

N. ANDOVER & BALLARDUALE EARTHWORKS/STONEWORK  
(SEE ALSO, MILLIS)

BULLETIN OF THE  
MASSACHUSETTS ARCHAEOLOGICAL  
SOCIETY

VOL. IV

NO. I

OCTOBER, 1942



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PUBLISHED BY THE  
MASSACHUSETTS ARCHAEOLOGICAL SOCIETY  
BOSTON, MASSACHUSETTS

## FORTS, BOUNDARIES, or HA-HAS?

Ripley P. Bullen

Massachusetts has a considerable number of so-called Indian forts, or earthworks. These usually consist of ditches with the dirt thrown out only on one side. Probably the most complicated one is at Millis but there are many simpler ones around Andover, Concord, and in the Connecticut Valley.

The origin and use of these ditches has caused some speculation in the past. They have been accredited to the Norsemen, Indians, or early Colonists. This paper will attempt to show, by means of modern archaeological methods not available to the earlier investigators, that some, and so by inference all, of these earthworks are post Indian in date of construction. Historical research will also be drawn upon to substantiate the archaeological evidence.

The first mention of these ditches in archaeological literature appears to be a few pages by Warren K. Moorehead in 1906 (1). He told of taking Charles C. Willoughby to the ditch near Haggett's Pond in West Andover and gave Willoughby's conclusion that it formed the remains of an Indian stockade. Willoughby in 1911 published on the Millis earthwork, mentioned the ones near Andover, and gave a sketch of the one near Haggett's Pond (2). He also included information on several small fortifications reported by the explorers and early Colonists. In 1912 Moorehead published on the earthworks around Andover and concluded that they were all of Indian origin (3).

As "Fort Graham" in Ballardvale and the "Haggett's Pond Work" in West Andover were considered by Moorehead unquestionably Indian in origin, they were the ones singled out for excavation by the author. For their exact location, the reader is referred to Moorehead's monograph (4). It will be necessary to refer frequently to that publication and Moorehead's notations will be used throughout.

### FORT GRAHAM

From Moorehead's plan of Fort Graham, (our Fig.1) it will be noticed that this earthwork is fairly extensive. The part investigated is around Sta. 4 and includes the "Pit" or "Circular Depression". Just

to the north of Sta. 4 the ground slopes down. About 150 feet to the west of the same station it also slopes down, while to the east it gently rises to a high hill. The gully to the south is shown on the map. The result is like a peninsula, running nearly east and west. On this elevation, on both sides of the earthwork and surrounding the pit, is an Indian site, (M-12/43), which is being excavated by Arthur M. Hofmann of Ballardvale with the assistance of the author (5). As the earthwork approximately bisects the site, the ditch can be dated, relative to the Indian occupation.

A trench, about three and one half feet wide, was dug through the ditch and the dirt thrown out from it near Sta. 4. Profile A, (Fig.2), shows the relationships found perpendicular to the ditch, while profile C shows them parallel to the ditch at the thickest part of the thrown out pile. Careful troweling discovered no post holes either in the mound or the bottom of the ditch.

For comparison, before discussing these profiles, it would seem advantageous to describe the usual nearby profiles. The tongue of land seems to be a kame composed of roughly stratified sands and gravels with an occasional, fairly good sized rock plus, probably, additional sand brought down by slope wash from the east.

Off the site, the normal profile consists of about 2½ inches of sod over 3 inches of brown humic stained sand. Next is a layer about 6 inches thick which with depth blends or fades from a light brown to a yellow brown. Underneath are yellow or white sands and gravels.

The situation on the site is similar, but the light brown layer has been replaced by a red brown layer which blends as before into the brown yellow. There also seems to be more variation in the thickness as the red brown may be from one to six inches and the yellow-brown from 2½ to 7 inches thick. The red-brown is the layer of Indian occupation, although the humus yields some Indian artifacts.

In profile A, (Fig.2), the outline of the original ditch is shown, cutting through the red-brown Indian layer and the yellow

(1) Moorehead, 1906, pp. 150-154.

(2) Willoughby, 1911, pp. 566-576.

(3) Moorehead, 1912.

(4) Ibid., especially Plan 3, "Fort Graham," opp. p.20.

(5) This site has never been plowed. A report on its excavation will be published later.

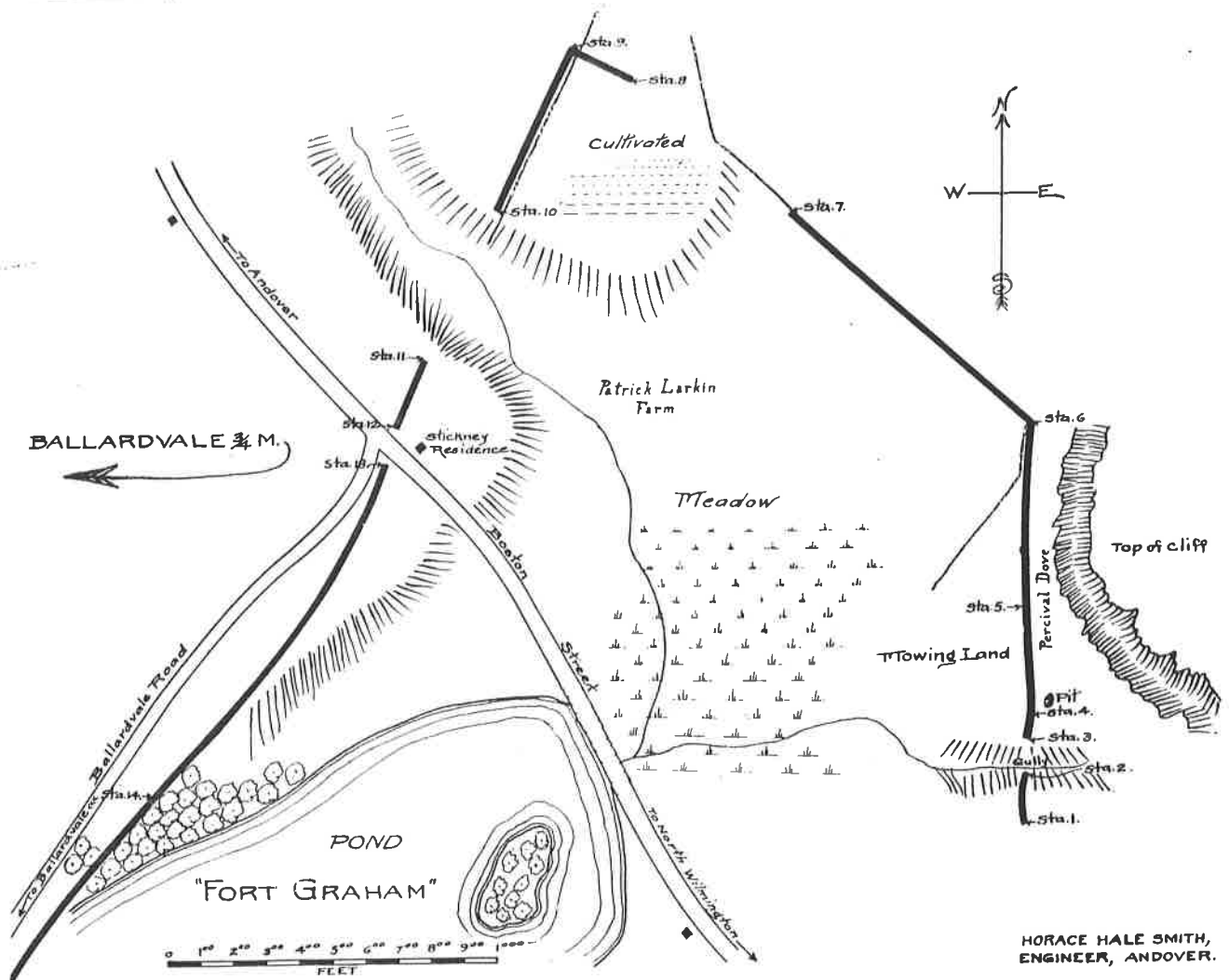


Fig. 1

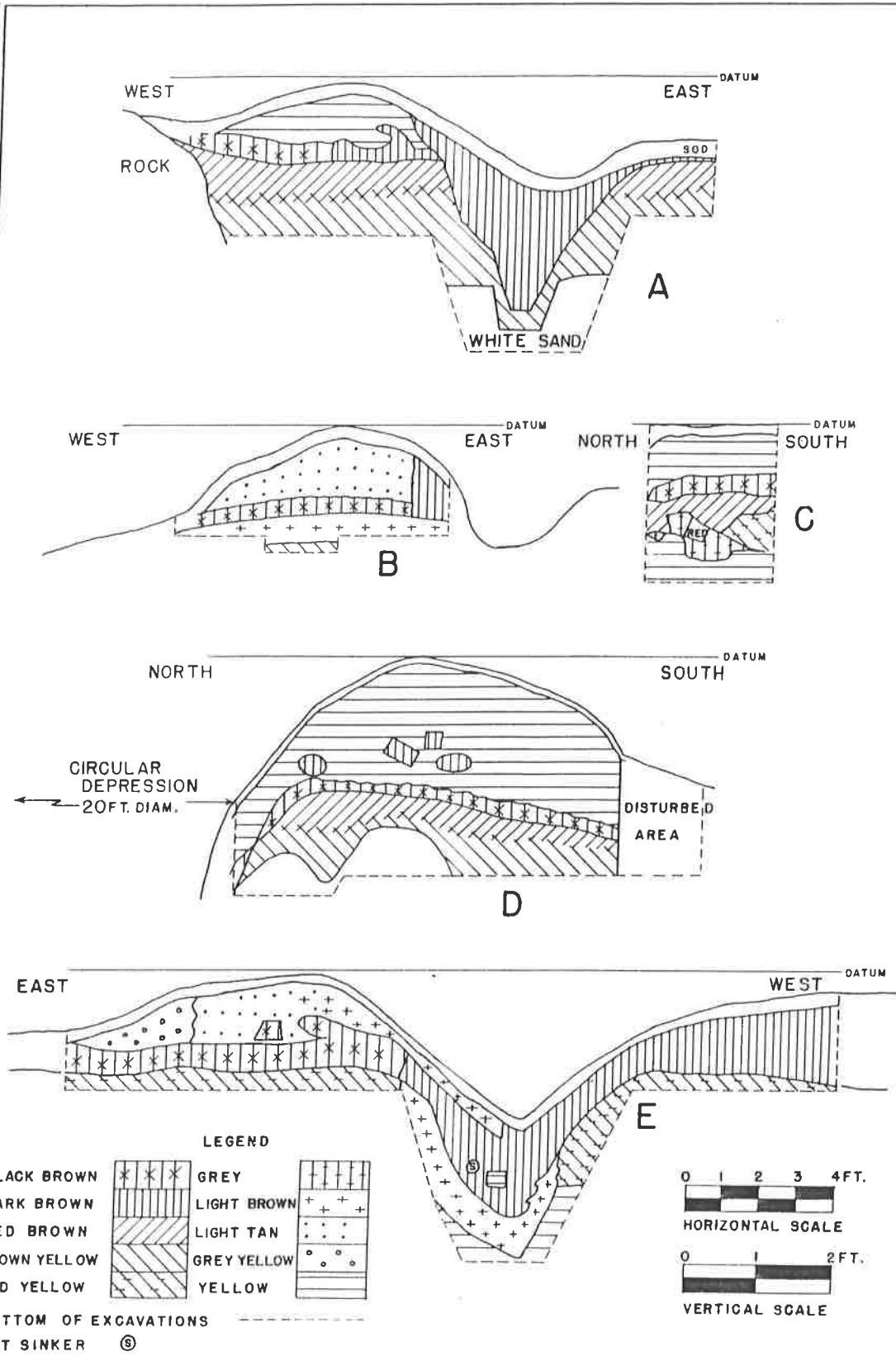
brown layer into the white sand. During the years, it has been nearly filled with dark brown humic material consisting, presumably, of leaf mold mixed with sand. It is the stain from this material which caused the apparent lowering of the surface of the white sand directly below the bottom of the ditch. The bottom of the ditch at this point was 6 inches wide but on the other side of the test trench its width was 12 inches, which seems to be the intended width. We have, therefore, a trench dug about 2 feet deep with sloping sides and varying in width from about 5 feet at the top to 1 foot at the bottom.

All of the dirt thrown out from the ditch was found under the present sod as a long mound on top of the old sod line on the west (downhill) side only. The western part

of the old sod line at this point was black brown, containing a lot of charcoal; to the east, nearer the ditch it was dark brown. A few feet further to the west was a large Indian hearth (6) from which the charcoal probably came. Below the old sod line was the usual Indian site profile of red-brown blending into brown-yellow.

The yellow dirt of the mound contained a little charcoal, mostly near the top, fifteen angular rock fragments, three chips, and one piece of burnt bone. These must have been shoveled out with the yellow dirt when the ditch was dug as there was no disturbance. In some places, near the west edge of the mound, white, red, or brownish lenses, like individual shovel loads, could be distinguished.

(6) Hofmann, 1942.



PROFILES OF EARTHWORKS

A,B,C,&D-FORT GRAHAM

E-HAGGETT'S

FIG. 2

*Handwritten notes:*  
 1. 100 ft. ...  
 2. 100 ft. ...  
 3. 100 ft. ...  
 4. 100 ft. ...

The yellow dirt rested unconformably upon the old sod line and near the bottom was mottled with small vertical cylinders, presumably where grass and bushes had been buried. The apparent great thickness of the old sod line is probably due to the fact that in digging the ditch the sod would be thrown out first. It contained eighteen angular fragments and burnt and unburnt bone.

The red brown layer under the old sod contained thirty-three angular rock fragments, some with red fire-stains, and a fair amount of charcoal. While the deposit was simple on the west wall of the trench, as shown in profile A, (Fig.2), it was complicated in the trench. A profile parallel with the ditch and through the center of the mound is given in C, Fig.2. Evidence of Indian occupation is apparent from the ash under the red brown layer. This disturbance may be the result of the construction of the hearth, (7) previously mentioned, just to the west.

In interpreting this evidence it seems clear that the ditch was dug some time after the abandonment of the site by the Indians. This is indicated by the small vertical cylinders found at the very bottom of the mound just over the old sod. Time enough for the accumulation of grass and small brush must have elapsed. The area here is too near the center of the Indian site to admit that much grass or brush was growing during Indian occupation. It is also to be noted that the present sod on top of the yellow dirt is thinner (1½ to 2 inches) than that shown (3 inches) for the surface east of the ditch (Profile A, Fig.2), or for the rest of the area. Nor does it have the brown humic layer found elsewhere. While thin sod would be expected on a mound, the substantial difference and the lack of a humic layer indicate that the yellow dirt was not deposited too long ago. The small amount of Indian material mixed in with the yellow dirt is what would be expected if a ditch were dug through an Indian site.

The presence of the clod of sod shown at the bottom of the yellow thrown-out dirt also argues for a post-Indian disturbance. Nearly all of the Indian site has been excavated and nothing remotely resembling a stone hoe, adze, celt, or gouge has been found. It would seem, therefore, that if the Indians had dug the ditch they would have had to use angular fragments of rocks, spear heads, knives, or digging sticks. While it might be possible to get a clod of sod with such tools it is not reasonable. As will be seen later, the shape of the clods which are a feature of these mounds, strongly suggests the use of metal shovels.

As a check, a trench was dug through the earthwork about 200 feet to the north, or about half way between Moorehead's Sta. 4 and Sta. 5, (Fig.1) and well off the area of the Indian site. This trench was only excavated through the mound and not through the ditch. The profile found is given as B in Fig. 2. As will be noticed from the old sod line, the land is sloping and the dirt is piled on the west or down hill side.

As would be expected, a distribution of strata similar to that found at the cut near Sta. 4 was found here with the exception of the evidence of Indian occupation which was absent. The thrown out dirt was light tan instead of yellow; under the buried sod line it was light brown fading to brown-yellow. As before, the present sod on top of the mound is thinner than the buried sod line, and the division between this thrown out dirt and the top of the buried sod is very irregular. The finding of this irregularity substantiates our contention that the Indian site must have had ground cover when the ditch was dug.

The pit or circular depression is shown on Moorehead's map just to the north-east of Sta. 4. It is entirely surrounded by the Indian site but on the north and south sides of the pit, or rather of the dirt thrown out from the pit, the site is very "thin" as the ground surface is beginning to slope rapidly. Moorehead says the pit was "something like forty feet in diameter and six or more feet in depth when we began its excavation." (8) Mr. Hofmann, who saw it as a youth, before Moorehead's work, says that it was much smaller than that. We measured the inside and found it now to be an oval about 18 feet east and west by about 25 feet north and south. Probably Moorehead measured the outsides of the thrown out dirt, which would give approximately the dimensions he reported.

With the exception of a small area on the south side, all of the thrown out dirt and the pit itself shows evidence of comparatively recent disturbance. Test pits indicated that this disturbance goes down to sterile sand. Assuming this to be the result of Moorehead's work of over thirty years ago, it is interesting to note that the sod here is less well developed than it is on the small undisturbed portion of the thrown out dirt to the south; which in turn is about the same as that on the mound accompanying the ditch, and less than that on the rest of the site.

A trench, about 30 inches wide, was dug through the small undisturbed portion of the thrown out dirt on the south side. A profile from this trench is given as D in Fig.2. It does not extend far into the pit because the side wall had been previously

(7) Hofmann, 1942.

(8) Moorehead, 1912, p.24.

disturbed. Another disturbed area was found at the extreme outside edge of the thrown out dirt.

Again the same situation was found; yellow dirt lay on top of an old sod line, the contact between the two being marked by a wavy line. In places, this yellow dirt was somewhat white at the top, blending to red brown at the bottom. (A reversal of the normal stratigraphy, which would be expected from such a deep hole.) There was some mottling at the bottom, indicating buried ground cover. A most interesting feature was the remains of clods near the bottom of the thrown out dirt, several of which are shown in the profile, D in Fig.2. Among these clods, and nowhere else in this thrown out dirt, twelve chips were found.

The old sod line was not quite as thick as in the other profiles, possibly because of the slope. On top of the old sod there was found one narrow triangular point, and in it, two chips and a charred nut.

Under the old sod there was the typical site profile of red brown blending into brown yellow. In the red brown layer one angular fragment of rock and a little charcoal was all that could possibly point to Indian occupation. As explained before, the ground begins to slope here and it is the edge of the Indian site.

The clods clearly indicated a rectangular shape, and it would seem that they must have been cut by metal shovels. They were from 5 to 8 inches long and 3 inches thick. The finding of chips only in direct association with the remains of sod near the bottom of the thrown-out dirt, seems to clearly indicate that this pit was dug after the Indian site had been abandoned (9).

#### HAGGETT'S POND WORK

Before discussing Fort Graham further it seems desirable to describe the excavation made in the Haggett's Pond Work. It will be remembered that this is the one first mentioned in 1906 and considered the remains of an Indian stockade (10). The map (Fig.3) shows the relationship between it and the Indian site, M-12/17.

A trench, 15 inches wide, was out through the earthwork at a point about 50 feet north of the south end (11). This was about 20 feet south of an old cut presumed to be the one made by Moorehead. A profile of this trench is shown as E, Fig.2. Trowelling produced no post holes in either the

ditch or the mound.

As at Fort Graham, a ditch had been about two feet deep but it seems to have been wider at the top than the one at Fort Graham. At the top the width was about 6 feet, at the bottom, about 1 foot; the west side was steeper than the east. The thrown out dirt was all piled on the east or lake side, and the present sod is much thinner than the buried sod line. There was no mottling or evidence of buried brush at the bottom of the mound. Old clods of sod or forest floor, 10 inches across, were found near the bottom. Two are shown in the profile.

The dirt of the mound was grey towards the east, light tan in the center, and light brown to the west. The trench was partly filled with dark brown humic material. Considerable slope wash is indicated by the profile, which shows the light brown dirt overlying the dark brown in the eastern part of the ditch, irregularities in the west wall, and the deposit of yellow near the bottom.

The buried sod line was particularly thick and seemed to be divided into an upper and a lower part. The appearance was as though a forest floor had been buried by similar material from the first diggings of the ditch. The top contained charred bark, ashes, and charcoal. The latter appeared to be pine. There was also some unburnt wood which appeared to be cedar.

Underneath the old sod line was red yellow sand and gravel with yellow sand and gravel below. This was stained light brown under the ditch proper.

Two points which may have possible bearing on the reason for the construction of this ditch are to be noted from the profile; the grey-yellow color of the dirt in the eastern part of the mound, and the great difference in the thickness of the humic layer under the present sod at the east and west ends of the profile. The greyness presumably indicates surface fires relatively soon after the ditch had been dug. Small test holes were dug 10 feet further to both the east and the west to test the humic layer and it was found that to the east it is about 6 inches thick and moderately black brown to dark brown while to the west it is 9½ inches thick and dark brown.

To the west the present ground seems more uneven, has more ferns, less underbrush and no blueberry bushes; while to the east there are blueberry bushes. Oaks and birch

(9) A guess as to the use of the pit is hazardous. It may have been the vegetable storage pit of an early settler. There is an old cellar hole on lower land a short distance to the west.

(10) Moorehead, 1906.

(11) Miss E.R. Frazer very kindly gave permission for this excavation.

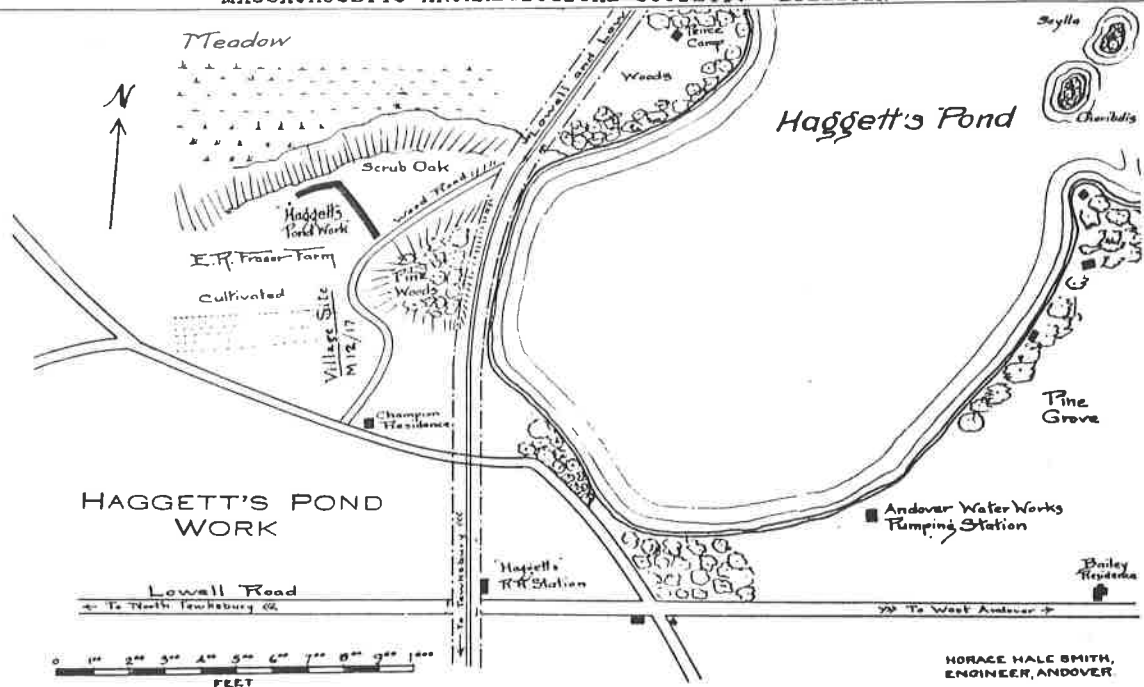


Fig.3

mixed, with an occasional pine, are found today on both sides of the ditch. While the evidence is not very conclusive, there is a suspicion that the land immediately to the west tends to be swamper. Moorehead noted a difference between the east and west sides 35 years ago but his interpretation is different. He reported large stumps to the east and none to the west. (12)

With one exception, absolutely no evidence of Indian material was found. The Indian site seems to end about 100 yards to the southwest of the ditch. The one exception was a crude, fully grooved, net sinker or grooved hammer,  $2\frac{7}{8}$  by  $2\frac{3}{4}$  by  $2\frac{1}{4}$  inches. This was found in the dark brown humic material filling the ditch. Its relative position is shown in profile E Fig.2.

As this artifact was in the fill of the ditch, it must have reached its final location after the ditch was dug. Examination of the dirt around the roots of trees felled by the hurricane and from two small test holes between the trench and the Indian site gave no suggestion of Indian occupation. Moorehead, who also trenched the ditch, mentions no Indian material and

there is no question but that he would have, if he had found any. As the ditch is between the Indian site and a brook running into the lake, the conclusion seems logical that this specimen represents a stray, lost on the surface, shovelled out when the ditch was dug, and then washed to its present location from the thrown out dirt.

Due to absence of other evidence of Indian occupation the author feels that this ditch is post-Indian and consequently dug by white settlers. The clods seem to bear this out, indicating, presumably, metal shovels. It also seems to be too far away from the Indian site to be considered the possible remains of a stockade, not to mention the fact that no post holes were found.



#### GENERAL CONSIDERATIONS

In spite of having presented the evidence from the excavations and concluding that both Fort Graham and the Haggett's Pond Work are post-Indian it would seem profitable to follow the question of possible Indian origin a bit further.

The possibility that the ditches were

(12) Moorehead, 1906, p.153.



made by the Indians for driving game has been suggested. However, they do not seem to have either the arrangement or location to function in that manner.

It seems that Moorehead was misled in his conclusions because he found evidence of Indian occupation at Fort Graham in Ballardvale. However, he only found it between Sta. 1 and 2 (13) and around Sta. 4, or about one twenty-fifth of the total extent of the earthwork. Examination of the map of Fort Graham shown in Fig. 1 will indicate that the earthwork seems to surround low land (14) and has a total traceable length of over 5000 feet. That would represent quite an undertaking for the Indians. While two or three small sites are included in the area, there is no evidence of the heavy population which would be inferred if Indian construction were assumed.

In the twenty acres which Moorehead considered as suitable for Indian habitation within Fort Graham, excepting the sites referred to above, he reported only one arrowhead and a half dozen chips from many searching trips and fifty test pits (15). Certainly not sufficient evidence to support the theory of Indian origin.

Willoughby discusses forts and palisaded spots known to be Indian from the accounts of the explorers or first settlers. The largest one reported for Massachusetts covered two acres while the rest are given as 40 or 50 feet across, and either square or round. Phillip's famous fort at South Kingston, Rhode Island, probably the largest built by the Indians in New England, is estimated as enclosing an area of only five acres (17). All of these are substantially smaller than the earthworks we are discussing. Also they are all spoken of as having palisades, of which no evidence has been found in the earthworks under discussion.

#### CONCLUSIONS

Having, we hope, demonstrated that these earthworks are post-Indian in date,

and consequently made by the early settlers; it would seem desirable that possible explanations for their construction be presented. Various reasons have been suggested: flax rotting pits, fortifications during the French and Indian Wars, firebreaks, drainage ditches, boundary lines, and ha-has to restrict the wanderings of animals.

It seems to the author that no one simple reason will explain all these ditches. Due to their size and location the possibility of their being flax rotting pits or trenches from the Colonial Wars can be eliminated (18).

Of the other four possibilities - there may be more - it seems that different ones may, in different places, be the reason for construction. Each one, therefore, should be studied separately to determine its original use. It is not the purpose of this paper to exhaust the possibilities of each ditch. However, general comments will be made and specific conclusions given in certain cases.

Mr. Benjamin L. Smith of Concord assures the author that in Concord similar ditches have been maintained as firebreaks in certain places, such as around Waldon Pond and Sleepy Hollow Cemetery, where fires occur every year or so. It is to be noticed that these are places of special interest warranting special precaution. Mr. Emerson, retired chief of the Andover Fire Department is certain that such has not, at least for a very long time, been done in Andover. Nor is there any evidence in the town records (19). For many years - at least from 1722 to 1788 - they mention appropriations for cleaning the fish courses so that it is not likely that one for cleaning firebreaks would have been omitted.

In favor of this theory it must be admitted that there was a great deal of valuable timber in Andover in the early days. The oaks were considered particularly fine for ship work (20) and the cedars for shingles. In fact it was necessary to get the

- (13) There is an Indian site between Sta. 1 and 2. It is across the gully from site M-12/43 and may or may not be an extension of it.
- (14) Moorehead, 1912, p.26, remarks "that these ditches are along the inside of the works strengthens the theory of the Indian origin." At Fort Graham the ditch is on the outside. See Moorehead, 1912, Fig. 3, opp. p.16, taken at Sta. 5 looking west. He continues "The ditch being towards these rocks and bluffs is an indication that the defenders had their camps east of the wall." But the enclosed area is to the west of Sta. 5, i.e. away from the rocks.
- (15) Ibid., p.23.
- (16) Willoughby, 1906, pp. 126-127; 1911, pp.572-575.
- (17) Willoughby, 1911, p.575.
- (18) Bailey, 1880, p.172. In 1676 the Court ordered "that a fence of stockades, or stones, be built eight feet high from the Charles River to Concord River in Billerica, thence connecting by way of the large ponds with the Merrimack River..." However, this was not done.
- (19) Andover Town Records. These were searched, moderately carefully, from 1700 to 1890. In 1822 they voted not to have a "fire ward", and in 1830 not to buy a "fire engine".
- (20) Bailey, 1880.



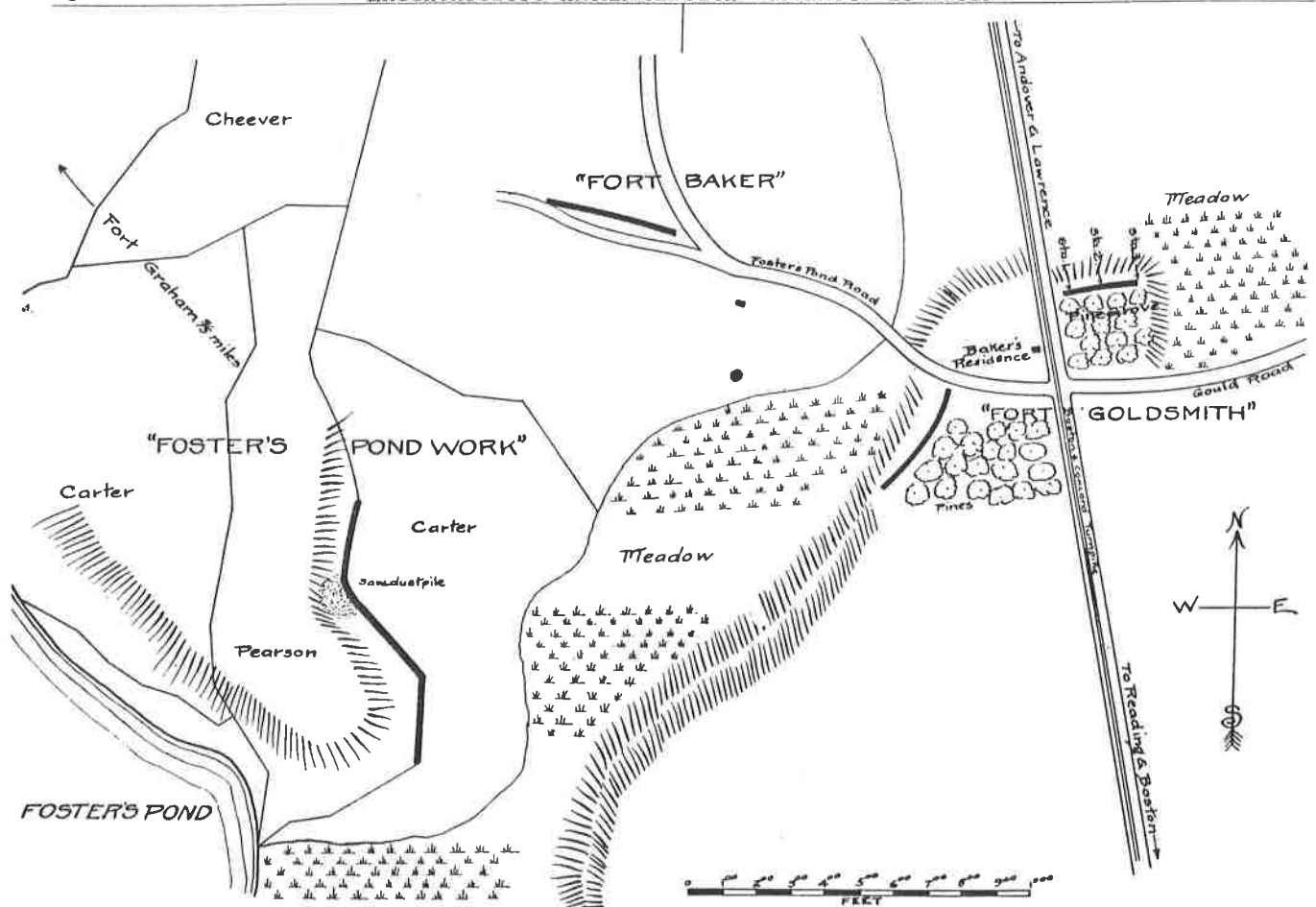


Fig. 4

town's permission to cut down a cedar tree (21). As certain "cedars" grow in swamps and some of the ditches tend to surround swamps the firebreak theory is plausible. However, they would not function as firebreaks unless maintained, and even then would only stop grass or small brush fires. Certain of them (Foster's Pond Work) could not possibly have served as firebreaks and the lack of local reference to them as such mitigates against this use in Andover.

As far as a general consideration goes, the possibility of their being drainage ditches is untenable as some go up and down hills. However, the one at Haggett's Pond seems to the author to be a drainage ditch (22). The difference in the vegetation and surface of the land east and west of the ditch has been mentioned earlier. It is also to be noticed that the eastern end of the

cultivated field, where the Indian site is located, a hundred yards or so to the southwest, shows evidence by fungus growth, etc., of dampness. It seems likely that this ditch was dug to lower the water table of a small swampy area between the field and the ditch. In this connection it is to be noted that there is no indication of any corner at the southeast end of the ditch, contrary to Moorehead's statement on page 17. At this end, the trench obviously just starts (or ends) and there is not the slightest evidence, now at least, of a corner or continuation. At the northwest end there is the corner and extension as shown by Moorehead (Fig. 3). In agreement with the drainage theory, the mound is on the east, or side away from the presumed swampy land, and to the north is a deep gully into which the water from the northeast extension of the ditch would seep.

(21) Andover Town Records, March 13, 1709/10.

(22) The grey yellow of the eastern part of the mound might be used as an argument for a fireditch but the lack of continuation to the south and the corner at the north would not seem logical.

The earthwork at Fort Goldsmith (Fig.4) is nothing more or less than the remnant of an old road, (23) cut into the side of a hill, as anyone who wishes to stop at Gould Road, between Andover and Reading, and look behind the pines will find out for himself. It begins only about 30 feet off the main road.

Ha-has are sunken fences used principally in England to restrict the range of cattle and sheep or to keep out deer. They were sunken so as not to obstruct the view. Apparently a classic ha-ha should have a fence either in the ditch or else along the mound. However, it can still be a ha-ha without the fence, one steep wall serving as the fence. No indication of fence post holes was found in the excavation but if rail fences were used, it would only be by luck that one would be found in a narrow test trench, or no posts might have been used, depending on the type of fence.

In the Andover Town Records there are a lot of references to the depredations of live stock, but no intimation there, or in the town history, of the use of ha-has, while the fence viewer was an early (1665) town officer (24). However, there is a definite possibility that some of the ditches may have been ha-has.

In the olden times, three kinds of land were spoken of; meadow, pasture, and tilling lands. The meadow lands were low, swampy and usually bordering on the streams or ponds. One feature that seems common to many of these ditches around Andover is that they tend to enclose low land. The mound is always on the water side. That may be because the water side is the lower side and consequently the easier side for throwing or because that would be the correct way to dig a ha-ha to keep animals out of the meadows. From their geographical location the earthworks of Fort Graham, Fort Shawsheen, and Fort Benner would fit this hypothesis admirably.

In the Connecticut Valley, similar ditches are referred to by some as ha-has or sheep ditches. The author has seen some of these ditches and they appear to be similar to Fort Graham, Fort Shawsheen, and Fort Benner. For the Connecticut Valley, there is documentary evidence which seems to shed light upon these earthworks.

"Next to the intervalles, the swamps were most sought after \*\*\* for lay," says Judd in his HISTORY OF HADLEY (25). He continues, "Hadley ordered, in 1669, that little Pansett fence should be made 'with ditch, posts, and two or three rails on the same.' The broad ditch and high bank of earth thrown out of the ditch were an important part of the old common fence, they may still be seen on both sides of the river. The ditch was on the outside of the bank and rails, for the main object of the fence was to secure the meadows from domestic animals that roved in the woods on the outside." (26) "The old ditch which belonged to the Forty Acre fence, may still be traced in many places, on the plain, on banks, and hill sides." (27) "The people of Hadley fenced the common fields, school meadow and home-lots, and for a century not many other lots. The fences were chiefly of two sorts, 1st, a fence was made of 5 rails with posts, about 4 feet high. 2d, a sufficient ditch was dug, and the earth was thrown upon one bank, and a line of posts with 2 or 3 rails was set upon this bank." (27) John Pynchon had four kinds of fences at Springfield and Suffield in the 17th century, "Including \*\*\* a ditch and dead hedge". "Some of his ditches exceeded 4 feet in width and 3 feet in depth, with a dead hedge on the bank." (29)

It is interesting to note that "The ditch fence was used many years after 1800," and that "Ditches were dug in the last century (18th Century) at 8 pence per rod, when labor was 2 s per day. Three rods were a day's work." (30)

A writer of 1848 says, "There is now a fence where the sheep pasture fence was, and the ditch of the old common fence still stretches up the mountain side. Most of the old sheep land is now in woodland." (31)

The above indicates that these ha-has were common in the Connecticut Valley in Colonial days. The similarity to many of the Andover earthworks in the location and description suggests a common purpose. It is logical to expect that as the meadow land was divided up, parts, at least, of these ha-has would become boundary lines, as is indicated in the preceding paragraph.

Such seems to be the case with Fort Graham (32). Referring to Moorehead's map reproduced in our Fig.1, it will be noticed

(23) Moorehead, 1912, pictures, Fig. 8 and 9, pp. 29-30, show this clearly.

(24) Bailey, 1880.

(25) Judd, 1863, p.202.

(26) *Ibid.*, p.41.

(27) *Ibid.*, p.200.

(28) *Ibid.*, p.439.

(29) *Ibid.*, p.439, footnote.

(30) *Ibid.*, p.440.

(31) *Ibid.*, p.298.

(32) Fort Graham, and Forts Benner and Shawsheen (Fig.5) meet all the requirements of the Connecticut Valley type of ha-has.

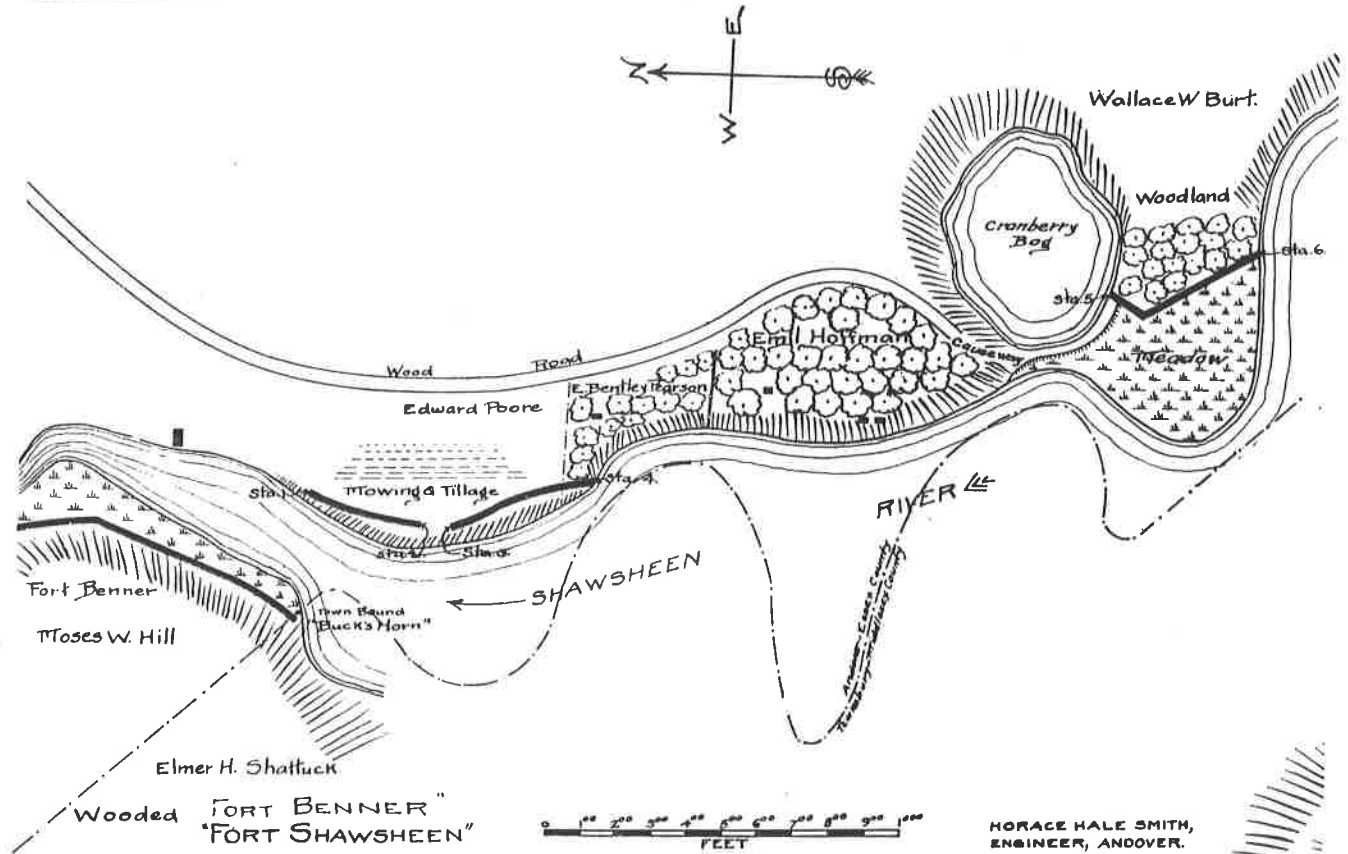


Fig. 5

that a stone wall approaches the earthwork from the southwest towards Sta. 6. Not shown on the map, however, is the fact that this wall continues past Sta. 6 towards the northeast, while another stone wall, following the earthwork from Sta. 7, continues past Sta. 6 towards the southeast. There is then, at Sta. 6, the corner of the earthwork, a crossing of two stone walls. The stone wall from Sta. 6 runs in the ditch, beside the ditch, or on the mound, depending on where one inspects it. It is clear that part of the way, at least, the earthwork and a boundary line coincide. A similar situation is suggested at Sta. 9 but the author has not examined it himself.

There are many more ditches in what might be called the "Foster's Pond Work" than are indicated by Moorehead's map (our Fig. 4). Three, of about the same length,

including the one shown on the plan, coincide with boundary lines, but there is no accompanying stone wall. One of these was the boundary in a deed recorded in Salem on April 25, 1825. Others were recorded later (33). It is to be noted that on Moorehead's plan the earthwork of the Foster's Pond Work is shown as coinciding with the boundary line between the land of Carter and Pearson. There is also another deed of the early 19th Century mentioning a line to a dry ditch, the latter being part of Fort Graham near Sta. 14. (34)

Moorehead mentions the Foster's Pond earthwork as being different from the others because the dirt was thrown out on the higher side (35). An examination fails to confirm this. Along the southern end of the earthwork, the land drops suddenly into a swamp. Only part of this steepness is the

(33) Miss Bessie Goldsmith of Andover has copies of some of these deeds. The 1825 one, from Amos Holt to Joseph Gowing, registered in Book 239, Leaf 48, reads in part as follows: "Thence north 12 west lay land as aforesaid four rods and one-half (4½) to a ditch by land of Jon Carter, and Asa Sheldon, "Thence Northerly and Easterly up said ditch as ditch is now dug, sixty-seven rods and three-tenths (67.3) to a stake in the corner of the ditch by land of John Russell."

(34) Arthur Hofmann, personal communication.

(35) Moorehead, 1912, p.43.

result of the ditch which is dug exactly at the edge of the swamp. It is not too clear, however, as to where the dirt was piled. Unquestionably the west wall towers up from the ditch but there is a suspicion of a mound just to the east, in the swamp, at the edge of the ditch. The difficulty is that dirt thrown out from the swamp would be muck and hard to locate. The top of the ground to the west would be a difficult throw. Following the ditch to the north, it becomes lost and then reappears, much smaller, and with the mound definitely on the swamp side. From an examination of this ditch there seems to be no possible use for it except as a boundary line, for which it is still being used today.

*Conclusions*

As the Millis earthwork is the most famous and complicated in Massachusetts, a few words should probably be included viewing it in the light of this investigation. Unfortunately, the author has not visited it himself. Willoughby did not specifically commit himself as to whether it was of Indian or white construction, but infers that it is Indian (36). Moorehead says, after looking at it, that "If they (the Millis earthworks) are of Indian origin, the ones near Andover certainly are." (37) From the illustrations they look similar but larger (38). From this we can assume that there is not much difference in their appearance, and the author would presume them to be post-Indian. Willoughby does not report any Indian material but Moorehead indicates some was found there (39).

Willoughby states that while the dirt is usually piled on the lower side, that some of the cross ditches vary in this respect, as will be noted from his plan and cross section (40). However, an examination of the model on exhibit at the Peabody Museum, Harvard University, Cambridge, Mass. and of the sketch on file there, indicates that while the side on which the dirt is piled varies, it is always on the lower side of any one ditch. It is also interesting to note that a photostat of a map of the land made in 1643 does not show any earthworks. There seems to be no reason for not assigning them to the work of the early settlers. Probably they are ha-has dividing the pastures on the hill for sheep grazing.

The evidence indicates that all the earthworks of this type in Massachusetts are the work of the early settlers and that they were built for various reasons but chiefly as ha-has or boundary lines.

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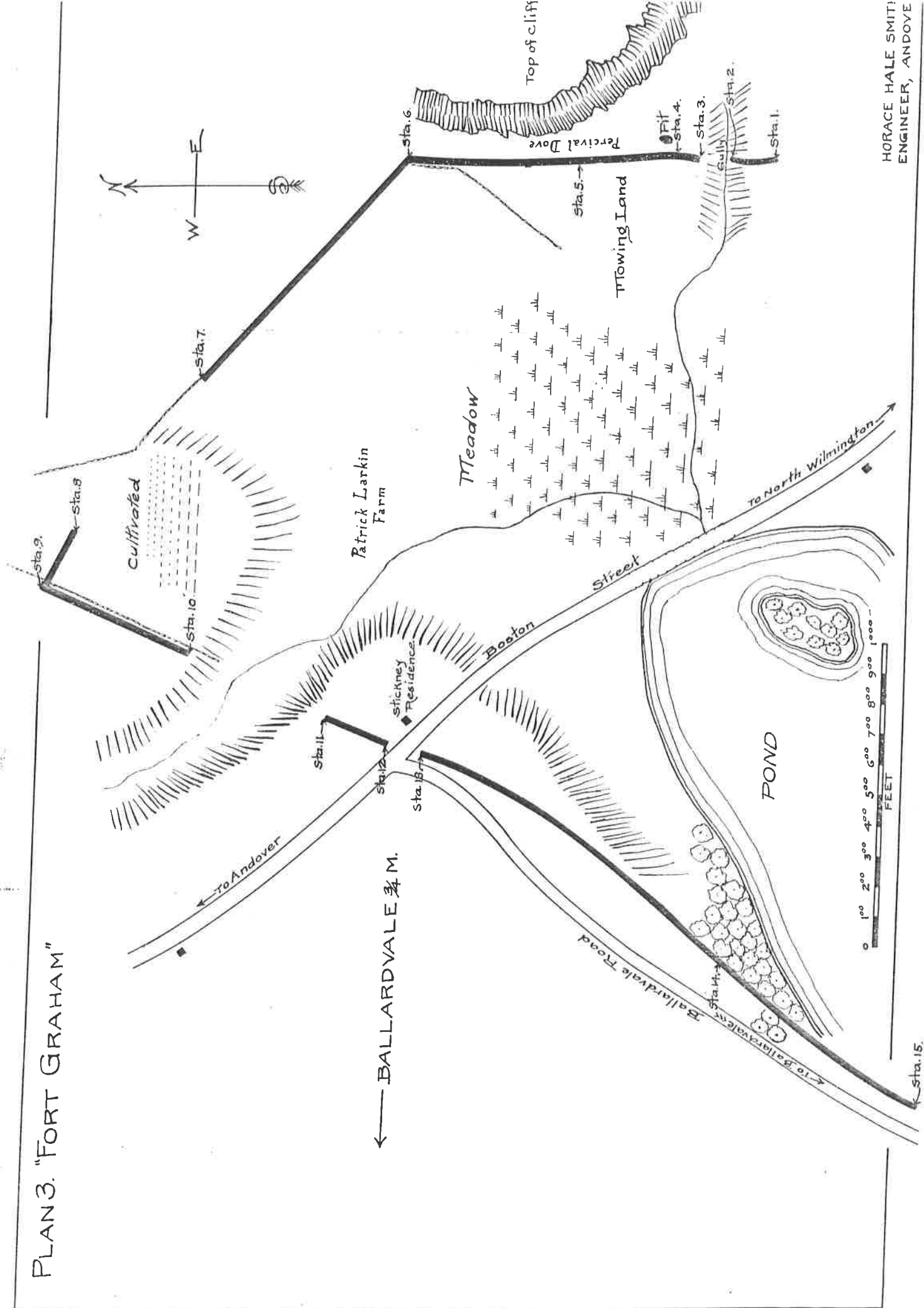
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- (36) Willoughby, 1911.  
(37) Moorehead, 1912, p.14.  
(38) Willoughby, 1911, Figs. 80-90, pp. 570-572.  
(39) Moorehead, 1912, pp.14 and 52.  
(40) Willoughby, 1911, Fig. 86 and 87, pp. 568 and 569.



# PLAN 3. "FORT GRAHAM"



HORACE HALE SMITH  
ENGINEER, ANDOVER