

SITE SUMMARY SHEET

93/140 A1 Trunk Road - Healam Bridge II (Dishforth to North of Leeming)

NGR: SE 24503500

Location, topography and geology

Eight areas were surveyed in five fields to the south of Healam Bridge, North Yorkshire. The survey blocks lie to the east of the present A1. The topography is relatively flat in all of the fields. The solid geology is Triassic and Permian sandstones and the drift geology is glacial sands and gravels.

Archaeology

Information collated by **Anthony Walker and Partners (AWP)**, in the form of a desktop survey, has indicated that the general area around Healam Bridge is of considerable archaeological interest. Recent fieldwalking initiated by AWP, and forming part of a larger assessment of the upgrading of the present A1, has found considerable quantities of Romano-British pottery in the area.

A recent survey by **Geophysical Surveys of Bradford** (Report No. 93/121), commissioned by AWP, has indicated substantial archaeological features on either side of the present road. It is thought that the remains indicate the position of a Roman fort and presumed associated settlement.

Aims of Survey

The aims of the survey, as set out in the original specification are:-

1. to provide a detailed plot of any below-ground archaeological features and deposits;
2. to provide information about the nature and possible interpretation of anomalies revealed by the survey;
3. to identify, as far as possible, any areas which are not responsive to geophysical techniques.

An additional aim of the second stage of survey at Healam Bridge was to trace some of the anomalies found in the original gradiometer survey.

Summary of Results *

All of the surveyed areas have provided some possible archaeological anomalies. However, the greatest concentration of anomalies lies adjacent to the presumed settlement i.e. Areas C11 and C13. The lack of anomalies in the southern areas suggest that the limit of the settlement lies within the investigated area. The Areas C9 and C10 surveyed around the fort, indicate some archaeological anomalies although the interpretation has been hindered by the presence of a buried gas pipe.

* It is essential that this summary is read in conjunction with the detailed results of the survey.

SURVEY RESULTS

93/140 A1 Trunk Road - Healam Bridge II (Dishforth to North of Leeming)

1. Survey Areas (Figure 1)

1.1 Eight survey areas were specified by AWP for Stage II of this project. They have been labelled C6-7 and C9-14. Area C8 identifies an area not surveyed during this stage. The survey blocks were subdivided into 20 x 20m grids and the corners of the grids were set out by AWP using an EDM total station instrument. Where appropriate the grid followed the surface collection grid previously established by AWP.

1.2 The position of the survey areas can be seen in Figure 1.

2. Display

2.1 The results are displayed as dot-density plots, X-Y traces and grey scale images. These display formats are discussed in the *Technical Information Section*, at the end of the text.

2.2 Plots showing the complete data sets, together with summary interpretation diagrams, are produced at a scale of 1:2500.

2.3 The data are also displayed at a scale of 1:500 in the archive section, along with detailed interpretations at the same scale. Letters in parenthesis refer to anomalies on these interpretations.

3. General Considerations - Complicating factors

3.1 Conditions at the site were generally good, with low vegetation cover.

3.2 Some parts of Areas C6, 12 and 14 were unavailable for survey due to mounds of manure or bales of straw.

4. Results

The results of the gradiometer surveys are reported in the numerical sequence given by AWP. Where appropriate adjacent areas have been processed together.

4.1 Area C6 & C14 (Figures 4-7)

4.1.1 This survey area lies to the south of the original Area C1. At the time of the survey the ground cover was stubble. A small part of the proposed survey area, at the southern end, was not available due to the presence of an electric fence and bales of straw.

4.1.2 The data collected in Area C 6 & 14 contain few archaeological type anomalies. The majority of these are in the western corner of the survey area and, given the orientation of the main ditch anomaly, the anomalies at (A) probably represent a limit of the settlement identified in the previous survey.

4.1.3 Elsewhere in the survey area there is a spread of ferrous material of unknown date.

4.1.4 There is a possible length of ditch (B) in the southern corner of the survey area.

4.2 Area C7 (Figures 8-9)

4.2.1 This area lies directly to the south of Area C6, and is the southernmost sample surveyed. The ground cover was bare earth.

4.2.2 There are occasional ferrous peaks throughout the area.

4.2.3 A small number of possible archaeological anomalies have been identified in Area C7. These anomalies are concentrated in the western corner and appear to indicate pits and a small length of ditch.

4.3 Area C9 (Figures 10-11)

4.3.1 This survey area is the northernmost surveyed in this stage of assessment. The ground cover was stubble.

4.3.2 The data collected in this section are dominated by the magnetic 'shadow' from the ferrous pipe that was found to run through Area C5.

4.3.3 Despite the presence of the pipe it is possible to say that a large part of the area appears to be devoid of archaeological type anomalies. A single pit type anomaly (C) has been noted.

4.4 Areas C10 & 12 (Figures 12-13)

4.4.1 This sample lies in the same field as Area C9, and is separated from it by the ferrous pipe.

4.4.2 Two lengths of ditch can be seen in the data. These apparently form a right angle (D), although part of the corner may lie beyond the surveyed area. A number of other anomalies have been identified and these include both possible ditch and pit type responses.

4.4.3 An area of 'shadow' from the ferrous pipe has been noted.

4.5 Areas C11A & 13A (Figures 14-17)

4.5.1 This section was under a young crop and lies adjacent to Area C1.

4.5.2 The dominant response (E) is a single linear that has been identified throughout the survey area. There are a number of linears that appear to join this central ditch: those that are definite archaeological features are on the southern side of the ditch.

4.5.3 There is a pair of possible curving ditches (F) in the northern corner of the survey. While it is likely that they are the product of archaeological features, a geological origin cannot be ruled out.

4.5.4 A series of broad anomalies (G) lie to the east of the central ditch. Although some of the anomalies must relate to archaeological features it is also possible that modern debris in the topsoil may have created some of the noise.

4.6 Areas C11B & 13B (Figures 18-19)

4.6.1 This area is the southern extension of Area C11A and 13A. However, the field was harrowed rather than planted.

4.6.2 The main anomaly (H) is the continuation of the linear noted in the previous section. However, the strength of the anomaly decreases significantly in its southern part. This appears to be a classic 'habitation' affect and is likely to reflect an increase in distance away from the main settlement area.

4.6.3 The main ditch is crossed by a single ditch which extends beyond the eastern boundary of the survey.

5. Conclusions

5.1 This second stage of gradiometer survey at Healam Bridge has extended the breadth of archaeological information in the survey areas, and has improved the quality of interpretation of the first stage data.

5.2. The second stage of survey has shown that the density of possible archaeological remains decreases with distance from the present A1. Similarly, the southerly samples, Areas C6, 7 and 14, contain fewer archaeological anomalies than the areas around the fort.

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Project Assistants: Dr C Adam, N Nemcek, D Shiel, A Shields, and A Wilson

10th January 1994

Geophysical Surveys of Bradford

TECHNICAL INFORMATION

The following is a description of the equipment and display formats used in **GEOPHYSICAL SURVEYS OF BRADFORD** reports. It should be emphasised that whilst all of the display options are regularly used, the diagrams produced in the final reports are the most suitable to illustrate the data from each site. The choice of diagrams results from the experience and knowledge of the staff of **GEOPHYSICAL SURVEYS OF BRADFORD**.

All survey reports are prepared and submitted on the basis that whilst they are based on a thorough survey of the site, no responsibility is accepted for any errors or omissions.

Magnetic readings are logged at 0.5m intervals along one axis in 1m traverses giving 800 readings per 20m x 20m grid, unless otherwise stated. Resistance readings are logged at 1m intervals giving 400 readings per 20m x 20m grid. The data are then transferred to portable computers and stored on 3.5" floppy discs. Field plots are produced on a portable Hewlett Packard Thinkjet. Further processing is carried out back at base on computers linked to appropriate printers and plotters.

Instrumentation

(a) Fluxgate Gradiometer - Geoscan FM36

This instrument comprises of two fluxgates mounted vertically apart, at a distance of 500mm. The gradiometer is carried by hand, with the bottom sensor approximately 100-300mm from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is conventionally measured in nanoTesla (nT) or gamma. The fluxgate gradiometer suppresses any diurnal or regional effects. Generally features up to one metre deep may be detected by this method.

(b) Resistance Meter - Geoscan RM4 or RM15

This measures the electrical resistance of the earth, using a system of four electrodes (two current and two potential.) Depending on the arrangement of these electrodes an exact measurement of a specific volume of earth may be acquired. This resistance value may then be used to calculate the earth resistivity. The "Twin Probe" arrangement involves the pairing of electrodes (one current and one potential) with one pair remaining in a fixed position, whilst the other measures the resistance variations across a fixed grid. The resistance is measured in Ohms and the calculated resistivity is in Ohm-metres. The resistance method as used for area survey has a depth resolution of approximately 0.75m, although the nature of the overburden and underlying geology will cause variations in this generality. The technique can be adapted to sample greater depths of earth and can therefore be used to produce vertical "pseudo sections".

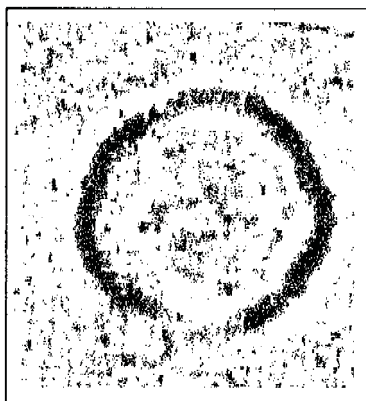
(c) Magnetic Susceptibility

Variations in the magnetic susceptibility of subsoils and topsoils occur naturally, but greater enhanced susceptibility can also be a product of increased human/anthropogenic activity. This phenomenon of susceptibility enhancement can therefore be used to provide information about the "level of archaeological activity" associated with a site. It can also be used in a predictive manner to ascertain the suitability of a site for a magnetic survey. The instrument employed for measuring this phenomenon is either a field coil or a laboratory based susceptibility bridge. For the latter 50g soil samples are collected in the field.

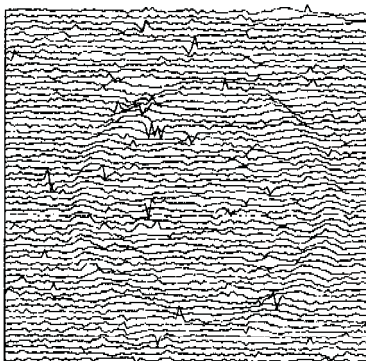
Display Options

The following is a description of the display options used. Unless specifically mentioned in the text, it may be assumed that no filtering or smoothing has been used to enhance the data. For any particular report a limited number of display modes may be used.

(a) Dot-Density



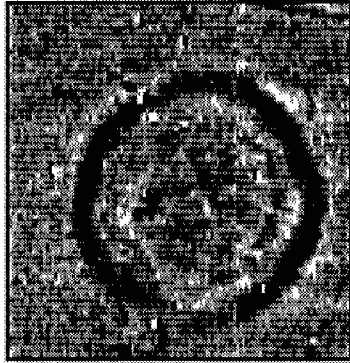
In this display, minimum and maximum cut-off levels are chosen. Any value that is below the minimum cut-off value will appear white, whilst any value above the maximum cut-off value will appear black. Any value that lies between these two cut-off levels will have a specified number of dots depending on the relative position between the two levels. The focus of the display may be changed using different levels and a contrast factor (C.F.). Usually the C.F. = 1, producing a linear scale between the cut-off levels. Assessing a lower than normal reading involves the use of an inverse plot. This plot simply reverses the minimum and maximum values, resulting in the lower values being presented by more dots. In either representation, each reading is allocated a unique area dependent on its position on the survey grid, within which numbers of dots are randomly placed. The main limitation of this display method is that multiple plots have to be produced in order to view the whole range of the data. It is also difficult to gauge the true strength of any anomaly without looking at the raw data values. This display is much favoured for producing plans of sites, where positioning of the anomalies and features is important.



(b) X-Y Plot

This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. Advantages of this type of display are that it allows the full range of the data to be viewed and shows the shape of the individual anomalies. Results are produced on a flatbed plotter.

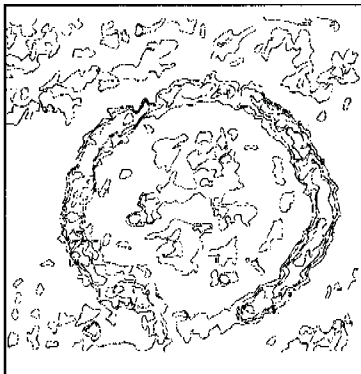
Display Options cont'd



(c) Grey-Scale

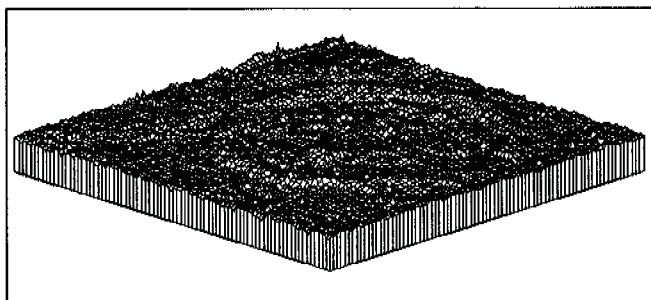
This format divides a given range of readings into a set number of classes. These classes have a predefined arrangement of dots or shade of grey, the intensity increasing with value. This gives an appearance of a toned or grey scale.

Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. While colour plots can look impressive and can be used to highlight certain anomalies, grey-scales tend to be more informative.



(d) Contour

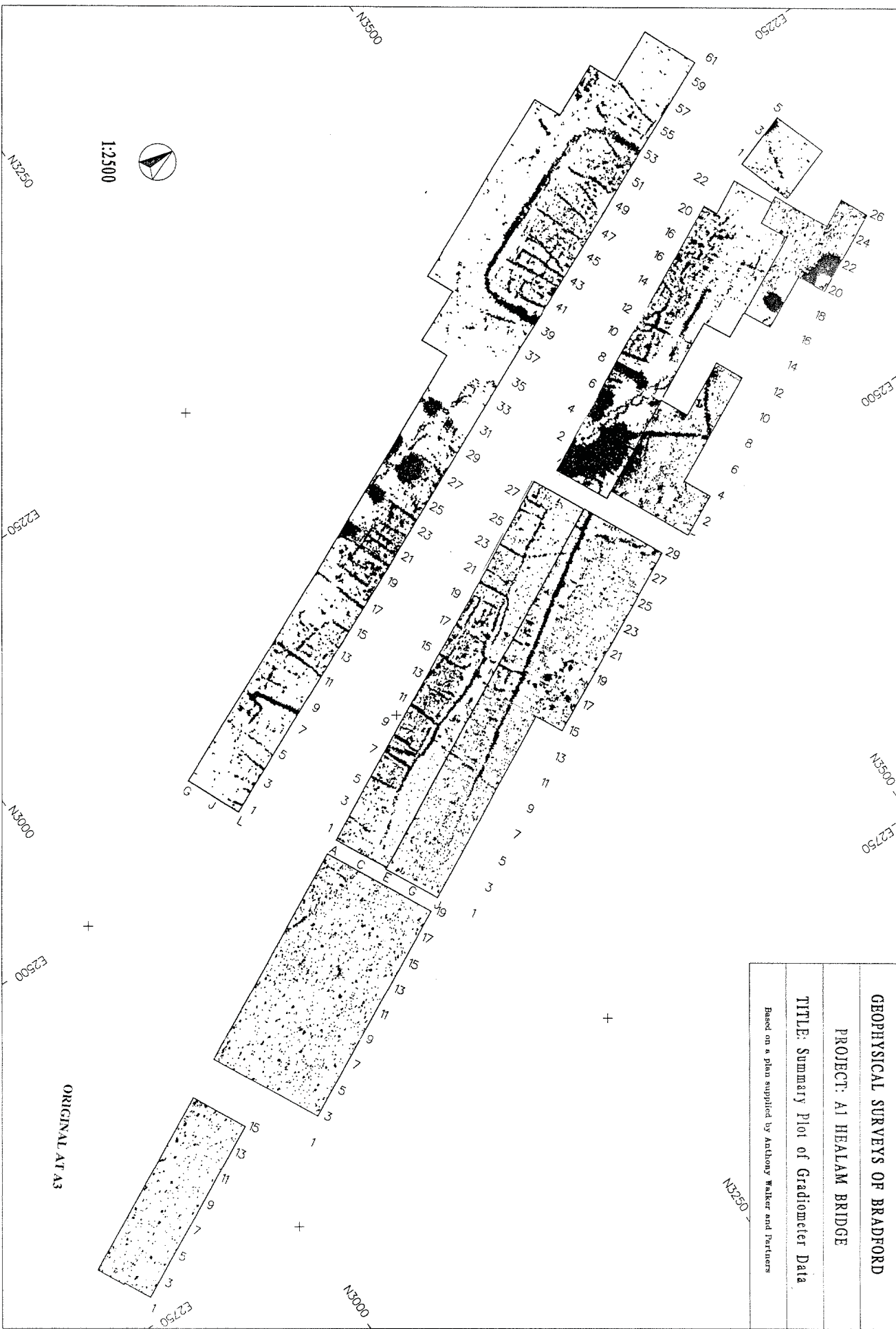
This display format is commonly used in cartographic displays. Data points of equal value are joined by a contour line. Closely packed contours indicate a sharp gradient. The contours therefore highlight an anomalous region. The range of contours and contour interval are selected manually and the display is then generated on the computer screen or plotted directly on a flat bed plotter / inkjet printer.



(e) 3-D Mesh

This display joins the data values in both the X and Y axis. The display may be changed by altering the horizontal viewing angle and the angle above the plane. The output may be either colour or black and white. A hidden line option is occasionally used (see (b) above).

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 Based on a plan supplied by Anthony Walker and Partners

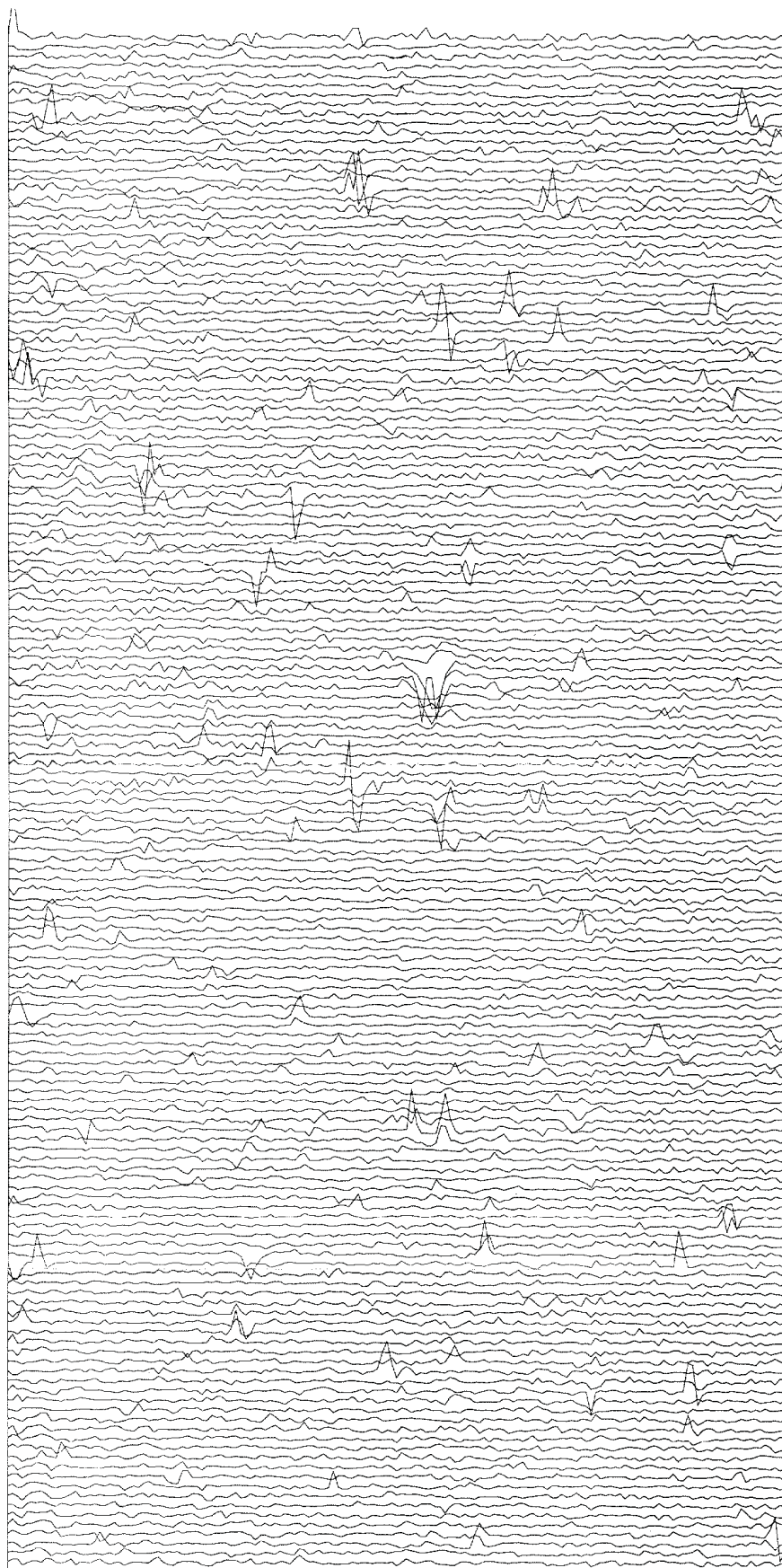


ORIGINAL AT A3

Figure 3

HEALAM BRIDGE II

Areas 6 & 14



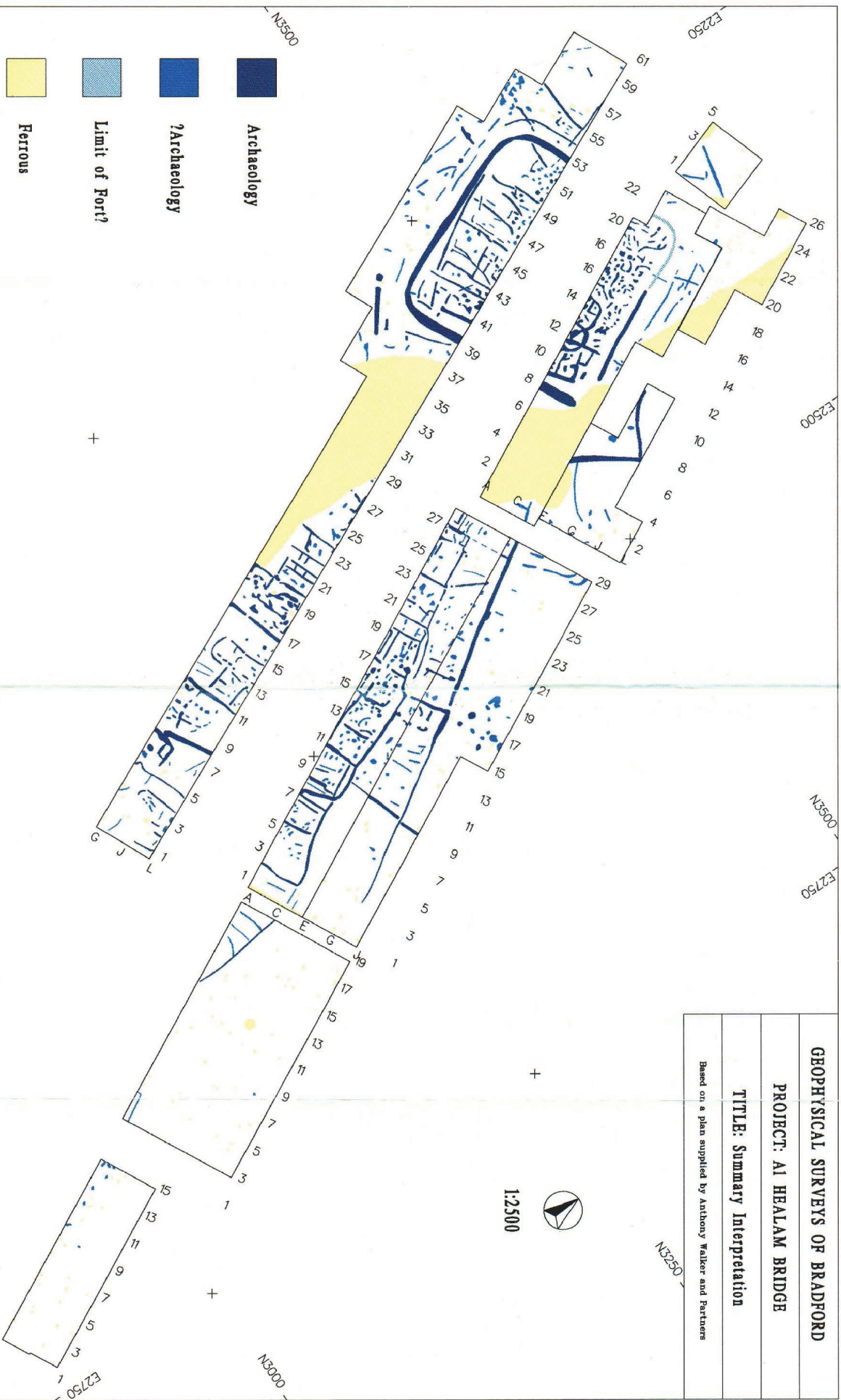
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Figure 4



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COLOUR

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GEOPHYSICAL SURVEYS OF BRADFORD
PROJECT: A1 HEALAM BRIDGE
TITLE: Summary Interpretation
Based on a plan supplied by Anthony Walkers and Partners

1:2500



Figure 2

GEOPHYSICAL SURVEYS OF BRADFORD
PROJECT: AI HEALAM BRIDGE
TITLE: Location of Survey Grids
Based on a plan supplied by Anthony Walker and Partners

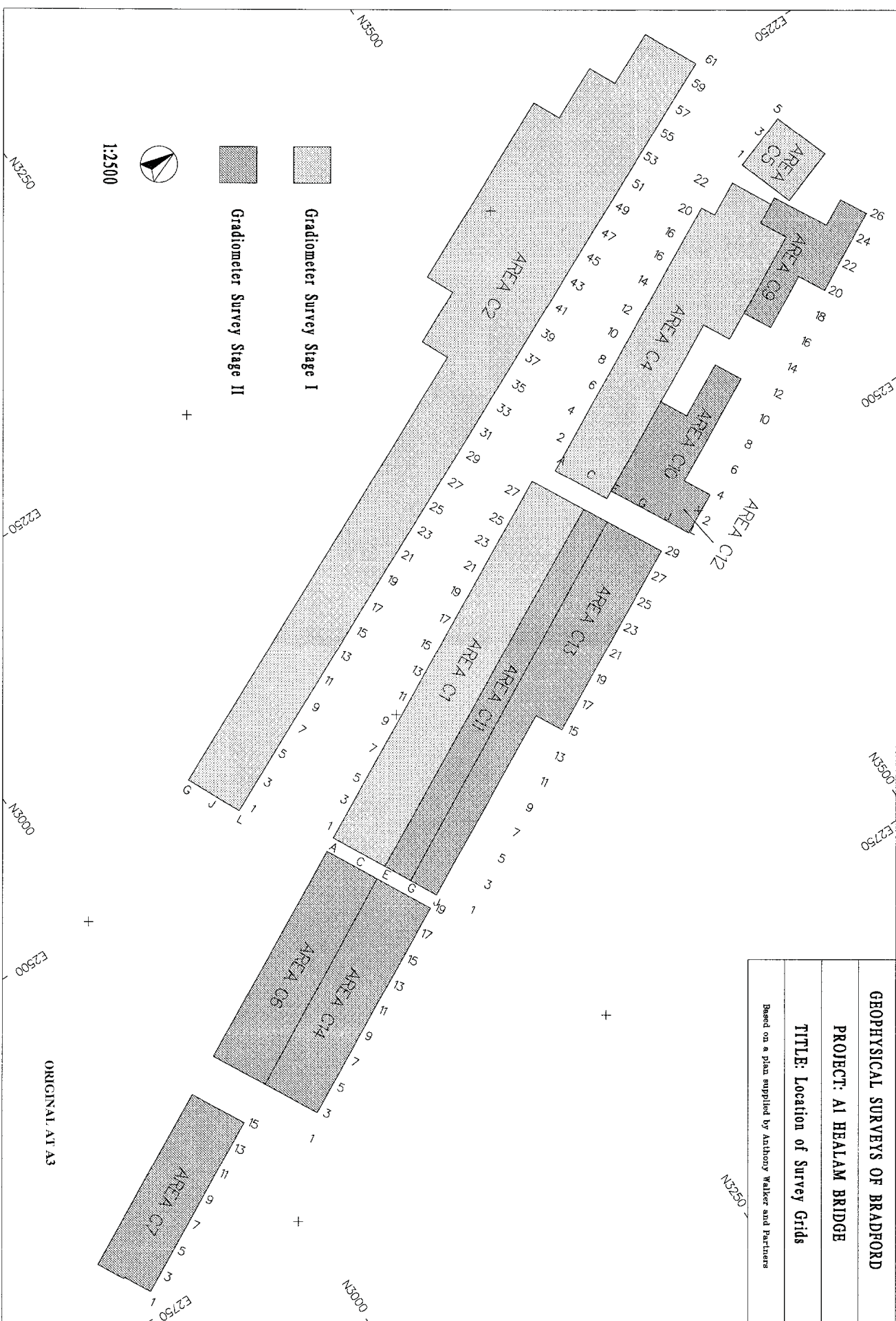


Figure 1

HEALAM BRIDGE II

Areas 6 & 14

ORIGINAL AT A3

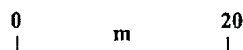
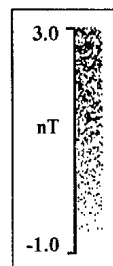
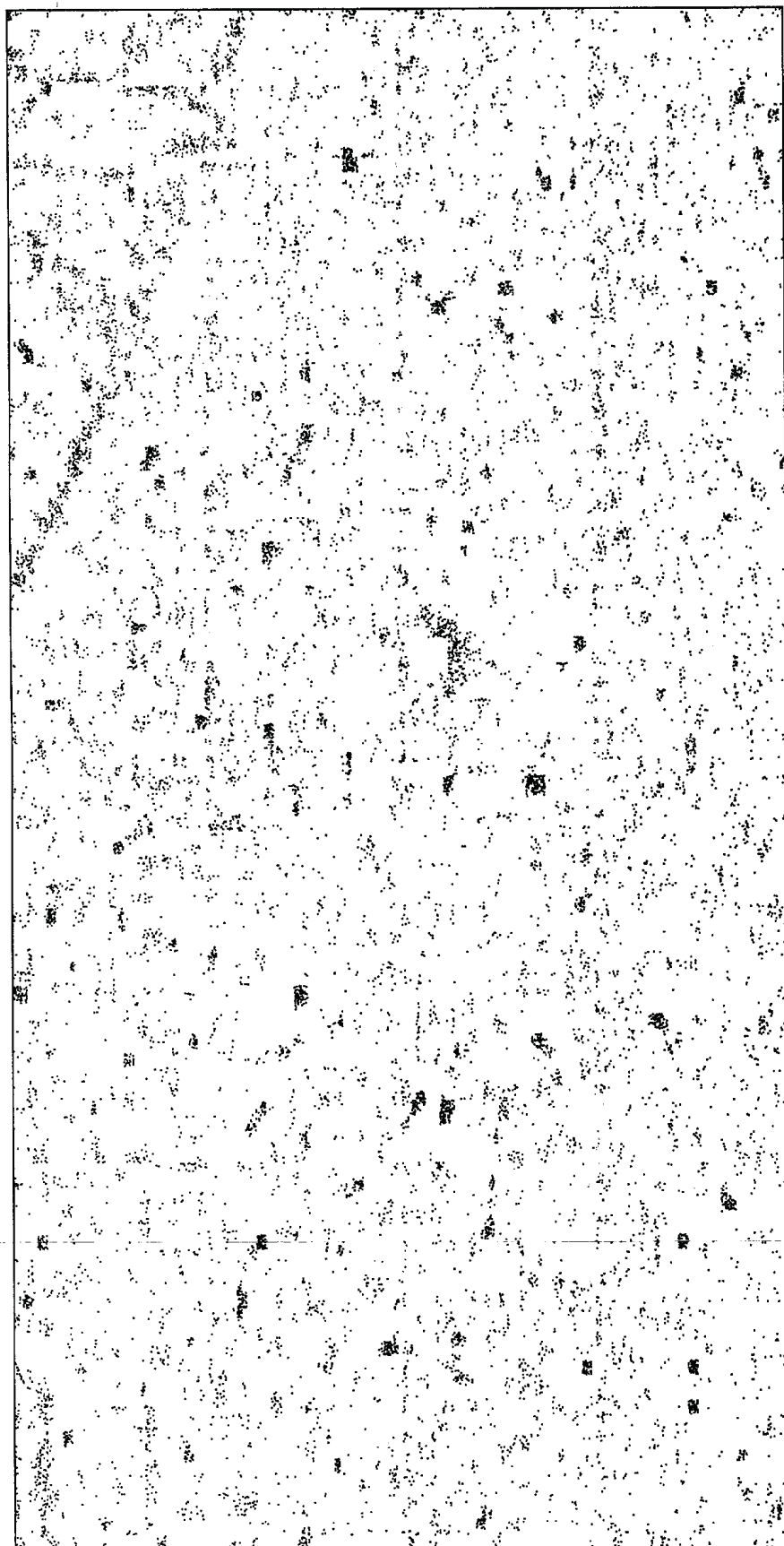


Figure 5

ORIGINAL AT A3

HEALAM BRIDGE II

Areas 6 & 14

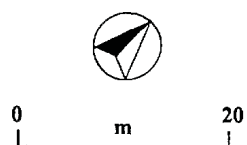
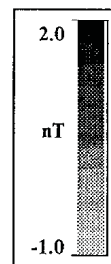
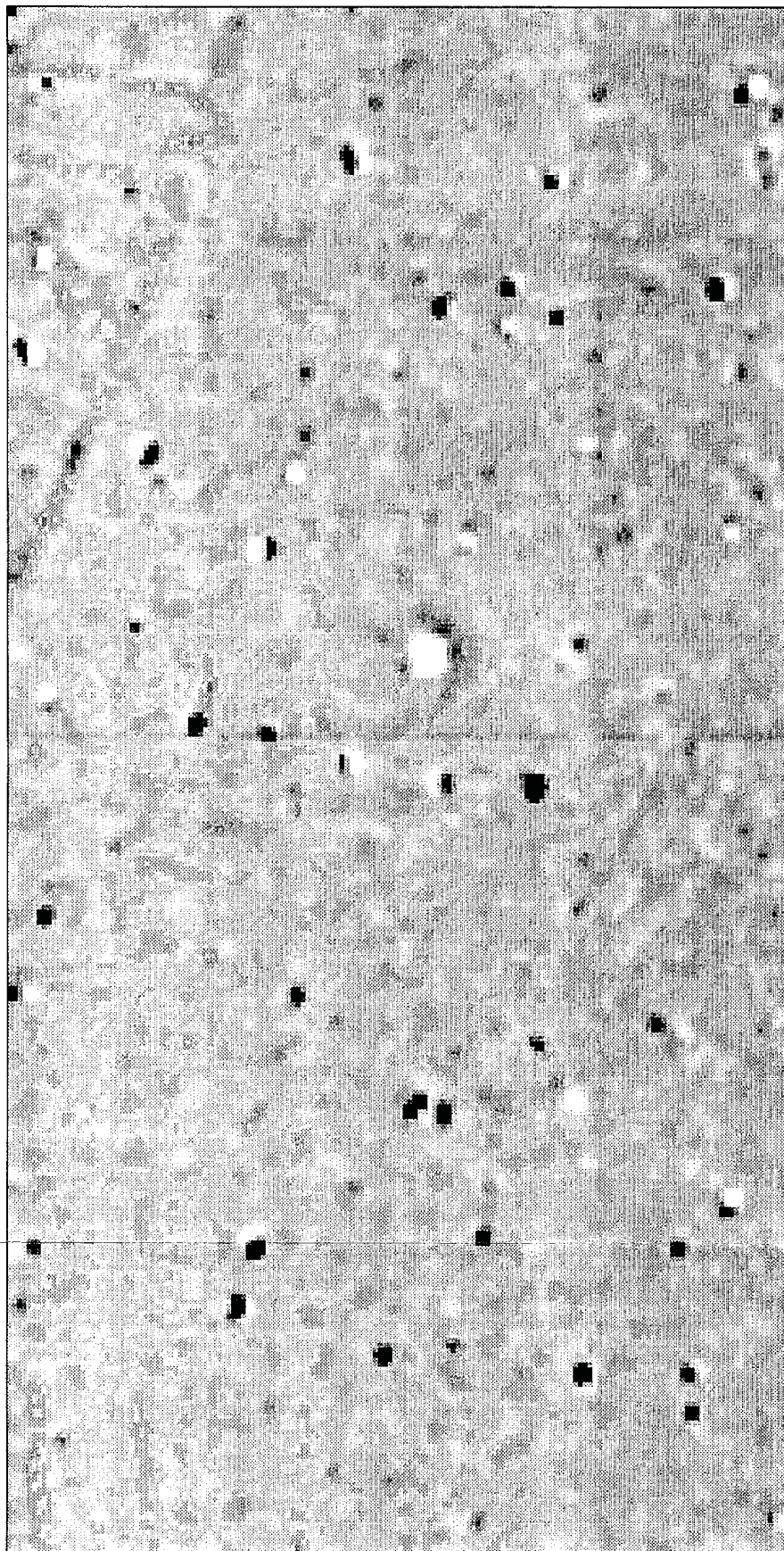
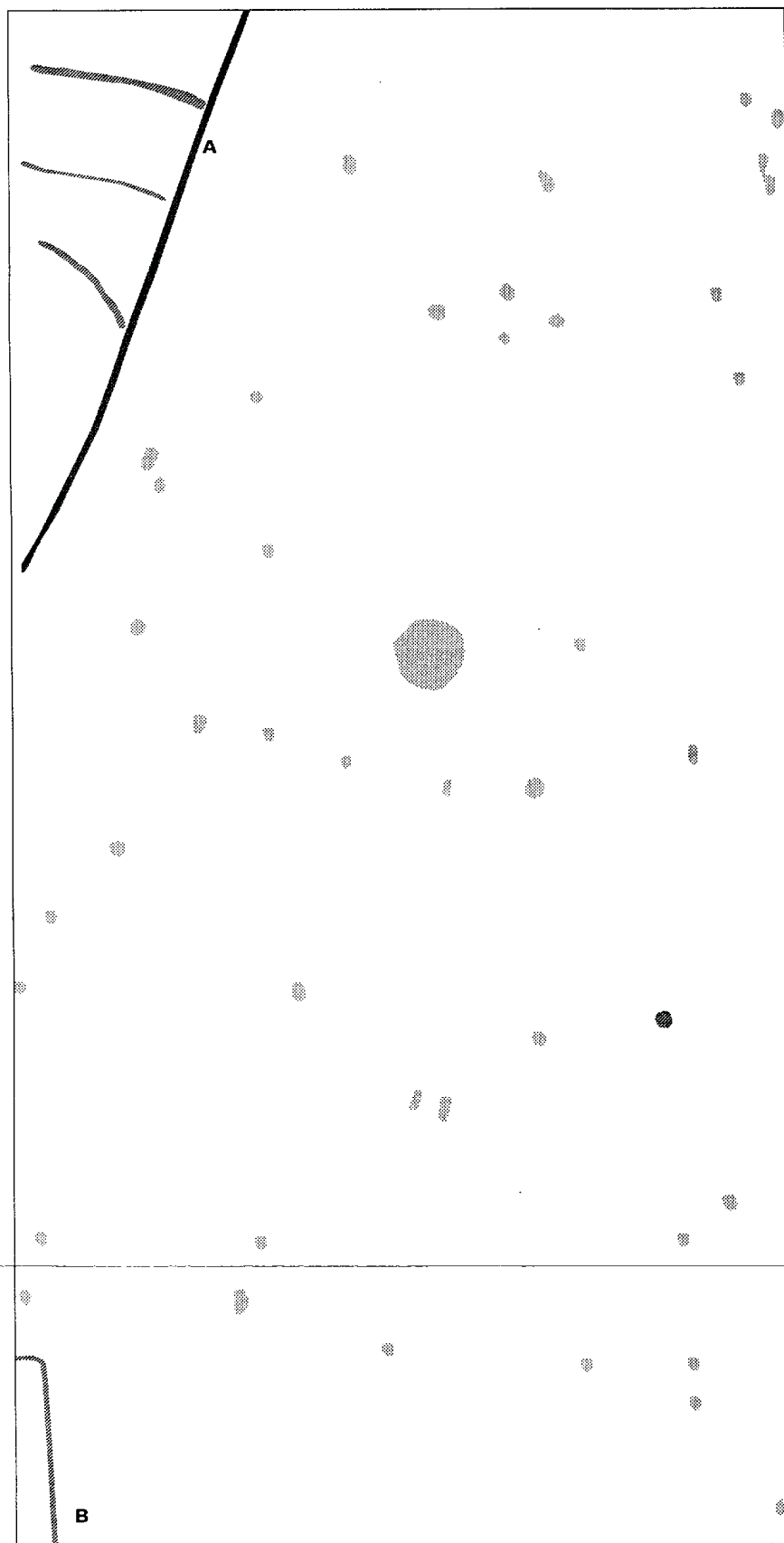





Figure 6

HEALAM BRIDGE II

Areas 6 & 14

ORIGINAL AT A3



-  Archaeology
-  ?Archaeology
-  Ferrous

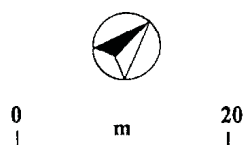
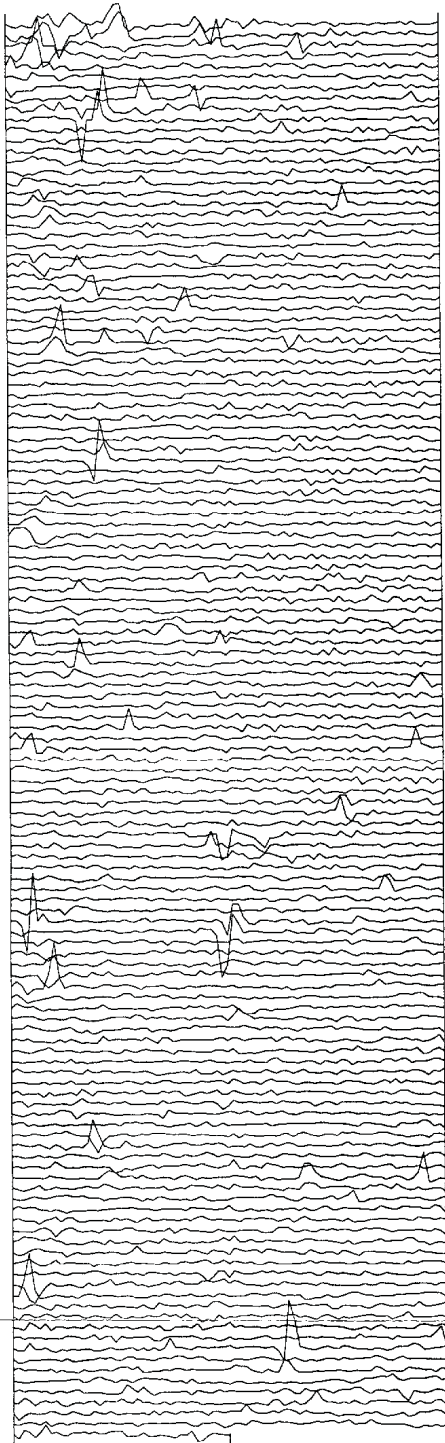


Figure 7

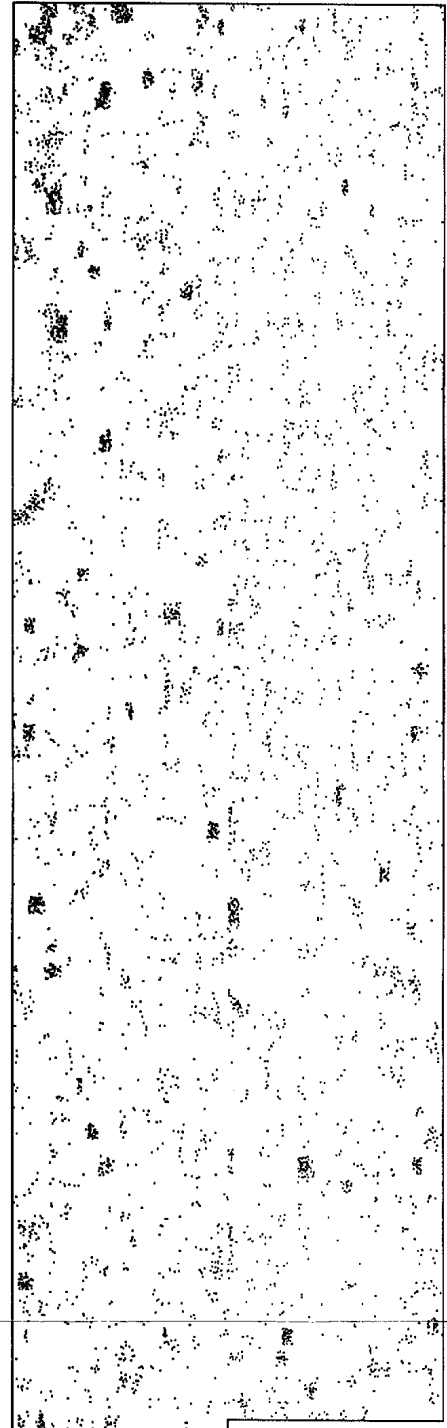
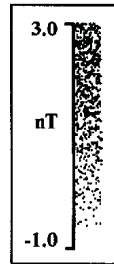
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HEALAM BRIDGE II

Area 7



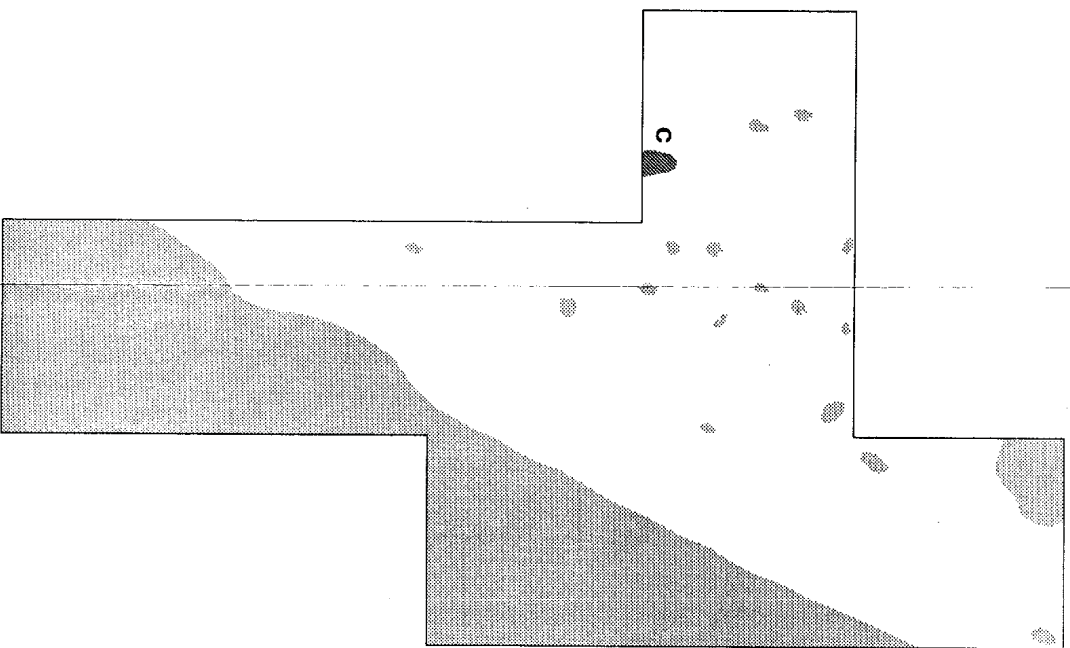
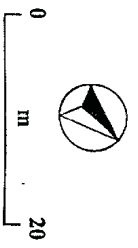
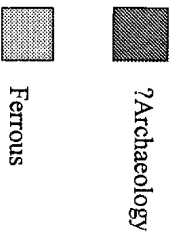
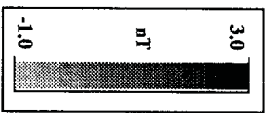
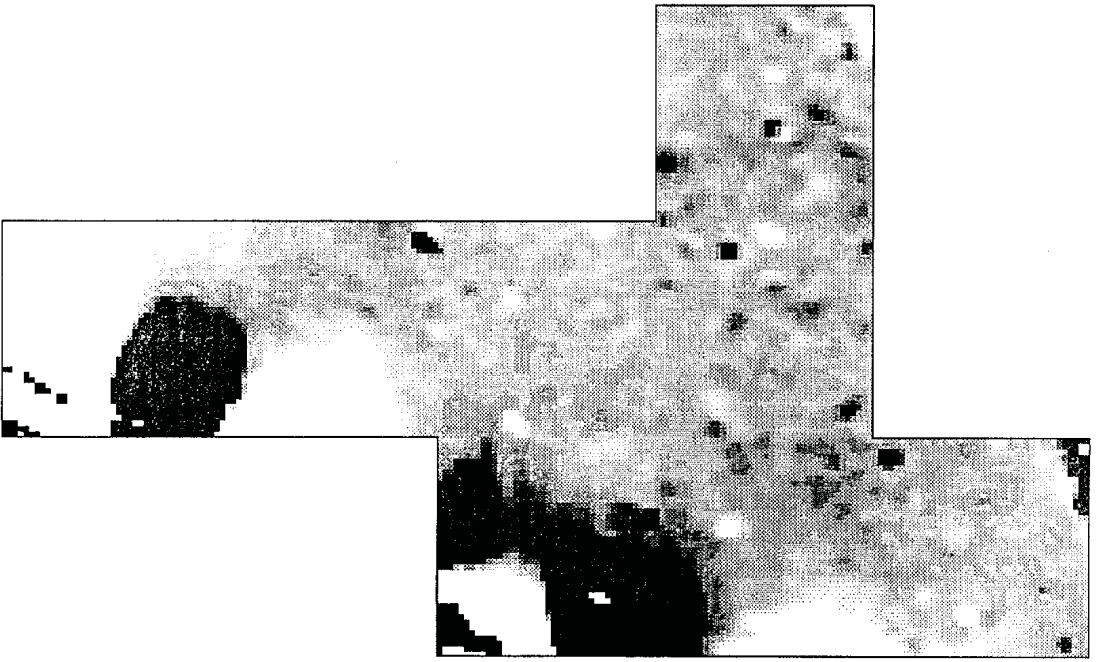
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Figure 8

HEALAM BRIDGE II Area 9



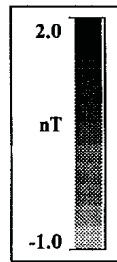
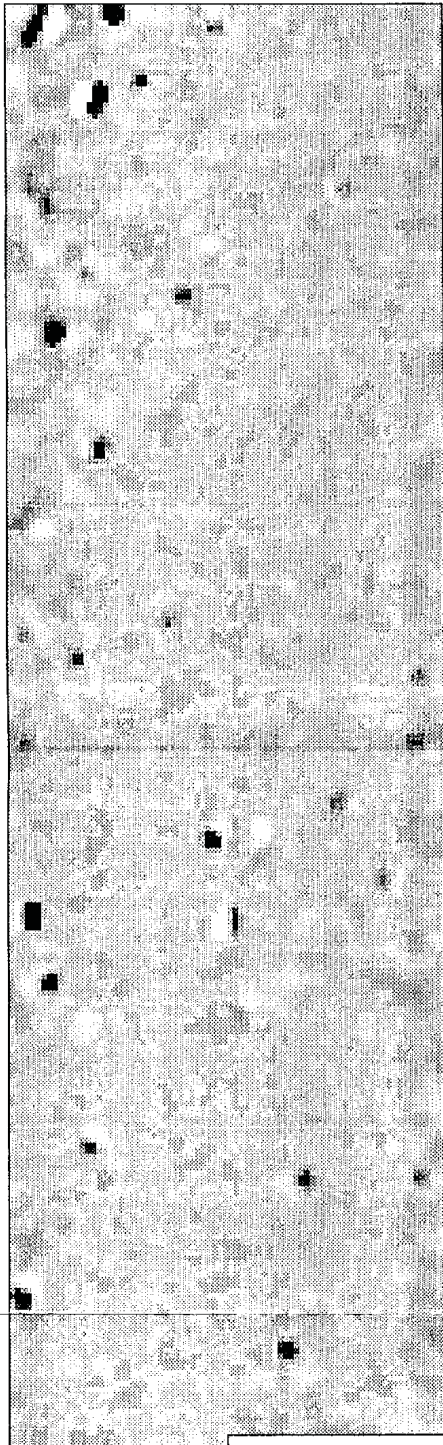
ORIGINAL AT A3

Figure 11

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HEALAM BRIDGE II

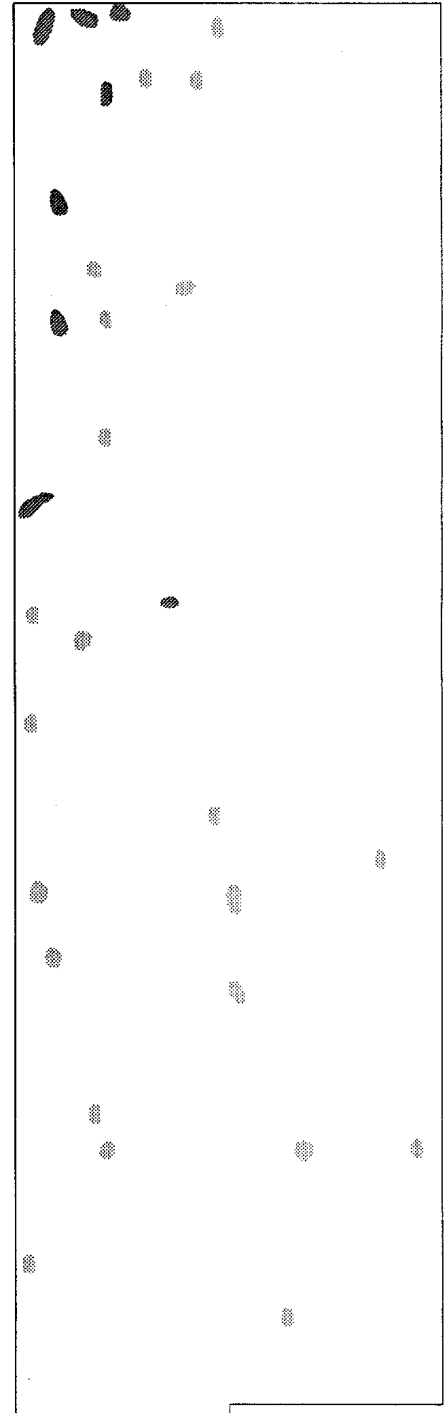
Area 7



?Archaeology



Ferrous

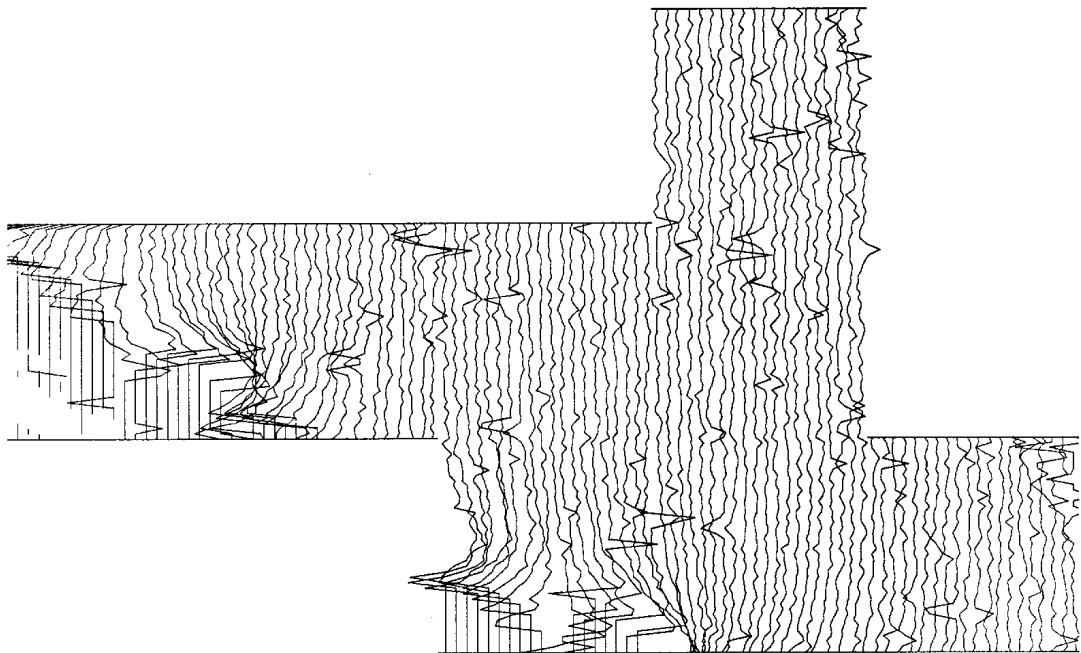


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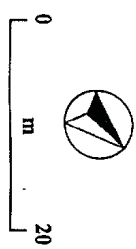
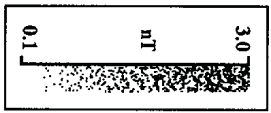
Figure 9

HEALAM BRIDGE II

Area 9



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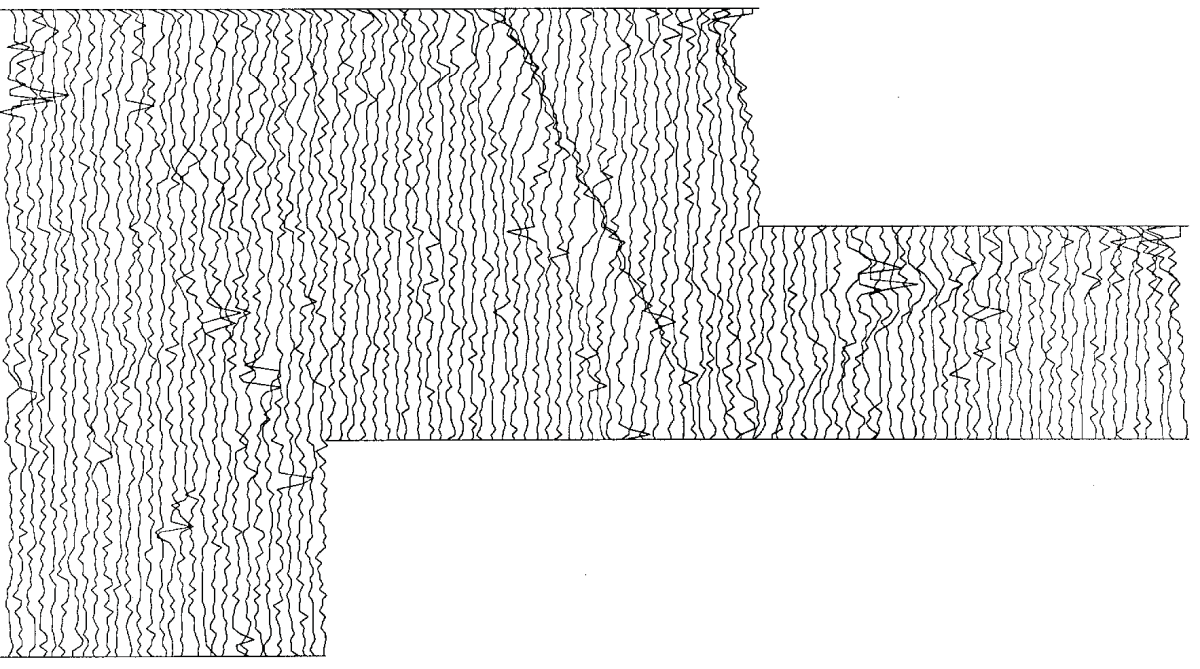


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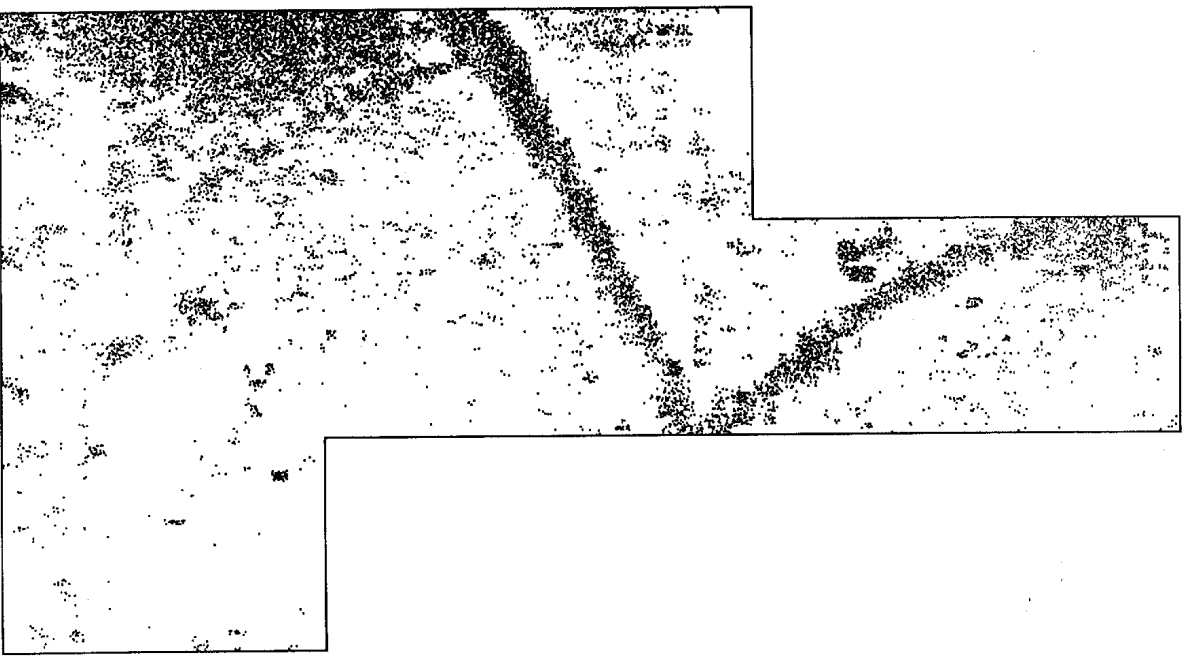
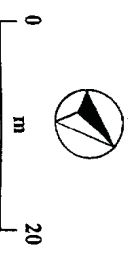
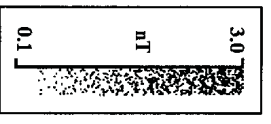
Figure 10

HEALAM BRIDGE II

Areas 10 & 12



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Figure 12

HEALAM BRIDGE II

Areas 10 & 12

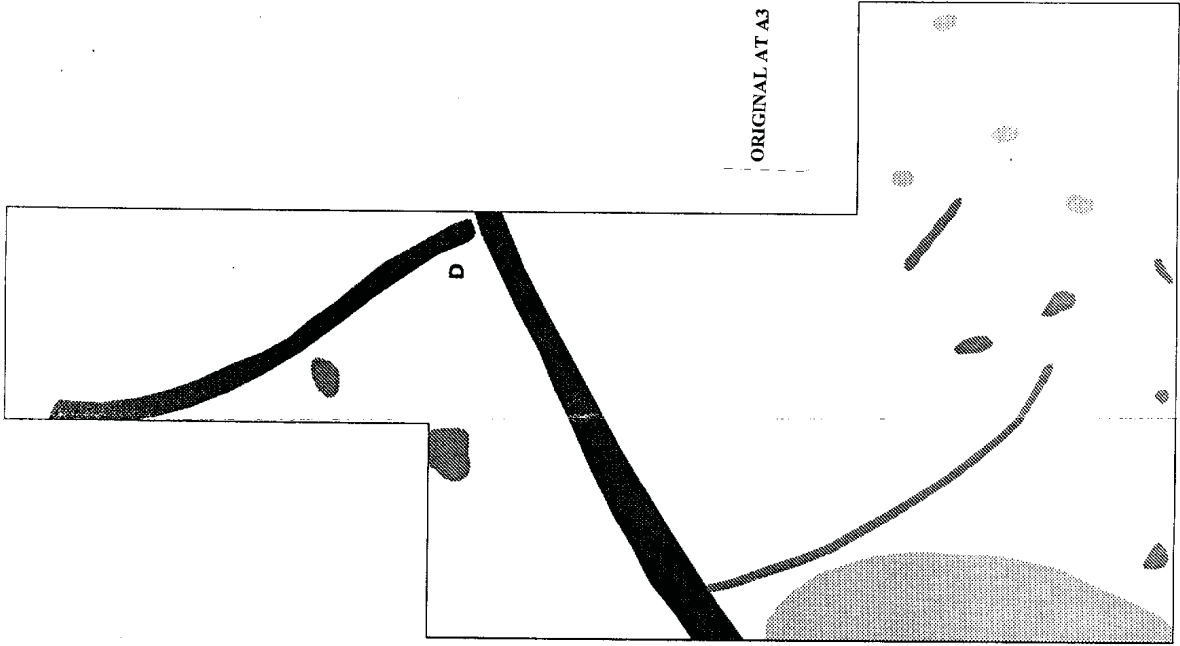
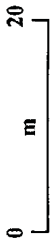
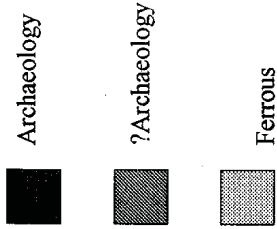
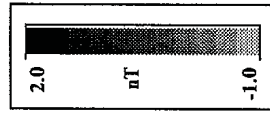
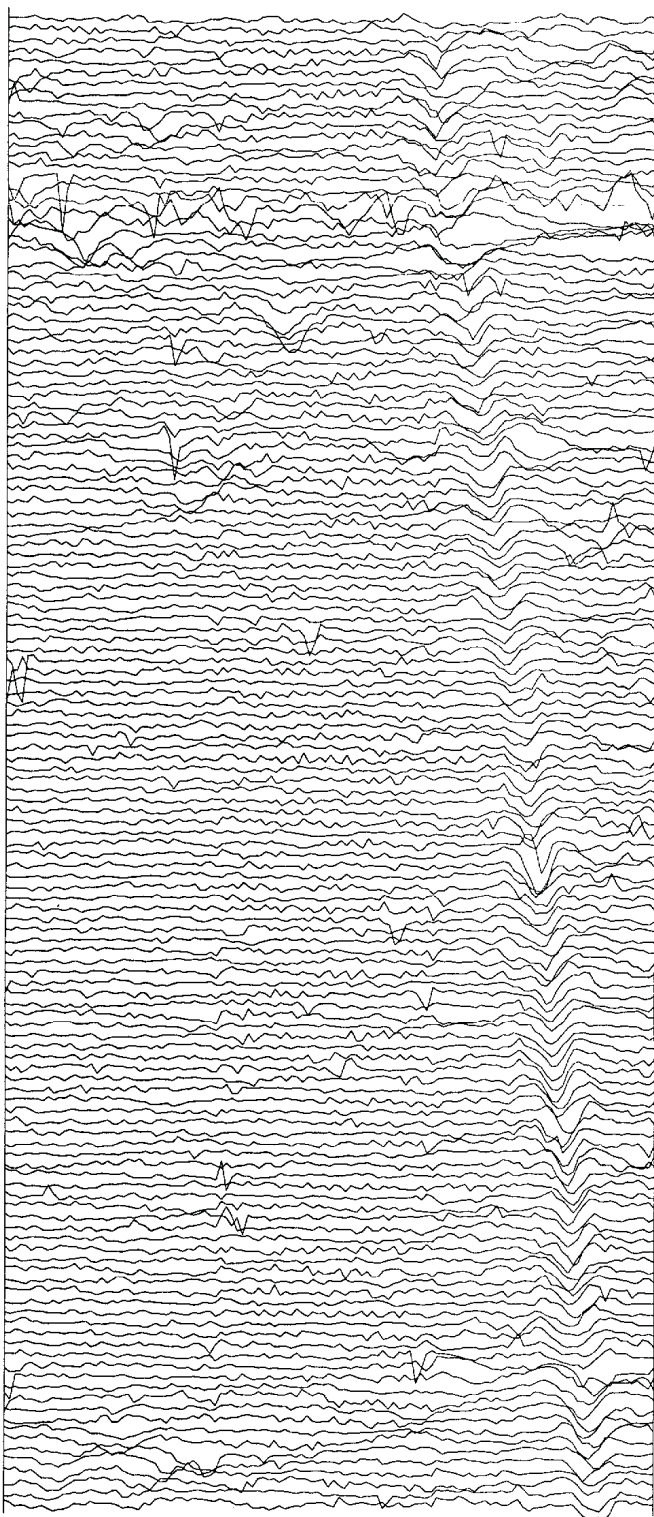


Figure 13

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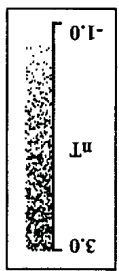
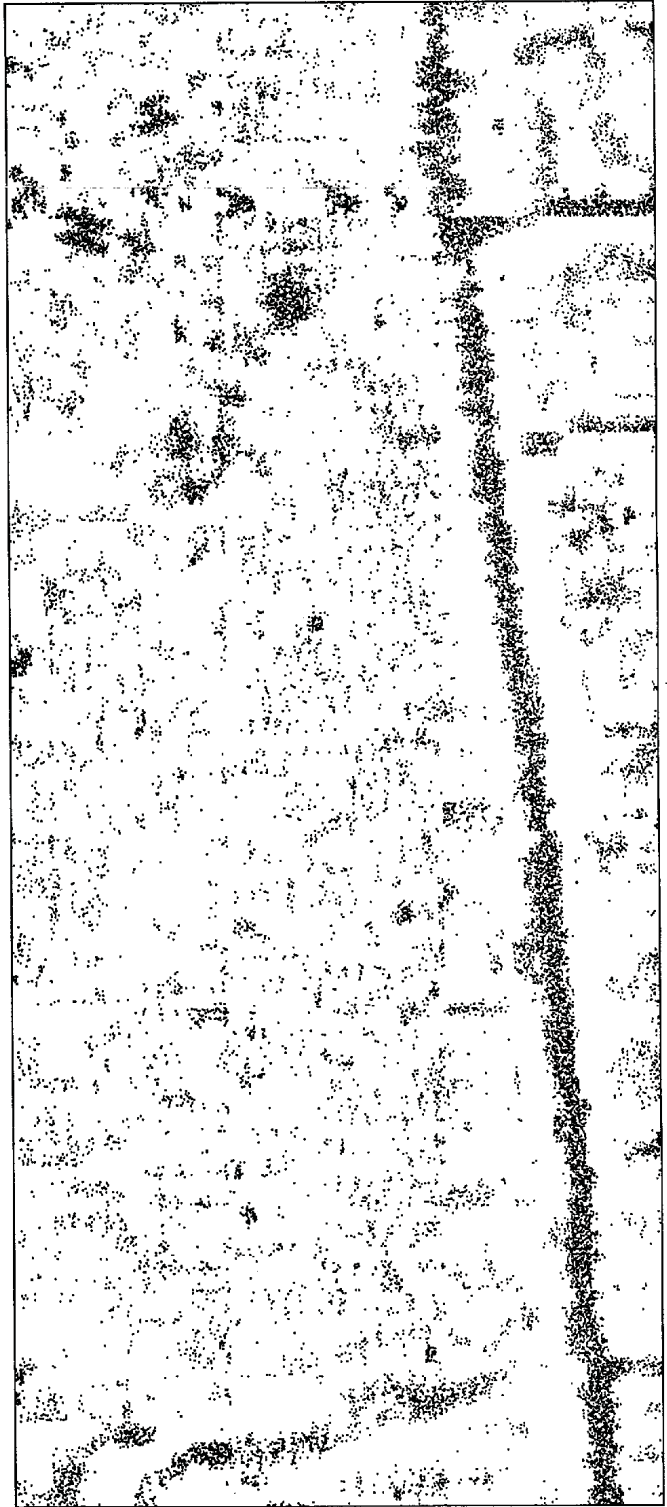
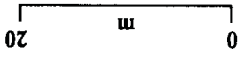


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**HEALAM BRIDGE II
Areas 11A & 13A**

Figure 14

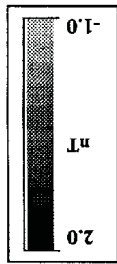
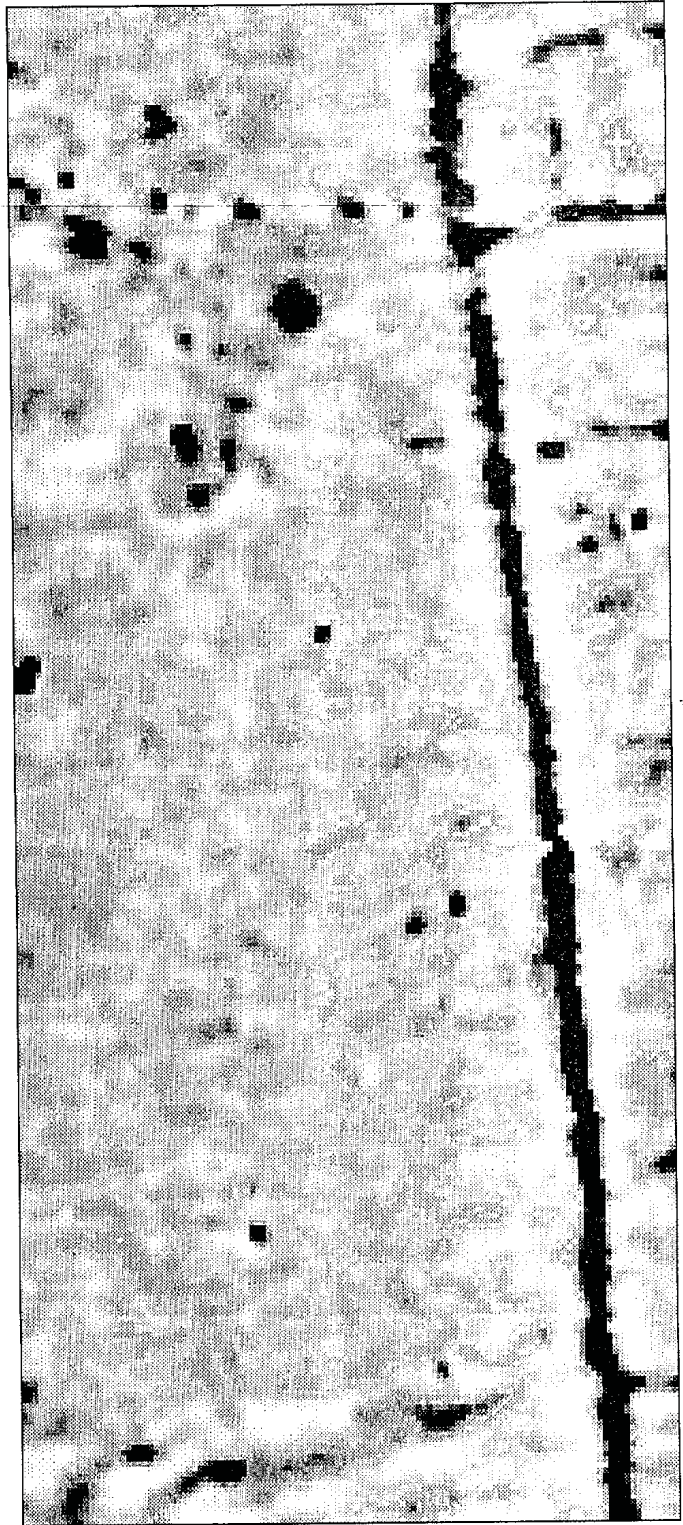
ORIGINAL AT A3



HEALAM BRIDGE II
Areas IIA & I3A

Figure 15

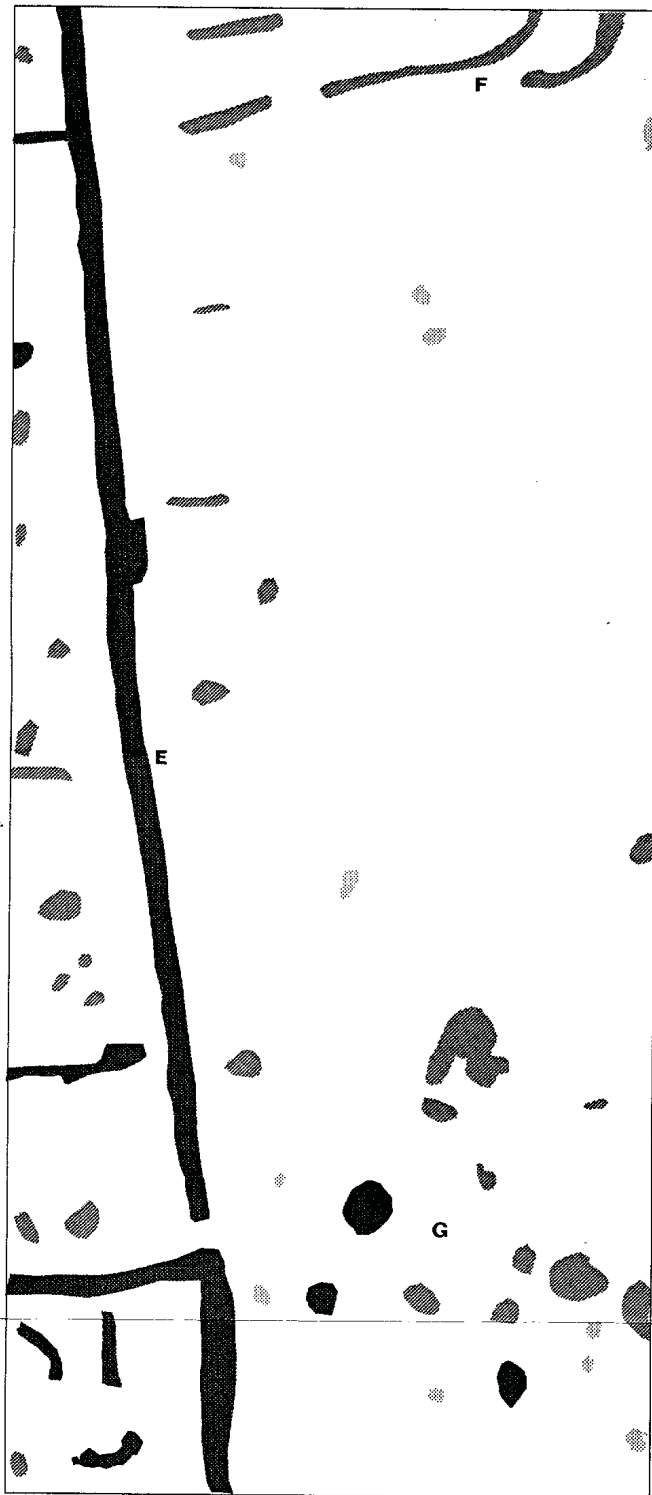
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HEALAM BRIDGE II
Areas IIA & I3A

HEALAM BRIDGE II

Areas 11A & 13A



ORIGINAL AT A3

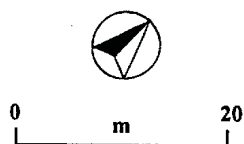
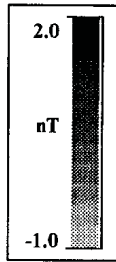





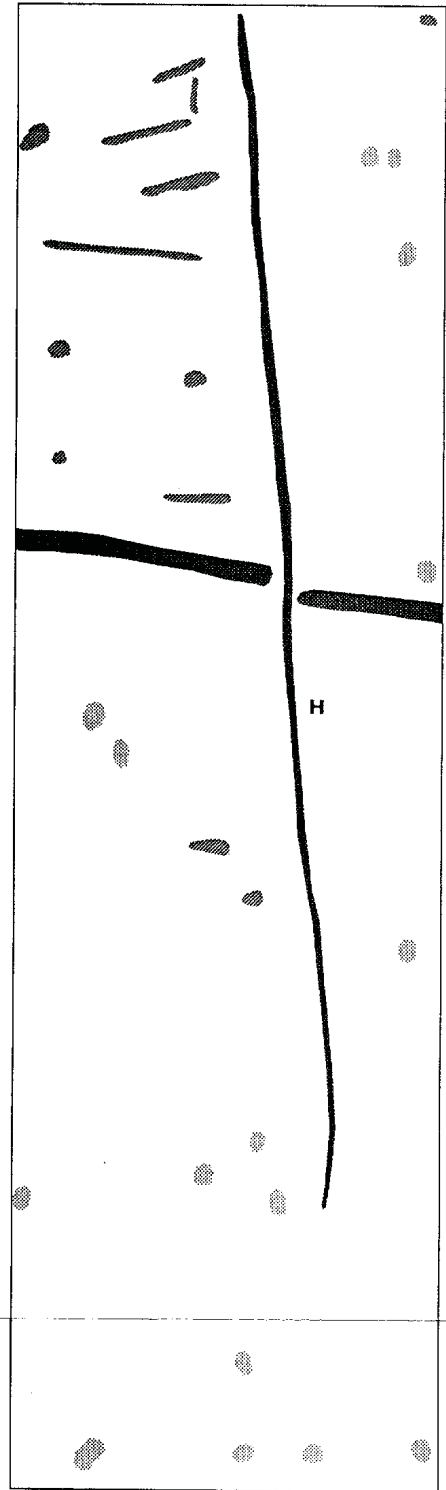
Figure 17

HEALAM BRIDGE II

Areas 11B & 13B



- Archaeology 
- ?Archaeology 
- Ferrous 

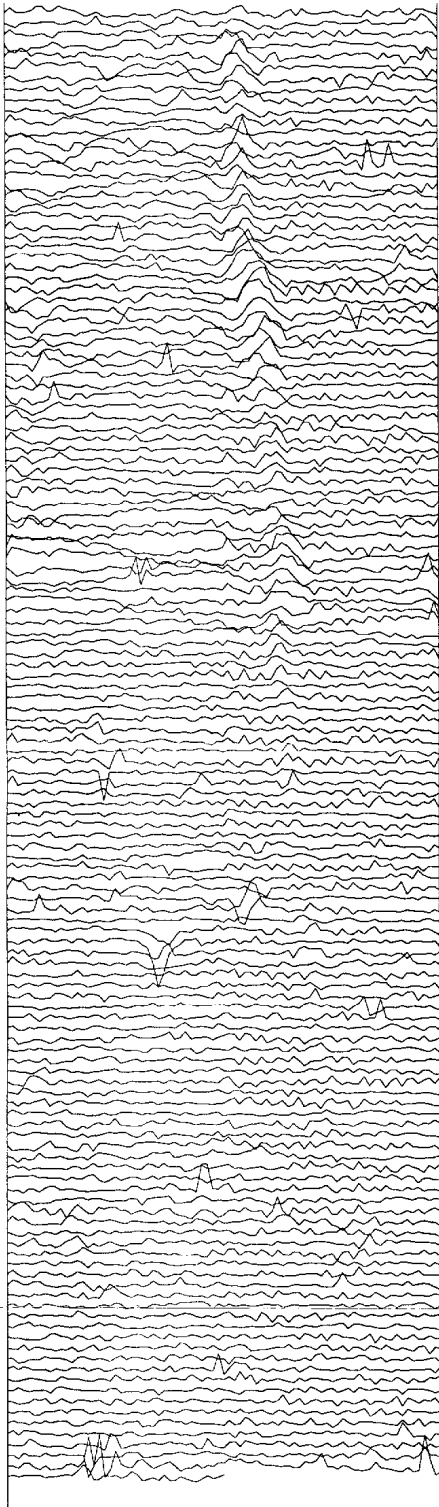


ORIGINAL AT A3

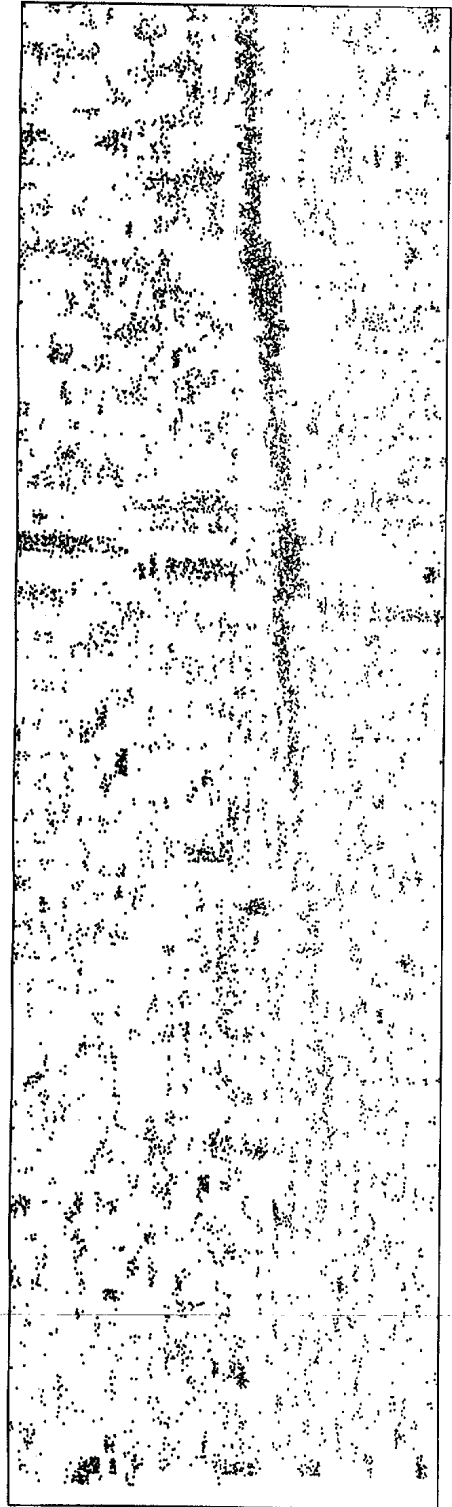
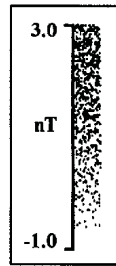
Figure 19

HEALAM BRIDGE II

Areas 11B & 13B



15 nT



ORIGINAL AT A3



Figure 18