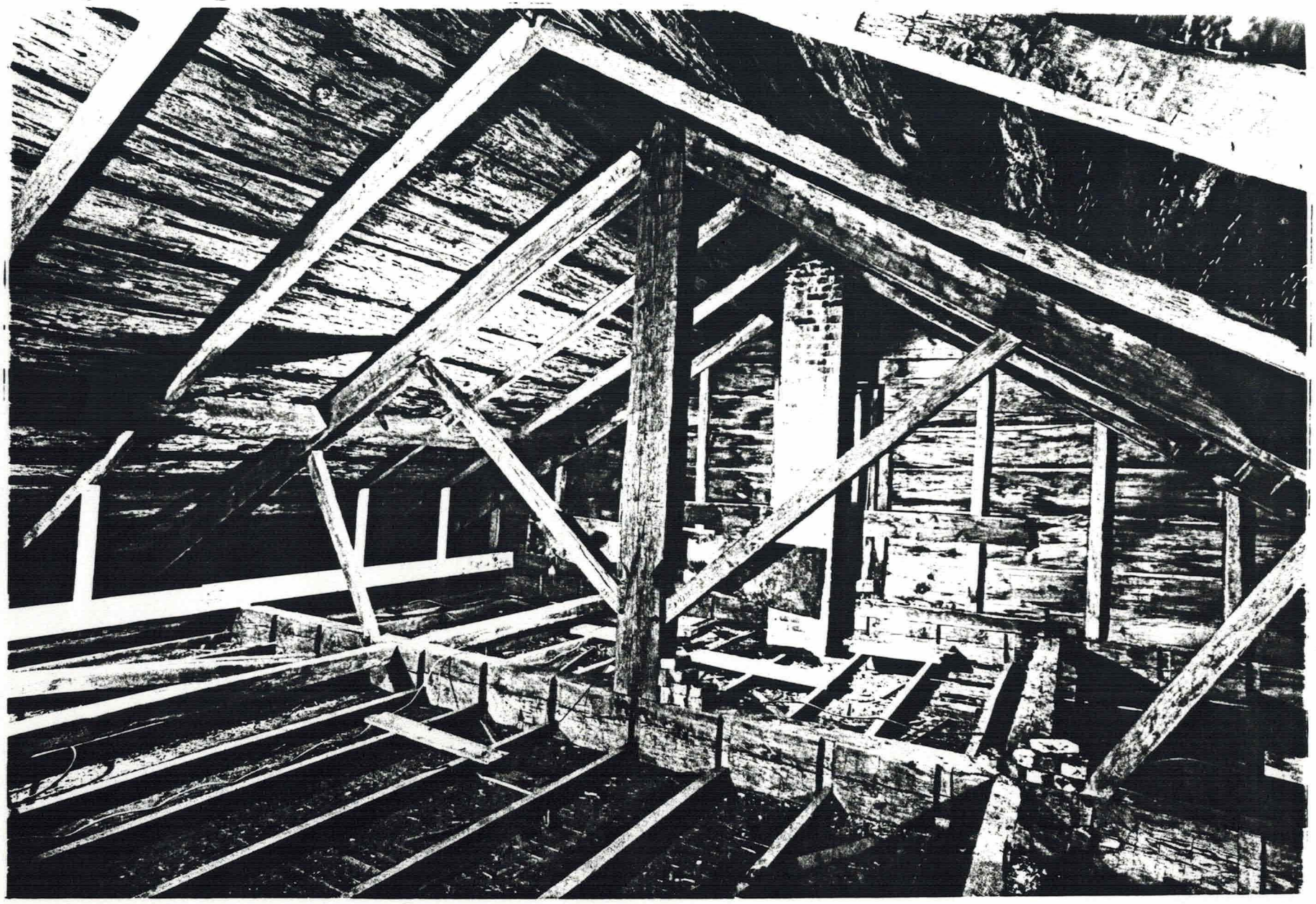
DRAWING 8: TYPICAL TIMBER SPLICES



DRAWING 9: TYPICAL STEEL HANGER APPLICATION

PHOTO CAPTIONS

1. Pelham Meetinghouse 1991
2. Roof framing Meetinghouse
3. Early shingles insitu under porch roof
4. Detail from Meetinghouse c. 1890's, photo, Charles B. Ward Pelham Historical Society Archives
5. Detail of severed joist (I-G), crawl space of Meetinghouse.
6. Decay southwest sill Pelham Meetinghouse
7. Timber (2), support, crawl space of Pelham Meetinghouse
8. Decay in timber (1), crawl space of Pelham Meetinghouse
9. Foundation separation northeast corner, Pelham Meetinghouse
10. Severed brace (Bay II), loft, Pelham Meetinghouse
11. Decay south end west plate of loft, Pelham Meetinghouse
12. Decay in north primary plate (Bay IV), Pelham Meetinghouse
13. Intact north plate/tie beam juncture, loft, Pelham Meetinghouse
14. Decay in north plate (Bay II), loft, Meetinghouse
15. Step stone making contact with skirtboard, main door, Pelham Meetinghouse
16. Pelham Church 1991
17. Lightning damage 1907, photo, Pelham Historical Society Archives
18. Failed splice, tie beam (E), Pelham Church
19. Fungi, south belfry roof, Pelham Church
20. Split rafter, Pelham Church
21. Split secondary plate northeast loft, Pelham Church
22. Fractured purlin and principle rafter (W-16), Pelham Church
23. Fractured joist, basement, Pelham Church
24. Fungi, post top, Pelham Church
25. Decayed brick east chimney, basement, Pelham Church



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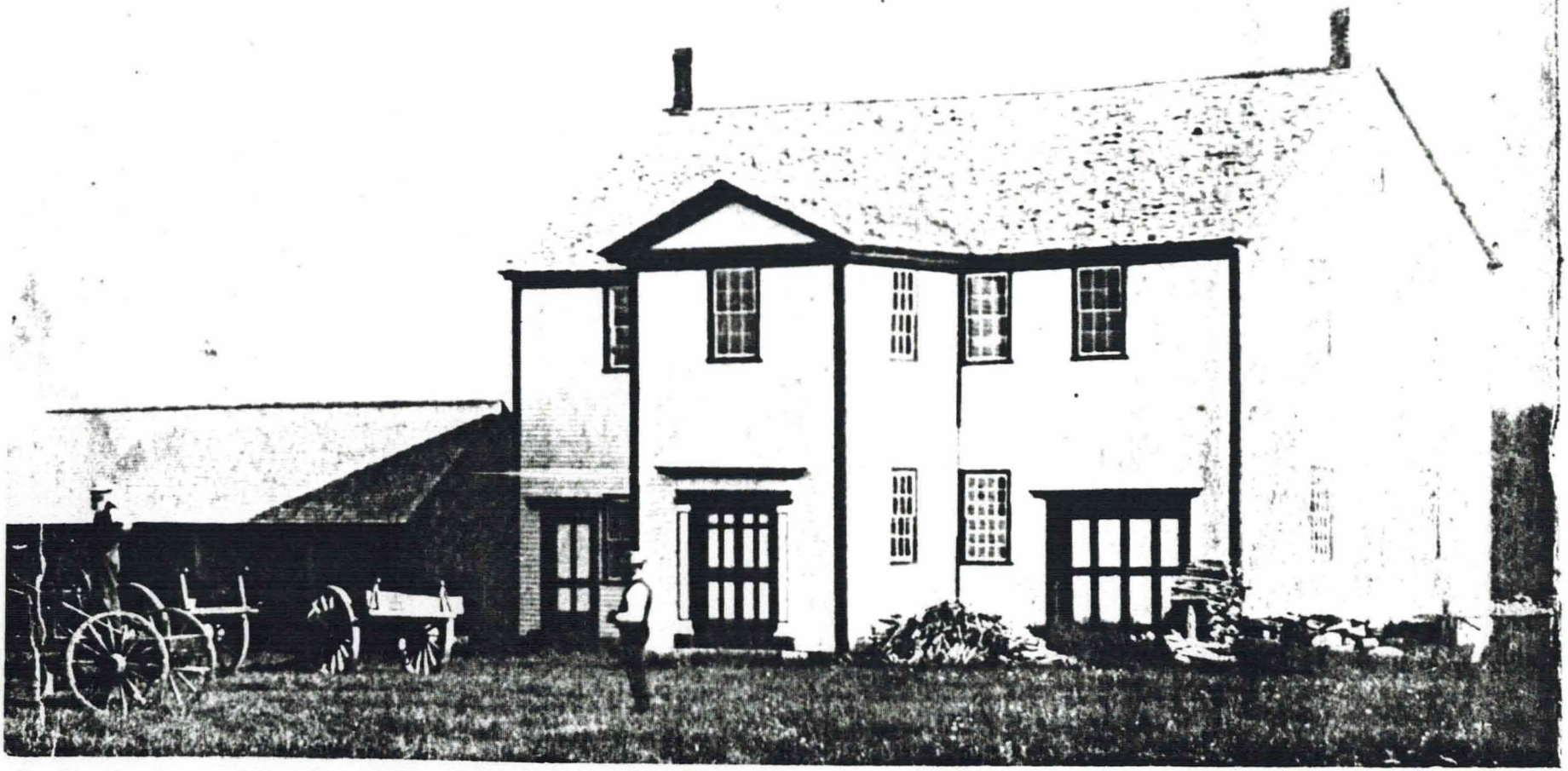

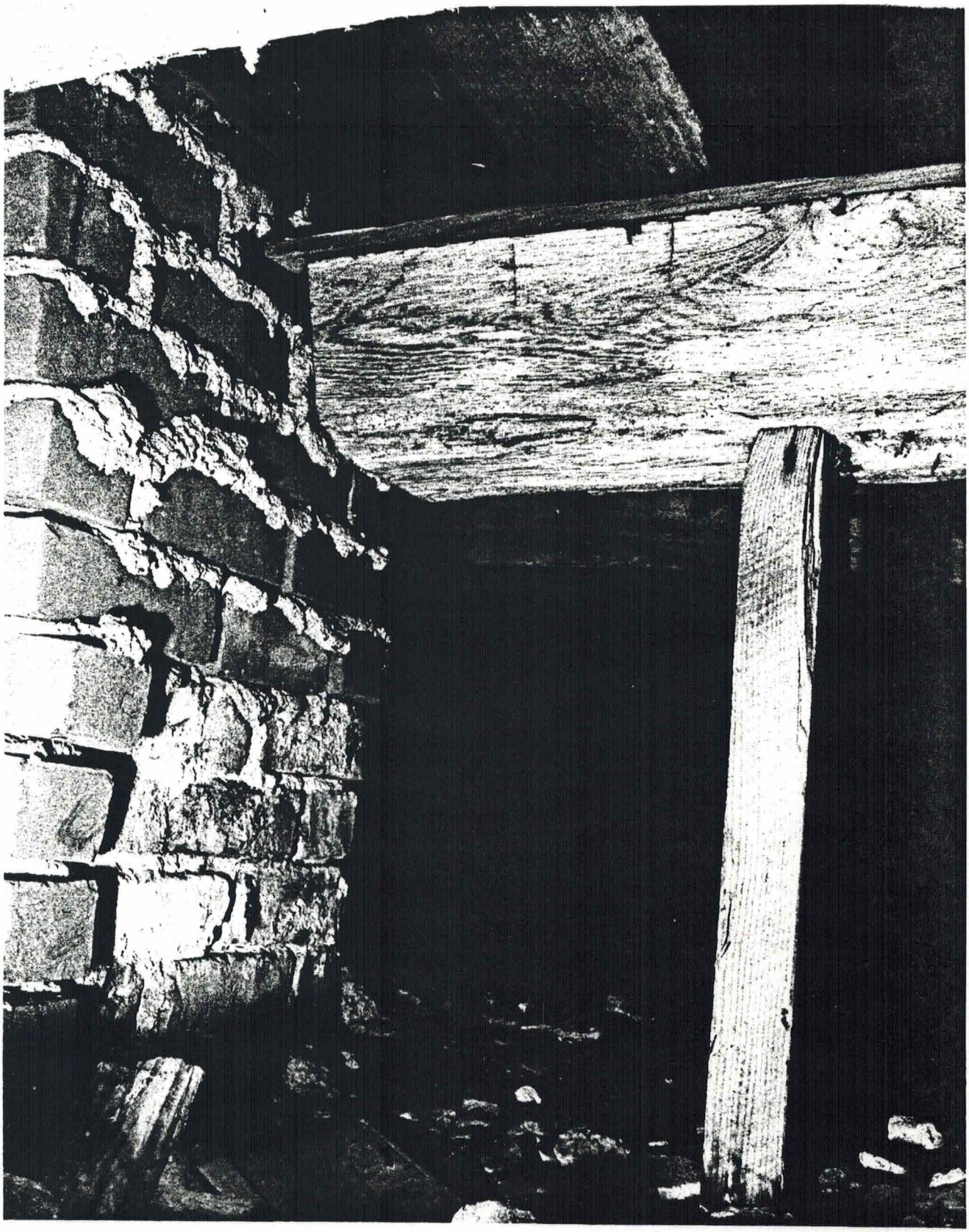

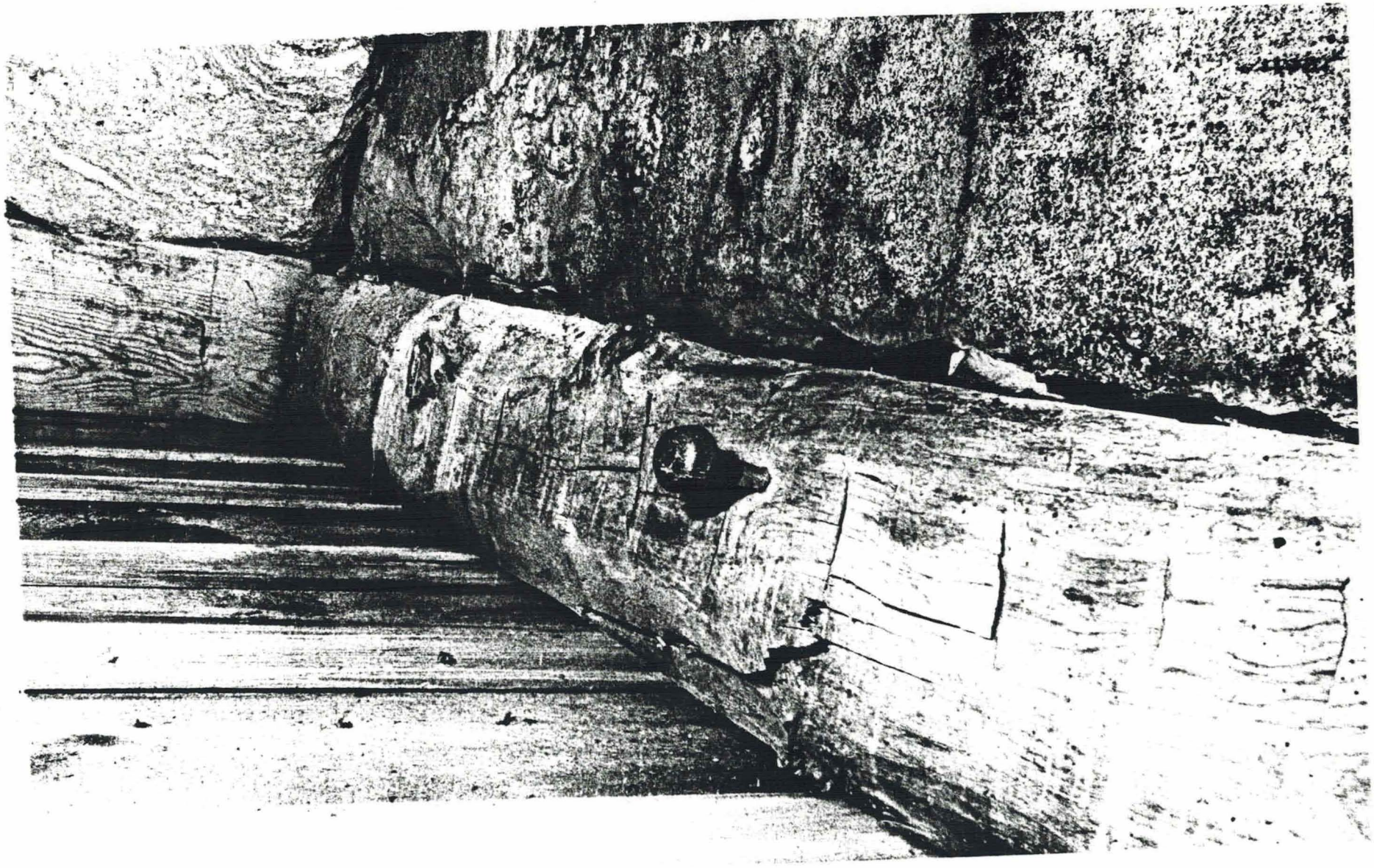

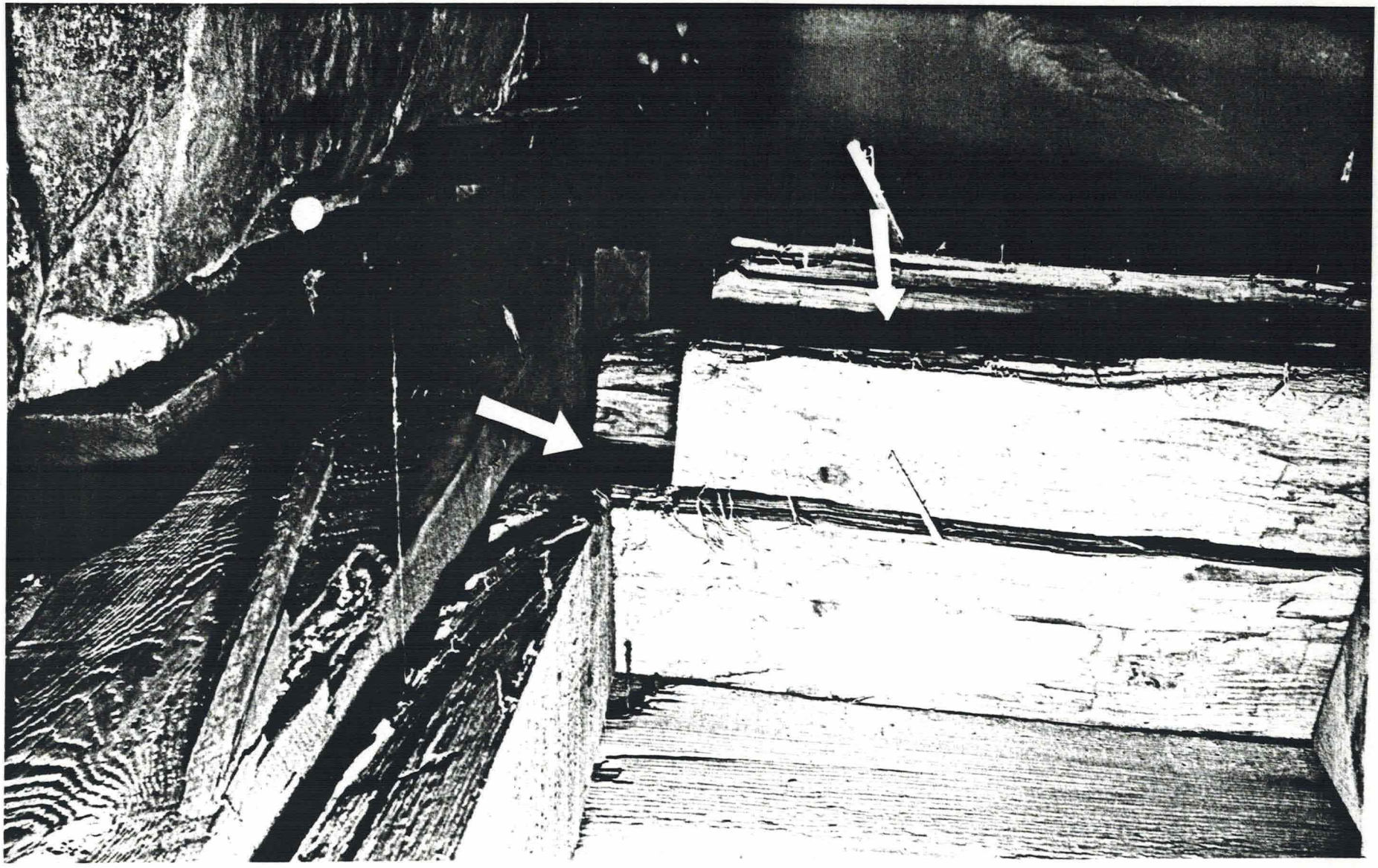

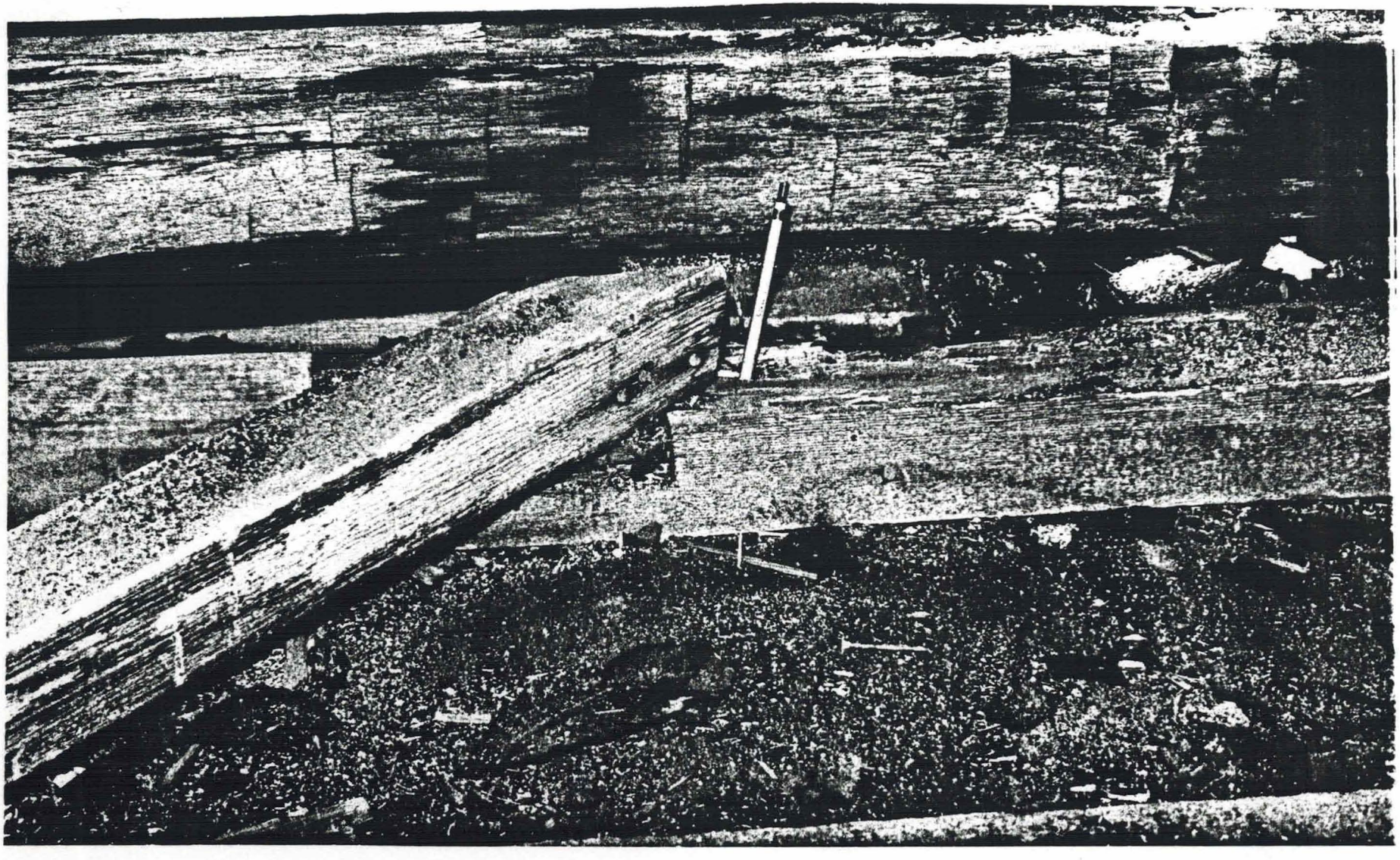

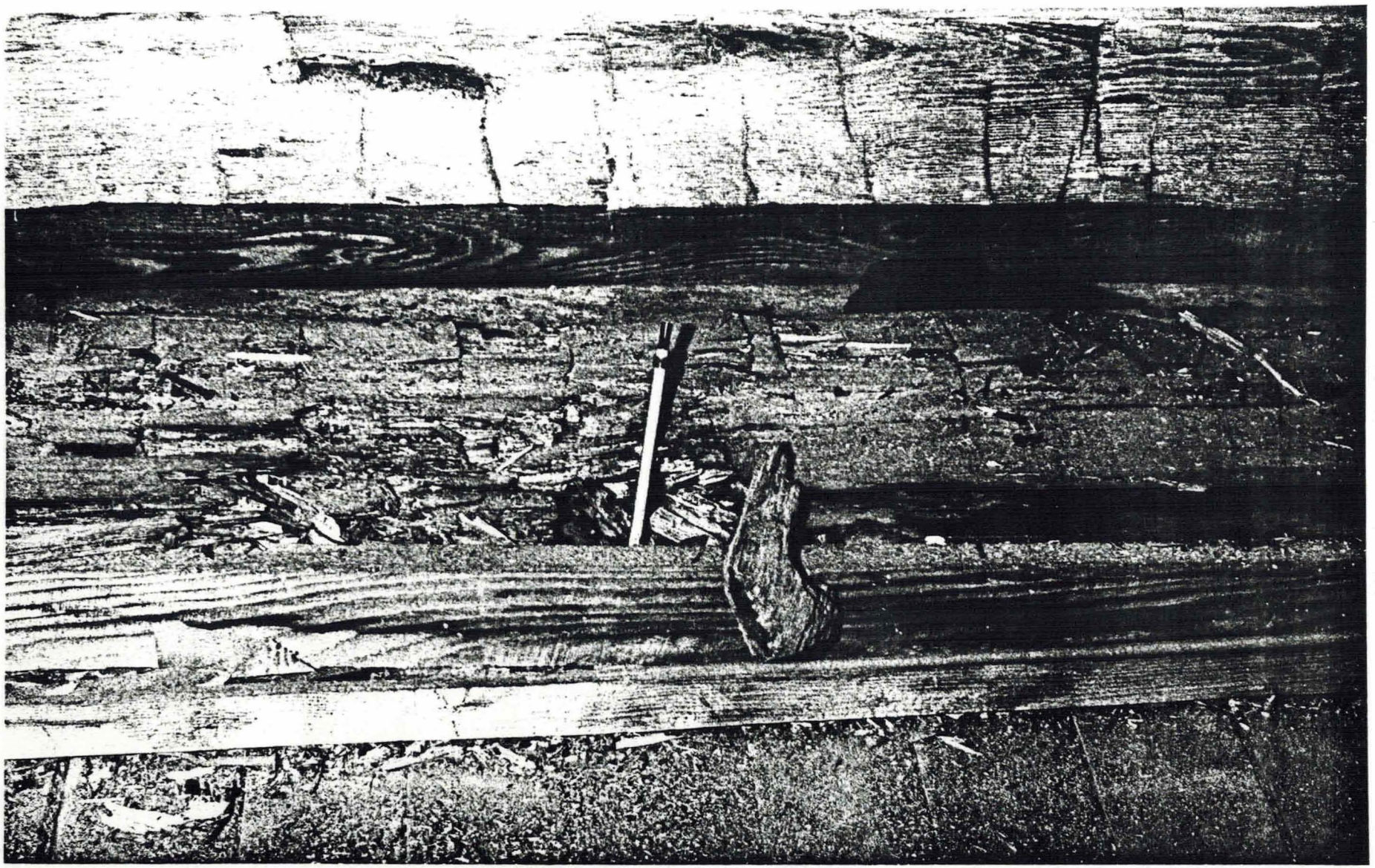

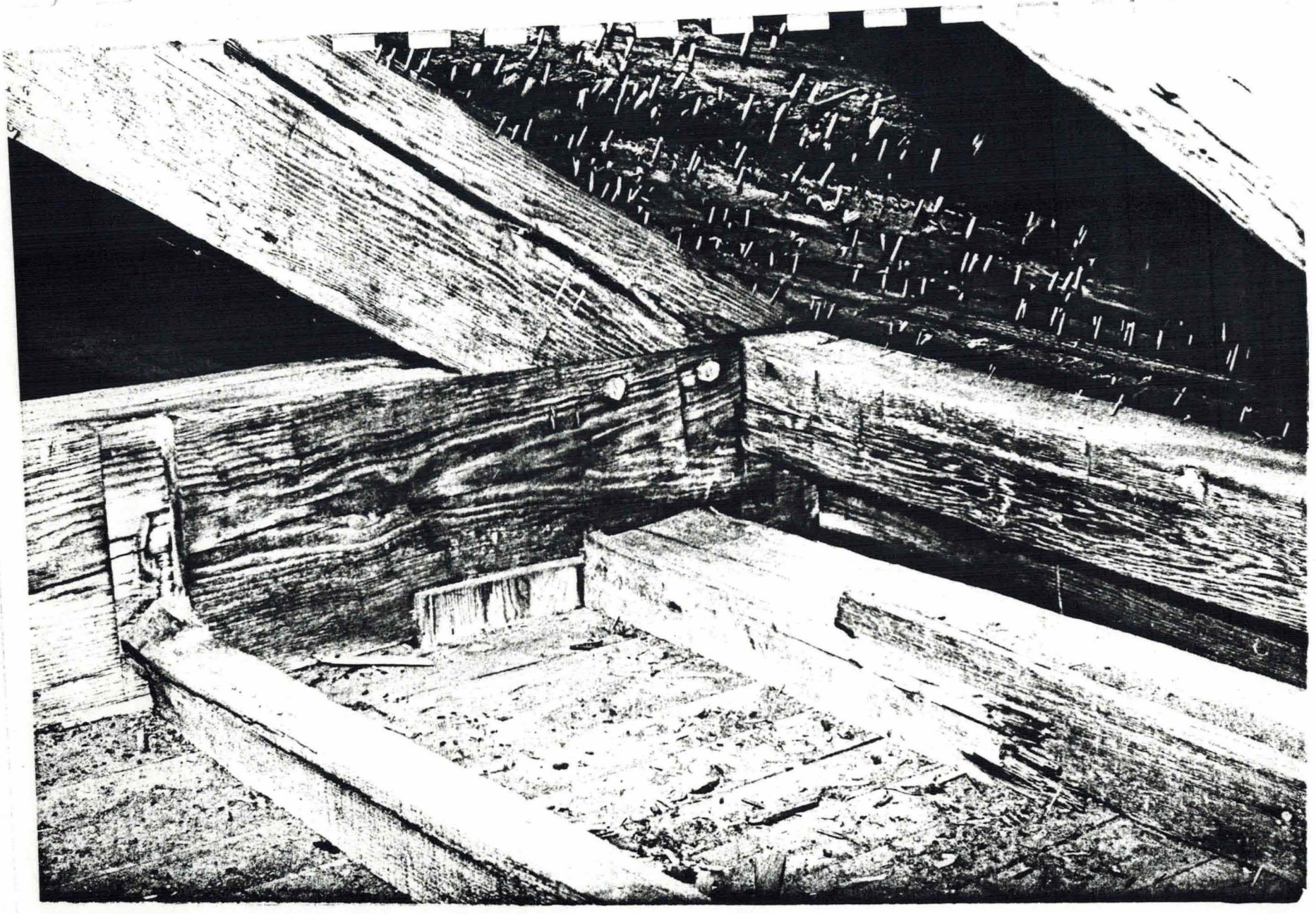

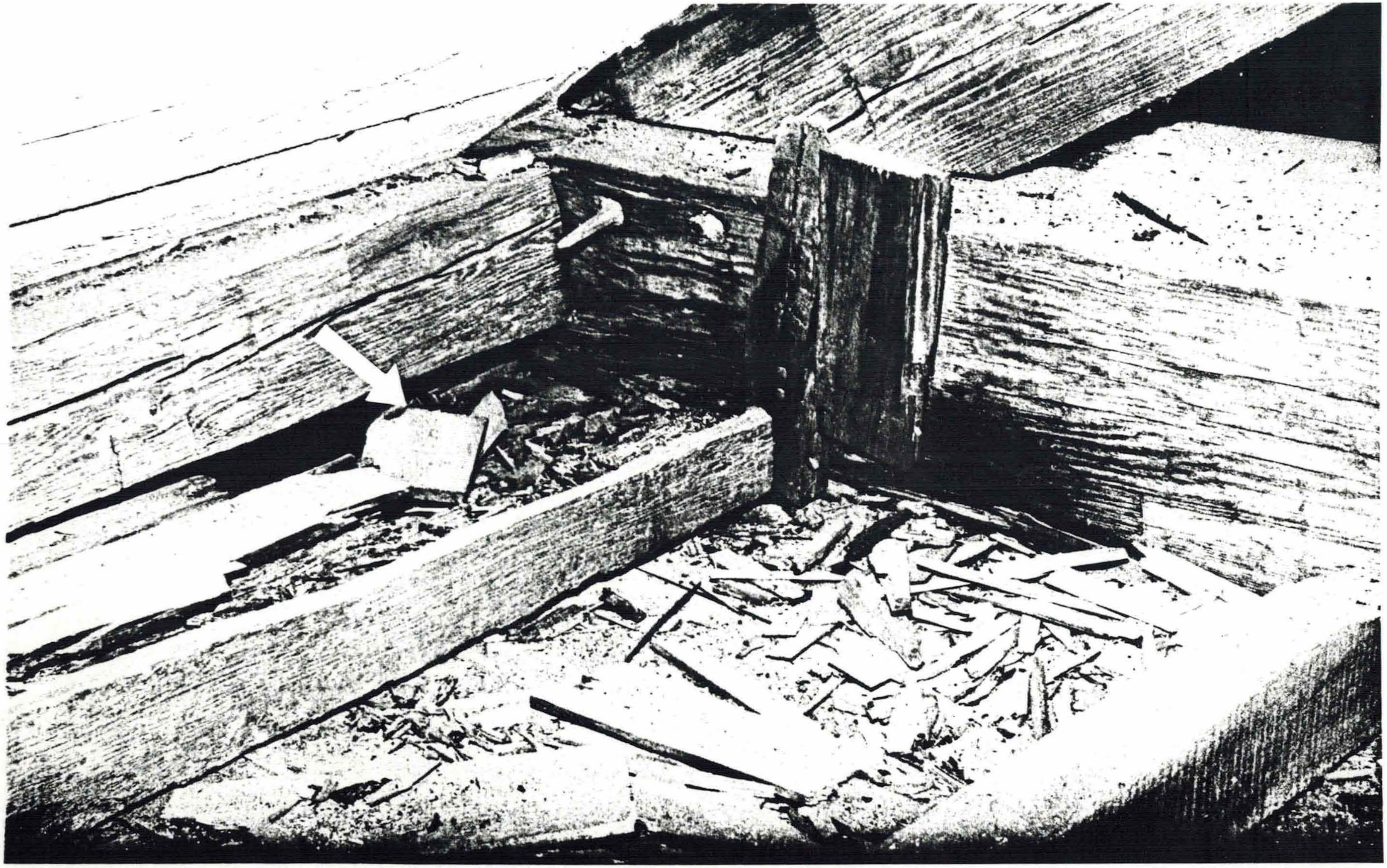

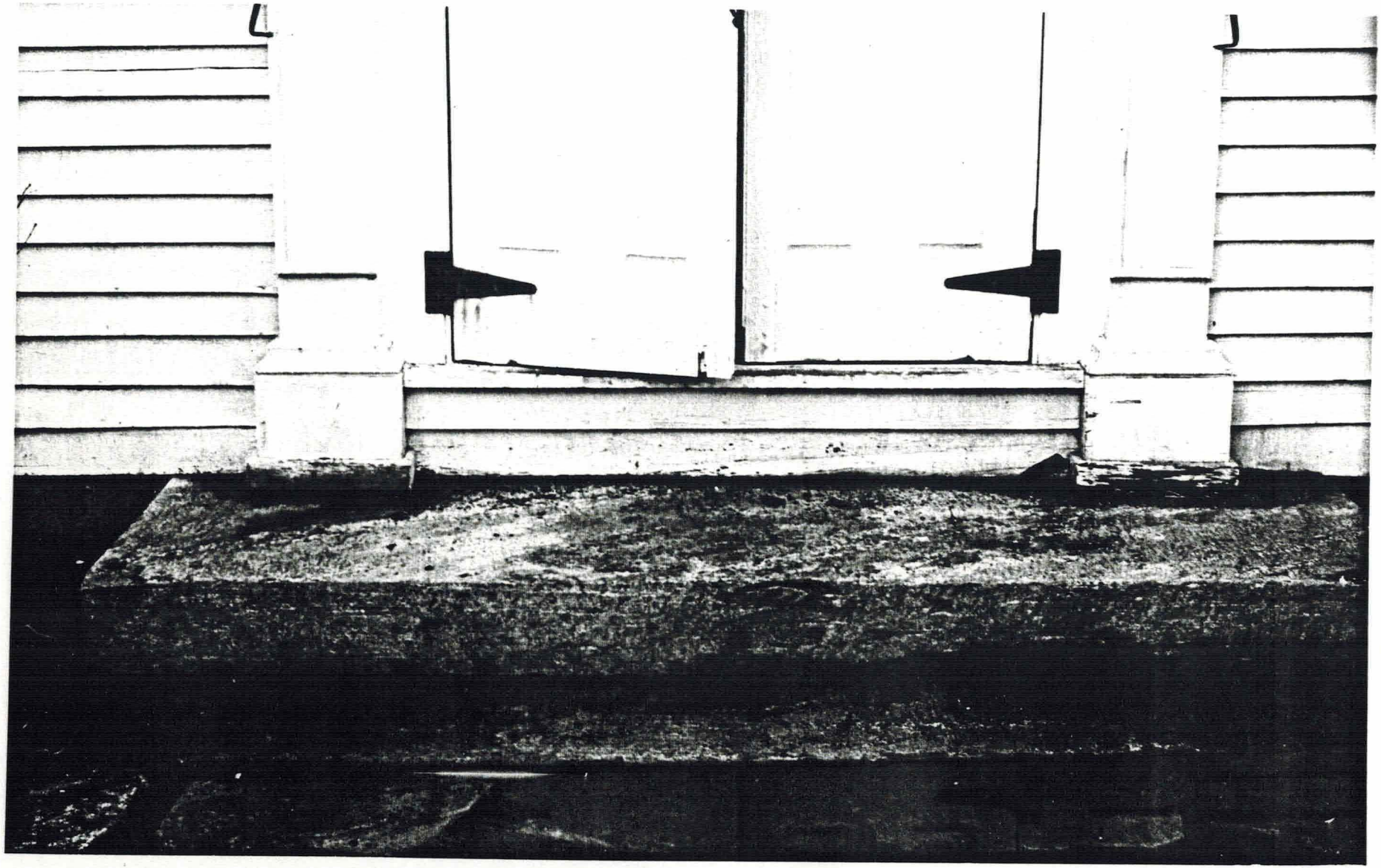

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