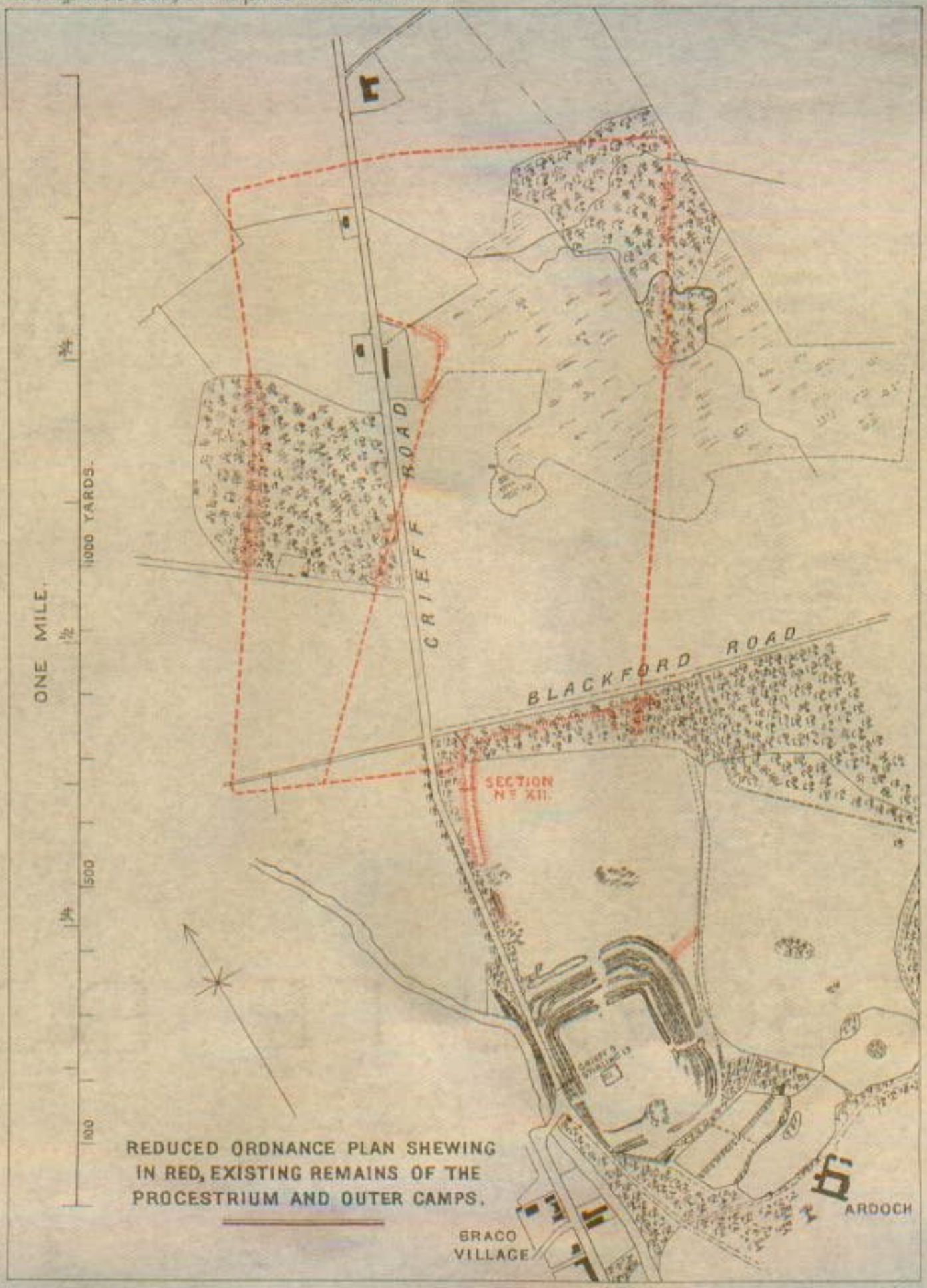
II. ACCOUNT OF THE EXCAVATIONS AND DESCRIPTION OF THE PLAN AND INTERIOR STRUCTURES. By J. H CUNNINGHAM, C.E., F.S.A. Scot.

The Roman station of Ardoch is situated in Perthshire, near the southern border of the county, and close beside the road from Dunblane to Crieff, at a point 7 miles distant from the former and 9 from the latter town. It is rather less than 1½ mile from Greenloaning, on the Caledonian main line, which is the nearest railway station. As the crow flies, its distance north of the Antonine Wall is about 18 miles. The fortified area is from 408 to 416 feet above the level of the sea, and is only slightly higher than the plain through which the Allan Water flows from Blackford, near its sources, to Kinbuck about 8 miles lower down its course. This plain is about a mile wide, and parts of it are frequently flooded in wet weather, particularly near the Royal Caledonian Curling Pond at Carsebreck. The 400 feet contour line on the Ordnance map may be taken to represent its boundary, and the site of Ardoch station is about the middle of its north side. At this point, the plain, which has taken a westerly direction from Blackford, trends away to the south-west towards Kinbuck. On each side of it, and within 2 miles from its edge, the ground rises to a height of 1000 feet, and beyond this there are upland pastures and moors which attain to very much higher elevations.

The work of excavating in the Roman station was commenced on the 11th of May 1896, and was carried on till the 6th of May 1897, except during a few weeks in January and February when the operations had to be suspended owing to the severe frost. Mr Thomas Ely was in charge as clerk of works, and three or four labourers were employed in digging under his supervision.

In describing these operations and the structural remains which they disclosed, it will be convenient to direct attention in the first place to the "Procestrium" and the other Outer Camps. According to Roy's plan, fig. 7, these were situated on a piece of ground ¾ of a mile in length and ⅜ of a mile in width lying to the north-east of the station, and occupied an area of about 150 acres. The Northern Rampart crossed



REDUCED ORDNANCE PLAN SHEWING IN RED, EXISTING REMAINS OF THE PROCESTRIUM AND OUTER CAMPS.

the line of the Crieff Road at a point about $\frac{7}{8}$ of a mile from Ardoch Bridge, but no traces of it now remain. In fact, by far the greater part of the fortifications of these camps have disappeared, but portions of them may still be seen on ground which has not been brought into cultivation, and the existing remains are shown in red on Plate IV., which is a reduced copy of the Ordnance plan. Though the existing mounds and ditches are comparatively small in extent, they are quite sufficient to bear testimony to the accuracy of Roy's plan, which appears to have been carefully and correctly made. Part of the Rampart of the "Procestrium" in the plantation on the south side of the Blackford Road is fairly perfect and may easily be found, but the traces of the defences of the other camps are now nearly obliterated. They may be found by the help of a plan, but a visitor, who was not previously aware of their existence, would most probably never detect them, and they would certainly afford him no clue to the form of the extensive fortifications of which they once formed a part. Only one section (No. XII., Plate VI.) was made in these outlying works. It was cut near the north-west angle of the "Procestrium" (plan, Plate IV.), and the rampart was found to consist of a simple mound of gravel, and to be of quite a different nature from the complicated structure which forms the main rampart of the station. It may be noted that at this section the ground is about 50 feet higher than at the south side of the station.

The enclosed area of the station is a rectangular piece of ground about 5 acres in extent, having sides 500 and 440 feet in length. Its defences cover upwards of 10 acres. The structural remains on this site which were examined under the direction of the Society may be classed under the following three heads :—

(1) Earthworks.
(2) Structures of Wood.
(3) Structures of Stone.

These will now be described.

1. Earthworks.

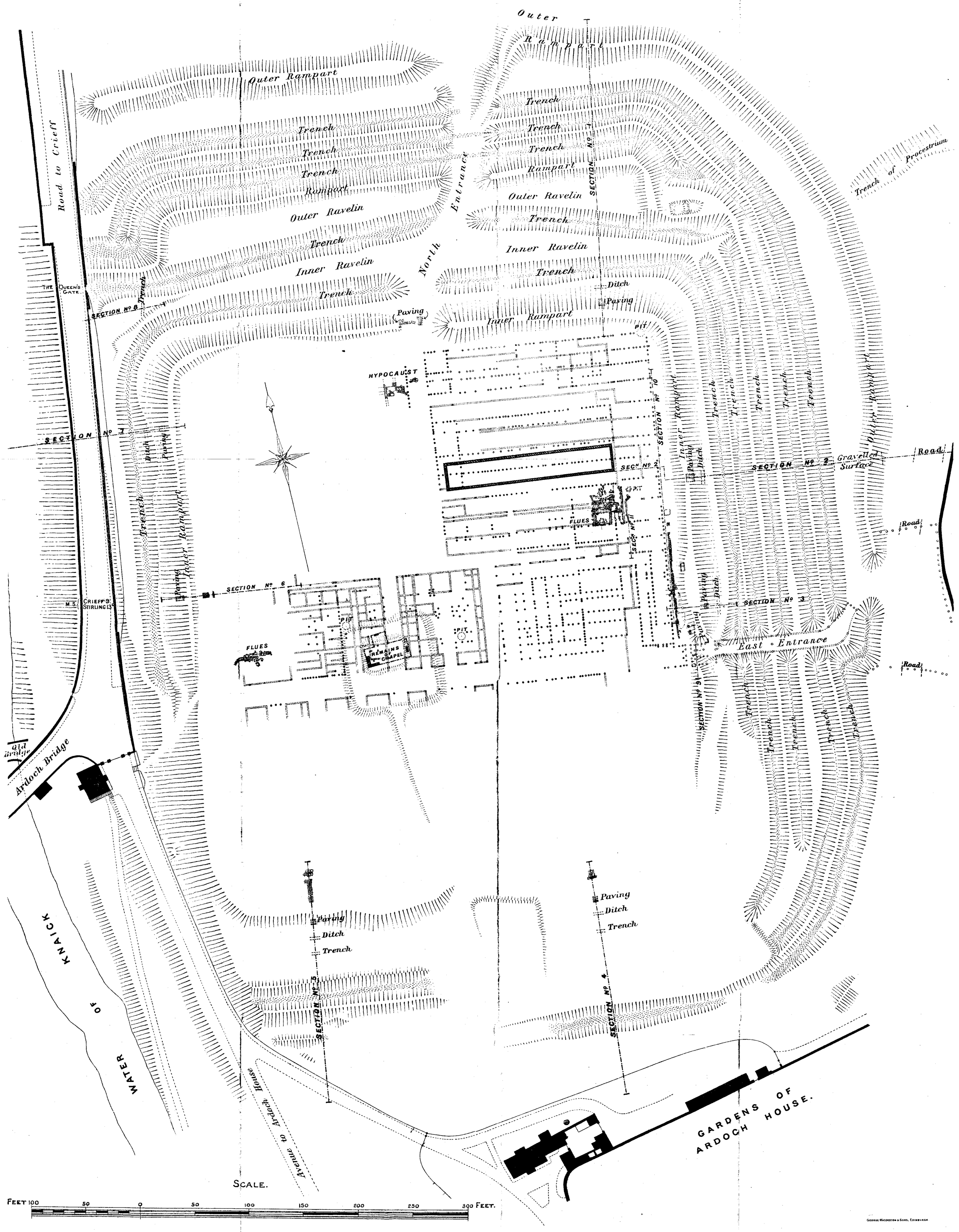
These are shown on the general plan (Plate V.), and consist of :—

(1) An Inner Rampart surrounding the area of the station; though on the south, and on part of the west side, it has been so nearly demolished that in these places it can now only be traced by excavating on its site.
(2) Five Trenches on the north and east sides.
(3) An Intermediate Rampart or mound of gravel defending the outer "Ravelin" on the north side.
(4) Outer and Inner Ravelins on the north side. This military term is used to denote the flat areas situated between the Inner and Intermediate Ramparts.
(5) An Outer Rampart or mound of gravel on the north and east sides.

Traces of trenches may be seen on the south and west sides, but those on the south have been nearly obliterated, apparently with the intention of bringing the ground which they occupied into cultivation. On the west side, the trenches can never have been extensive or important, as the station was placed close to the precipitous bank of the River Knaik, which forms a strong natural defence.

Clearly defined roadways enter the station on the north and east sides, and there appears to be distinct traces of a gateway on the west side, in a position corresponding to that of the one in the Eastern Rampart.

Excavations in the North Entrance and Approach indicated that at the time the trenches were made the road did not extend northwards beyond the Rampart of the outer Ravelin. The ends of the two trenches south of that Rampart were found on each side of the roadway, so that the roadway appeared to have been left intact when the trenches were made. On the other hand, the two trenches north of the Rampart did not end at the roadway but ran through it (Plate V.), so that the existing road has evidently been laid on filling thrown into these



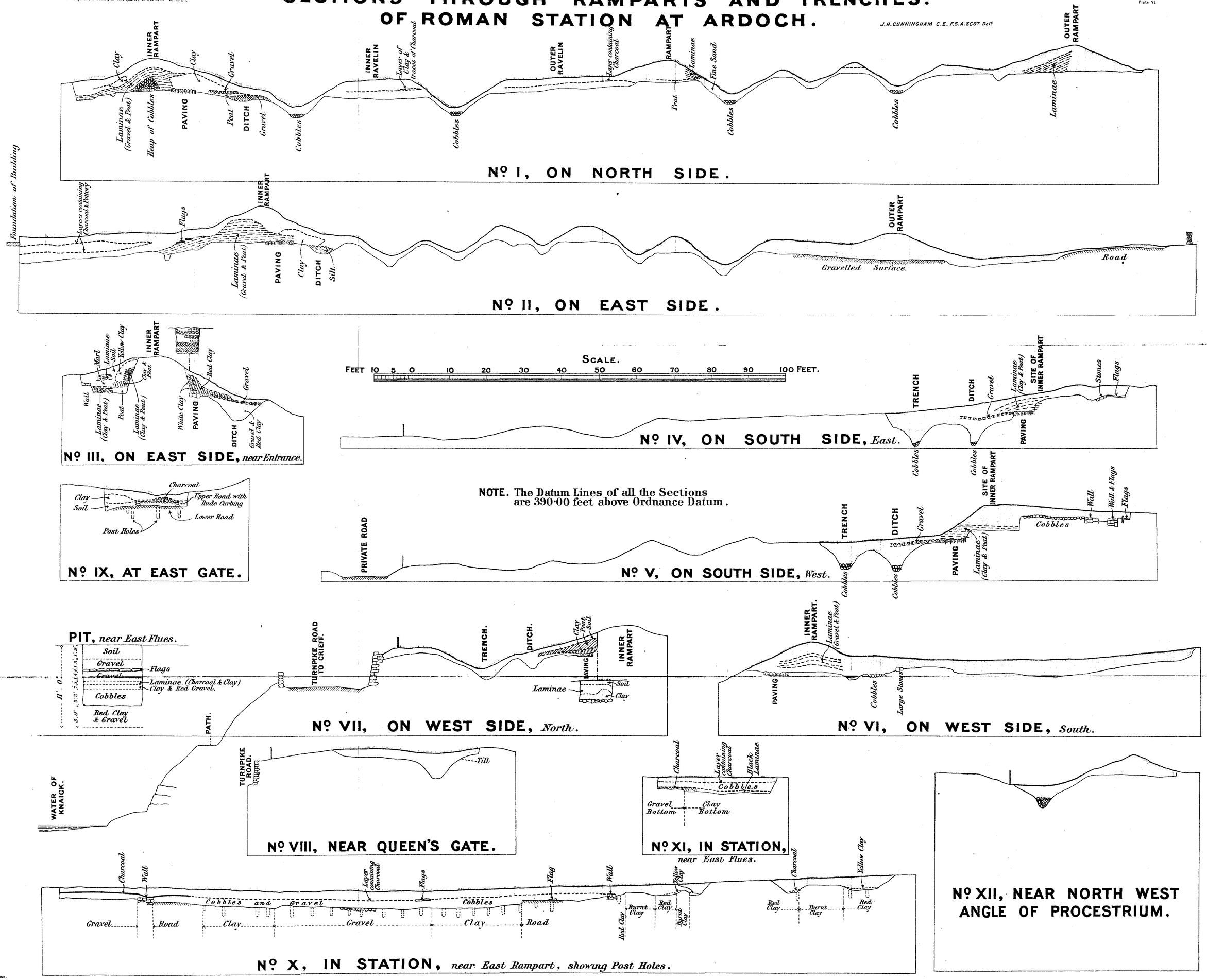
PLAN OF ROMAN STATION AT ARDOCH.

J. H. CUNNINGHAM C.E. F.S.A.SCOT. Del.

GEORGE WATERSTON & SONS, EDINBURGH.

SECTIONS THROUGH RAMPARTS AND TRENCHES. OF ROMAN STATION AT ARDOCH.

J. H. CUNNINGHAM C.E. F.S.A.SCOT. Del.



George Waterston & Sons, Edinburgh.

trenches. The fifth or outer trench did not, however, extend through the road. A road may have originally been carried across the third and fourth trenches on a wooden structure, but no traces of anything of that kind were found.

Good views of the ramparts and trenches on the north and east sides may be obtained from the top of the Outer Rampart, at a point about 30 yards northwards from the trench of the "Procestrium," and Plates I. and II. are reproductions of photographs which were taken from near this point of view. They have been explained at length in Dr Christison's division of this Paper.

From the points on the Outer Rampart from which these photographs were taken the visitor may obtain a view of part of the Rampart of the "Procestrium," which lies to the north across a piece of pasture land, at a distance of about 400 yards. It consists of a low mound covered with bracken, and shows up distinctly against the dark plantation which lies behind it.

Seven sections which are indicated by red lines on the general plan (Plate V.) were cut through the defences, and the profiles thus obtained are shown on Plate VI. Nos. I. to VII. These sections were cut down to the till, except in passing through the structure of the Inner Rampart in Nos. IV. and V. The till throughout both the station and its defences consisted of a reddish gravel containing a good many small boulders. The Inner Rampart was found to be remarkably uniform in structure, and several distinctly marked features were discovered which will be described later on. In regard to the trenches, the Rampart of the Ravelin, and the Outer Rampart, little was observed worthy of note, but attention may be briefly directed to the following points:—

(1) The almost complete absence of the laminæ which indicate the use of sods or brushwood in the construction of embankments. In this respect these two Ramparts differ essentially from the Inner one.

(2) The large amount of filling on the Ravelins (Plate VI. section I.), and on the level area just within the Outer Rampart (sections I. and II.).

(3) A layer on the Ravelins (section I.), situated at from 2 to 3 feet below the surface and from 18 inches to 2 feet above the till, and containing fragments of charcoal. In one part of the Inner Ravelin

the quantity of charcoal in this layer was so great as to form a deposit about 2 yards in length and 4 inches thick.

(4) Cobble stones, as if laid for drainage in the bottoms of some of the trenches and ditches (sections I., IV. and V.). And here it may be well to explain that the term "trench" in this paper is used to denote a work apparently constructed for purposes of defence, whereas the word "ditch" is appropriated to works which seem to have been made for drainage or some such secondary object.

(5) A gravelled surface, beneath and to the inside of the Outer Rampart (section II.). Excavation showed that, at least on the flat area, this gravelled surface extended for about 100 yards northwards from the section. In section II. may also be noticed a road formed close to the boundary wall on the east of the station.

Sections IV. and V. show how the defences have been levelled down on the south side.

The points which seemed most worthy of consideration in the sections of the Inner Rampart were :—

(1) A clearly defined piece of paving on the till beneath the Rampart, 7 to 8 feet in width, made of roughly dressed stones, many of them being 12 to 15 inches in length. This was found in each of the seven sections cut into the Rampart, and distinct traces of it were also observed in the north and east gateways. The paving was invariably found towards the outer edge of the Rampart, and may be seen fully displayed in sections I., II., and VI. It may also be noticed in sections III., IV., V. and VII., but in them the excavation was not continued so far as to uncover the whole of the stone work.

The edge of this paving may be seen in figs. 11 and 12, which are reproduced from photographs taken from the outside of the Inner Rampart, looking into sections V. and VII.

(2) A ditch which does not show on the surface, parallel to the paving and 8 to 12 feet from its outer edge. This was found in six sections, viz., Nos. I., II., III., IV., V. and VII., but No. VI. was not carried so far as to reveal it, if it exists at that point, as is most probably the case. In sections I. and II. this ditch, though quite distinct, showed as only a slight depression in the till. In sections III., IV. and V. it was

Fig. 11. View of South (west) Section (No. V.) looking north, showing edge of rough stone paving under rampart.

Fig. 12. View of West (north) Section (No. VII.) looking east, showing edge of rough stone paving under rampart.

deeply cut, and appeared to have been deliberately filled in and covered with a layer of gravel about 6 inches thick, laid so as to form a kind of platform, extending to a width of fully 15 feet from the face of the paving. In sections IV. and V. cobble stones, which appeared to have been thrown in to form a drain, were found in the bottom of the ditch. In section VII. the ditch was found to be cut fairly deep, and this may be noticed in the view of that cutting (fig. 12), where the Clerk of Works may be seen standing in the ditch, while one of the workmen holding the levelling rod stands on the top of the Inner Rampart and a visitor stands close beside the edge of the paving.

(3) Masses of clay, yellow and red, were found in sections I., II., III. and VII. above the paving and somewhat to the outside of it. Similar masses of clay were also found in the interior side of the Rampart in sections I. and III.

(4) In all sections the greater part of the Rampart was found to consist of laminated structure formed of layers of gravel or clay about 8 inches in thickness, separated from each other by thin black streaks of peat, in which the remains of brushwood and sods were easily detected. The bulk of the Rampart at Sections I., II. and VI. consisted of gravel, but in sections III., IV., V. and VII. the predominating material was clay.

(5) In every instance traces of rude stonework were found close to the Rampart on the inside. These traces consisted of (*a*) fragments of walls (sections III., V. and VI.); (*b*) flags (sections II., IV. and V.); and (*c*) cobble pavement (sections IV., V. and VI.). Small portions of flags were also found in section I., and it will be observed that section VII. was not cut through to the inside of the Rampart.

All these five features were remarkably distinct, and were found to be characteristic of the Rampart wherever it was opened. The following features may also be noted, though they only appeared in one or two sections.

(1) A heap of cobble stones was found in section I., in the centre of the Rampart.

(2) A considerable mass of peat was found in section III. on the inner side of the Rampart.

(3) In sections I., II. and VI. there appeared to be traces of a small ditch just inside the Rampart and parallel to it.

Only one other section need be referred to in connection with the Earthworks, viz., No. VIII., near the Queen's Gate (general plan, Plate V.). This cutting indicated that the end of the Inner Ravelin had at one time been defended by a short trench running in a direction nearly parallel to the public road. At this section there was also a considerable amount of filling.

2. Structures of Wood.

Attention must now be directed to the north-east quarter of the area enclosed by the defences, and to the portion lying between the east and west gates, also, to the east approach (plan, Plate V.); for it was in these parts of the station that the remains of wooden structures were found. After the explorations were commenced in the middle of May 1896, the first proceeding was to make several cuttings about 3 feet 6 inches in width, and from 3 to 7 feet in depth, across the north-east quarter, in directions parallel to the Ramparts, and soon clearly defined walls of a long narrow building were discovered, close beneath the surface. Traces of rude walls, built drains, and cobble and gravel paving were found in many parts of these cuttings, also low, narrow tracks in the till, apparently the beds once occupied by some kind of foundation. Several small iron and bronze articles were also found, as well as fragments of pottery, pieces of lava querns, a considerable quantity of charred wheat, and a number of clay pellets. The plan reproduced in fig. 13 was made after the work had been carried on for about three weeks, and shows the cuttings which had been excavated at that time, and the position of the long narrow building. So far, however, nothing had been found sufficiently definite, nor any group of things so clearly related to each other as to give a clue to their purpose. But about the middle of June a clue was found to a theory which seemed likely to supply a satisfactory explanation of some of the mysterious features which had been noted, and this idea served to direct the explorations for many weeks. In one of the cuttings the Clerk of Works noticed

several holes about 10 inches in diameter and 30 inches deep. Some were empty or nearly so, and some were filled with fine soil which could easily be distinguished from the surrounding till. In some of them

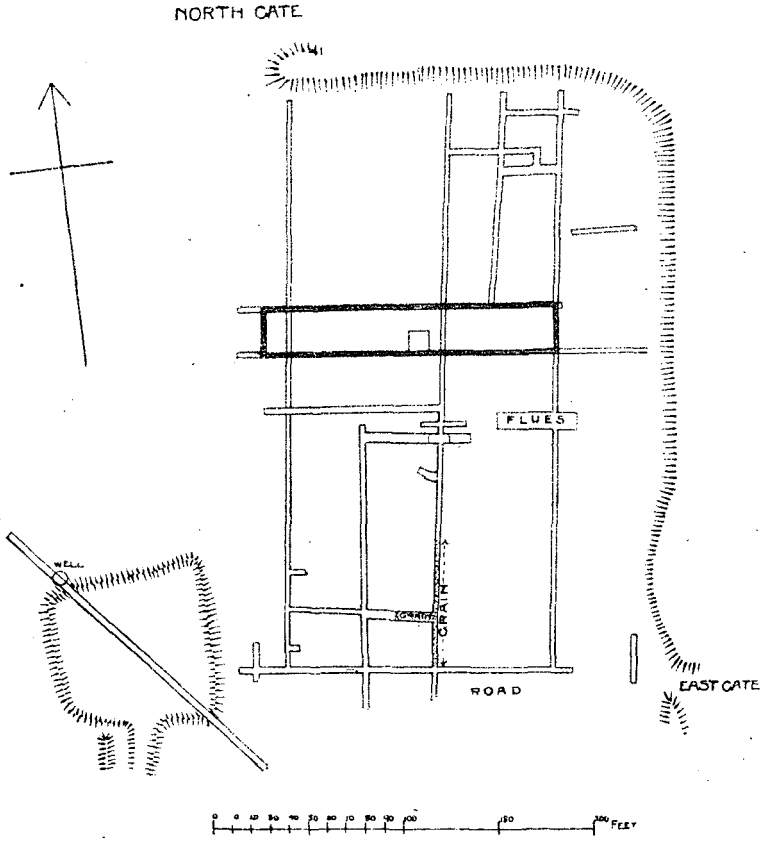


Fig. 13.

fragments of charred wood were mixed with the soil, and in a few, pieces of decayed wood 4 or 5 inches in length and about 3 inches in diameter were found. A flat stone was generally lying at the bottom, and

the sides consisted of cobbles. Apparently, these holes were the sockets in which piles formerly stood, so as to form posts or upright members in the framework of wooden buildings. It was now surmised that the narrow tracks already noticed in some of the cuttings, which it had been difficult to account for, were the beds in which wooden sleepers or cills had been laid, and that some of the buildings in the station had been constructed of wood, having upright timbers either fixed into the ground or mortised into cills. Both these methods of founding wooden structures are still in use, and may be better understood by referring to the sketches, figs. 14 and 15. If cills are to be used a track is cut in the ground, and a wooden sleeper about 12 inches wide and 6 inches

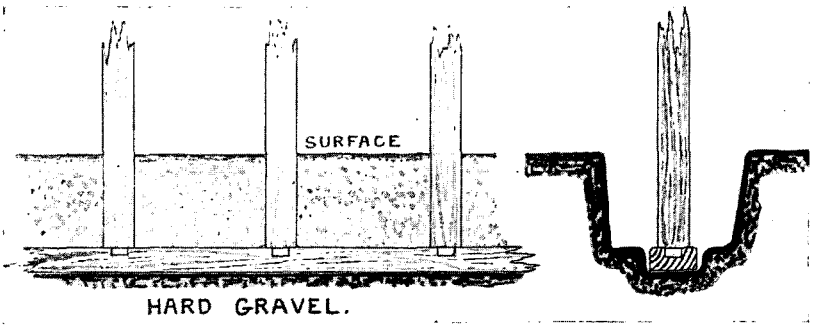


Fig. 14.

thick is laid in it. The ends of the upright posts are then mortised into the cill (fig. 14).

If the posts are to be fixed in the ground, holes are dug at the proper places, and in each of them a solid footing, probably a flat stone, is laid to receive the upright timber. The post is then placed in position and carefully packed round its base with stones or earth (fig. 15).

It must be understood that these sketches represent a sleeper-bed and a post-hole actually found in the station, and that the woodwork is introduced merely to indicate a method of construction which may account for the holes and narrow tracks found in the cuttings. In fig.

15, the floor of the wooden building may have been at an old surface, which was found from 2 to 3 feet below the present surface, and is marked in the sketch by a black streak running between the upper and lower beds of gravel. But the floor may possibly have been at a lower level near the top of the clay, as both the beds of gravel shown in fig. 15, as well as that shown in fig. 14, had been artificially filled in, and were not natural deposits.

Having thus come to the conclusion that wooden sheds or houses had been erected in the station, it was resolved to test this hypothesis by further excavations, and, if possible, to ascertain the extent and general arrangement of the buildings. The results of these investigations are shown in red on the general plan (Plate V.), holes being indicated by small circles and sleeper-tracks by dotted lines. It will be seen that the holes are situated in straight lines, and spaced at fairly regular distances apart; also, that the sleeper-tracks are cut along lines which coincide with the directions of the rows of holes. Both holes and sleeper-tracks seem to be parts of one system, and there can be little doubt that the area in which they were found was at one time covered by rectangular blocks of wooden buildings. In many places the cuttings passed through beds of packed gravel, or clay, 6 to 8 inches in thickness, and it would therefore seem that some of the apartments or sheds had been floored with gravel or clay, and that narrow roads had intersected the buildings. But it is not now possible to determine which of the small rectangular areas were originally roofed over, and which of them were merely open courts or roadways.

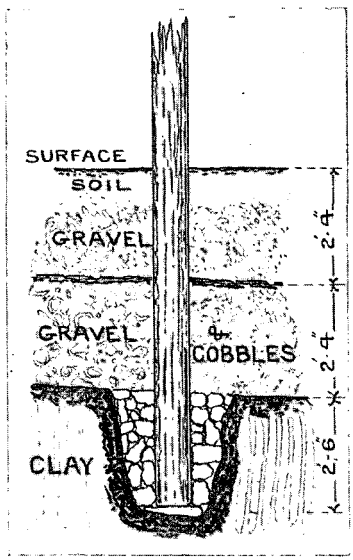


Fig. 15.

It is worth noting that the general configuration of the buildings and principal streets closely resembles that found in the Roman station at Birrens, as shown on the plan made by Mr James Barbour in 1895 (*Proceedings*, vol. xxx., 1895–96, p. 96). There, however, the foundations were all of stone.

The East Gateway and Approach (plan, Plate V.) were thoroughly explored, and the former must have been defended by a structure of exceptional strength, if we may judge from the number of post-holes clustered together at that point and near it. Some of these holes were in a remarkable state of preservation and almost quite empty. Sleeper-tracks and holes were found along each side of the Approach, indicating that it had been fortified by palisading. Holes were also found in the roadway, near its eastern end, where it is carried through the outer trench, and at the distance of about 20 yards from the line of the Inner Rampart, and probably gates formerly stood at these points. Three lines of post-holes were traced outside of the Outer Rampart, and it seems probable that they indicate the former existence of a palisade for the defence of the outer end of the Approach.

Sections Nos. X. and XI., with part of No. II. (Plate VI.), may be taken as fairly representing the character of the cuttings which were made inside the station, chiefly for the purpose of tracing the ground plan of the wooden buildings by means of the post-holes and sleeper-tracks in which their upright supports had been founded. These sections, as well as the enlarged section of the "Pit near the East Flues" (Plate VI.), may also serve to give some idea of the various beds of material which were found to cover the area of the station. In general, the following strata were observed in digging downwards from the surface:—

(*a*) Soil, 8 or 9 inches thick.

(*b*) Gravel, 15 to 24 inches thick.

(*c*) A thin layer containing fragments of charcoal, pottery, and occasionally bronze or iron objects.

(*d*) Gravel, 20 to 30 inches thick. In this bed the gravel was coarser and contained more cobbles than in (*b*).

(*e*) The till, consisting of gravel which had never been disturbed.

In a length of about 12 yards near the southern end of section No. X. the quantity of charred fragments in the layer (*c*) was so great as to form a deposit 3 or 4 inches thick. Portions of gravel roads and a piece of cobble paving were found in the bottom of this cutting, also several masses of burnt clay, which seemed to have formed the hearths of considerable fires. The positions of some of the post-holes and their depths in the till may also be noticed (section X., Plate V.).

These phenomena clearly suggest two occupations of the site, viz., one which has left its traces in layer (*c*), and another whose remains were found close to the surface of the till, but they do not indicate in any way the length of time which elapsed between the earlier and the later tenancy. Probably these occupations did not differ greatly in character, and were not separated from each other by an interval during which the site was wholly unoccupied.

The amount of the filling on the area of the site is worth noting, for it was seldom less than 3 feet in depth, and in some places, near the East Flues for example (see section II.), it attained a depth of 7 feet.

In section XI. (Plate VI.) may be noticed the two beds of gravel, and two layers containing charcoal, the one about 2 feet below the surface, and the other close to the till, which, in part of this cutting, consisted of clay. The lower layer of gravel contained an unusual number of cobbles.

Similar beds of gravel and charcoal layers may be seen in the west part of section II., which lay between the Inner Rampart and the long stone building, but in this case the lower layer of charcoal was found on the top of gravel which seemed to have been laid on the till to a thickness of nearly 2 feet.

In the section of the "Pit near the East Flues" (Plate VI.), flags were found apparently *in situ*, 3 feet 2 inches below the surface. These may be taken as traces of the second occupation, and remains of the first may be noted in the clay and charcoal which was found 16 inches below them. This pit was excavated only to a depth of 8 feet, and the nature of the material below that was ascertained by inserting a bar. There

was no difficulty in doing this, and apparently the bar might have been pushed further down if it had been longer.

Section IX. shows a cutting made across the East Gateway. Several of the post-holes are marked upon it, and it also shows two roadways which were found, one of them having been laid on the top of the other. Just above the upper roadway there was a considerable deposit of charcoal.

In the course of the operations four pits were found, two of them in the central part of the station near the remains of the Chapel, one in the north-east corner, and one, which has been already referred to, near the East Flues. They were 7 or 8 feet in diameter, and were cleared out, so far as this could be done, without using timber linings and hoisting tackle. But it was not considered worth while to incur the expense which a thorough investigation of them would have involved.

3. Structures of Stone.

In several places within the fortified area of the station, stonework or rude masonry was found which appeared to be the remains of buildings of some kind. The most important of these remains was the corner of a Chapel which was discovered near the centre of the station. As a description of this by Mr Thomas Ross, architect, will be found at page 471, nothing more need be said about it here.

Next to the fragment of the Chapel, perhaps the best piece of masonry was the long narrow building which was found soon after the works were commenced. It was 154 feet in length and 25 feet 9 inches in width, and the walls were remarkably perfect, though they consisted of only about two courses. They lay close beneath the surface. No scrap of moulding or anything else was found which might have given some clue either to the time when this building was constructed or to the purpose for which it was used.

Near the North Gate some masonry which appeared to be the remains of a hypocaust was uncovered. It consisted chiefly of portions of two narrow passages or flues, running north and south, and about 6 feet

6 inches apart. When cleared out they were found to be 1 foot 9 inches in width, with side walls from 3 to 4 feet in height, and to contain a good deal of burnt material, both clay and charred wood. Fragments of plaster or concrete, which seemed to be the remains of a floor, were also found in them. The walls had evidently been carefully and substantially constructed, and well-built corners were observed, showing that these flues had been joined by other similar ones, running into them at right angles. It is difficult to convey any idea of a struc-

Fig. 16. View of Rude Masonry near North Gate, taken from east.

ture of this kind by means of a plan, and the flues themselves were too deep below the surface to admit of their being photographed. Two photographs were, however, taken by Mr Macintyre of some rude stonework found just beneath the surface, which apparently must have been connected with the flues at some period. Figs. 16 and 17 are reproductions of these photographs, the former having been taken from the east and the latter from the west side.

Near the south-east corner of the long building already referred to an

area of about 140 superficial yards was found to be covered by stones laid in a very confused and irregular way, but nevertheless affording clear traces of flues or channels which appeared to have been intended to carry off water. This structure, if the term may be applied to such a rude conglomeration of stones, was situated at a depth of about 3 feet below the surface. A similar structure, but covering only about 40 superficial yards, and close beneath the surface, was found near the

Fig. 17. View of Rude Masonry near North Gate, taken from west.

West Gate. A view of the smaller one was taken from the west side, and fig. 18 is a reproduction of the photograph.

Close inside the East Rampart and extending northwards from the East Gate for about 40 yards the remains of a wall were discovered. Near the Gate there were also two hearths, a piece of cobble paving, and a clay floor.

The positions of all the remains of stonework which have just been described are laid down in red on the plan (Plate V.).

As has already been stated in describing the earthworks and the wooden structures, bits of cobble paving, walls, flags, and clay hearths

were found in a good many places, both close inside the ramparts and on other parts of the site, but these remains were too rude, and too vaguely defined, to throw light on any of the unsolved questions connected with the station.

Although the structures which were found on the site of the Roman

Fig. 18. View of Rude Masonry near West Gate, taken from west.

station at Ardoch have not been described very minutely in the foregoing pages, it is believed that attention has been directed to their main features, and especially to all phenomena which were noted so frequently as to be at all characteristic of any kind of construction.