DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
25 AUPUNI STREET • HILO, HAWAII 96720
TELEPHONE (808) 969-1421 • FAX (808) 969-6996

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QUALITY CONTROL

May 7, 1990

State Office of Environmental Quality Control
Office of the Governor
465 South King Street, Room 115
Honolulu, HI 96813-2910

POHOIKI-KAPOHO TRANSMISSION PIPELINE
DWS JOB NO. 89-499

We are forwarding for your files copies of the Environmental Impact Assessment for this project.

The engineering firm of Okahara & Associates, Inc., with the assistance of Y. K. Hahn and Associates prepared this assessment.

Based on the assessment, we are categorizing the proposed waterline project as a negative declaration.

William Sewake
H. William Sewake
Manager

GK

Encs.

1990-05-23-HA-FEA

FILE COPY

ENVIRONMENTAL IMPACT ASSESSMENT

FOR THE

~~POHOIKI-KAPOHO TRANSMISSION PIPELINE~~
ISLAND OF HAWAII

TAX MAP KEYS:

TMK: 1-3-02-p 14, 69, 70

TMK: 1-4-08-p 5

APRIL 1990

APPLICANT:

COUNTY OF HAWAII
WATER COMMISSION
25 AUPUNI STREET, HILO HAWAII 96720

ACCEPTING AUTHORITY:
MAYOR, COUNTY OF HAWAII

PREPARED BY:

OKAHARA AND ASSOCIATES
200 KOHOLA STREET
HILO, HAWAII 96720

WITH ASSISTANCE OF

Y.K. HAHN AND ASSOCIATES
1180 N. KUMUWAINA PL.
HILO, HAWAII 96720

ISSUED

MAY 01 1990

OKAHARA & ASSOC., INC.

BY _____

ENVIRONMENTAL IMPACT ASSESSMENT

FOR THE

POHOIKI-KAPOHO TRANSMISSION PIPELINE
ISLAND OF HAWAII

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ENVIRONMENTAL IMPACT ASSESSMENT

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CHAPTER I. SUMMARY OF PROPOSED POHOIKI-KAPOHO TRANSMISSION PIPELINE, PROBABLE ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

1. Introduction

The Hawaii County Department of Water Supply (HDWS) has noted a gradual deterioration of water quality in the existing Kapoho water system.
This Environmental Impact Assessment(EIA) has been prepared to support a grubbing and grading permit which will enable the HBWS to upgrade the water quality at the present Kapoho water system. Improvement of water quality is to be achieved by connecting the current Kapoho system to the existing Pahoa system by way of constructing 26,000 linear feet of 8" water transmission pipeline.

2. Project Description

The proposed water transmission pipeline project will involve alignment of new piping within existing easement except portion of piping within agricultural lands owned by Amfac(Puna Sugar Co.) and A & O international and located in Puna District, island of Hawaii. New easement through these property will facilitate the new pipeline, service roads and necessary cuts and fills.

The excavation and pipeline emplacement involves a corridor approximately 26,000 feet long running from Pohoiki County Road to County Road 137 near Pohoiki (Figure 1.). Disturbance will involve a swath associated with construction vehicles maximum 50 feet in width, and also the trench itself, which will be measure approximately 3 1/2 feet in depth and 3 feet in width.

3. Environmental Setting

The seaward 3000 feet of the corridor cuts through a mostly native forest, while the upper 7000 feet intersects papaya orchards and a few thin sections of native forest. Climate is uniformly Wet Tropical over the entire corridor. Geology and soils show slightly more variation but are all derived from recent lava flows of the East Rift of Kilauea Volcano.

4. Impacts:

Geology and Soils

The project will involve excavation of a trench approximately 3 1/2 feet deep and 3 feet wide along the entire length of the pipeline. The material will be removed from the site and a fill consisting of finer materials will cover the pipeline. The shallow soil cover and extremely porous substrate mean that the proposed activities will not affect runoff or soil erosion in any significant way.

Flora and Vegetation

The very localized impact of the proposed project will have minimal effect on native species in the area because of the extremely disturbed state of the vegetation. All native species present along the corridor are common in lower Puna in both disturbed and undisturbed habitats, and no endangered or threatened species were found. Weeds are already widespread along the entire corridor and will not increase in abundance significantly as a result of the project.

Fauna

The project will not effect any significant disturbance of habitat for native bird species such as hawk, owl, or plover, or for the bat. Since there are very few native invertebrates in the area, and those that are present already probably impacted by the history of papaya farming, the addition of a water pipeline should not affect them adversely.

Archaeological Resources

Examination of the route of the proposed water line passed through a corridor containing a total of 21 sites. All of these sites were mapped, photographed and some (two platforms) were subjected to subsurface examination. The results of these subsurface examinations were negative due to lack of osteological or cultural material. Soil accumulations were sparse at both locations being only 10-15 cm.

The remainder of sites observed in the corridor of the proposed waterline are clearing mounds related to agricultural activities, walls, walled natural outcrops and a single enclosure resting on an unexcavatable lava base.

In consideration of the fact that the trench for the proposed waterline in estimated to be only 3 feet wide, we anticipate that little or no damage will occur to any significant sites along the proposed route.

Nevertheless, it is our opinion that archaeological monitoring is necessary for this project as the proposed corridor is surrounded by a series of high density site complexes that may be jeopardized by the movement of heavy equipment.

Moreover, adequate archaeological monitoring may also serve to redirect trench placement within the corridor itself and preclude impacts to sites contained therein -irrespective of their NLS (no longer significant) status.

Economics

There is a short term benefits resulting from income and employment the project will generate during construction periods. Approximately $ 600,000 income and additional $200,000 business revenue will be generated within the island economy. This translates into 15 - 20 man/year equivalent of employment for the island economy. Taking into account the indirect impact, the total jobs and income resulting from this project will be 20 man/year equivalent in employment and 1.2 million dollars in income.

The readily available public water system may further encourage potential agriculture and commercial activities supported by the "spill over" effect of recent increase in population growth in Puna district (19,800 as of 1988 which is 68 % increase over 1980).

Social

The proposed actions will have positive social benefits which largely stems from the improvement of water quality, thereby enhancing the health of community residents.

There are no known or anticipated adverse social impacts expected to result from the proposed pipeline construction.

5. Alternatives

The "no project" alternative would mean doing nothing to improve water quality on the existing Kapoho water system. This is an unacceptable alternative because the maintenance of water quality standard is the responsibility of County Government. In addition, failure to improve water quality for the Kapoho community may lead to an increased health hazard for the residents residing in this community.

Development of new ground water source at alternate site is a possibility. However, such site(s) is likely subject to the same problem faced by the current well site and thus makes little sense to pursue.

An alternate routing along the existing county roads has been contemplated. However, considering numerous curves, big trees along the corridor, and the submersion of the part of the makai side of county road during certain part of year makes this alternate routing economically less attractive.

CHAPTER II: DESCRIPTION OF PROPOSED PROJECT

A. BACKGROUND

The Hawaii county Department of Water Supply (HDWS) has noted a gradual deterioration in water quality (high fluctuations in the level of salinity) in the existing Kapoho water system, particularly during the periods in which the average precipitation falls below the norm.

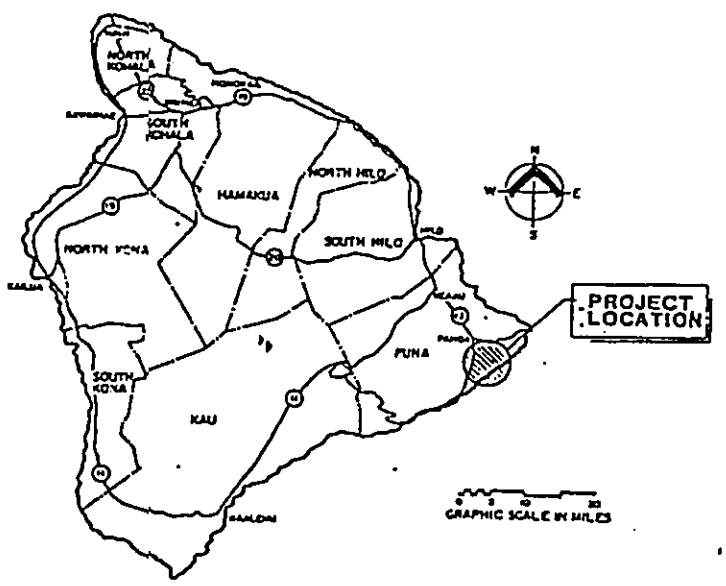
The existing Kapoho Water System which consist of 100,000 gallon concrete reservoir with two 100 gpm pump has been serving a limited number of agriculture lots in the community of Kapoho on the island of Hawaii for the past 20 years. The system currently services 22 connections. The HDWS proposes to upgrade the quality of existing system by constructing water transmission pipeline connecting the present Kapoho system to the existing Pahoa system.

This Environmental Impact Assessment(EIA) has prepared to support a grubbing and grading permit needed to undertake the project.

B. PROJECT DESCRIPTION

The proposed construction of water transmission pipeline will involve alignment of new piping within existing easement except portion of piping within agricultural lands owned in fee by Amfac (Puna Sugar Co.) and A & O international and located in Puna District, island of Hawaii (Figure 1). New easement through these property will accomodate the new pipeline, service roads and necessary cuts and fills.

The excavation and pipeline emplacement involves a corridor approximately 26,000 feet long running from Pohoiki County Road to County Road 137 near Pohoiki. Disturbance will involve a swath associated with construction vehicles maximum 50 feet in width, and also the trench itself, which will be measure approximately 3 1/2 feet in depth and 3 feet in width.



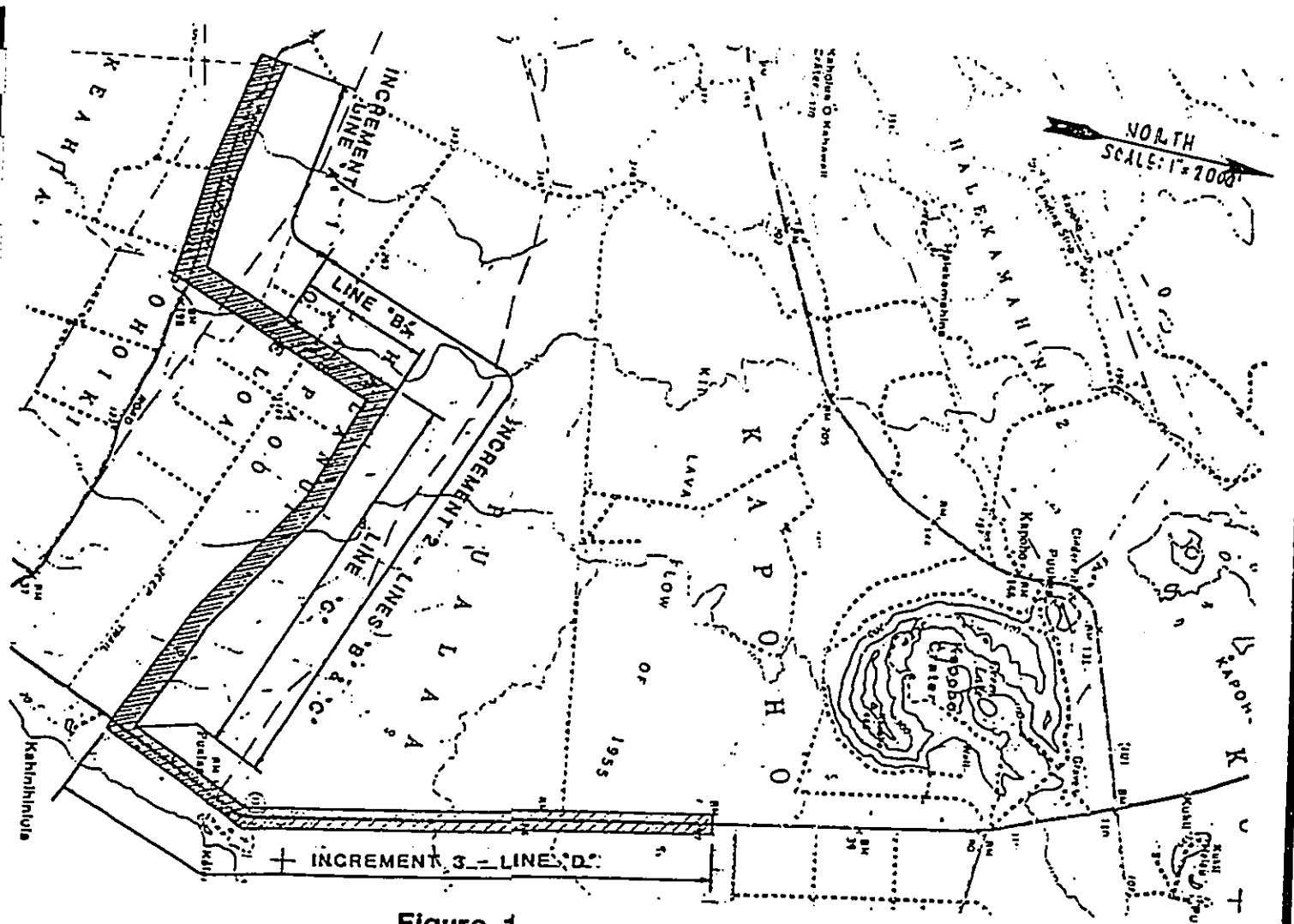


Figure 1
ISLAND MAP AND VICINITY MAP

CHAPTER III: DESCRIPTION OF AFFECTED ENVIRONMENTS AND PROBABLE ENVIRONMENTAL CONSEQUENCES

A. GENERAL SITE CONDITIONS AND SURROUNDING LAND USES

The seaward 3000 feet of the corridor cuts through a mostly exotic forest, while the upper 7000 feet intersects papaya orchards and a few thin' sections of native forest. Climate is uniformly Wet Tropical the corridor. Geology and soils show slightly more variation but are all derived from recent lava flows of the East Rift of Kilauea Volcano.

B. PHYSICAL ENVIRONMENT

1. Geology and soils

a) Existing conditions

All terrain in the corridor is recent basalt lava from the Prehistoric Member of the Puna Volcanic Series of Kilauea (Stearns and MacDonald 1945). Pahoehoe flows are present in the seaward 1000 feet, but most of the project length is a'a, extensively disturbed by bulldozing for papaya orchards. Soil in the a'a area is classified as Malama Extremely Stony Muck, which is young, acid, and thin. Opihikao Extremely Rocky Muck, a soil with similar properties found on pahoehoe, is present in the seaward 1000 feet (U.S. Soil Conservation Service, 1973). Soils are very poorly developed over most of the project length. Isolated pockets of soil 2-6" deep (some probably anthropogenic in origin) exist in the lower section. Both soils are highly permeable and are considered to have only "slight" erosion hazard.

b) Probable impacts

The project will involve excavation of a trench approximately 3 1/2 feet deep and 3 feet wide along the entire length of the pipeline. The material will be removed from the site and a fill consisting of finer materials will cover the pipeline. The shallow soil cover and extremely porous substrate mean that the proposed activities will not affect runoff or soil erosion in any significant way.

2. Climate

Although Hawaiian climate is quite geographically variable, the small extent of the project area and the slight elevation change of 190 feet (from +10 to +200 feet above m.s.l) involve only slight variation in weather, and thus climate within the project area is uniform. Annual rainfall along the corridor averages between 80 and 120", with an early morning and nighttime maximum. Average daily high temperatures for this altitude vary seasonally from 79 to 84 degrees F., and average daily minimums from 61 to 65 degrees F. (data interpolated from maps from University of Hawaii, Dept. of Geography 1983). Such climatic conditions may be labeled "Wet Tropical," and they promote a humic environment for plant growth, though the porous substrate modifies conditions towards a mesic state.

3. Flora and Vegetation

a) Existing conditions

A botanical survey of the native flora and vegetation along the pipeline corridor was conducted by Linda Cuddihy and Dr. Ron Terry in April 1990. The objective was to inventory the flora; describe vegetation types; search for rare, threatened, or endangered plant species; and identify areas of potential environmental concern. The methodology consisted of a walking survey of the entire pipeline corridor, including a belt approximately 50 feet in width on either side. A full species list is included as Appendix A in this EIA. The recent vegetational history of the area was also investigated through airphoto interpretation of two large and medium scale panchromatic images from 1965 and 1976.

No relatively undisturbed native plant communities are present in the project area, and although some native plants are present, they are in general part of alien-dominated weed associations. Two basic vegetation types are present: 1) Alien-Dominated Forest and Scrubland and 2) Papaya Fields (Figure 2). The first type is found surrounding the seaward 3000 feet of the pipeline. Non-native trees are dominant here, especially the weedy trees or shrubs Melochia umbellata, Trema orientalis, Psidium cattleianum and Psidium guajava (guavas), Schinus terebinthifolius (Christmas-berry), and Pluchea odorata. Other somewhat common aliens are the Polynesian-introductions coconut (Cocos nucifera), and noni (Morinda citrifolia), and also 19th century economic trees such as mango (Mangifera indica). Isolated stands of

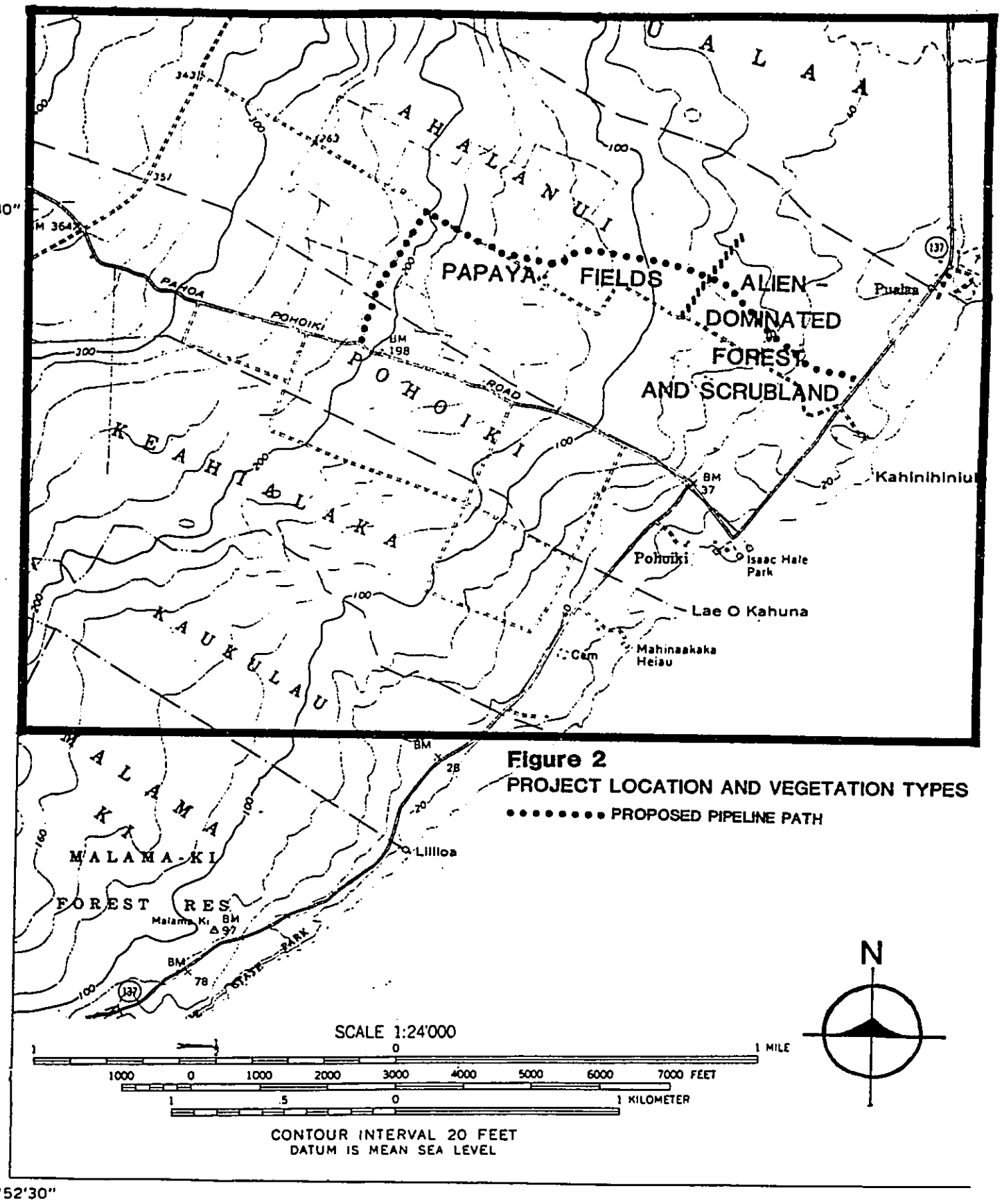


Figure 2
PROJECT LOCATION AND VEGETATION TYPES
●●●●●●●● PROPOSED PIPELINE PATH

vegetation are present where natives such as alahe'e (Canthium odoratum), lama (Diospyros ferrea), mamaki (Pipturus albidus), hala (Pandanus odoratissimus), and 'akia (Wikstroemia sandwicensis) occur as co-dominants or sub-dominants.

Evidence of recent disturbance is present in many locations in the lower section. The upper 7000 feet of the corridor is almost exclusively papaya orchard, with small linear forests composed mainly of Melochia. The papaya orchards are host to dozens of weedy herbs and shrubs, especially in the abandoned sections.

Airphoto interpretation revealed that cultivation in the papaya field section dates back to at least 1965. There is also an abundance of linear and polygonal features in the alien forest section, indicating that this area also has a recent history of cultivation and other disturbance.

b) Probable impacts

The very localized impact of the proposed project will have minimal effect on native species in the area because of the extremely disturbed state of the vegetation. All native species present along the corridor are common in lower Puna in both disturbed and undisturbed habitats, and no endangered or threatened species were found. Weeds are already widespread along the entire corridor and will not increase in abundance significantly as a result of the project.

4. Fauna

a) Existing conditions

During the vegetation surveys an inventory was also made of birds present on the site. Doves (Streptopelia chinensi and Geopelia striata), white-eyes (Zosterops japonicus), mynahs (Acridotheres tristis), and cardinals (Cardinalis cardinalis) were all common. The lesser golden plover or kolea (Pluvialis dominica) was the only native bird sighted flying in the area. Fieldworkers also reported hearing what may have been the call of the 'i'o or Hawaiian hawk (Buteo solitarius). Because of the mobile nature of birds, a more thorough survey would undoubtedly discover many additional species, but such lowland alien forests are not known to be significant habitats for the native birds.

Several alien mammals including the mongoose (Herpestes auropunctatus) and several species of rats and mice (Rattus spp. and Mus musculus) were sighted or are assumed to occur in the area. In addition feral and/or domestic pigs, cats and dogs (Sus scrofa, Felis catus and Canis familiaris) are probably also present. The only land mammal native to Hawaii, the 'opa'ape'a or Hawaiian hoary bat (Lasiurus cinereus semotus), was not seen in the area during an evening reconnaissance but is perhaps present.

Lowlands dominated by exotic forests are not significant habitats for native invertebrates, and thus no invertebrate inventory was conducted. Exotic land snails, butterflies, and many insects including mosquitos, flies and grasshoppers were sighted during the vegetation survey.

b) Probable impacts

The project will not effect any significant disturbance of habitat for native bird species such as hawk, owl, or plover, or for the bat. Since there are very few native invertebrates in the area, and those that are present already probably impacted by the history of papaya farming, the addition of a water pipeline should not affect them adversely.

5. Historical and Archaeological Resources

a) Survey of existing conditions

During April, 1990, Archaeological Consultants of Hawaii, undertook an archaeological survey of the project site. The basic purpose of this reconnaissance survey was to discover and locate on an appropriate scale map, any sites or features of possible archaeological significance present within the survey corridor, and to make recommendation regarding the value and preservation of such archaeological sites.

Early archaeological work in this area began with Stokes (1906) and was followed by Hudson (1930). In more recent times, Emory (1959), Bonk and Loo (n.d.), and Cox and Stasack (1971). Newman (1970) supplies a map of the island of Hawaii entitled "Agricultural Sites of Hawaii Island CA. 1823 A.D." which indicates the subject property was located in the midst of a major agricultural area. Of more importance to the project area is the work at Hawaii Volcanoes National Park by Ladefoged et al (1987) and the work of Crozier and Barrere at nearby Pualaa.

The only previous archaeological project that has actually covered a portion of the subject property is the survey work by Bevacqua and Dye (1972). At that time they surveyed at 2000ft. wide proposed highway corridor that passed through a narrow, makai section of Halanui. Here they identified a total of seven sites (2503, 2504, 2505, 2506 and 2507); these included caves, platforms, mounds and walls. These are no doubt a small portion of the lower high site density area described earlier in this report.

During the survey, twenty one sites were recorded in this corridor; these include 13 mounds, 2 platforms, 4 walls, 1 enclosure and 1 walled outcrop.

b) Methodology

Three man field team examination consisted of controlled compass sweeps between flagged corridor markers along the entire route of the proposed water line. All observed sites were flagged with blue and white plastic tape and assigned a State of Hawaii Archaeological Site Number. Individual sites and features were sketched and photographed.

The two platforms (11549a and 11593) were subjected to subsurface examination. A 1 meter wide by 2.5 meter trench exposed, underlying soils were subjected to standard archaeological excavation with all soils passing through a 1/8 inch screen. Test results are as follows for both of subsurface examination; in addition, no cultural material of any sort was recovered.

Soil deposits at both locations were only 10 -15 cm to sterile. Subsurface examination of the single enclosure was not possible due to the fact that this structure rests entirely on a lava base.

The identified twenty-one sites summarized below in Figure 3.

Figure 3: Summary of Description of Archaeological Sitings

SITE-#	DESCRIPTION	POSSIBLE SIGN	FUNCTION
11539-A	Mound	NLS	Ag
11549-A	Platform (Tested)	NLS	Habitation
11553-A	Wall	NLS	Ag
11556-A	Walled Outcrop	NLS	NS
11558-B	Large Mound	NLS	Ag
11558-C	Mound	NLS	Ag
11560-H	Mound	NLS	Ag
11560-I	Mound	NLS	Ag
11560-J	Mound	NLS	Ag
11573	Enclosure	NLS	Hab/Ag
11575	Wall	NLS	Ag
11592	Wall	NLS	Ag
11593	Platform (Tested)	NLS	Hab
11593-B	Mound	NLS	Ag
11594	2 Mounds	D	Ag
11941	Mound	NLS	Ag
11942	Mound	NLS	Ag
11943	Mound	NLS	Ag
11944	Mound	NLS	Ag
11945-A	Mound	NLS	Ag
12175	Wall with Konane Board (collected)	NLS	Ag

Code for Criteria significance Evaluation:
NS - Not Significant
NLS - No Longer Significant
A - Site Reflects Major Trends in History
B - Site is Associated with the Life of Significant Person
C - An Excellent Example of A Site Type
D - Site Likely to Yield Important Scientific Data
E - Site has Cultural Significant (Heiau, Shrine, Burial)

c) Probable Impacts

In consideration of the fact that the trench for the proposed waterline is estimated to be only 3 feet wide, we anticipate that little or no damage will occur to any significant sites along the proposed route.

Nevertheless, it is our opinion that archaeological monitoring is necessary for this project as the proposed corridor is surrounded by a series of high density site complexes that may be jeopardized by the movement of heavy equipment.

Moreover, adequate archaeological monitoring may also serve to redirect trench placement within the corridor itself and preclude impacts to sites contained therein -irrespective of their NLS (no longer significant) status.

C. ECONOMIC AND SOCIAL ENVIRONMENTAL CONSIDERATIONS

1. Economic Characteristics

a) Existing Conditions

Hawaii County's economy reflects industry development along the line of historical and geographical diversity. More traditional agricultural industry such as sugar and more recently diversified agriculture, are located in the eastern part of the island where rainfall, topographical, and other natural conditions are more suitable for sugar, ranching, macadamia nuts, papaya, coffee and other diversified agricultural products. Hilo continues to serve as the center of government, financial, transportation and other supporting industry services that are vital to the maintenance of the agricultural industry.

The sunny west coast of the island, including North Kona and more recently the South Kohala District, have rapidly grown to be important visitor destination areas, and centers for related support-service activities. Developing over the past few decades, West Hawaii tourism and East Hawaii Agriculture (and governmental services) have tended to provide economic complimentarity.

The Puna district is generally rural and agricultural in character with local farmers producing the bulk of the County's papaya, anthuriums and orchids, worth nearly 20 million dollars in annual sales. More recently, however, the prospect of establishing 25 Mw geothermal energy power on line in Pohoiki within next 12 to 16 months appears to be very good.

b) Probable Economic Impacts

1) Beneficial Impacts

There is a short term benefits derived from income and employment creation by the proposed project. The entire project cost is estimated to be one million dollars and it will generate approximately $ 600,000 income to the island. In addition, $ 200,000 business revenue will be generated within the island economy. This translates into 15 - 20 man/year equivalent of employment for the island economy. Taking into account the indirect impact, the total jobs and income resulting from this project will be 20 man/year equivalent in employment and 1.2 million dollars in income.

2) The readily available public water system may further encourage potential agriculture and commercial activities supported by the "spill over" effect of recent increase in population growth in Puna district (19,800 as of 1988 which is 68 % increase over 1980).

2. Social Characteristics

a) Existing Conditions

Within the Puna District(population of 19,800), roughly 20 percent of the residents who are living in the three towns of Keaau, Mountain View, and Pahoa, the balance of 80 percent were scattered throughout the district. There are several small and thinly populated communities in the Glennwood-Volcano areas and Pohoiki-Kapoho area. There are no known residents within one mile of either side of the project site. The distance to the nearest home for the construction site is located approximately 1.1 miles at the makai end of the proposed construction site..

b) Probable Impacts

1) Beneficial Impacts

The proposed actions will have positive social benefits which largely stems from the improvements of water quality thereby enhancing the health of community residents.

2) Adverse Impacts

There are no known or anticipated adverse social impacts expected to result from the proposed pipeline construction.

D. AIR QUALITY AND NOISE

1. Air Quality

Longterm air quality within the project area should not be adversely affected by the proposed actions. There will be some unavoidable short-term impacts on air quality during project construction through the release of fugitive dust and wind blown soil. However, these adverse effects will be minimized through the use of proper abatement procedures. There are no residential areas adjacent to or near the project site likely to be impacted.

2. Noise levels

Noise levels in the project area is expected to be at minimum during the project construction. The impacted area is determined not to be the sanctuary for the known Hawaiian hawk, 'i'o, and such lowland alien forests are not known to be significant habitats for the native birds.

CHAPTER IV: ALTERNATIVE TO THE PROPOSED ACTION

A. NO PROJECT

The "no project" alternative would mean doing nothing to improve water quality on the existing Kapoho water system. This is an unacceptable alternative because the maintenance of water quality standard is the responsibility of County Government. In addition, failure to improve water quality for the Kapoho community may lead to an increased health hazard for the residents residing in this community.

B. ALTERNATE WELL SITES

Development of new ground water source at alternate site is a possibility. However, such site(s) is likely subject to the same problem faced by the current well site and thus makes little sense to pursue.

C. ALTERNATE TRANSMISSION ROUTING

An alternate routing along the existing county roads has been contemplated. However, considering numerous curves, big trees along the corridor, and the submersion of the part of the makai side of county road during certain part of year makes this alternate routing economically less attractive.

CHAPTER V: DETERMINATION OF NEGATIVE DECLARATION

In accordance with Chapter 343, HRS it has been determined that a full Environmental Impact Statement is not required for the proposed construction of Kapoho-Pohoiki Water Transmission Pipeline project because the intended actions are, on the basis of technical evaluation, not expected to produce any "significant effects" in the context of Section 1:31 of the EIS Regulations. This determination is based on the generally small scale of the proposed project, its important social benefits, and the measures adopted to mitigate anticipated minor adverse environmental impacts.

CHAPTER VI: REFERENCES

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APPENDIX A

SPECIES LIST OF PLANTS SEEN ALONG POHOIKI PIPELINE CORRIDOR

Species List of Plants Seen Along Pohoiki Pipeline Corridor,
April 7, 1990

by Linda Cuddihy

Nomenclature of flowering plants follows H. St.John 1973, with names according to Imada, Wagner, and Herbst (1989) in parentheses. Fern nomenclature follows an unpublished list by C. H. Lamoureux. Common names (when known) are listed below each plant's scientific name. Status is listed as Endemic (E), Indigenous (I), Alien (A), or Polynesian introduction before 1778 (P). Abundance was estimated as abundant (A), common (C), occasional (O), uncommon (U), and localized (lc).

Fern	Status	Abundance
Davalliaceae		
Nephrolepis exaltata Kukpukupu, swordfern	I	O
Nephrolepis multiflora Scaly swordfern	A	C
Polypodiaceae		
Phymatosorus scolopendria Laua'e	A	A
Psilotaceae		
Psilotum nudum moa, whisk fern	I	U
The lypteridaceae		
Christella parasitica Oak fern	A	U
GYMNOSPERMS		
Araucariaceae		
Araucaria heterophylla Norfolk Island pine	A	O, lc
FLOWERING PLANTS - MONOCOTS		
Araceae		
Scindapsus aureus (Epipremnum pinnatum) Taro vine, pothos	A	C, lc

MONOCOTS (continued)	Status	Abundance
Commelinaceae		
Commelina diffusa Dayflower, honohono	A	C
Cyperaceae		
Cyperus brevifolius	A	C
Cyperus polystachyus	I	U
Gramineae (Poaceae)		
Andropogon glomeratus (Schizachyrium condensatum) Bush beardgrass	A	C
Andropogon virginicus Broomsedge	A	U
Axonopus affinis Narrow-leaved carpetgrass	A	O
Digitaria violascens Violet crabgrass	A	O
Eleusine indica Goosegrass, wiregrass	A	O
Melinis minutiflora Molasses grass	A	C, lc
Oplismenus hirtellous Basketgrass	A	A
Paspalum conjugatum Hilo grass	A	U
Paspalum orbiculares (P. scrobiculatum) Ricegrass	A (I)	O
Paspalum urvillei Vasey grass	A	O
Pennisetum purpureum Elephant grass	A	O
Sacciolepis indica Glenwood grass	A	O
Sporobolus africanus Smutgrass	A	U
Liliaceae (Agavaceae)		
Cordyline terminalis (C. fruticosa) Ti, ki	P	O
Orchidaceae		
Arundina bambusaefolia (A. graminifolia) Bamboo orchid	A	O
Spathoglottis plicata Malaysian ground orchid	A	O

FLOWERING PLANTS - DICOTS	Status	Abundance
Palmae (Arecaceae)		
Cocos nucifera Coconut, niu	P	C
Pandanaceae		
Pandanus tectorius Hala, screwpine	I	C
Acanthaceae		
Thunbergia fragrans White thunbergia	A	A
Anacardiaceae		
Mangifera indica Mango	A	C
Schinus terebinthifolius Christmasberry	A	C
Araliaceae		
Brassaia actinophylla (Schefflera actinophylla) Octopus tree	A	U
Begoniaceae		
Begonia sp.	A	U
Caricaceae		
Carica papaya Papaya	A	A
Caryophyllaceae		
Drymaria cordata Drymaria	A	U, lc
Compositae (Asteraceae)		
Ageratum conyzoides Ageratum	A	C
Bidens pilosa Spanish needle	A	O
Crassocephalum crepidioides	A	O
Emilia sonchifolia Flora's paintbrush, red pua lele	A	O
Erechtites hieracifolia Fireweed	A	C
Erigeron bonariensis (Conyza bonariensis) Hairy horseweed	A	O

DICOTS (Continued)	Status	Abundance
Pluchea odorata (Pluchea symphytifolia) Sourbush	A	C
Sonchus oleraceus Sow thistle, yellow pua lele	A	U
Vernonia cinerea Little ironweed	A	O
Wedelia trilobata Wedelia	A	O, lc
Youngia japonica Oriental hawksbeard	A	U
Unknown	A	U
Convolvulaceae		
Ipomoea congesta (I. indica) Koali, morning glory	I	O
Ipomoea triloba Little bell	A	C, lc
Crassulaceae		
Kalanchoe pinnata Air plant	A	U
Ebenaceae		
Diospyros ferrea (D. sandwicensis) Lama	E	C
Euphorbiaceae		
Aleurites moluccana Kukui	P	U, lc
(Chamaesyce hyssopifolia) Spurge	A	C, lc
Euphorbia hirta (Chamaesyce hirta) Garden spurge	A	O, lc
Euphorbia thymifolia (Chamaesyce thymifolia) Thyme-leaved spurge		AA, lc
Phyllanthus debilis Phyllanthus	A	O, lc
Guttiferae (Clusiaceae)		
Calophyllum inophyllum Kamani	P	O, lc
Clusia rosea Autograph tree	A	O
Labiatae (Lamiaceae)		
Hyptis pectinata Comb hyptis	A	A

DICOTS (Continued)	Status	Abundance
Lauraceae		
Cassytha filiformis Kauna'oa pehu	I	O
Leguminosae (Fabaceae)		
Abrus precatorius Rosary pea, black-eyed susan	A	C
Cassia leschenaultiana (Chamaechrista nictitans) Partridge pea	A	O
Cassia occidentalis (Senna occidentalis) Coffee senna	A	U
Cassia aff. bicapsularis (Senna pendula) Cassia	A	U
Crotalaria mucronata (C. pallida) Rattle pod	A	U
Desmodium cajanifolium	A	O
Desmodium triflorum Three-flowered beggarweed	A	U
Desmodium uncinatum (D. sandwicense) Spanish clover	A	C
Desmodium sp.	A	C
Indigofera suffruticosa Indigo	A	O
Mimosa pudica Sensitive plant, sleeping grass	A	O,lc
Mucuna gigantea Ka'e'e	I	C
Phaseolus lathyroides (Macroptilium lathyroides) Cow pea	A	U
Samanea saman Monkeypod tree	A	U, lc
Loganiaceae (Buddlejaceae)		
Buddleja asiatica Butterfly bush	A	C
Malvaceae		
Malvastrum coromandelianum False mallow	A	O
Sida fallax 'Ilima	I	U
Sida sp.	A	U

DICOTS (Continued)	Status	Abundance
Menispermaceae		
Cocculus ferrandianus (C. trilobus) Huehue	E (I)	U
Moraceae (Cecropiaceae)		
Cecropia obtusifolia Guarumo	A	O
Myrsinaceae		
Ardisia humilis (A. elliptica) Shoebutton ardisia	A	C
Myrtaceae		
Eugenia cumini (Syzygium cumini) Java plum	A	U
Metrosideros polymorpha 'Ohi'a	E	O, lc
Psidium cattleianum Strawberry guava, waiawi	A	A
Psidium guajava Common guava	A	C
Oxalidaceae		
Oxalis corniculata Yellow wood sorrel, 'ihi	P?	U
Oxalis martiana (O. corymbosa) Pink wood sorrel	A	U
Passifloraceae		
Passiflora foetida Scarlet-fruited passionflower	A	O
Piperaceae		
Peperomia leptostachya 'Ala'ala-wai-nui	I	O
Polygalaceae		
(Polygala paniculata)	A	U, lc
Rosaceae		
Rubus rosaefolius (R. rosifolius) Thimbleberry	A	O
Rubiaceae		
Borreria laevis (Spermacoce assurgens) Buttonweed	A	C, lc
Canthium odoratum Alahe'e	I	C

DICOTS (Continued)	Status	Abundance
Hedyotis corymbosa	A	C, lc
Morinda citrifolia Noni	P	C
Paederia foetida (P. scandens) Maile-pilau	A	U, lc
(Spermacoce sp.)	A	C, lc
Sterculiaceae		
Melochia umbellata Melochia	A	A
Waltheria americana (W. indica) 'Uhaloa	I	U
Thymelaeaceae		
Wikstroemia sandwicensis 'Akia	E	O
Ulmaceae		
Trema orientalis Gunpowder tree	A	C
Umbelliferae (Apiaceae)		
Centella asiatica Asiatic pennyroyal	A	U
Urticaceae		
Pipturus hawaiiensis (P. albidus) Mamaki	E	C
Verbenaceae		
Lantana camara Lantana	A	C
Stachytarpheta cayennensis (S. dichotoma) Vervain	A	C
Verbena litoralis Weed verbena, oi	A	U

Plants Seen only in Papaya Fields
Araucaria heterophylla
Borreria laevis
Chamesyce hyssopifolia
Drymaria cordata
Eleusine indica
Emilia sonchifolia
Euphorbia hirta
Euphoriba thymifolia
Hedyotis corymbosa
Ipomoea triloba
Paederia foetida
Phaseolus lathyroides
Phyllanthus debilis
Youngia japonica

Weeds with Most Cover in Papaya Fields
Buddleja asiatica
Commelina diffusa
Euphorbia thymifolia
Hyptis pectinata
Ipomoea triloba
Melochia umbellata
Pluchea odorata
Spermacoce sp.
Thunbergia fragrans

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APPENDIX B

ARCHAEOLOGICAL INVESTIGATIONS AT POHOIKI FOR PROPOSED WATERLINE STUDY

ARCHAEOLOGICAL CONSULTANTS
of
HAWAII

59-624 Pupukea Rd.
Haleiwa, Hawaii 96712
(808) 638-7442

JOSEPH KENNEDY
Archaeologist

ARCHAELOGICAL INVESTIGATIONS

AT

TMK: 1-4-2:13,14,69

POHOIKI, PUNA, ISLAND OF HAWAII

PROPOSED WATERLINE STUDY

APRIL 1990

Submitted to: Mr. Don Okahara
Okahara Engineering
200 Kolola St.
Hilo, Hawaii 96721

Submitted by: Joseph Kennedy
Archaeological Consultants
of Hawaii, Inc.
59-624 Pupukea Road
Haleiwa, Hawaii 96712

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JOSEPH KENNEDY
Archaeologist

Mr. Don Okahara
Okahara Engineering
200 Kohola St.
Hilo, Hawaii 96721

April 18, 1990

RE: ARCHAEOLOGICAL INVENTORY REPORT CONCERNING A PROPOSED WATER LINE AT AHALANUI, PUNA, HAWAII, (TMK:1-4-2:13, 14, 69)

Dear Mr. Okahara:

INTRODUCTION

At the request of your office, Archaeological Consultants of Hawaii, Inc. has conducted an inventory survey along the route of a proposed county water line located in Ahalanui Ahupua'a, Puna, Island of Hawaii (Figure 1).

This proposed water line will necessitate the excavation of a three foot wide trench that will pass through a corridor approximately 50 feet wide and 3300 feet in length. Twenty one sites were recorded in this corridor; these include 13 mounds, 2 platforms, 4 walls, 1 enclosure and one walled outcrop. Discussions regarding these sites along with conclusions will be presented in the text below.

PHYSICAL SETTING

Puna District lies between the District of Hilo to the North and Ka'u to the South and extends from Cape Kumukahi on the East to the forested slopes of Mauna Loa on the West. Geologically dominating the Puna is the East Rift Zone of Kilauea Volcano. Volcanically active, this East Rift Zone with some 60 cinder and spatter cones extends from Kilauea 52 kms. to Cape Kumukahi.

There are two general types of flora in the project area ie. 'Ohi'a forest and strands of diverse native vegetation.

The forest areas are dominated by the 'Ohi'a lehua tree, a species endemic to Hawaii and a hardy pioneer tree that is usually the first to establish itself on new lava flows.

'Ohi'a forests cover much of inland Puna and also portions of the coastline, accounting for the majority of the vegetation present on the lava flows. Usually present in the 'Ohi'a forests are a variety of ferns, mosses, and lichens.

The secondary vegetation is characterized by its diversity and its indigenous character. This vegetation is usually found in coastal areas undisturbed by recent lava flows and includes such native plants as naupakakahakai (Scaevola collina subsp. polymorpha), hau (Hibiscus tiliaceous), milo (Thespesia populnea), kou (Cordia subcordata), kamani (Calophyllum inophyllum), noni (Morinda citrifolia), ki, or ti (Cordyline terminalis), 'ulu (Artocarpus communis), hala (Pandanus odoratissimus), niu, or coconut palm (Coco nucifera), moa (Psilotum nudum), and pohuehue (Ipomea pes-caprae).

In addition to these native plants, several recently introduced species are present, such as guava (Psidium guajava) and (Psidium cattleianum), lantana (Lantana camara), mango (Mangifera indica), and koa haole (Leucaena glauca) (Latin names from Neal, 1965.)

ETHNOGRAPHIC ACCOUNTS OF THE AREA AND PREVIOUS ARCHAEOLOGICAL WORK

The written history of the Puna area begins with observations made by Lt. King and David Samwell who were aboard the Resolution with Captain Cook. King mentioned that he did not think Puna as populous as Kona; Samwell, however, wrote that many people collected on shore to look at the ship and that "many canoes came off to us... [with] a great number of beautiful young women."

Missionary accounts begin in 1823. It was then that the Rev. Ellis visited the area and declared Puna "...much more populous [District] than any we had passed since leaving Kona." (Ellis 1917:215). He described the villages of Puna as "...pleasant, populous and prosperous." (ibid.) He guessed the population of the villages in the vicinity of Kaimu to be 2000.

In 1841, the Reverend Titus Coan wrote in the Missionary Herald Extracts that most of the inhabitants of Puna lived along the shore, though hundreds were scattered inland. He noted the population at 4,371, of which none were foreigners.

In a short 30 years, the population of Puna began to dwindle. Chester Lyman visited Puna in 1871 and noted "...There are but a few people in this region... miserably poor and for some time past have been almost in a state of famine." (Lyman 1924: 103) Dutton, in 1884, says that Puna's population was 'scanty' and had undergone a great decrease within the present century (Dutton 1884: 147).

It is worth noting the volcanic role in the history of Puna. Handy (1972: 524) notes that "One of the most interesting things about Puna is that Hawaiians believe, and their traditions imply, that this was once Hawaii's richest agricultural regions and that it is only in relatively recent time that volcanic eruptions have destroyed much of its best land."

The volcanologist McDonald has commented that there

> "...is ample evidence that in geologically recent times Puna has often been the site of eruptions of cinder cones and extensive lava flows. It is probable that all of the surface lavas throughout this region should be considered geologically recent, but many of them are of such late date that it is surprising not to find more mention of them in native tradition.
>
> Few references to prehistoric lava flows have been preserved by the Hawaiian chroniclers however, perhaps because eruptions were so commonplace." (McDonald 1941:1)

Curiously, Dutton, in the 1880's, remarked that "the traditions of the natives declare that no king ever reigned in Puna without seeing large parts of his dominion overflowed [by lava]. (Dutton 1884: 150)

Early archaeological work in this area began with Stokes (1906) and was followed by Hudson (1930). In more recent times, Emory (1959), Bonk and Loo (n.d.), and Cox and Stasack (1971). Newman (1970) supplies a map of the island of Hawaii entitled "Argricultural Sites of Hawaii Island CA. 1823 A.D." which indicates the subject property was located in the midst of a major agricultural area. Of more importance to the project area is the work at Hawaii Volcanoes National Park by

Ladefoged et al (1987) and the work of Crozier and Barrere at nearby Pualaa.

The only previous archaeological project that has actually covered a portion of the subject property is the survey work by Bevacqua and Dye (1972). At that time they surveyed at 2000ft. wide proposed highway corridor that passed through a narrow, makai section of Ahalanui. Here they identified a total of seven sites (2503, 2504, 2505, 2506 and 2507); these included caves, platforms, mounds and walls. These are no doubt a small portion of the lower high site density area described earlier in this report.

The reader may question why more than seven sites were not reported by Bevacqua. A partial explanation has to do with the dense vegetation in this area and another is that site 2503 is a complex of features that encompass 22,500 square meters.

In addition to these works, the reader should be informed that the subject property is surrounded on all sides by a considerably larger study area that is currently undergoing extensive and intensive archaeological examination.

METHODOLOGY

Three man field team examination consisted of controlled compass sweeps between flagged corridor markers along the entire route of the proposed water line. All observed sites were flagged with blue and white plastic tape and assigned a State of Hawaii Archaeological Site Number. Individual sites and features were sketched and photographed.

The two platforms (11549a and 11593) were subjected to subsurface examination. A 1 meter wide by 2.5 meter trench was placed throughout the middle of each structure. Once exposed, underlying soils were subjected to standard archaeological excavation with all soils passing through q 1/8 inch screen. Test results are as follows for both platforms. No osteological material was recovered as a result of subsurface examination; in addition, no cultural material of any sort was recovered.

Soil deposits at both locations were only 10 -15 cm to sterile. Subsurface examination of the single enclosure was not possible due to the fact that this structure rests entirely on a lava base.

Legend for Site Listings

SITE-# :
DESCRIPTION :

DIMENSIONS :
FUNCTION : Agriculture(Ag),Habitation(Hab),Burial(B),Not Significant(NS)
POSSIBLE SIGNIFICANCE CRITERIA: NS,NLS,A,B,C,D,E,*
CONDITION : Poor,Fair,Good,Excellent
TEST/PHASE : Tested,Not Tested/Phase I,Phase II
LOC/CLASS : Location on map/Preservation,Passive Preservation,Impacted,
Impacted Pink Area (Buffer Zone Around Waterline Area)

CODE FOR CRITERIA SIGNIFICANCE EVALUATION

NS - Not Significant
NLS - No Longer Significant
A - Site Reflects Major Trends in History
B - Site is Associated with the Life of Significant Person
C - An Excellent Example of A Site Type
D - Site Likely to Yield Important Scientific Data
E - Site has Cultural Significance (Heiau, Shrine, Burial)

* Possible Burial
(p) Preservation

1 -

SITE-# : 11539-A
DESCRIPTION : Mound

DIMENSIONS : 3x2.5x(0.7,0.5,0.2)m
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

2 -

SITE-# : 11549-A
DESCRIPTION : Platform with soil-filled area in top center

DIMENSIONS : 6x5m 0.3m AGL to 1.2m AGL
FUNCTION : Hab
POSSIBLE SIGNIFICANCE CRITERIA: NLS Tested - no burials, no cultural material
CONDITION : Good
TEST/PHASE : Tested/Phase I
LOC/CLASS : Section A/Impacted

3 -

SITE-# : 11553-A
DESCRIPTION : Wall

DIMENSIONS : 2x0.5m 0.4m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

4 -

SITE-# : 11556-A
DESCRIPTION : Walled outcrop and 5 Mounds

DIMENSIONS : 4x2x1m 1x2x2m 1.5x1.5x0.2m 1x1m 1x1.5m 0.3x1m
FUNCTION : NS
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

5 -

SITE-# : 11558-B
DESCRIPTION : Large mound

DIMENSIONS : 3x2x1m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Good
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

6 -

SITE-# : 11558-C
DESCRIPTION : Mound

DIMENSIONS : 2x1x1m
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Fair
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted pink

7 -

SITE-# : 11560-H
DESCRIPTION : Mound

DIMENSIONS : 3x1m 0.6m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted Pink

8 -

SITE-# : 11560-I
DESCRIPTION : Mound

DIMENSIONS : 3x2.5x(0.4 to 0.5)m
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted Pink

9 -

SITE-# : 11560-J
DESCRIPTION : Mound

DIMENSIONS : 1x2m 0.8 to 1m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

10 -

SITE-# : 11573
DESCRIPTION : Enclosure

DIMENSIONS : 30x30m 1 to 0.4m AGL
FUNCTION : Hab/Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Good
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

11 -

SITE-# : 11575
DESCRIPTION : Wall

DIMENSIONS : 8x1.5x1m
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

12 -

SITE-# : 11592
DESCRIPTION : Wall

DIMENSIONS : 8x0.5m 0.2m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted Pink

13 -

SITE-# : 11593
DESCRIPTION : Platform

DIMENSIONS : 5x6m 30 to 50cm AGL
FUNCTION : Hab/B
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Fair
TEST/PHASE : Tested/Phase I-no burials-no midden
LOC/CLASS : Section A/Impacted

14 -

SITE-# : 11593-B
DESCRIPTION : Mound

DIMENSIONS : 1x1x0.4m
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

15 -

SITE-# : 11594
DESCRIPTION : Mound,Mound against outcrop

DIMENSIONS : 4x1.5x0.3m 2x1x0.8m
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: D
CONDITION : fair
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

16 -

SITE-# : 11941
DESCRIPTION : Mound

DIMENSIONS : 4x3.5m 0.8 to 0.3m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Good
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

17 -

SITE-# : 11942
DESCRIPTION : Mound

DIMENSIONS : 1x1m 0.5m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

18 -

SITE-# : 11943
DESCRIPTION : Mound against outcrop

DIMENSIONS : 2x1.5m 1m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

19 -

SITE-# : 11944
DESCRIPTION : Mound

DIMENSIONS : 2x1.5m 0.4m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: D
CONDITION : Fair
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted Pink

20 -

SITE-# : 11945-A
DESCRIPTION : Mound

DIMENSIONS : 1x2m 0.5m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Poor
TEST/PHASE : Not Tested/Phase I
LOC/CLASS : Section A/Impacted

21 -

SITE-# : 12175
DESCRIPTION : Wall with Konane Bd. (collected and curated)

DIMENSIONS : 20x0.6m 0.8 to 0.3m AGL
FUNCTION : Ag
POSSIBLE SIGNIFICANCE CRITERIA: NLS
CONDITION : Good
TEST/PHASE : Not Tested/Phase II
LOC/CLASS : Section A/Impacted

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59-624 Pupukea Rd.
Haleiwa, Hawaii 96712

Ahalanui,Puna,Hawaii

(TMK: 1-4-2:13,14,69)

SITE-#	DESCRIPTION	POSSIBLE SIGN
11539-A	Mound	NLS
11549-A	Platform (Tested)	NLS
11553-A	Wall	NLS
11556-A	Walled outcrop	NLS
11558-B	Large mound	NLS
11558-C	Mound	NLS
11560-H	Mound	NLS
11560-I	Mound	NLS
11560-J	Mound	NLS
11573	Enclosure	NLS
11575	Wall	NLS
11592	Wall	NLS
11593	Platform (Tested)	NLS
11593-B	Mound	NLS
11594	2 Mounds	D
11941	Mound	NLS
11942	Mound	NLS
11943	Mound	NLS
11944	Mound	NLS
11945-A	Mound	NLS
12175	Wall with Konane Board (collected)	NLS

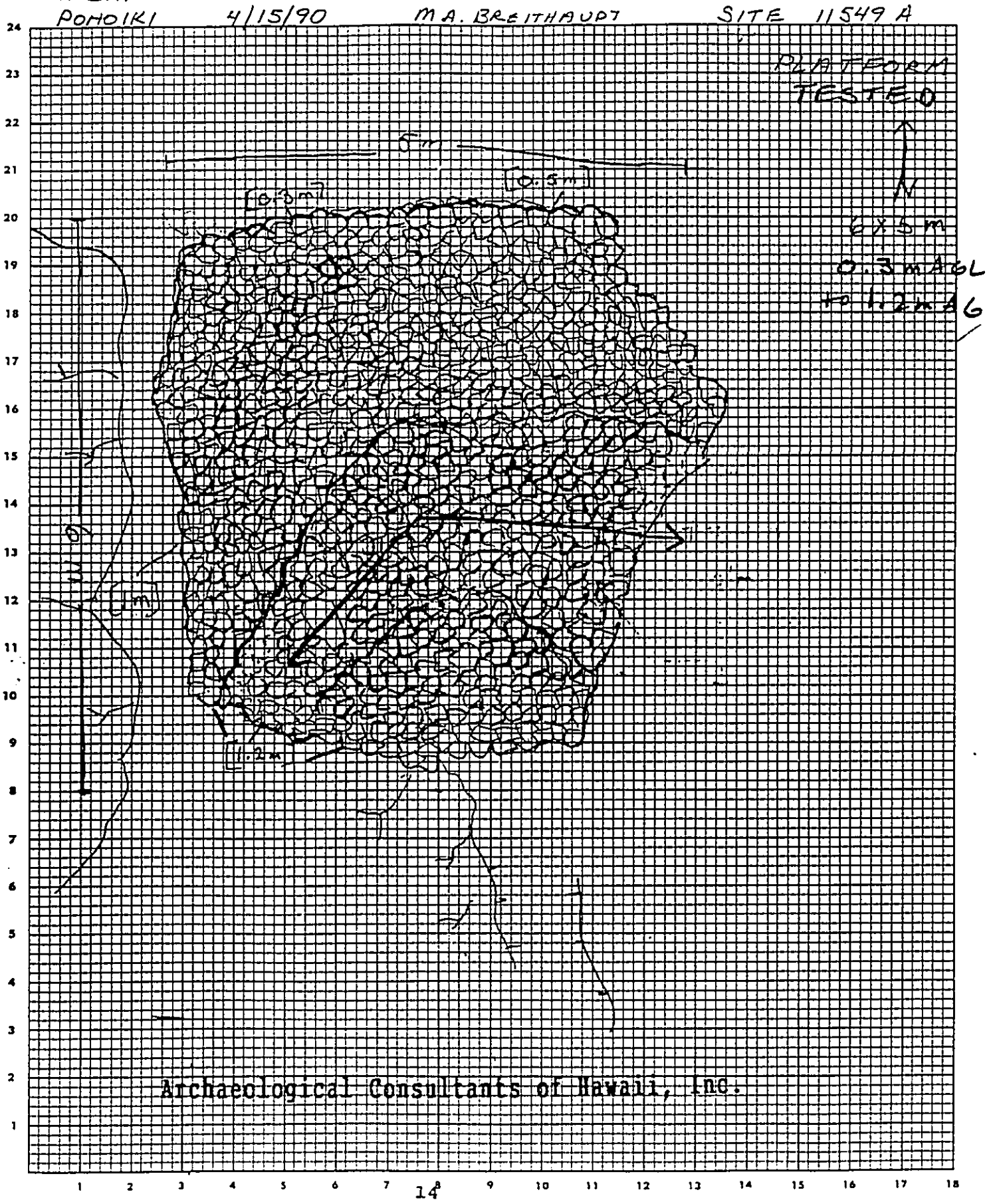
Archaeological Consultants of Hawaii,Inc.
59-624 Pupukea Rd.
Haleiwa, Hawaii 96712

Ahalanui,Puna,Hawaii

(TMK: 1-4-2:13,14,69)

SITE-#	DESCRIPTION	FUNCTION
11539-A	Mound	Ag
11549-A	Platform (Tested)	Habitation
11553-A	Wall	Ag
11556-A	Walled outcrop	NS
11558-B	Large mound	Ag
11558-C	Mound	Ag
11560-H	Mound	Ag
11560-I	Mound	Ag
11560-J	Mound	Ag
11573	Enclosure	Hab/Ag
11575	Wall	Ag
11592	Wall	Ag
11593	Platform (Tested)	Hab
11593-B	Mound	Ag
11594	2 Mounds	Ag
11941	Mound	Ag
11942	Mound	Ag
11943	Mound	Ag
11944	Mound	Ag
11945-A	Mound	Ag
12175	Wall with Konane Board (collected)	Ag

A.C.H
POHOIKI 4/15/90 M.A. BREITHAUPT SITE 11549 A



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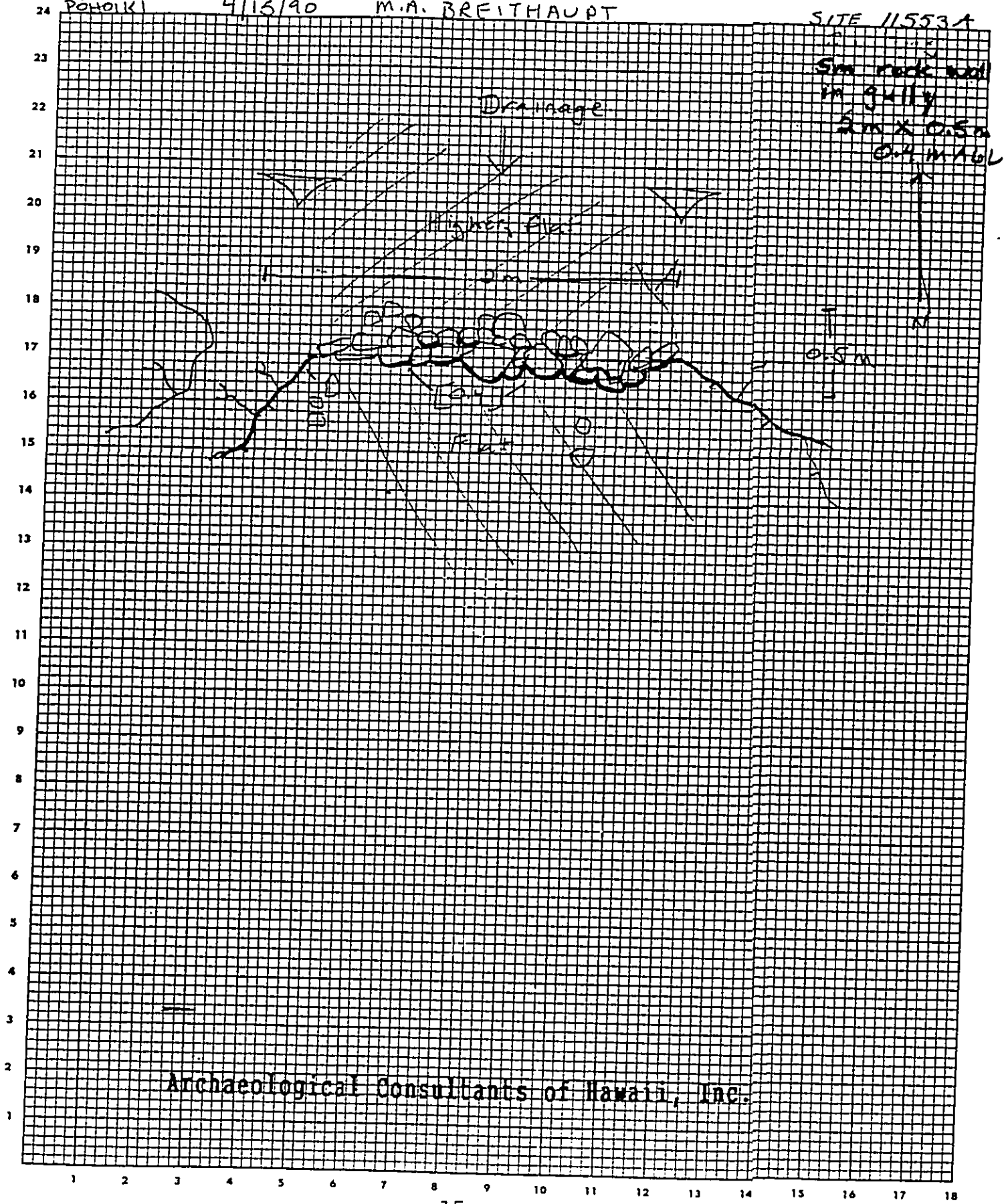

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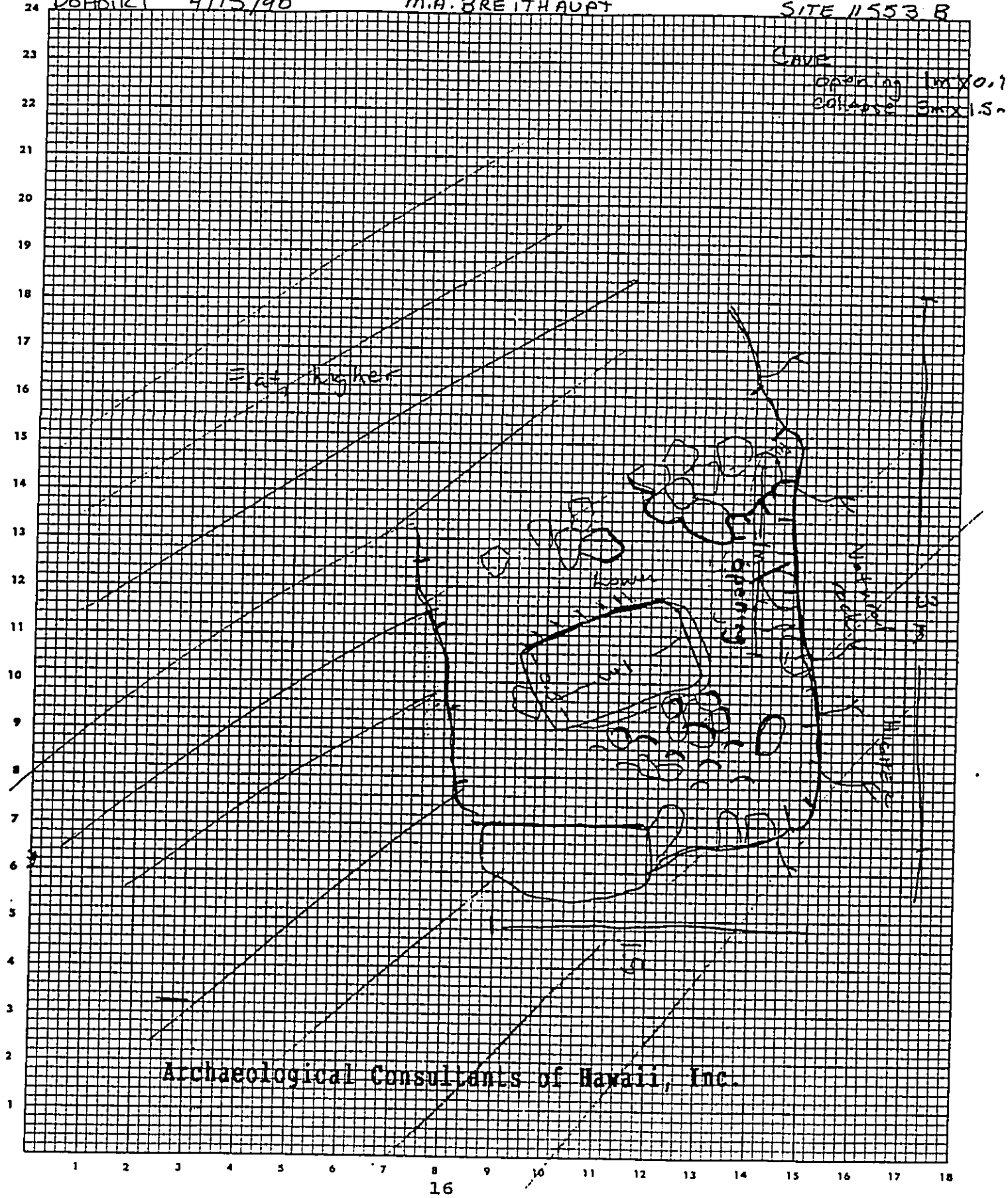

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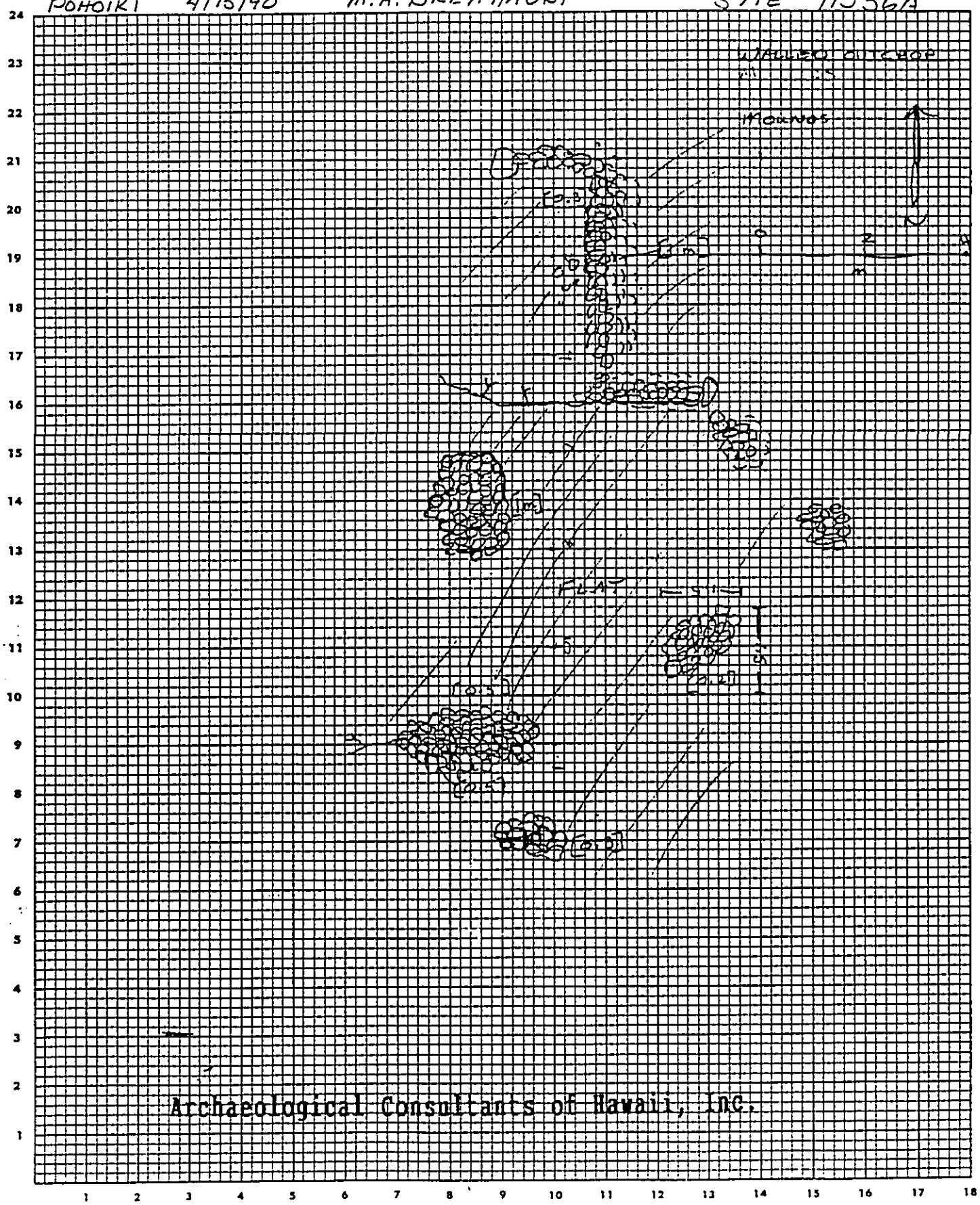

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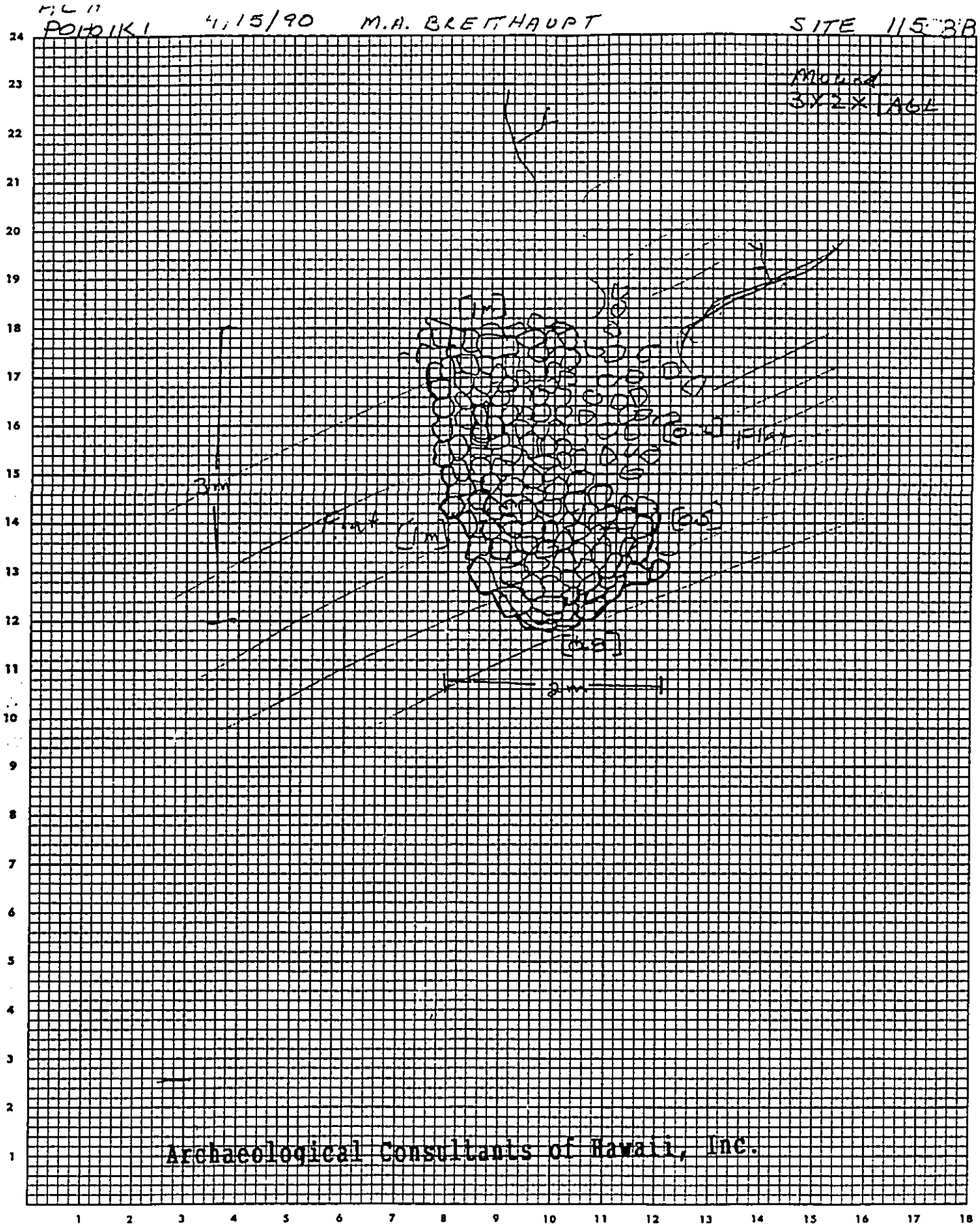
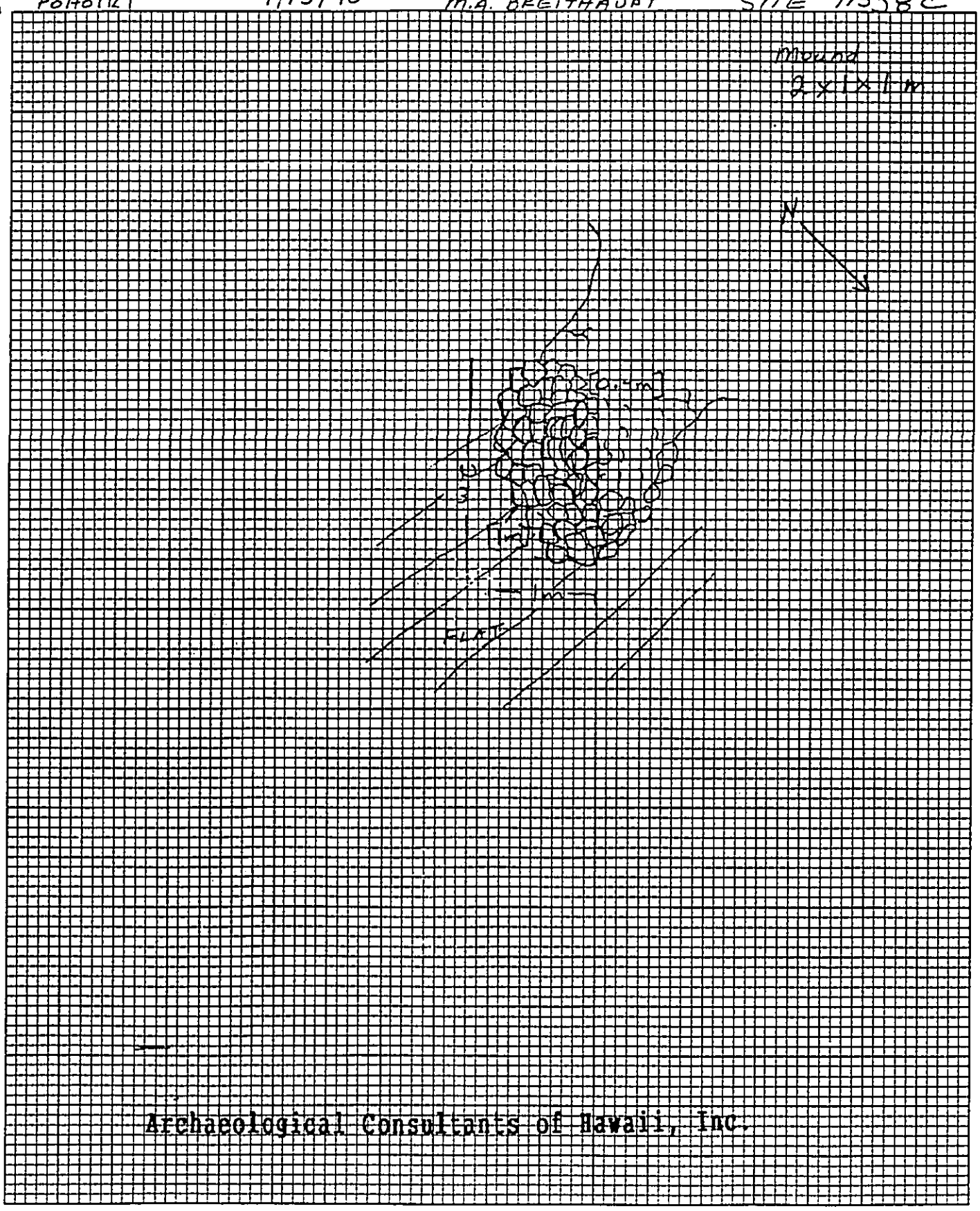

POHOIKI 4/15/90 M.A. BRETTHAUPT SITE 115 BB
Mound
3Y 2* AGL
1m
3m
1.4m*
1m
2m
Archaeological Consultants of Hawaii, Inc.

ACH
Pohoiki 1

4/15/90

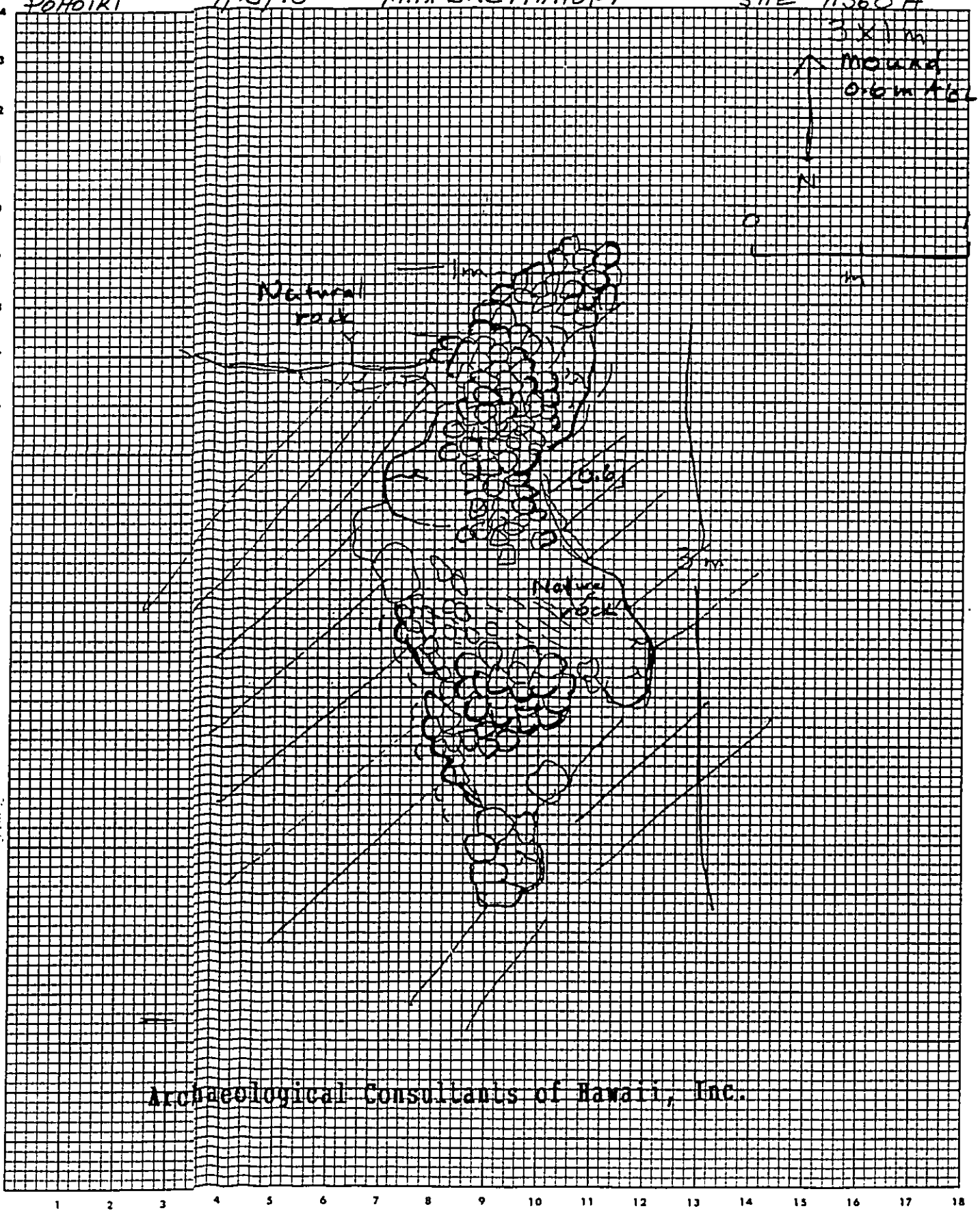
M.A. Breithaupt

SITE 11558C



Archaeological Consultants of Hawaii, Inc.

ACH
POHOIKI 4/15/90 M.A. BREITHAUPT SITE 11560 H



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ACH
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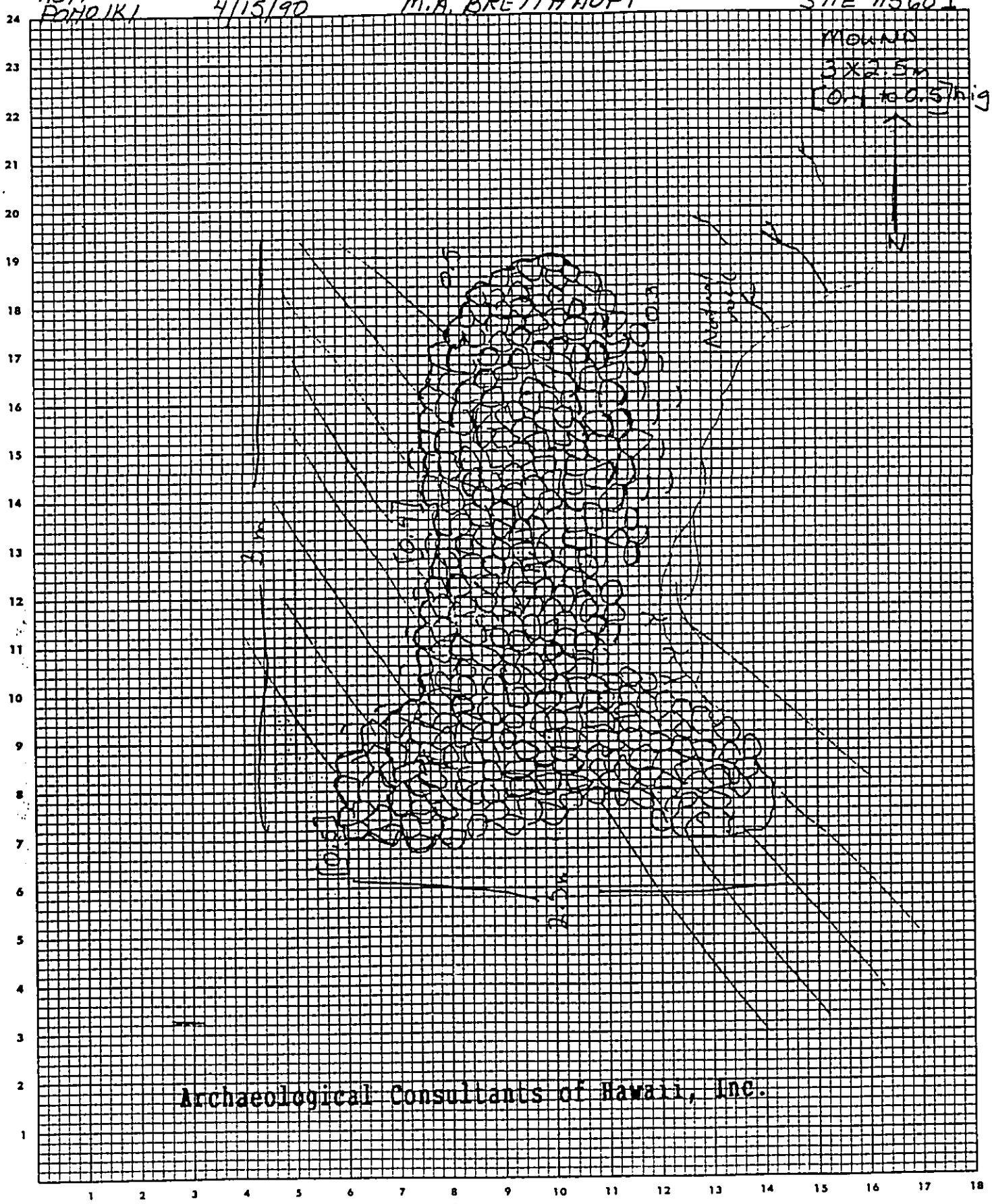

ACH
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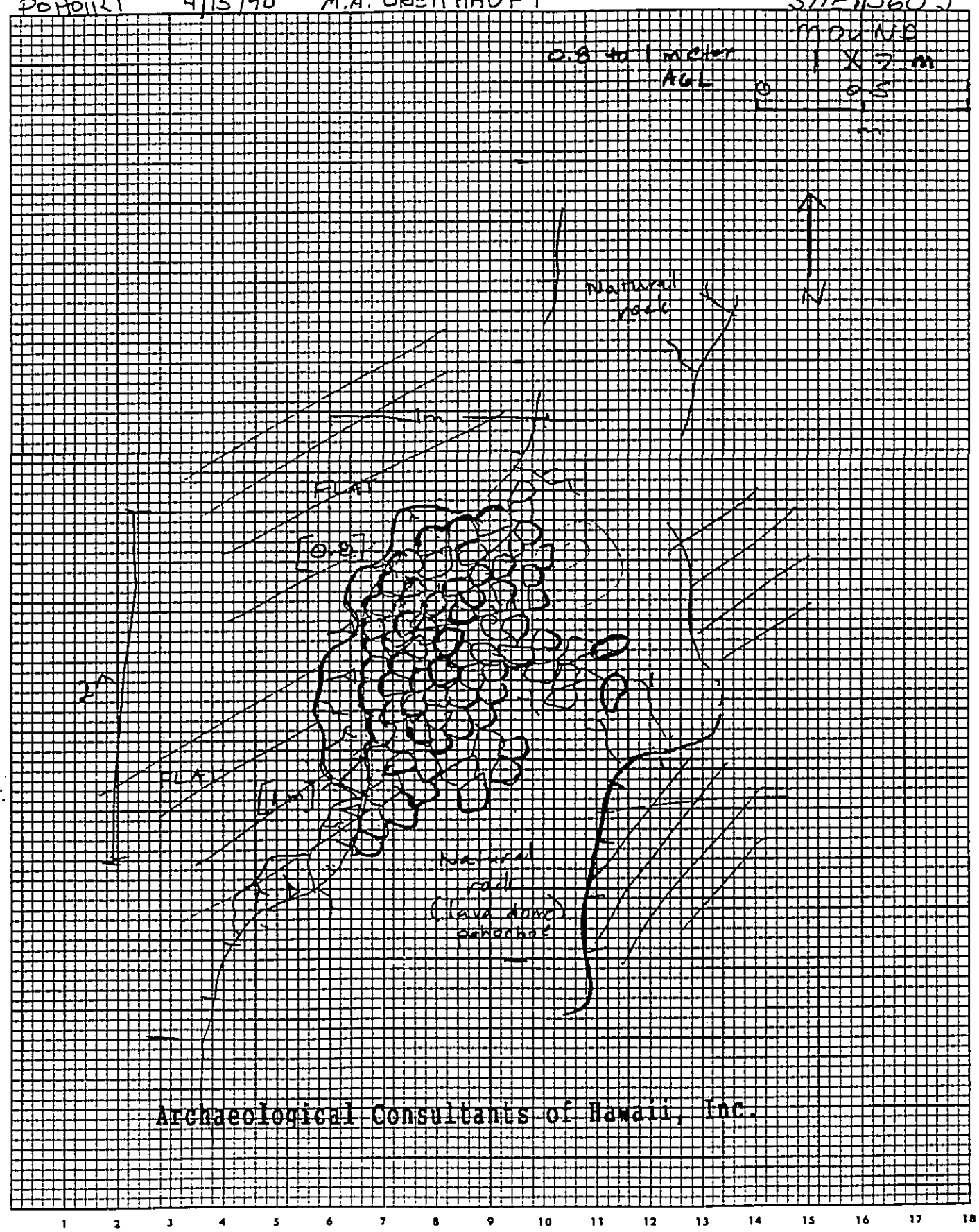
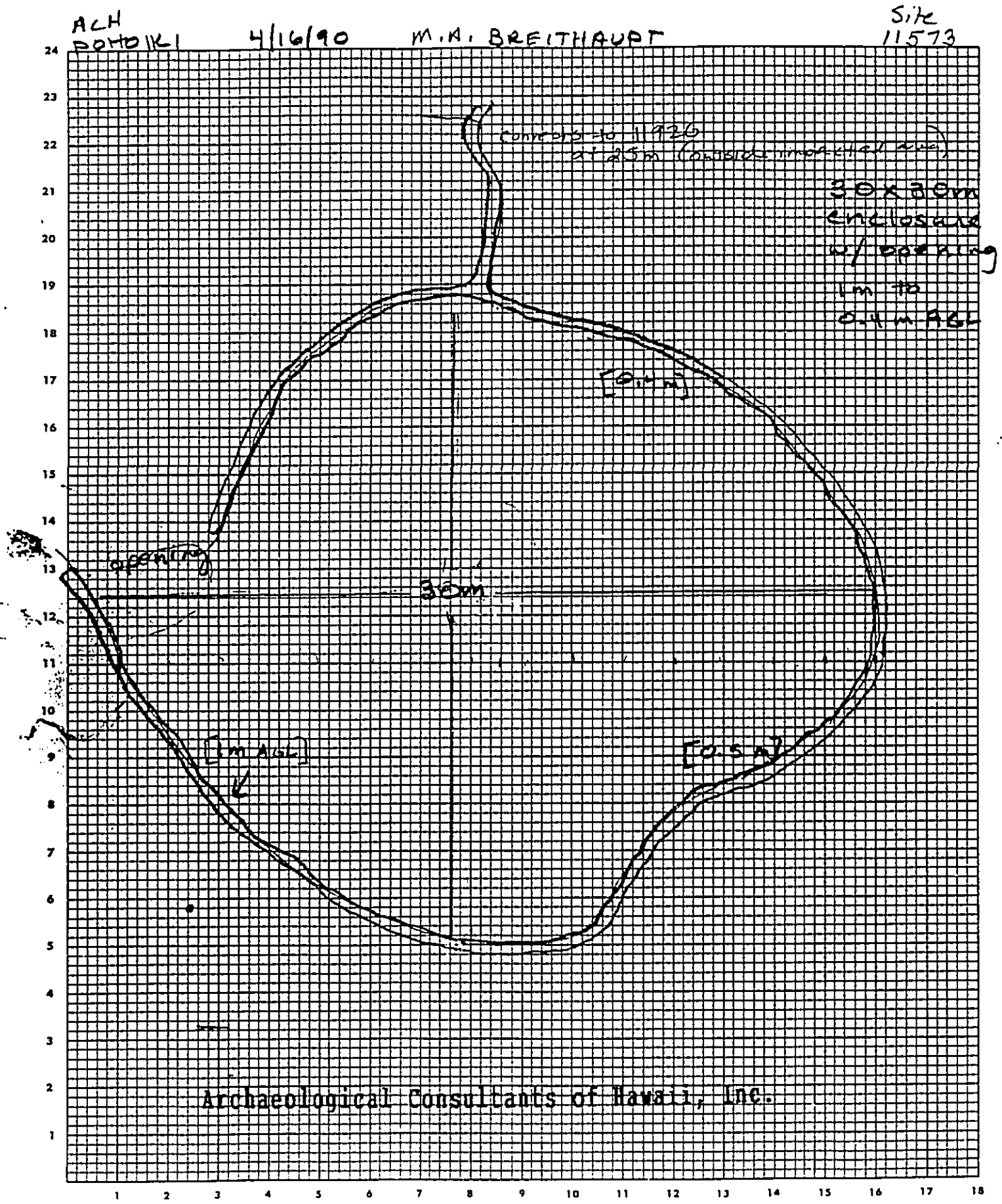


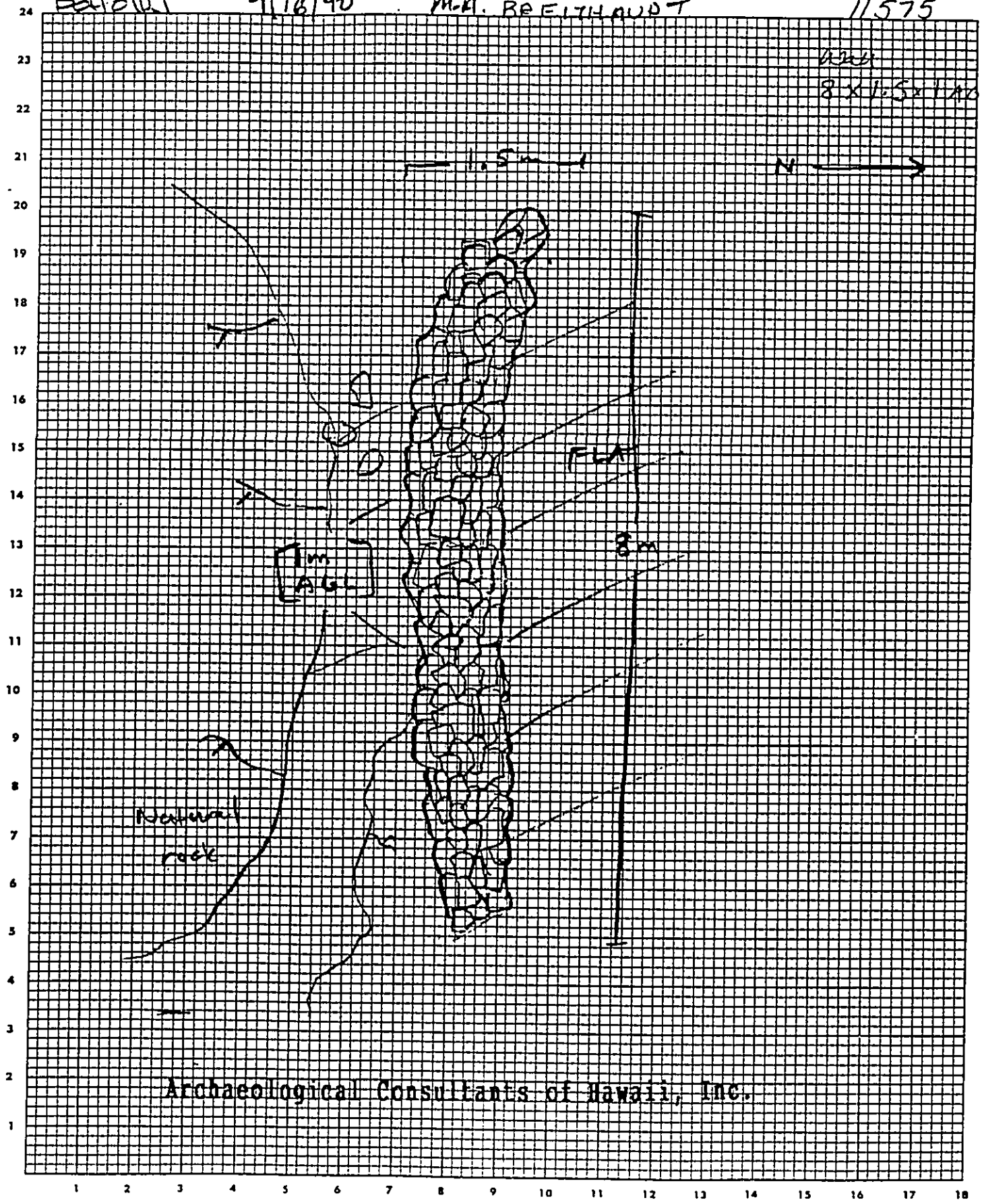
Archaeological Consultants of Hawaii, Inc.

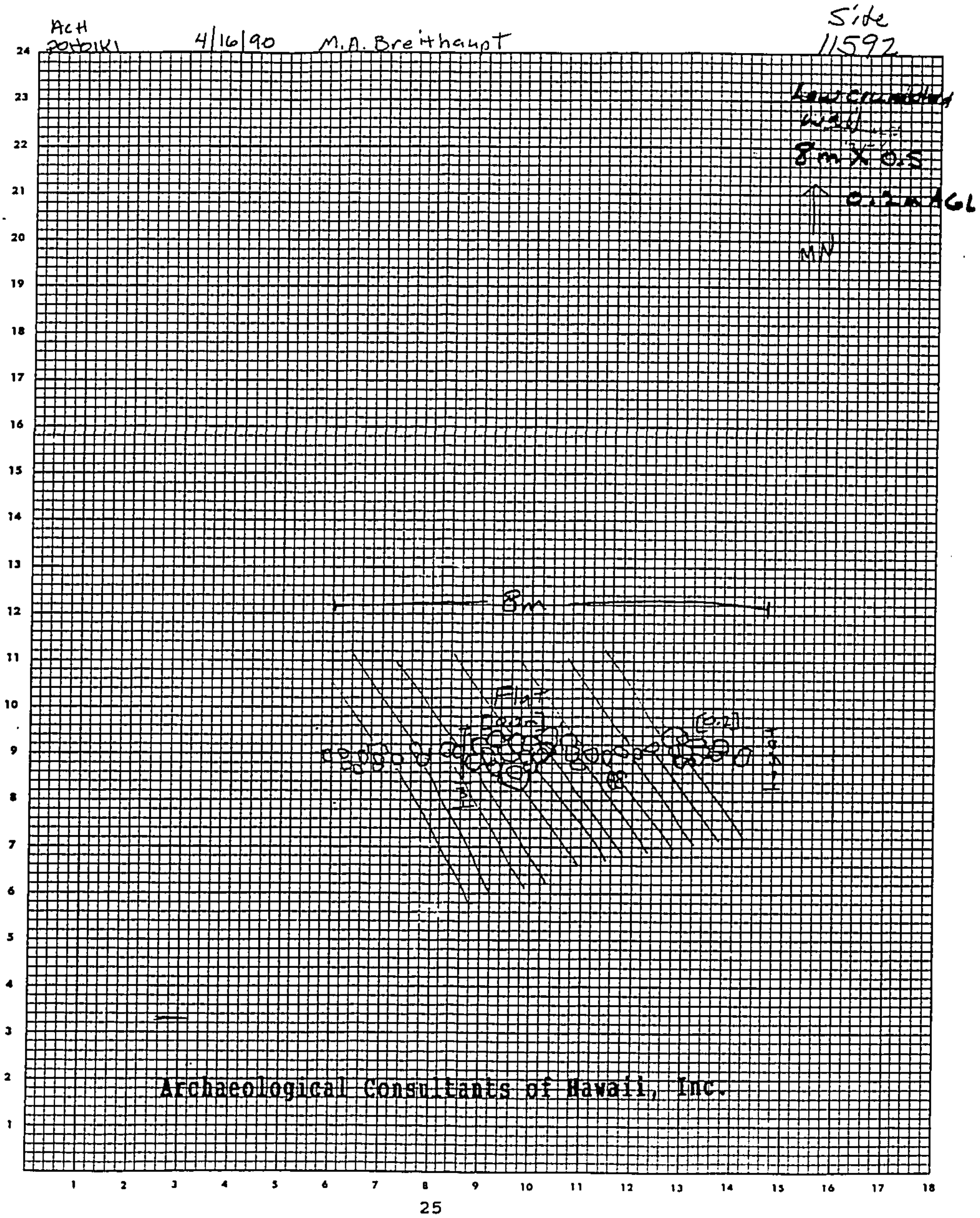
ACH
POHOIKI 4/16/90 M.A. BREITHAUPT Site 11573



Archaeological Consultants of Hawaii, Inc.

ACH
Bellows 4/18/90 M.A. Beithaupt Site 11575



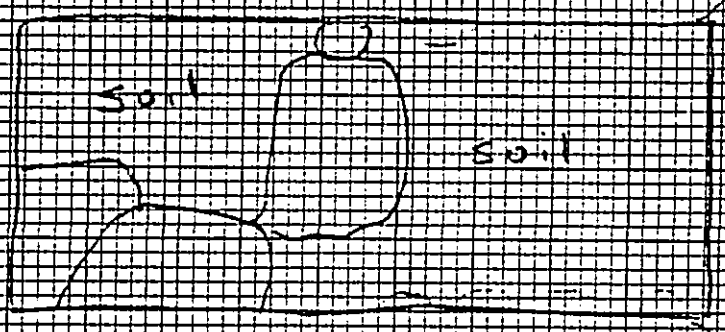

ACH
4/16/90
M.A. Breithaupt
Site
11592
8m X 0.5
0.2m AGL
MN
8m
Archaeological Consultants of Hawaii, Inc.

ACH
POHO(IK) 4/16/90 M.A. BREITHAUPT SITE 11593

Archaeological Consultants of Hawaii, Inc.

ACH
POHOIKI 4/16/90 MH Breithaupt 11593

PLAN VIEW: N

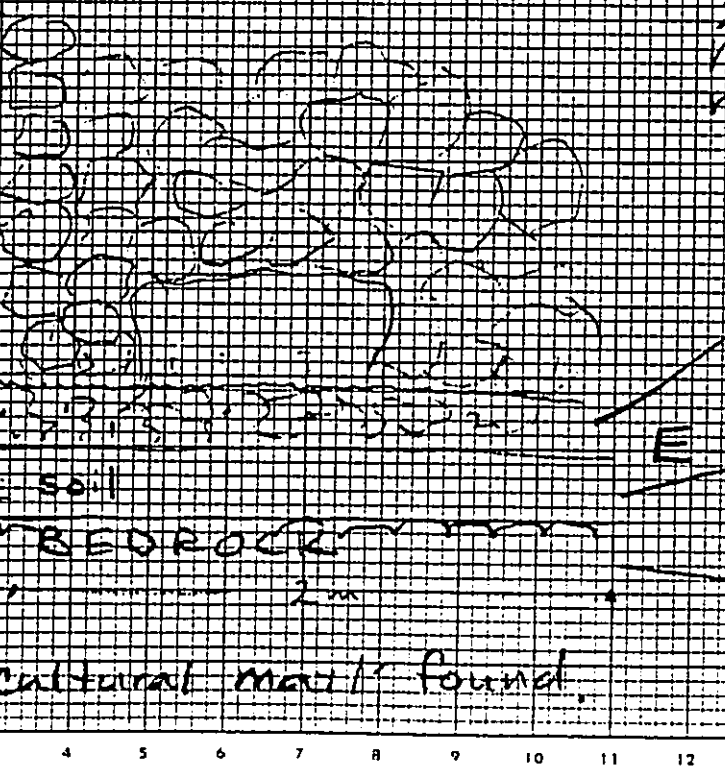


edge of platform

T-1 of Site 11593.

Platform constructed on some bedrock with stones placed to complete level surface. No fill. Center depression where only large stones (50cm x 50cm x 20cm). Major fill of rocks range from 35 to 10 cm in width.

PROFILE:



* No cultural matter found.

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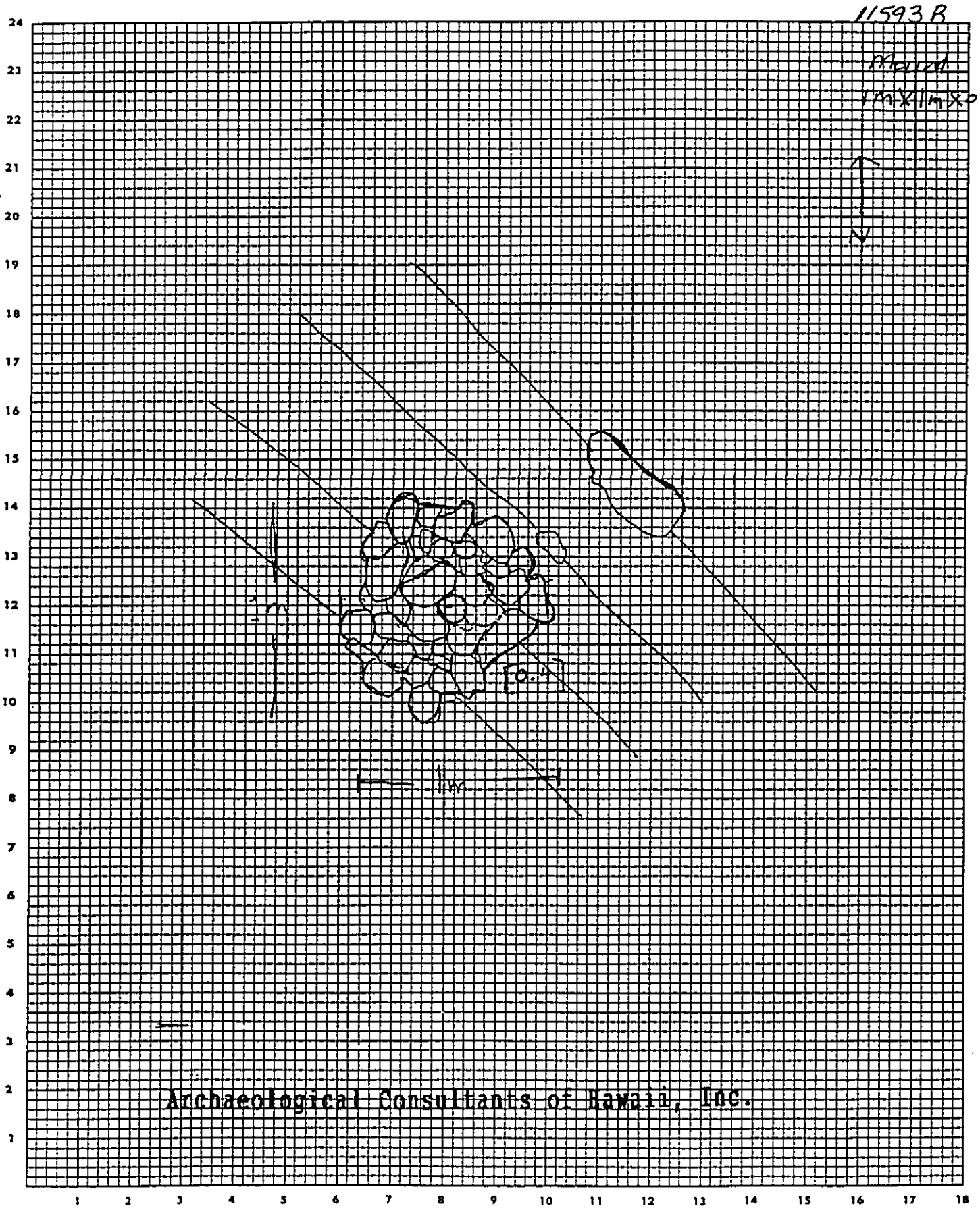
SITE
11593 B

Mound
1m X 1m X 0.4



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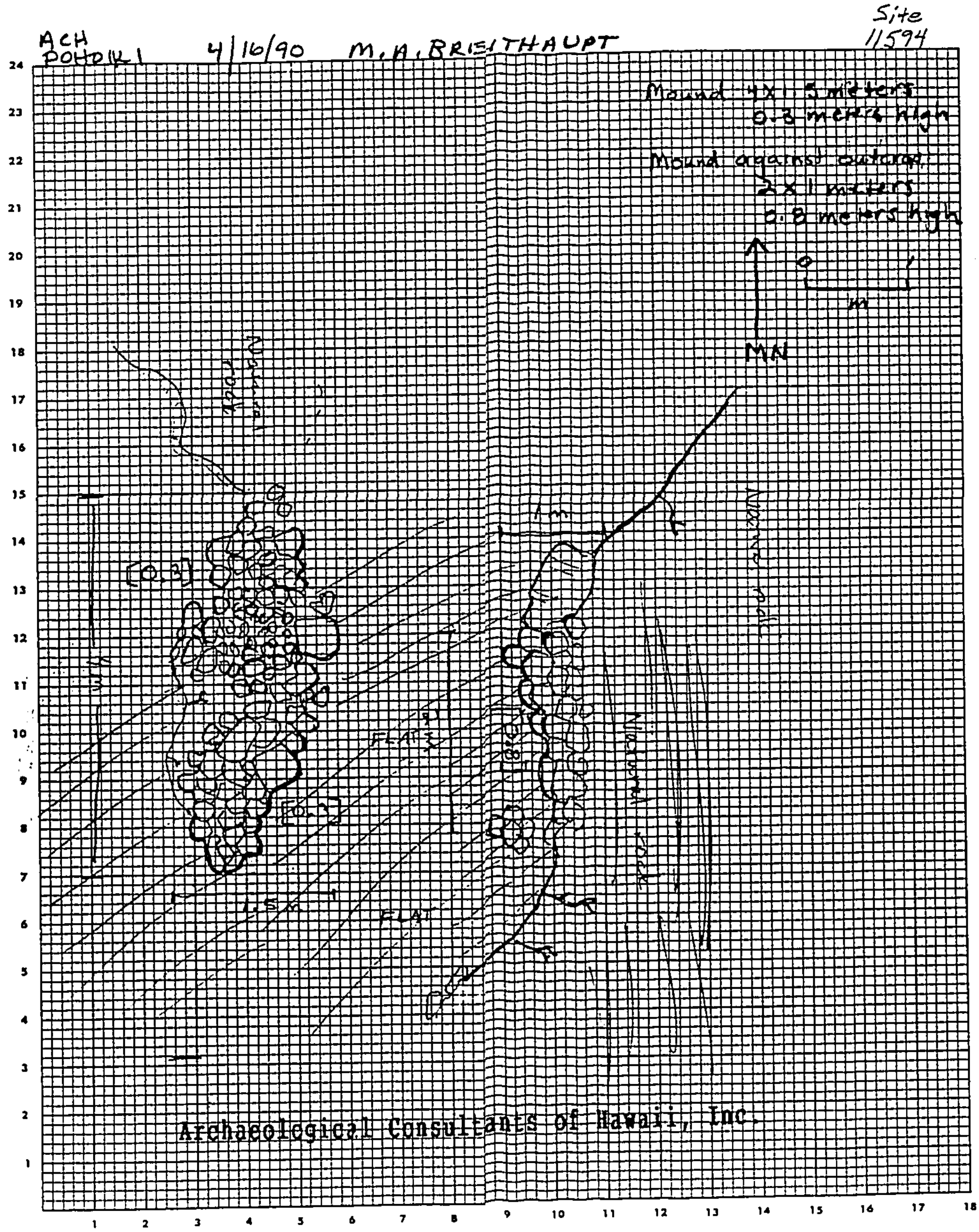
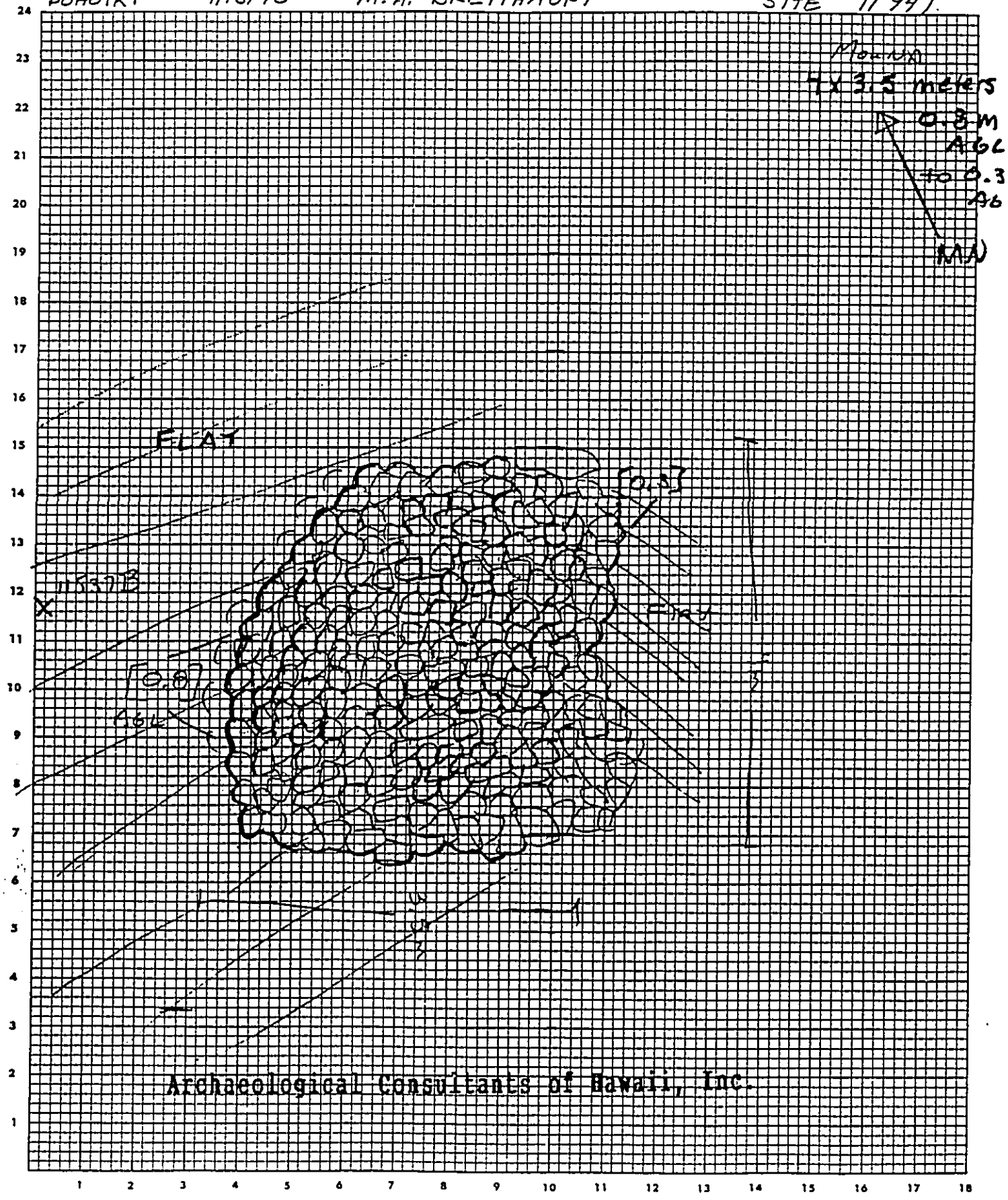

ACH
POHOIKI
4/16/90
M.A. BREITHAUPT
Site 11594
Mound 4x1.5 meters
0.3 meters high
Mound against outcrop
2x1 meters
0.8 meters high
MN
m
4m
[0.3]
[0.3]
1 m
1.5 m
FLAT
FLAT
Natural rock
Natural rock
Natural rock
Archaeological Consultants of Hawaii, Inc.

ACH

DOHOIKI 4/15/90 M.A. BREITHAUPT SITE 11941.



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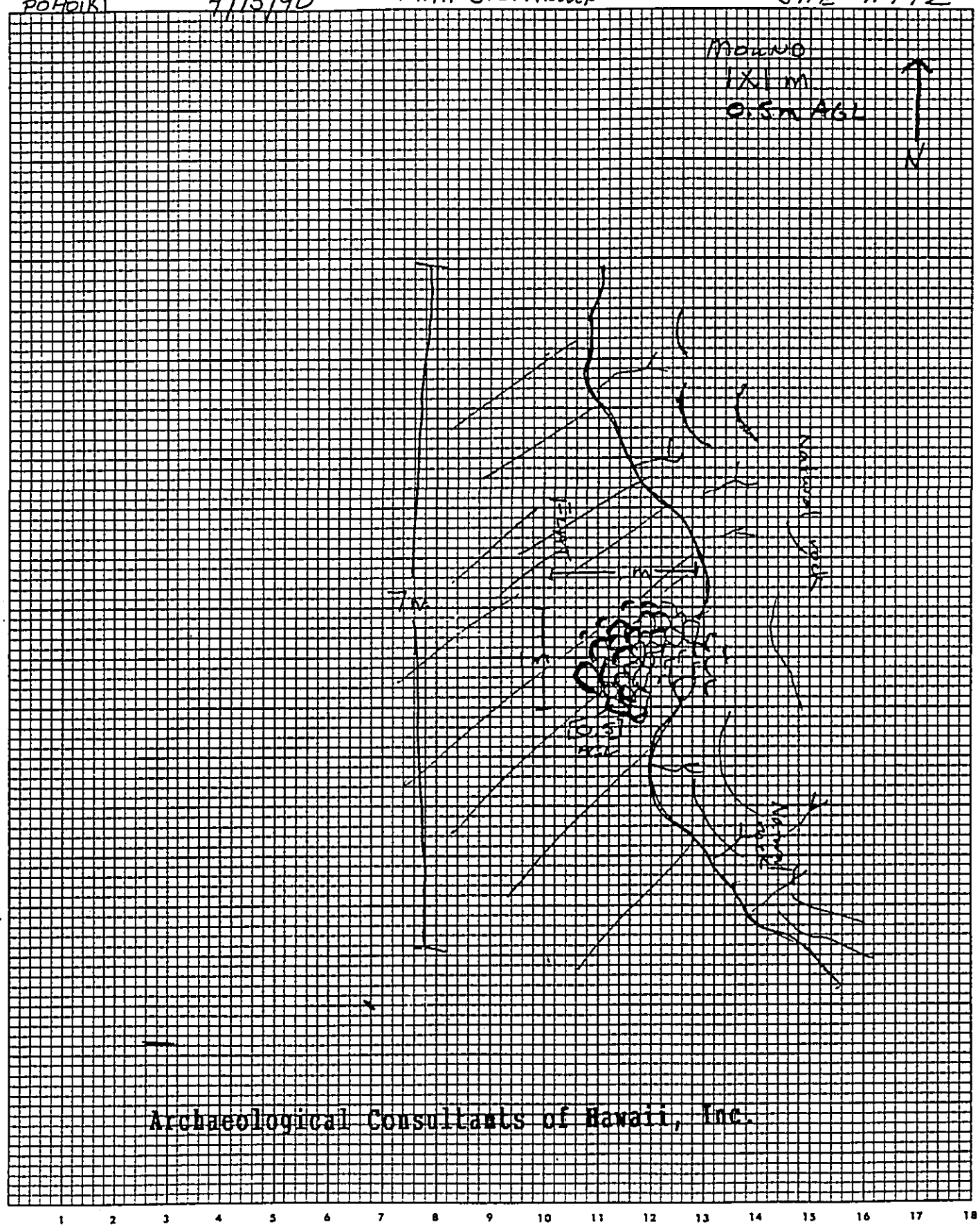
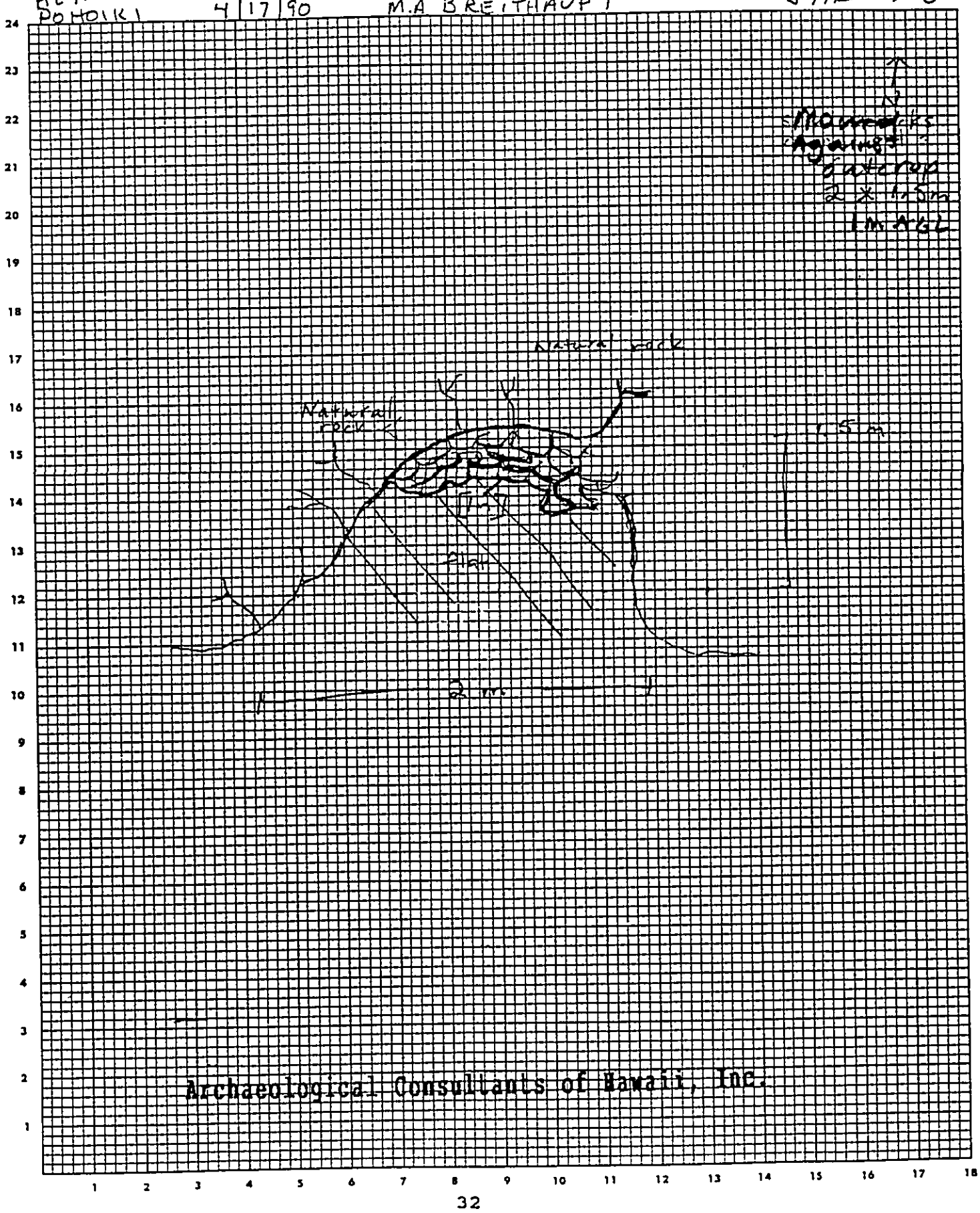
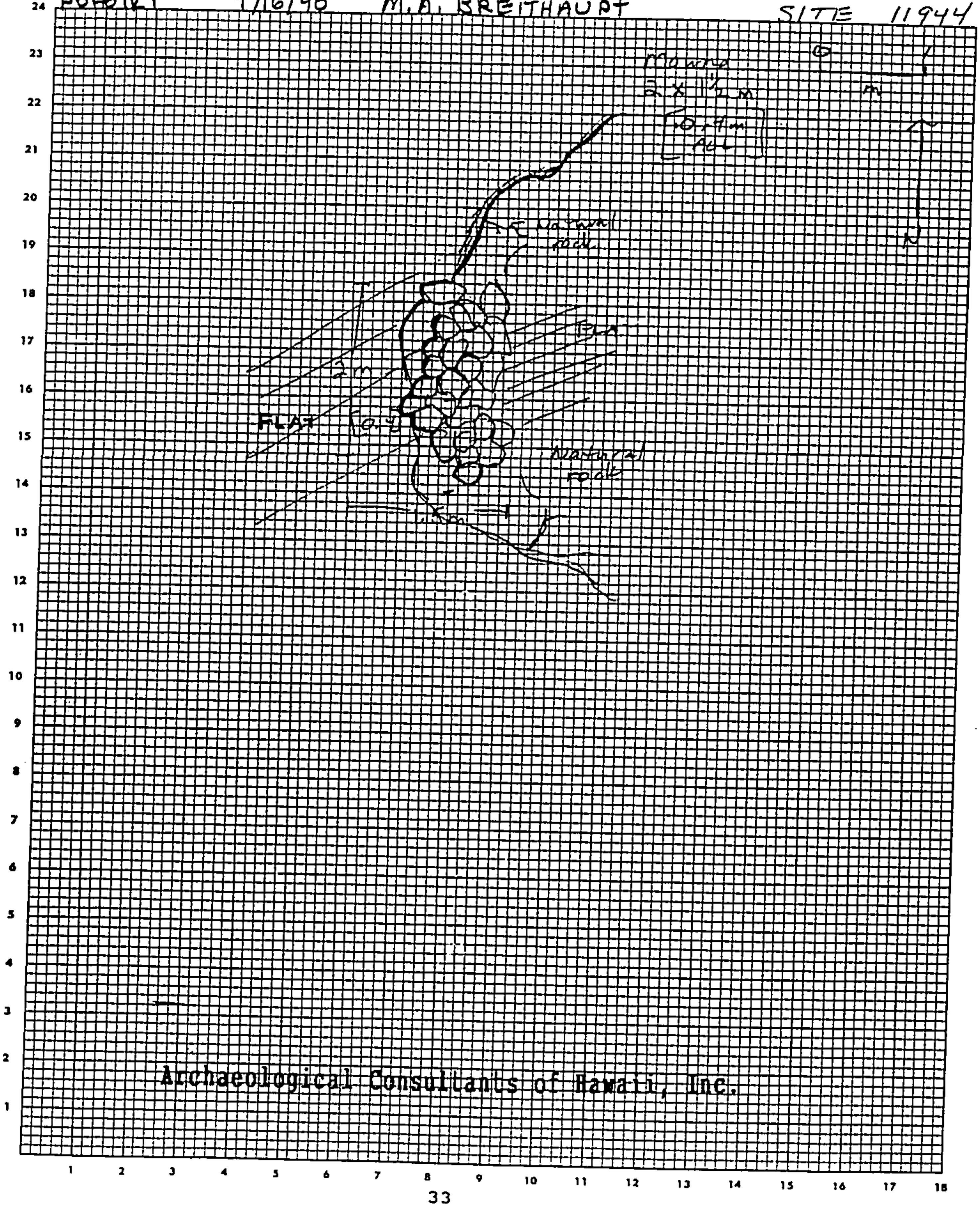
ACH
POHOIKI 4/15/90 M.A. Breithaupt SITE 11942



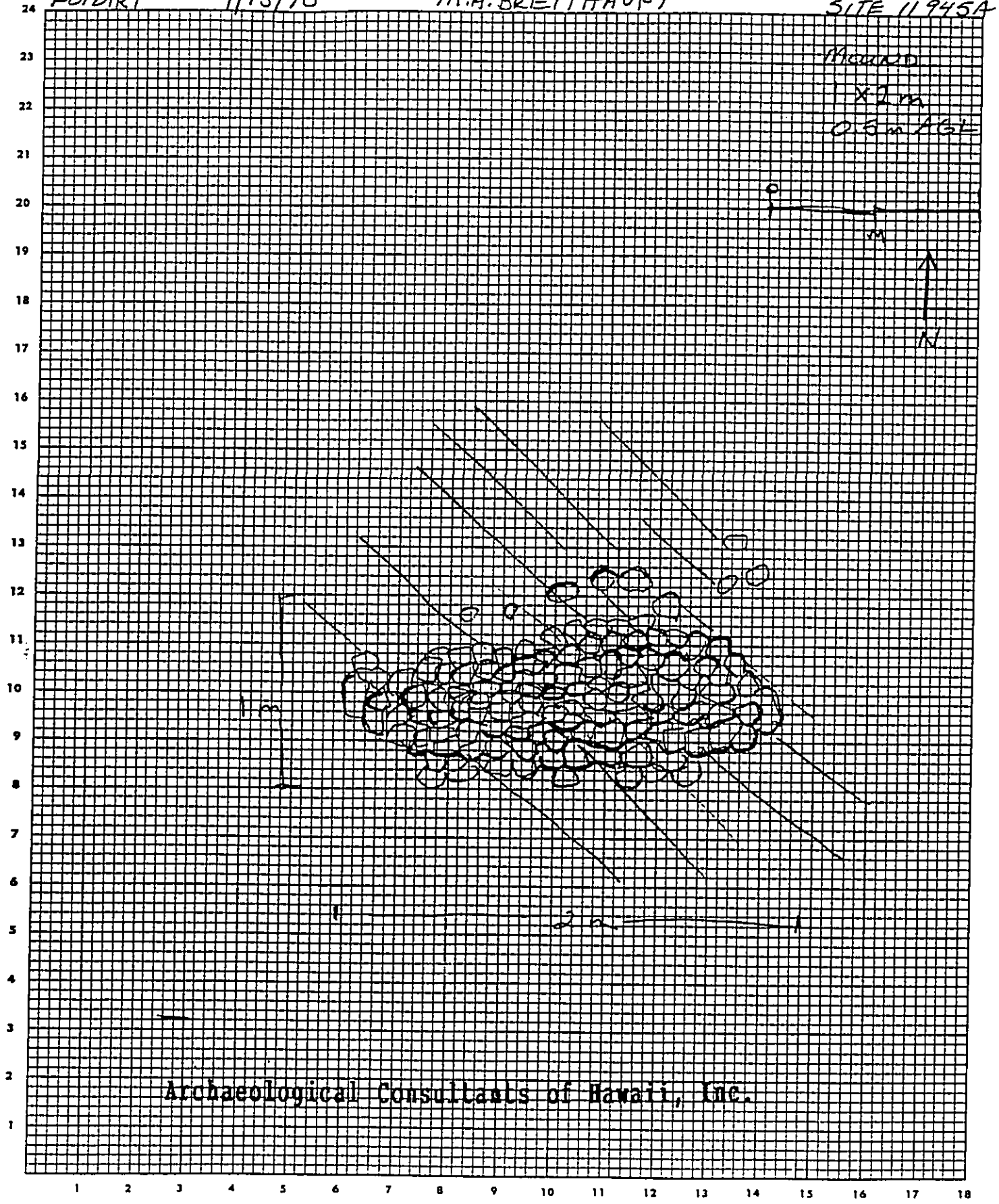
ACH
POHOIKI 4/17/90 M.A BREITHAUPT SITE 11943



ACH
POHO(K)   4/16/90   M.A. BREITHAUPT   SITE 11944

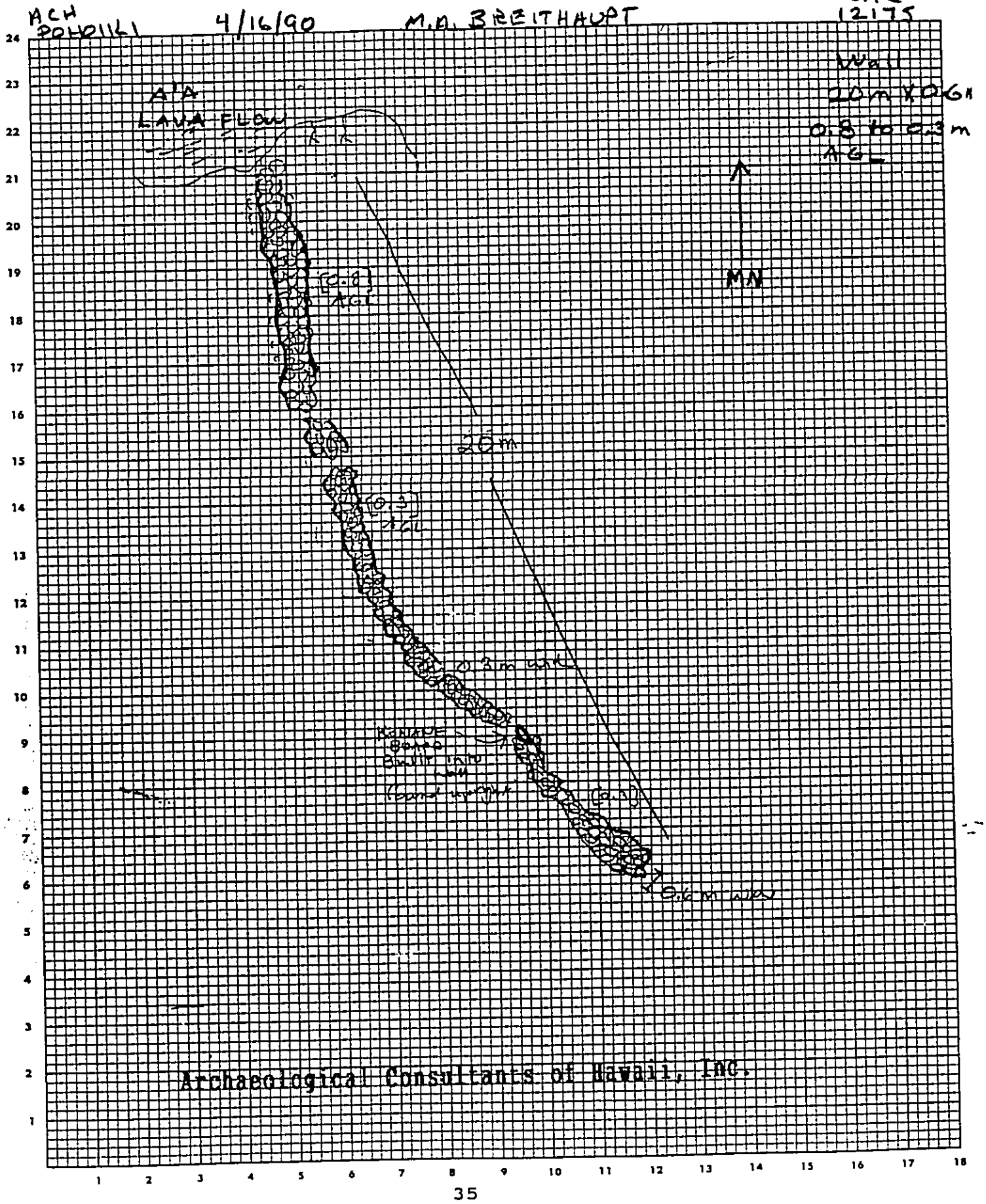


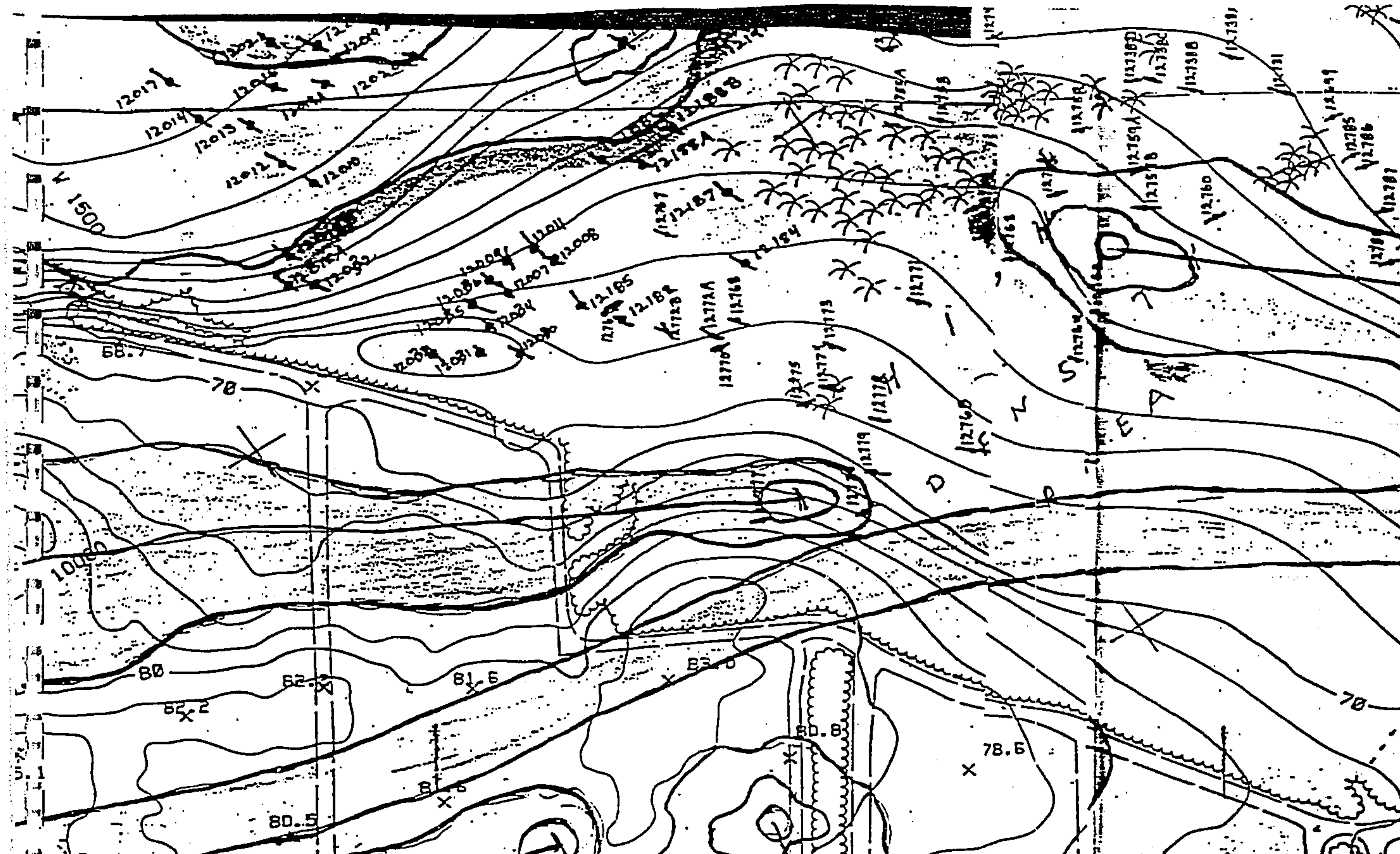
ACH
PONDIKI 4/15/90 M.A. BREITHAUPT SITE 11945A

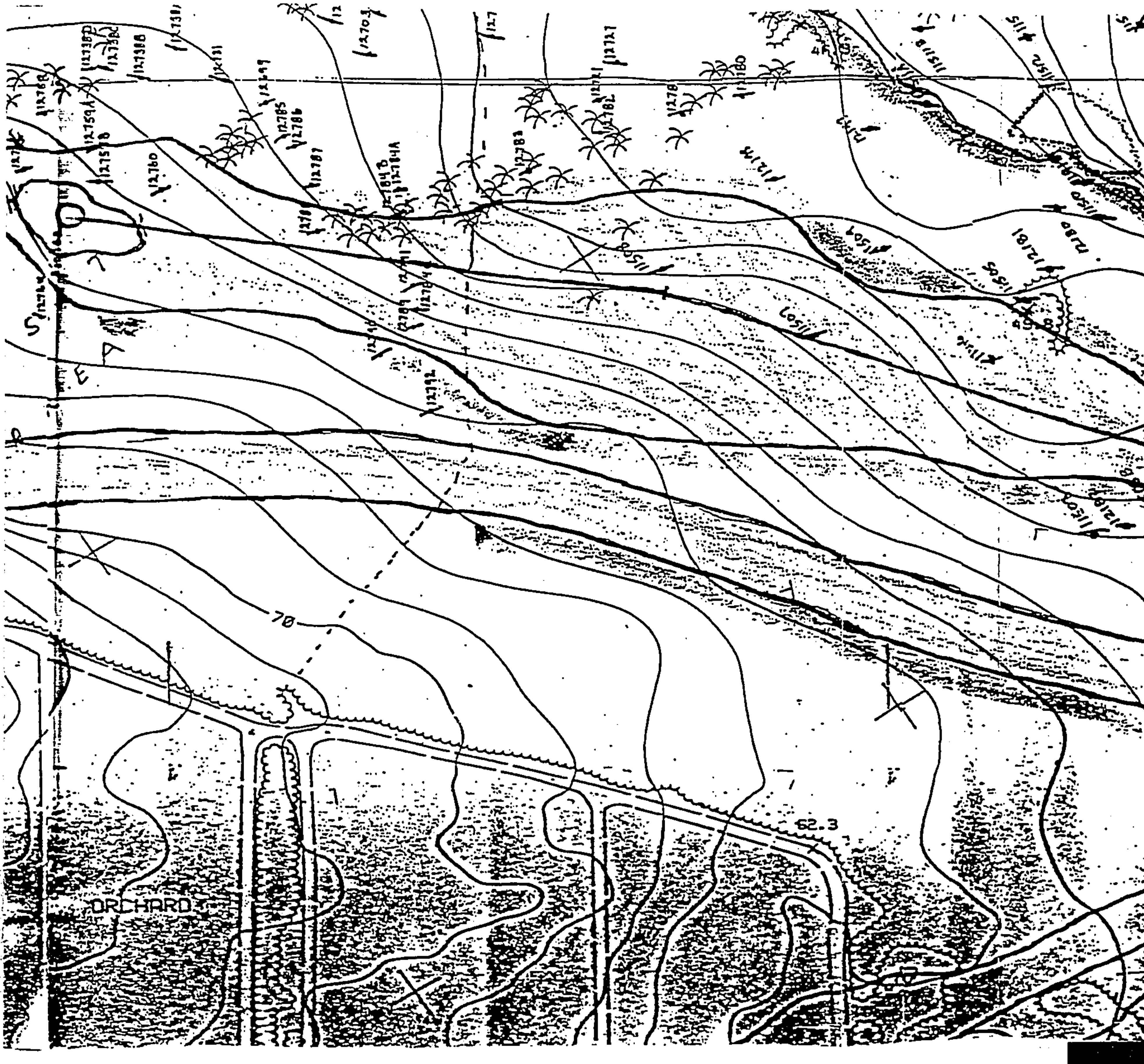


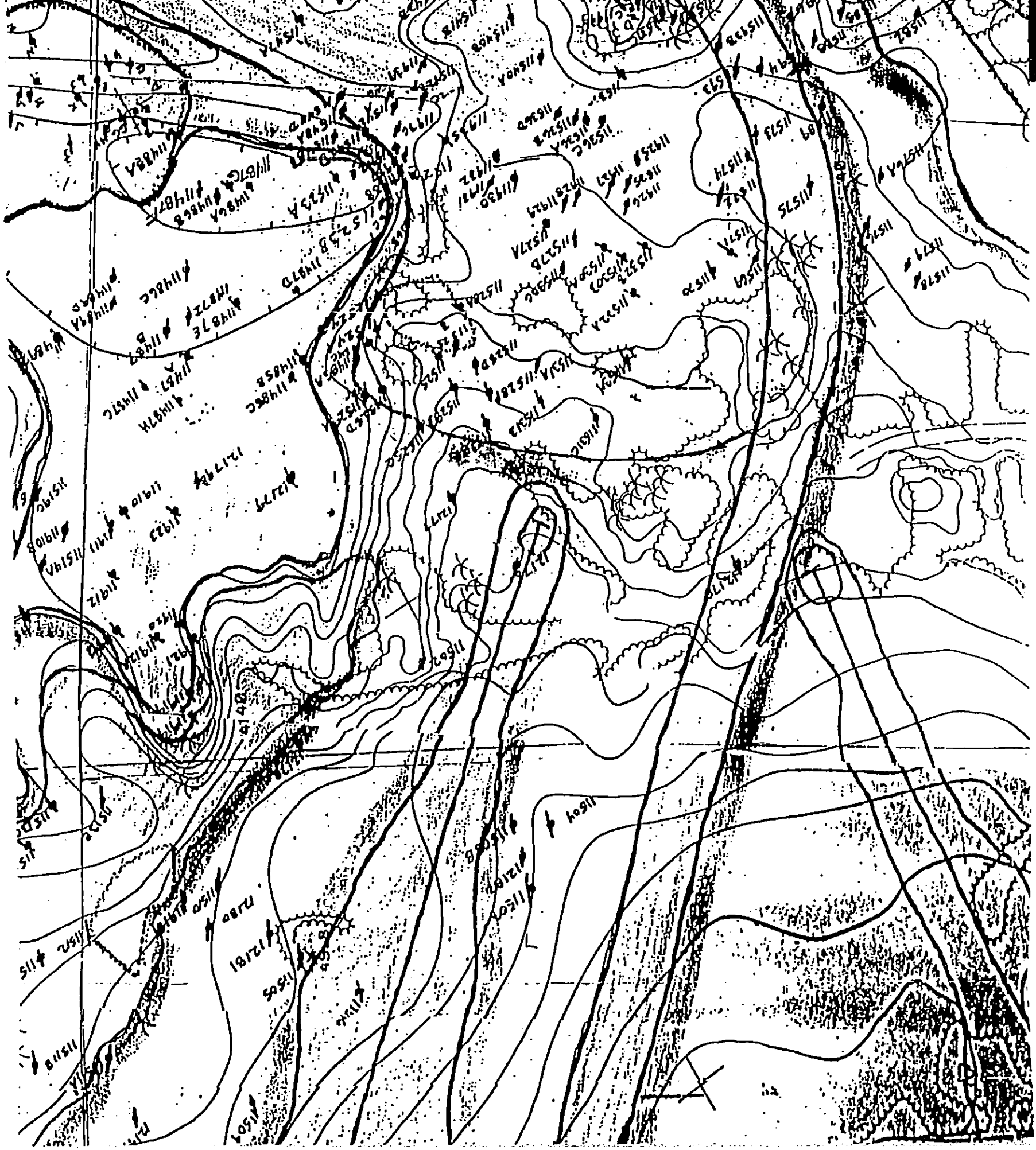
ACH
POLO1161 4/16/90 M.A. BREITHAUPT

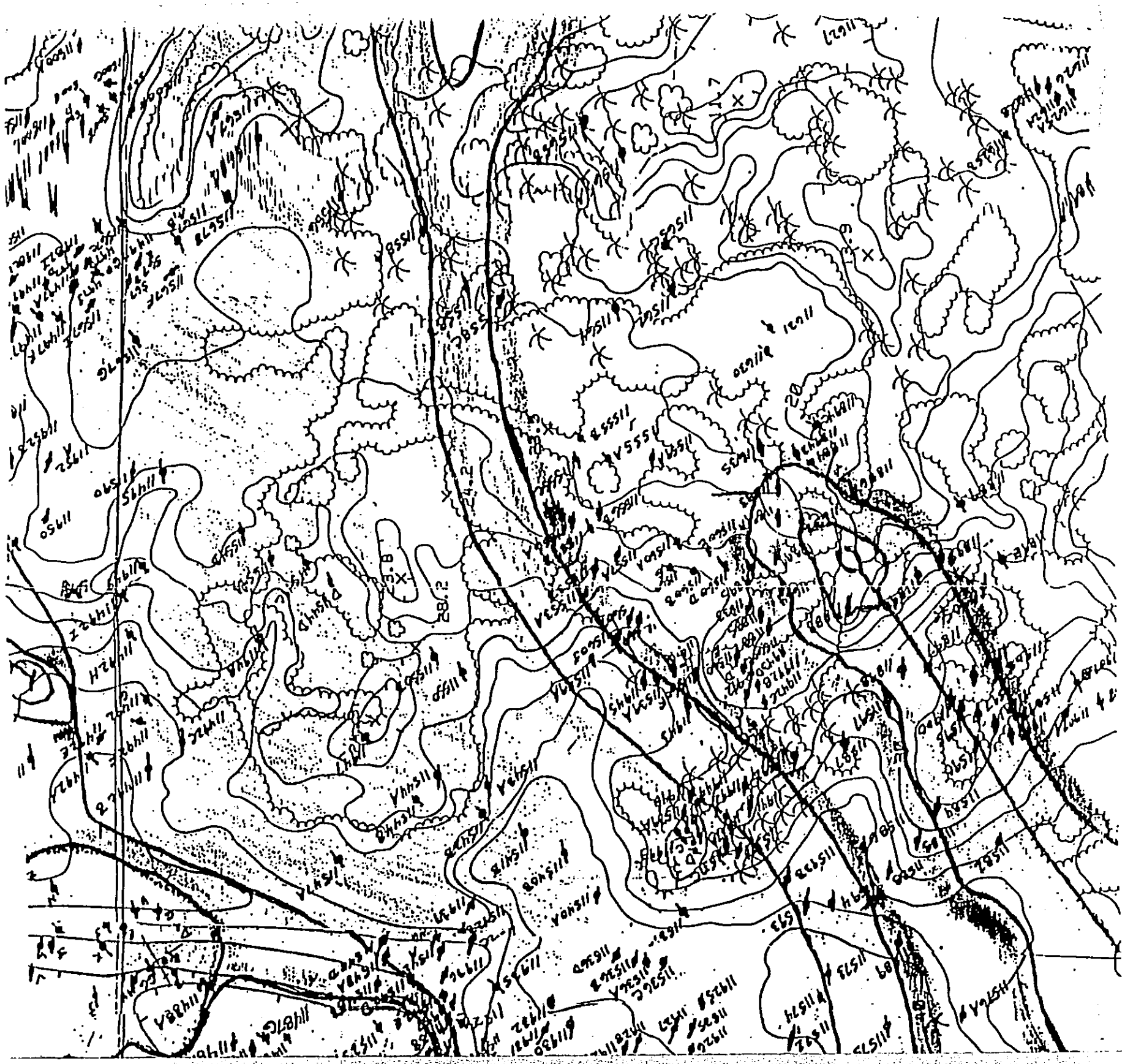
Site
12175




1500
68.7
70
1000
80
81.6
80.8
78.6
80.5
80.5
80.5
81.4
80
ORCHARD
78.9
79.9
78.5
80.7
70


70
62.3
ORCHARD





CONCLUSIONS AND RECOMMENDATIONS

Examination of the route of the proposed waterline passed through a corridor containing a total of 21 sites. All of these sites were mapped, photographed and some (two platforms) were subjected to subsurface examination. The results of these subsurface examinations were negative due to lack of osteological or cultural material. Soil accumulations were sparse at both locations being only 10-15 cm.

The remainder of sites observed in the corridor of the proposed waterline are clearing mounds related to agricultural activities, walls, walled natural outcrops and a single enclosure resting on an unexcavatable lava base.

In consideration of the fact that the ditch for the proposed waterline in estimated to be only 3 feet wide, we anticipate that little or no damage will occur to any significant sites along the proposed route.

Nevertheless, it is our opinion that archaeological monitoring is necessary for this project as the proposed corridor is surrounded by a series of high density site complexes that may be jeopardized by the movement of heavy equipment.

Moreover, adequate archaeological monitoring may also serve to redirect trench placement within the corridor itself and preclude impacts to sites contained therein - irrespective of their NLS (no longer significant) status.

If there are any questions regarding this report, please feel free to contact me.

Aloha,

Joseph Kennedy
Consulting Archaeologist

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