4. HA LAW WAN

THE SITE

Ha Law Wan is on the western side of a narrow neck of land joining the southern hill to the rest of Chek Lap Kok; Kwo Lo Wan is on the eastern side (see Figure 5.2). The two sites both have sandy beaches and both have some relatively flat land which has been cultivated in recent times. Villagers report that Ha Law Wan has a very reliable water supply, even when the rest of the island is suffering from drought. We were able to confirm this situation during June 1990, when the island had its worst drought in living memory.

The site was searched by Schofield in the 1930's, and by our team over a period of several weeks. No prehistoric deposit was found, in spite of the marked similarity of the site to Fu Tei and the proximity of the other Middle Neolithic site at Kwo Lo Wan upper. Seven adzes were found at Ha Law Wan either on the surface or in late contexts. The reasons for this absence of prehistoric deposit remain unclear.

During the survey it was noted that the back beach formations were mostly of hard gritty reddish brown slopewash rather than sand (see Figure 4.2). All of the area south of the pond was extensively terraced and the terrace cuts showed clear stratigraphy down to 1m below ground surface. No cultural deposits were seen with the exception of part of the wall of a fired clay structure (FC2) which had been exposed in one of the terrace

Figure 4.1 -- View of Ha Law Wan facing southeast.

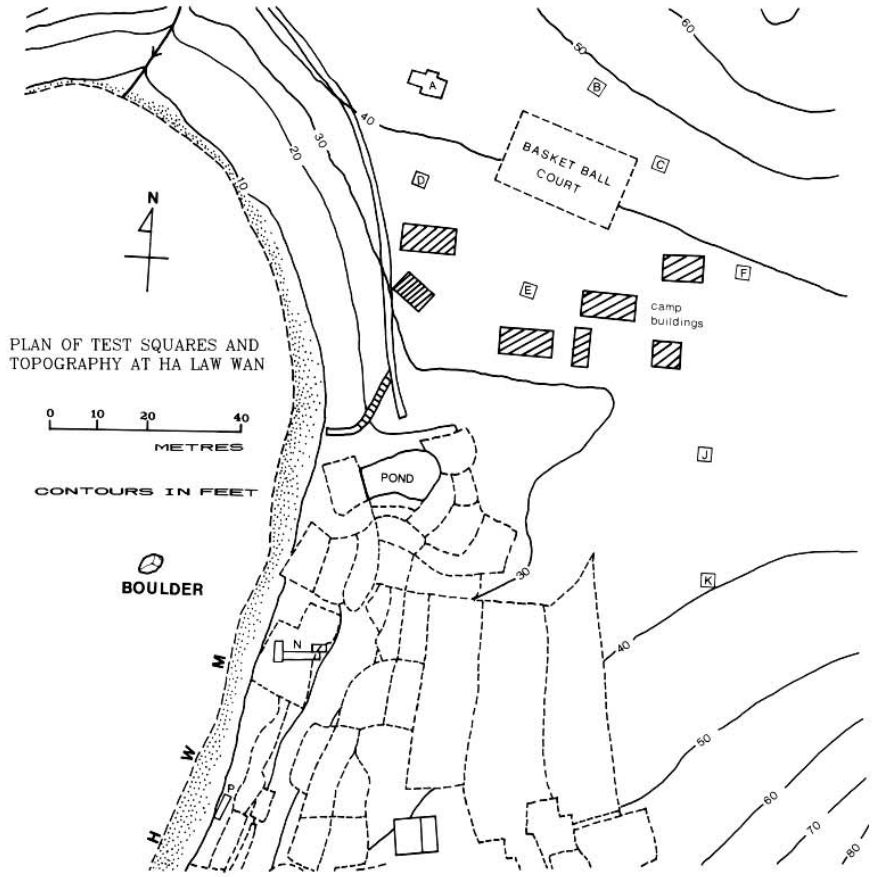


Figure 4.2 -- Plan of Ha Law Wan showing location of test squares.

walls. North of the pond was considered the most likely area for ancient occupation, in spite of the lack of surface finds. It was considered worthwhile to commit two to three weeks to the investigation of this site, on account of its setting and probable attractiveness to Neolithic people in the area.

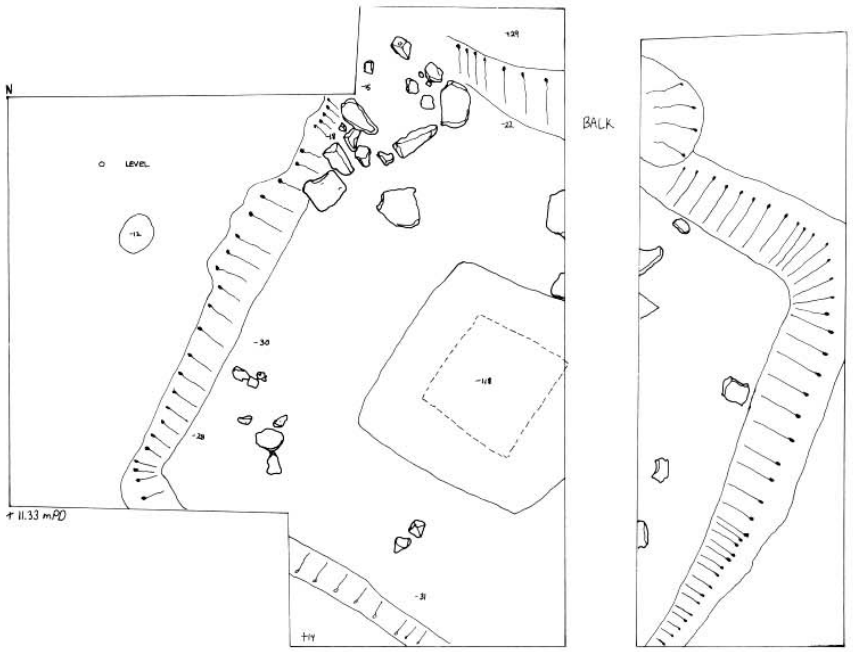
EXCAVATIONS AT HA LAW WAN

Testing of the site began with a series of squares around the basketball court at elevations of 10 to 14 mPD, comparable to the Middle Neolithic deposits at Fu Tei and Kwo Lo Wan. Squares B-F proved almost devoid of material, only sparse Tang and Sung were found. Square A however had a square floor cut into the DG with a square cisely in the centre. This structure had a numerous Tang and Sung potsherds, but ed no clue as to its function.

sherds
pit pre
provid

Figure 4.3 -- Excavation of Square A.

Figure 4.4 -- Square pit in the centre of Square A.



CM

quare feature.

e of the isthmus, yielding no
xcavated near the beach, and
Tang and Sung sherds.

tructure FC2 exposed in the
:e wa[illegible]
(FC1) just at the end of the
ıot appear at first to be of
all kilns).

he structure was clearly a kiln
der hard red clay that seemed
l three vents, one of them an
as it was different in many
from the floor gave a result
er than Tang, but its function

low the footpath, and further
to FC2, with channels in the
l by a stone structure. The silt
ore the fired clay blocks had

Figure 4.5 -- Floor plan of Square A showing the s

Testing continued with squares J and K in the saddl
pre-modern artifacts at all. Two trenches (N and P) were e
once again the only material found was a small quantity of

The final task was the excavation of the kiln-like s
terrace wall just south of the pond. Meanwhile, other terra
other structures were found. A small patch of reddish clay
footpath were investigated, and although strange it did
archaeological significance (see Figure 4.21 for location of

FC2 however proved to be of considerable interest. T
or furnace; it had a thick layer of charcoal at the bottom, un
to be part of a superstructure or interior furniture; and it ha
L-shaped chimney. The function of the kiln was unclear,
respects from the Tang lime kilns. A C-14 date on charcoal
of 620 +/- 50 BP. The dating confirmed that the kiln was lat
remained unclear.

Attention then turned again to the red clay patch be
excavation revealed that it too was a large kiln (FC1) simila
floor which continued outside the mouth, which was bridged
inside this kiln had built up to a thickness of 50-70cm bef

Figure 4.6 -- Wall and vent of FC2 as discovered.

Figure 4.7 -- FC2 after excavation.

Figure 4.8 -- View from above of FC2.

Figure 4.9 -- Excavation of FC1.

Figure 4.10 -- FC1 after excavation.

Figure 4.11 -- Mouth and exterior channel of FC1.

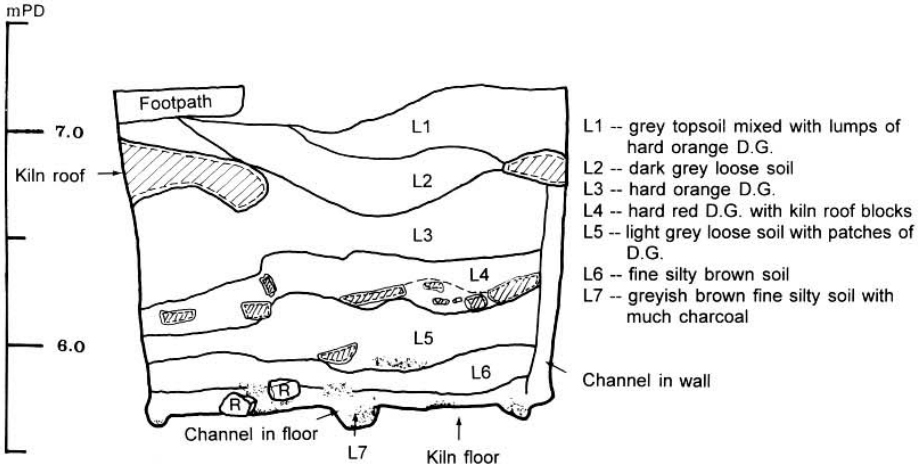


Figure 4.12 -- East-west profile through the centre of FC1.

collapsed, and it was clear that these were fragments of the roof. There was however no evidence as to what purpose the kilns served.

Excavation of the area outside kiln FC1 showed large quantities of charcoal, mainly in and around the channel cut in the DG. But the spread of charcoal appeared to be slightly askew to the east, well outside the general "flow" from the mouth of FC1. It appeared that further evidence of activity related to the kiln industry might be found in that direction, and a 2 x 5 m trench was opened (see Figure 4.21). A massive charcoal flow was immediately revealed, and extensions to the trench located three more kilns (FC8,4,9). At the same time, the walls of an old irrigation ditch were shaved, and another three kilns were discovered (FC3,5,6). A call of nature answered by the deputy director revealed the existence of another (FC7). Further shaving of the terrace walls brought to light charcoal trails which led to more kilns (FC10,11,12,13).

All of the kilns had been constructed in a similar fashion: a cavern was dug in the DG, it was plastered with mortar and fired. The over-lying stratigraphy was undisturbed by the kiln construction and use, except in cases where the roof collapsed and brought the DG down into the kiln cavern. Several kilns had some or most of the roof intact, and two (FC3 and 4) were only partially filled when discovered. FC6 on the other hand was completely silted up, a condition which preserved its roof almost completely. FC11 had a well preserved, covered mouth, and FC5 had a stone-lined and -covered channel leading away from the mouth. All kilns had large amounts of charcoal inside and near the mouth. Another C-14 date of 720 +/-60 BP was obtained on a sample from the floor of FC1.

Each kiln differed in certain respects, both in original construction and in state of preservation. Details of each are given in the next section.

A trench was extended from the mouth of FC5 to provide a section across the

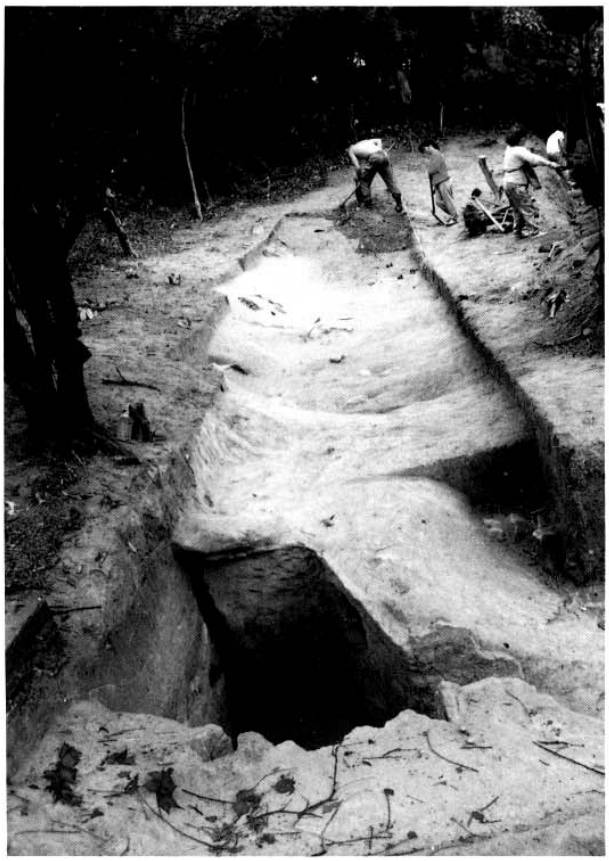


Figure 4.13 -- Excavation of the trench east of FC1.

Figure 4.14 -- The mouths of FC8, FC4 and FC9.

former stream bed. The first clue as to the function of the kilns came from a slag pit 4m away from the kiln mouth. A modest amount (ca 3.2kg) of grey metallic slag pellets was found, along with larger pieces resembling an ore, some with pellets embedded within. A single piece of this material had been previously found 2m outside the mouth of FC6, but it was in the disturbed floor of the irrigation ditch, and not considered reliably associated with the kiln. The slag pit in trench FC5TR was unquestionably related to the kilns.

A trench cut in the face of the ledge overlooking the pond revealed another slag deposit in a 3cm thick layer only found in the southern end of the trench and obviously related to FC11. Exploratory trenches in the small ravine between the two groups of kilns revealed no more structures but several areas of slag and charcoal deposit.

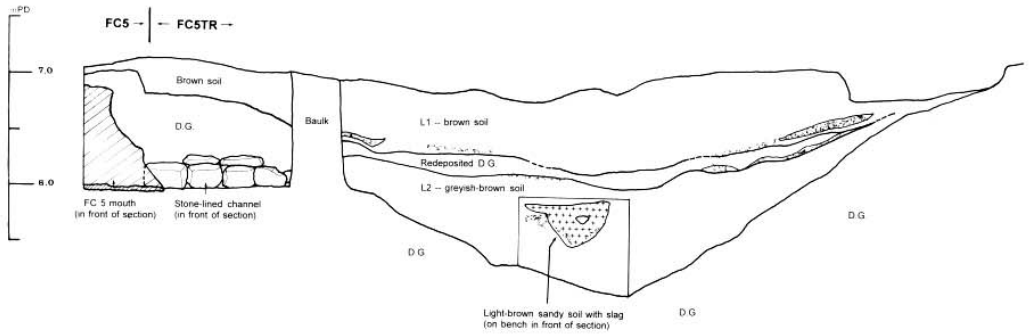


Figure 4.15 -- Profile of the east wall of trench FC5TR (see Figure 4.27 for plan).

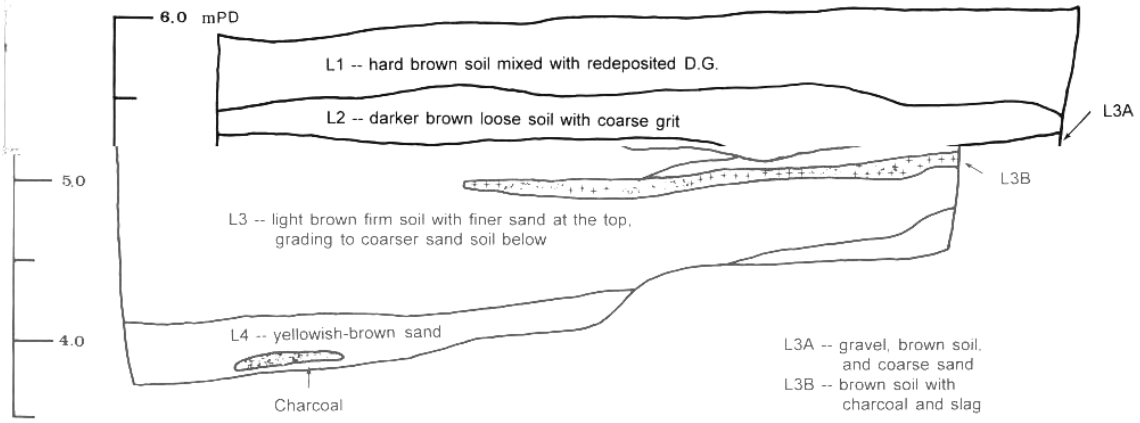


Figure 4.16 -- Profile of the east wall of trench TR1 (see Figure 4.21).

Figure 4.17 -- View facing west of the excavation of FC5 and FC5TR (in foreground) and FC6, FC9 and FC4.

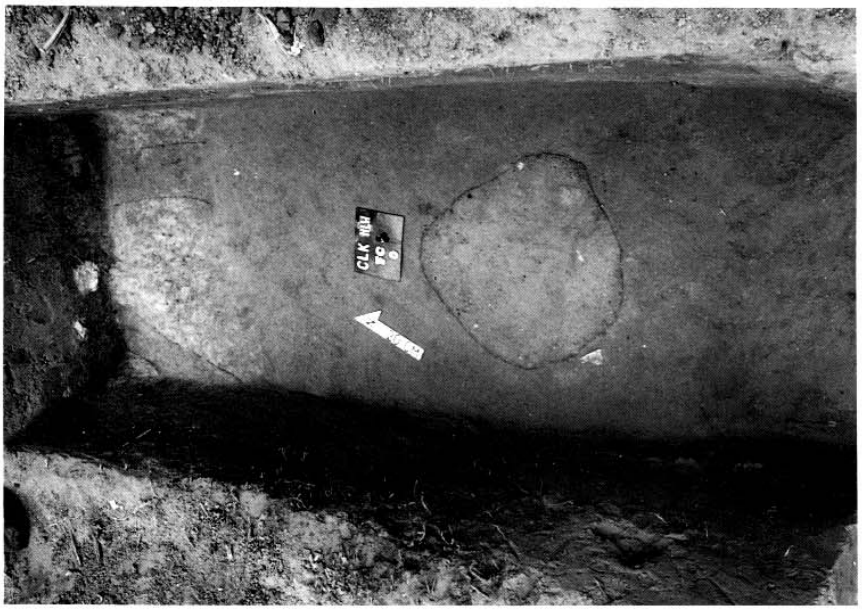


Figure 4.18 -- The floor of FC5TR at the level of the slag pit.

DESCRIPTION OF FINDS FROM HA LAW WAN

The material from the test pits had no special characteristics; the square platform structure in square A had many fine pieces of Sung celadon, and Tang potsherds were also found. Seven adzes were recovered, but no pottery from any prehistoric period. Possible reasons for this disparity are discussed below. During the excavation villagers produced a Sung coin dating to 1256 AD. They reported that a jar full of coins had been found near FC 10, but all were lost save one.

Pottery from the kiln complex was remarkably little; some undistinguished pieces of plain ware, and a few Sung celadon fragments. One piece possibly dating to the Yuan dynasty (the period indicated by the C-14 dates) is a celadon fragment (see Figure 4.20) of late Sung or Yuan type. No tools of any kind were found in the kiln complex, nor were there any pieces of containers or kiln furniture.

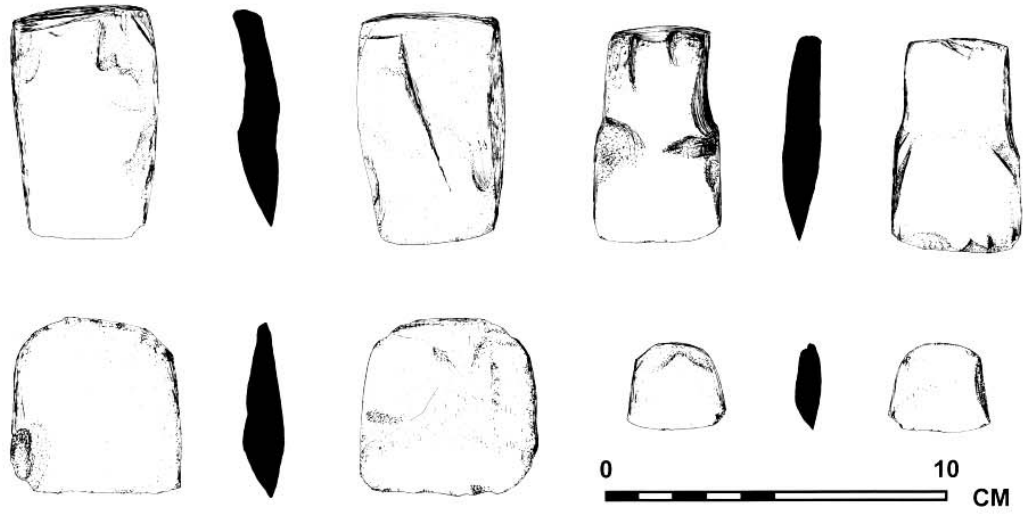


Figure 4.19 -- Adzes from Ha Law Wan.

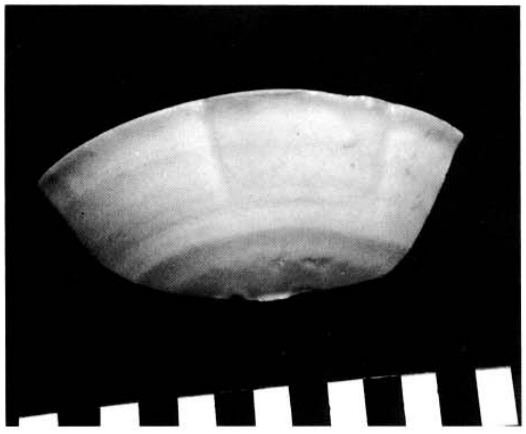


Figure 4.20 -- A Sung/Yuan celadon piece from near the slag pit in FC5TR.

Each kiln is described below :

KILN : FC1

SHAPE AND DIMENSIONS : Ovaloid rectangular, length >120 cm, width >160 cm, height 120-130 cm.

LEVEL MPD OF FLOOR : +5.70

CONDITION ON DISCOVERY : Completely infilled; only a small portion of the roof near FC1 datum was exposed.

EXCAVATION : Front half, mouth, and exterior channel.

ROOF : Collapsed except for a small portion on east and west sides.

ORIENTATION (FROM BACK TO MOUTH) : 140 degrees approximately.

MOUTH : Contains a stone bridge over out-flow channel; sides intact, but roof collapsed.

CHANNELS IN FLOOR : On both sides, and down the centre; joining at a sump just inside the mouth.

VENTS AND CHIMNEYS : One vent in south wall, mid-way up from floor.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : Clearly defined channel cut in DG leads away from mouth bearing 160 degrees; massive charcoal deposits south of the mouth.

OTHER FEATURES : Concave channels in centre of east and west walls.

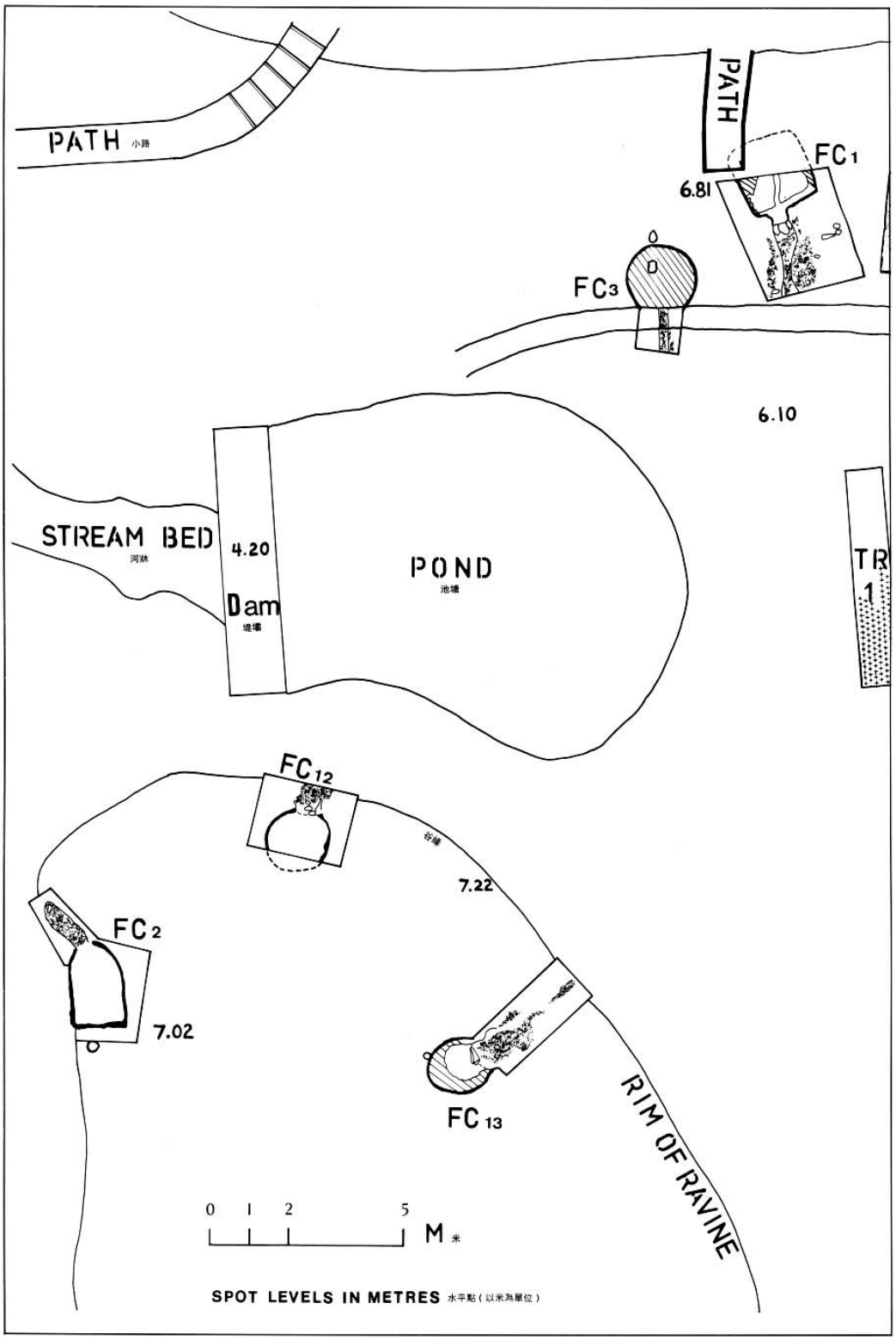
KILN : FC2

SHAPE AND DIMENSIONS : Rectangular with rounded corners, length 195 cm, width 120 cm, height >80 cm.

LEVEL MPD OF FLOOR : +5.94

CONDITION ON DISCOVERY : Completely infilled with sediment; top 25 cm below present ground surface; vent and some of the wall visible from hillside indicated location.

[next two pages] Figure 4.21 -- Excavation plan for Ha Law Wan showing kilns discovered.


PATH 小路
PATH
FC1
6.81
FC3
6.10
STREAM BED
河牀
4.20
Dam
壩場
POND
池塘
TR
1
FC12
谷緣
7.22
FC2
7.02
FC 13
RIM OF RAVINE
0 1 2 5
M 米
SPOT LEVELS IN METRES 水平點(以米為單位)


FC8
FC4
FC9
DITCH

EXCAVATION : Complete interior and channel; excavated to DG some distance on all sides to determine extent; initial half-section running lengthwise.

ROOF : Totally collapsed and infilling kiln in complete layer 40-50 cm below wall top.

ORIENTATION (FROM BACK TO MOUTH) : 332 degrees approximately.

MOUTH : Complete collapse; presence is indicated by charcoal flow with clay rubble exiting inside, 20 cm above floor (!).

CHANNELS IN FLOOR : None, but floor slopes from east to west towards the two vents in the west wall.

VENTS AND CHIMNEYS : South wall has chimney from floor turning almost at a right angle to surface; also, two vents in the base of the west wall.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : One exterior charcoal flow from mouth 30 cm above floor bearing approx 90 degrees leads about 2 m before ending.

OTHER FEATURES : West and east ends have many stones, both piled up outside and as part of kiln wall.

KILN : FC3

SHAPE AND DIMENSIONS : Round, slightly flattened along 80 degrees axis, diameter approximately 180 cm, height 90 cm.

LEVEL MPD OF FLOOR : +4.94

CONDITION ON DISCOVERY : Two-thirds infilled with silty clay; void near roof and part of chimneys; cut by ditch with wall and roof exposed.

EXCAVATION : Complete interior and top surface to locate chimneys and vents.

ROOF : Intact, except for front 1/3 cut by ditch.

ORIENTATION (FROM BACK TO MOUTH) : 165 degrees approximately.

MOUTH : Missing, cut by ditch.

CHANNELS IN FLOOR : Interior has channel running completely around edges and through middle to a large pit in the center of floor.

VENTS AND CHIMNEYS : Two chimneys rising straight from roof to ground surface.

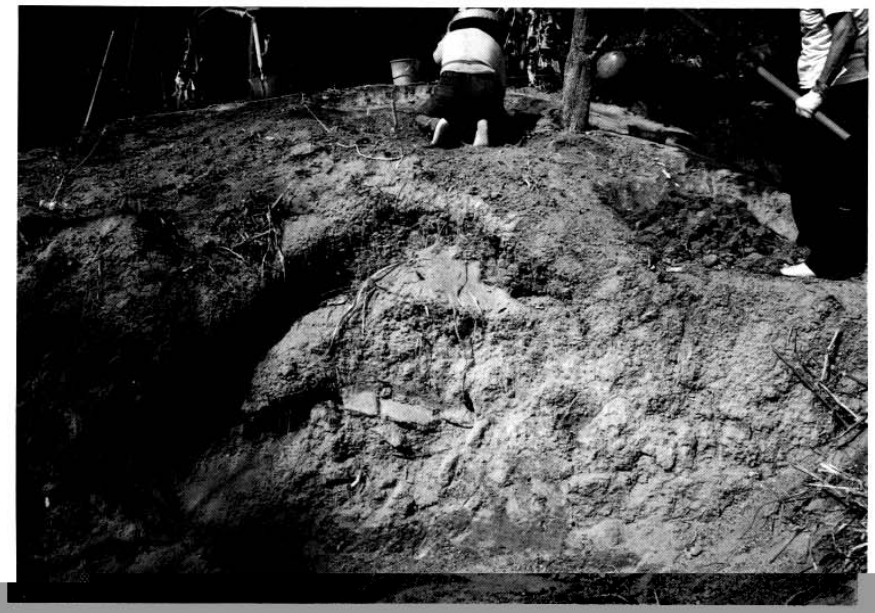


Figure 4.22 -- FC3 as discovered.

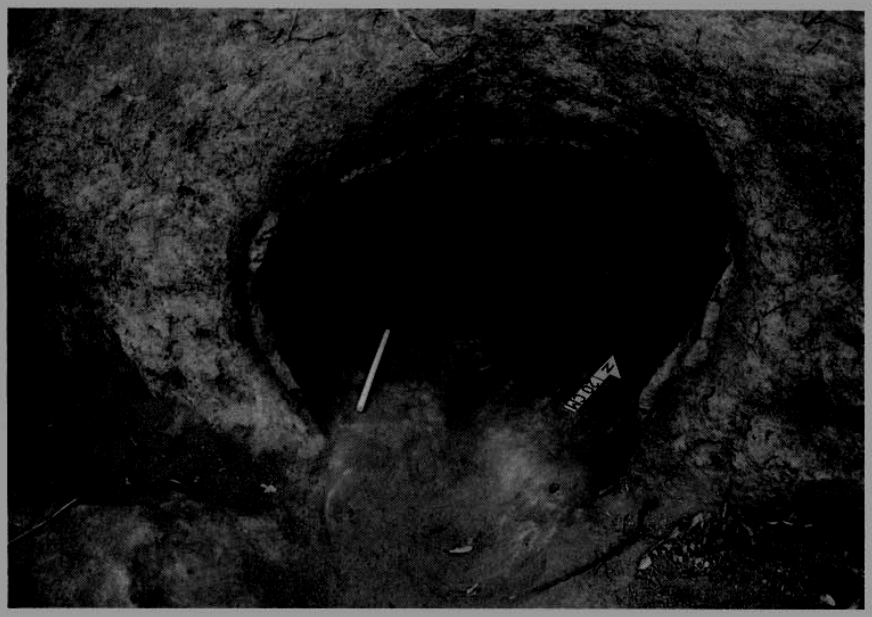


Figure 4.23 -- FC3 after excavation.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : Traces of a channel cut in DG were found under the area where the mouth would have been, and outside, bearing 160 degrees approximately

OTHER FEATURES : Chimney has a fired clay exit structure approx 25 cm in diameter, protruding 10-15 cm above DG surface. Interior floor has a deep hole (62 cm) filled with rocks.

KILN : FC4

SHAPE AND DIMENSIONS : Circular-rectangular, width 140 cm, length 110-130 cm, height >80 cm.

LEVEL MPD OF FLOOR : +6.44

CONDITION ON DISCOVERY : Partially infilled; mouth protruding from hillside DG; soil overlaying the entire structure.

EXCAVATION : Interior complete; front portion of exterior and mouth on hillside.

ROOF : Collapsed in front 2/3 of structure, excepting the mouth which still had a narrow 'bridge'.

ORIENTATION (FROM BACK TO MOUTH) : 160 degrees approximately.

MOUTH : Clay structure with outflow channel cut in DG.

CHANNELS IN FLOOR : None.

VENTS AND CHIMNEYS : One chimney at rear.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : Outflow from mouth into ravine channel.

OTHER FEATURES : Channels in east and west walls, similar to FC 1, but with large rocks set in or near the base of each groove.

Figure 4.24 -- FC4 as discovered.

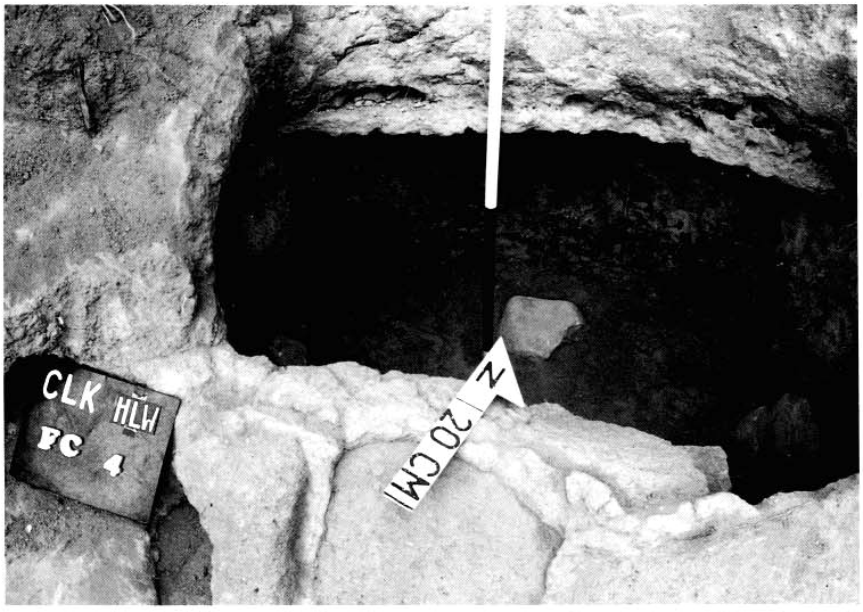


Figure 4.25 -- FC4 after excavation.

KILN : FC5

SHAPE AND DIMENSIONS : Circular ovaloid; width 160 cm, length 180 cm, height 124 cm.

LEVEL MPD OF FLOOR : +5.97

CONDITION ON DISCOVERY : Infilled within 10 cm of roof. Small portion of roof and wall protruding from hillslope; cut and exposed by ditch.

EXCAVATION : Interior excavated; front 3/5, mouth and exterior channel excavated completely.

ROOF : Rear 1/3 intact, from collapsed; tunnel remaining over mouth and exit channel.

ORIENTATION (FROM BACK TO MOUTH) : 170 degrees approximately.

MOUTH : Contains stone bridge, stone sides and roof intact in places; definite, elaborate outflow channel.

CHANNELS IN FLOOR : None inside, but slightly sloping floor.

VENTS AND CHIMNEYS : None evident.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : Well defined channel covered by and lined with stones and clay, filled with charcoal and slag deposits approx 3 m from mouth, combining with the central ravine channel.

OTHER FEATURES : Slag concentration down slope from kiln.

KILN : FC6

SHAPE AND DIMENSIONS : Base roughly circular. Kiln intact and overall resembles an "igloo", diameter 210 cm, height 75 cm with chimneys adding another 40 cm.

LEVEL MPD OF FLOOR : +5.16

CONDITION ON DISCOVERY : Complete and intact, excepting one small section missing from roof. Completely filled up with sediment.

EXCAVATION : Exterior complete to base of kiln at DG; interior removed only to within 20-40 of mouth.

Figure 4.26 -- FC5 as discovered.

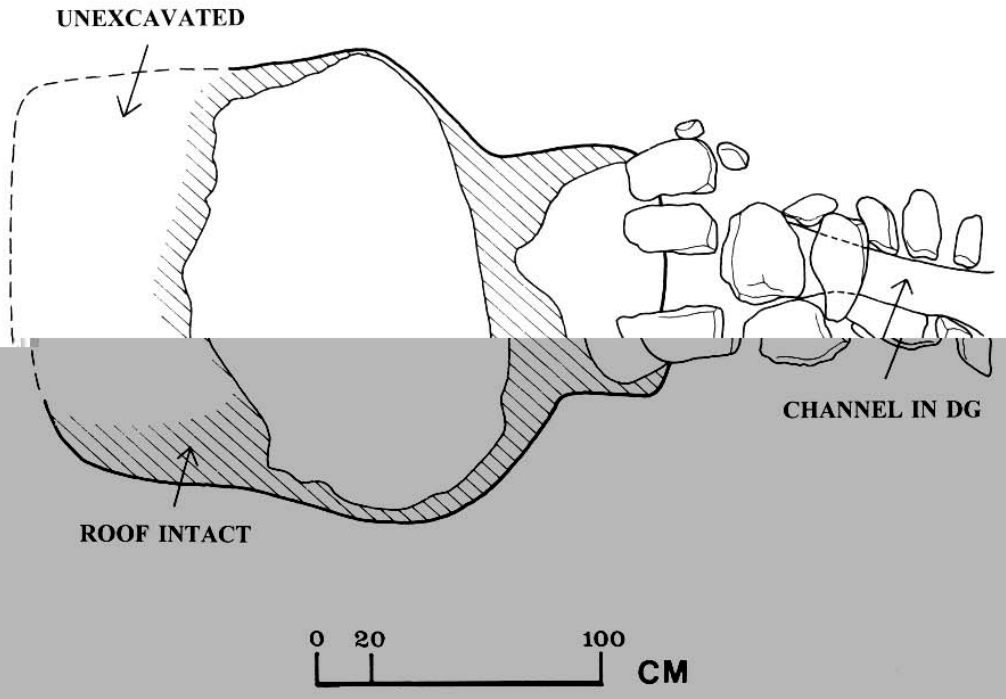


Figure 4.27 -- Floor plan of FC5 and stone-lined and covered channel outside the mouth. (See also Figure 4.15 for profile.)

ROOF : Intact except for one small (30x30 cm) section collapsed.

ORIENTATION (FROM BACK TO MOUTH) : 209 degrees approximately.

MOUTH : largely intact , with smaller end missing the roof section.

CHANNELS IN FLOOR : Unknown (interior unexcavated).

VENTS AND CHIMNEYS : Three, free standing chimneys lined with clay (formerly tunneled into DG), spaced evenly over the roof surface; rising straight from roof to ground surface. One other infilled chimney at rear of kiln, without fired clay lining.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : Large exterior charcoal flow from mouth continuing into central ravine flow.

OTHER FEATURES : Rocks near mouth in charcoal flow lead downhill into main flow; two small pieces of iron slag found 1 m outside mouth.

Figure 4.28 -- FC6 as discovered (small part of mouth visible at lower right).

Figure 4.29 -- FC6 after partial excavation.

Figure 4.30 -- Excavation of FC6.

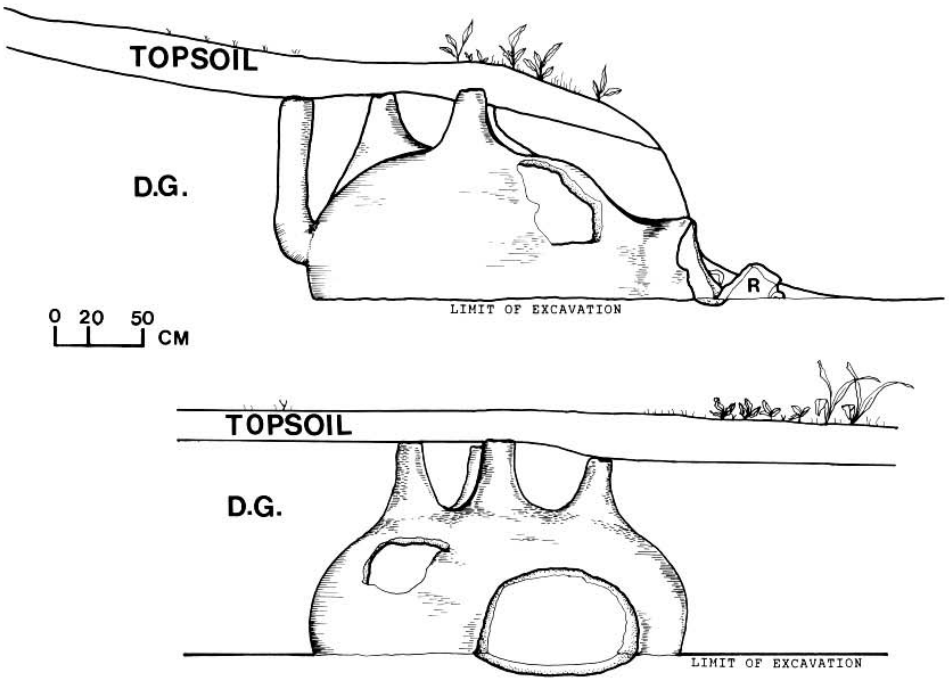


Figure 4.31 -- Artist's view of FC6 in situ.

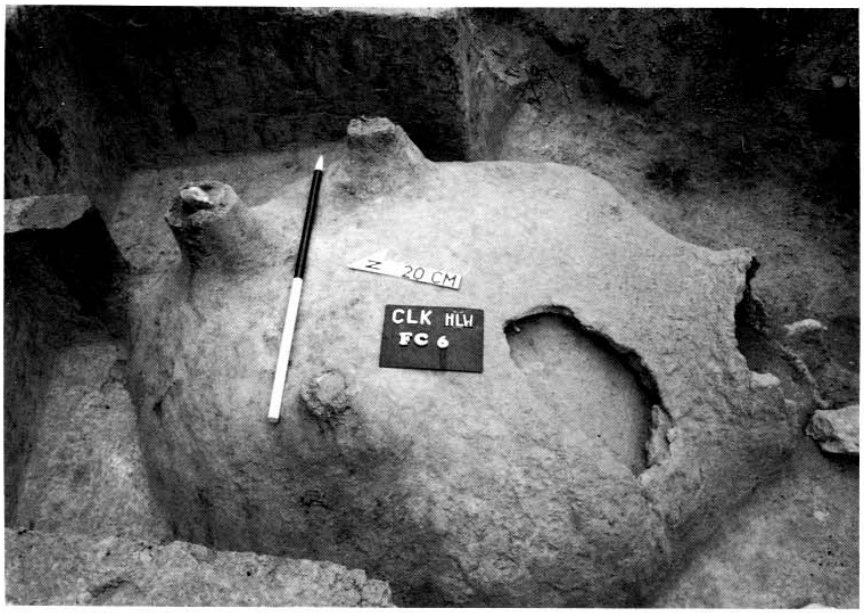


Figure 4.32 -- FC6 after excavation.

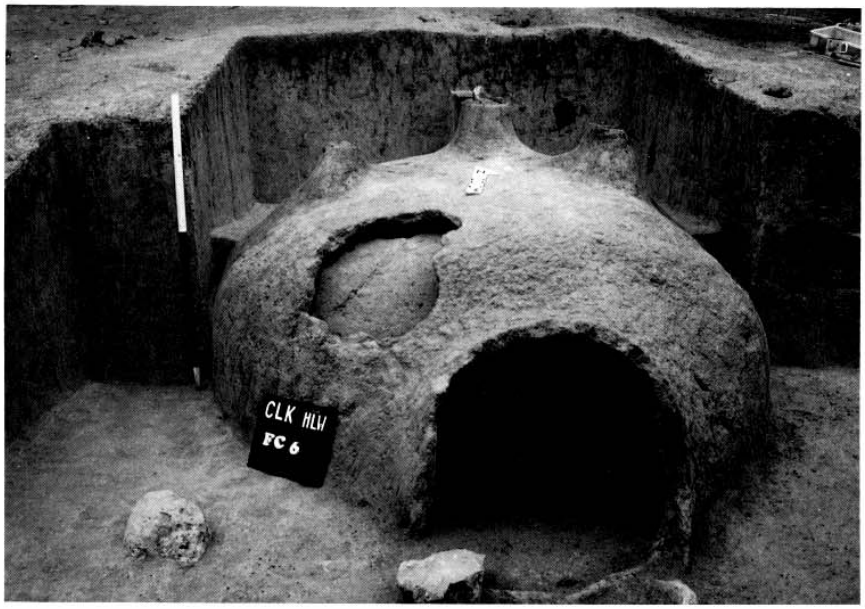


Figure 4.33 -- FC6 after excavation.

KILN : FC7

SHAPE AND DIMENSIONS : Bell shaped, constricting toward mouth. Length >170 cm, width at rear 150 cm, at front 80 cm. Height greater than 1m.

LEVEL MPD OF FLOOR : +5.77

CONDITION ON DISCOVERY : Infilled completely, only rear right corner clay protruding from soil. Wall outline protruding from DG after clearance of topsoil.

EXCAVATION : Most of interior and mouth, exterior in large square to determine extent and uncover mouth, channel, and flow.

ROOF : Missing, except in front near mouth; perhaps 10% survives.

ORIENTATION (FROM BACK TO MOUTH) : 240 degrees approximately.

MOUTH : Contains stone bridge and sides, roof collapsed.

CHANNELS IN FLOOR : Along center on floor, splitting into 'V' at rear; along both sides joining at a large sump in front of mouth. Flows outward, with stones lining/channel.

VENTS AND CHIMNEYS : None; no roof survives and walls have no vents.

Figure 4.34 -- FC7 after excavation.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : Well defined charcoal flow cut into DG flowing approx 250 degrees away from mouth.

OTHER FEATURES : Black fired patches on the floor; thick charcoal deposit in sump and mouth.

Figure 4.35 -- View of the mouth of FC7 from inside the kiln.

KILN : FC8

SHAPE AND DIMENSIONS : Ovaloid rectangular, narrowing towards front; length 1 m, width 2 m, height >75 cm.

LEVEL MPD OF FLOOR : +6.33

CONDITION ON DISCOVERY : Completely infilled by silt and clay deposits, small portion of the mouth protruding from DG. Entire structure overlaid by thin layer of topsoil.

EXCAVATION : Partial interior; mouth left unexcavated for support.

ROOF : Collapsed a few cm only except for 40 cm on right, >20 cm on left; exterior south of mouth intact; small bridge almost complete over mouth.

ORIENTATION (FROM BACK TO MOUTH) : 161 degrees approximately.

MOUTH : Fired clay channel nearly complete at top, but the rest missing.

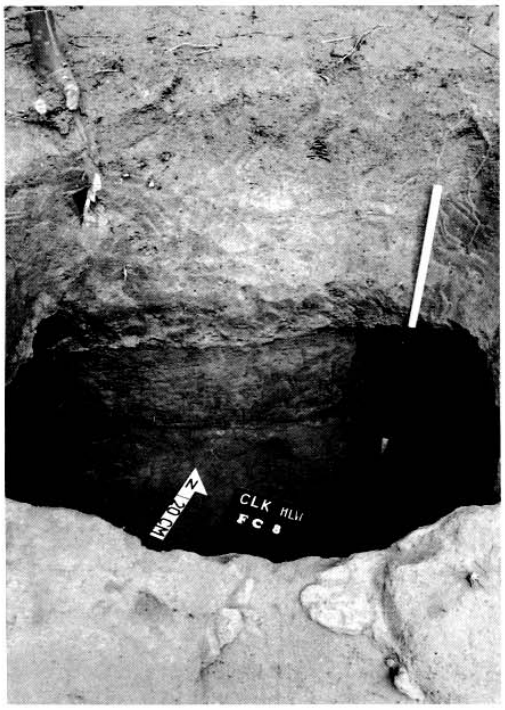


Figure 4.36 -- FC8 after excavation.

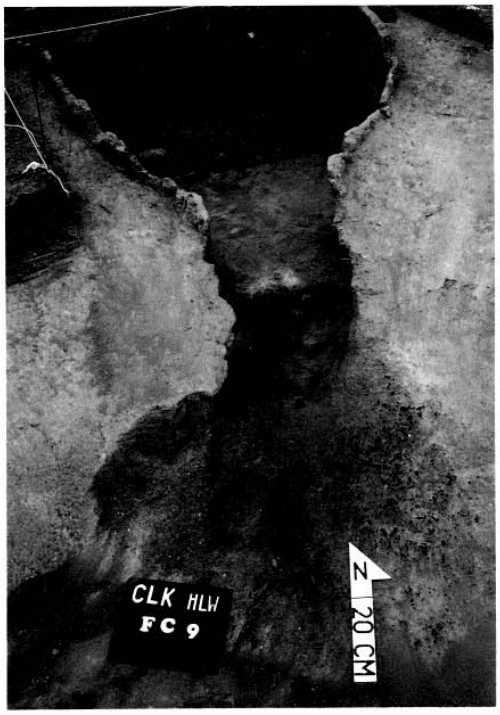


Figure 4.37 -- FC9 after excavation.

CHANNELS IN FLOOR : No distinct channels within.

VENTS AND CHIMNEYS : None noted.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : Flow of charcoal and black soil in vague trench cut in DG joins main ravine flow.

OTHER FEATURES : On eastern side the roof had collapsed only 3-4 cm, on western side nearly 20 cm; kiln had been almost entirely silted up before roof collapsed.

KILN : FC9

SHAPE AND DIMENSIONS : Bell shaped or oval, more narrow towards front. Front width 50 cm, rear 140 cm. Length >120 cm, height >90 cm.

LEVEL MPD OF FLOOR : +7.27

CONDITION ON DISCOVERY : Completely filled by sediments; right side of structure just below topsoil layer; left side protruding in parts. Complete outline above DG layer.

EXCAVATION : Interior complete; mouth excavated to extent of clay floor.

ROOF : Missing, no overhang present.

ORIENTATION (FROM BACK TO MOUTH) : 195 degrees approximately.

MOUTH : Clay channel with floor and sides intact; no stones, no roof.

CHANNELS IN FLOOR : Central channel of 25 cm width, filled with charcoal and red clay (roof fragments); smaller channels on each side, joining at sump in front of mouth.

VENTS AND CHIMNEYS : None extent in walls.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : Charcoal flow in channel cut in DG, running from clay mouth out to join with common ravine flow.

OTHER FEATURES : None.

KILN : FC10

SHAPE AND DIMENSIONS : Ovaloid rectangle, width 160 cm, length >200 cm, height 1 m approximately.

LEVEL MPD OF FLOOR : +5.79

CONDITION ON DISCOVERY : Filled nearly to roof with sediment, parts of mouth protruding from DG. Entire mouth and body overlaid by soil.

EXCAVATION : 1/2 of interior; large interior vent leading upward was probed. Mouth exposed, and general area north of mouth excavated.

ROOF : Intact but visible from inside only.

ORIENTATION (FROM BACK TO MOUTH) : 340 degrees approximately.

MOUTH : Large opening still present, but small mouth gone; stones at base may have been bridge over channel.

CHANNELS IN FLOOR : Interior excavated area contains no channels; floor missing in front area; intact at rear.

VENTS AND CHIMNEYS : Roof slopes slightly upward at back, possibly leading into a chimney; exit hole not located, therefore length not known. A vent in the NW corner, 38 cm above floor.

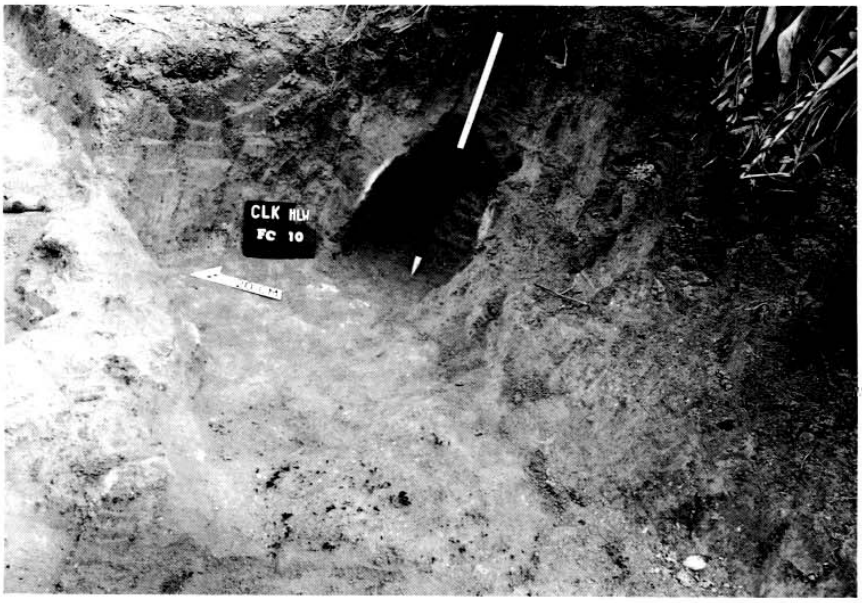


Figure 4.38 -- FC10 after excavation.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : Charcoal flow angling to NW from kiln opening.

OTHER FEATURES : North of charcoal flow, 1 m from mouth, is a pile of black stone floor fragments.

KILN : FC11

SHAPE AND DIMENSIONS : Excavated part indicates rectangular plan with rounded corners. Length unknown, width 180 cm, height (of wall) >60 cm.

LEVEL MPD OF FLOOR : +6.02

CONDITION ON DISCOVERY : Infilled with roof fragments and sediment; large portion of clay rim protruding from DG; all overlaid with topsoil.

EXCAVATION : Approximate 1/2 section with front 1/2 and mouth excavated; soil and DG removed all around to depth of 80 cm approx to determine extent and to expose charcoal flow.

ROOF : Intact over mouth section and to some degree at sides; collapsed inside main chamber.

Figure 4.39 -- FC11 after excavation.

ORIENTATION (FROM BACK TO MOUTH) : 250 degrees approximately.

MOUTH : Large intact covered mouth turning left from opening, filled with rocks, approx 1 m long and 60 cm wide; traces of a possible second mouth adjacent.

CHANNELS IN FLOOR : None on floor of kiln.

VENTS AND CHIMNEYS : None, as there is no roof. Perhaps one exterior vent in wall adjacent to mouth.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : Charcoal flow from hole, near mouth to distance of 70 cm. Mouth has large channel, well-defined and filled with rocks and charcoal past 1 m in distance.

OTHER FEATURES : Slag layer in TR1 3.5 m from mouth at nearest point is probably related.

KILN : FC12

SHAPE AND DIMENSIONS : Roughly circular, flattened towards mouth and rear. Diameter 150 cm, height 90 cm approximately.

LEVEL MPD OF FLOOR : +5.44

CONDITION ON DISCOVERY : Completely infilled with sediment and roof collapse. Pieces of mouth clay evident on cleared hillside. Structure overlaid by DG and topsoil.

EXCAVATION : 2/3, in front part. Interior excavated, with exterior exposed in front. Mouth left unexcavated for strength.

ROOF : Collapsed almost completely. Sides have some overhang; front has small ribbon remaining over mouth.

ORIENTATION (FROM BACK TO MOUTH) : 355 degrees approximately.

MOUTH : Collapsed and missing except for small clay fragments showing location; some side pieces and floor under mouth intact.

CHANNELS IN FLOOR : Central channel and one on each side, excavated only at mid-point profile line; tightly packed with debris from roof collapse.

VENTS AND CHIMNEYS : None to be seen in present walls; over 95% of roof missing.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : None, perhaps due to disturbance from modern pump house less than 1 m from kiln mouth.

OTHER FEATURES : None.

Figure 4.40 -- Excavation of FC12.

KILN : FC13

SHAPE AND DIMENSIONS : Roughly ovaloid (egg-shape), longer towards mouth and rear.

LEVEL MPD OF FLOOR : +5.92

CONDITION ON DISCOVERY : Completely filled by sediment wholly overlaid by topsoil; kiln was discovered by following the charcoal trail into the bank.

EXCAVATION : Interior completely excavated; mouth partly excavated.

ROOF : Intact but for about 40% of area in center; visible only from inside kiln, as DG was not stripped off the exterior.

ORIENTATION (FROM BACK TO MOUTH) : 54 degrees approximately.

MOUTH : Not excavated to base; only one side intact.

CHANNELS IN FLOOR : Running along either wall to a depth of 10 cm.

VENTS AND CHIMNEYS : One chimney in right rear of kiln leading from roof to surface.

Figure 4.41 -- Following the charcoal trail into the mouth of FC13.

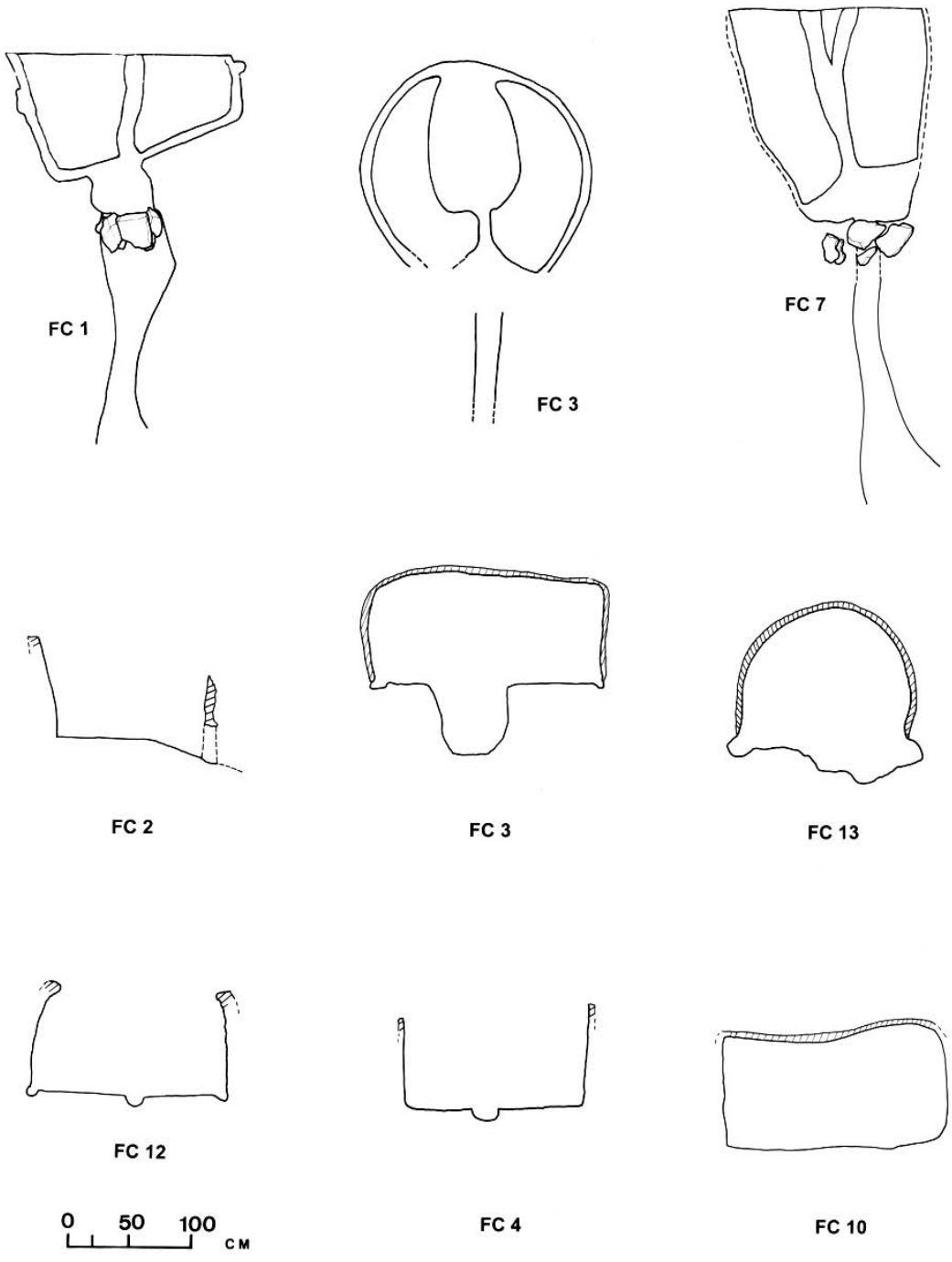


Figure 4.42 -- Floor plans (top row) and profiles of some of the kilns.

EXTERIOR CHANNELS AND CHARCOAL FLOWS : A thin trail of charcoal leading northeast away from mouth.

OTHER FEATURES : Large depression of 30 cm found in right side of kiln floor.

ANALYSIS OF MATERIAL FROM HA LAW WAN

Two C-14 dates were obtained on charcoal samples:

FC1 -- 720 +/- 60 BP (BETA-42856) calibrates to 1255-1340 AD.
FC2 -- 620 +/- 60 BP (BETA-42855) calibrates to 1265-1405 AD.

The slag samples were analyzed by Dr. G. Greene of the Dept. of Mechanical Engineering at the University of Hong Kong, taking surface readings of the constituent elements. The results indicated that the samples were mainly iron, with other elements normally present in soils and presumably in the crusty portions of the samples that resemble ore. It is hardly appropriate therefore to refer to such material as "slag", given the high iron content.

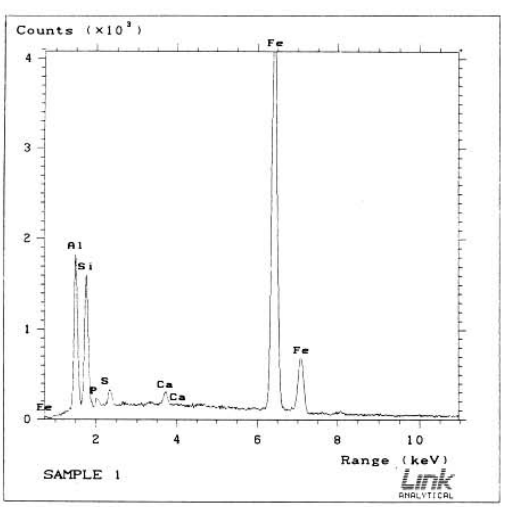
Two further "slag" samples, one consisting solely of the grey pellets and the other of the ore-like material, were analyzed chemically at the XRF Laboratory, Dept. of Mining, University of Nottingham. Their findings demonstrate clearly that the samples are almost entirely iron.

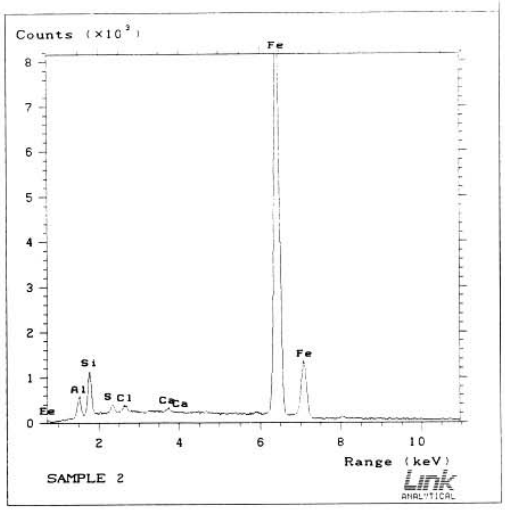
DISCUSSION OF THE HA LAW WAN SITE

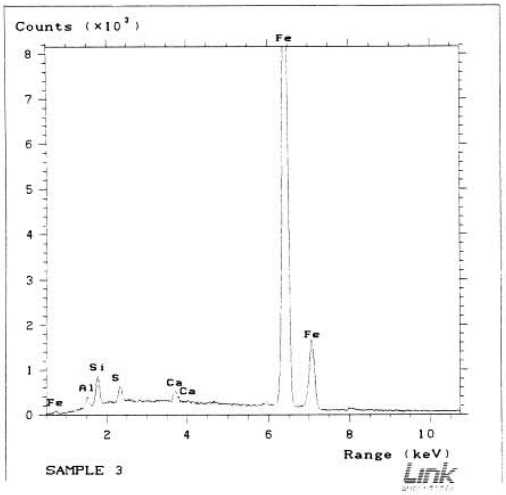
The absence of any prehistoric deposit at Ha Law Wan poses a question, since the site is certainly attractive and located mid-way between two sites which were occupied during the Middle Neolithic. The presence of adzes may be interpreted in two ways : 1) as evidence of very brief visits to the site by Neolithic people who were cutting/working wood on the site, but who did not occupy the site for any length of time and left no pottery; or 2) that Neolithic occupation did take place but has since been completely destroyed by erosion. In the latter scenario, the adzes would have survived transport by water whereas the pottery would not. Both alternatives are viable.

Little can be said about the Tang occupation of the site; no lime kiln debris or other artifacts were discovered to indicate the activities taking place there. The Sung material may be another phase of occupation distinct from the Yuan kiln phase, but is more likely to be contemporaneous with it, the same ceramic types remaining in use for some decades or longer.

The precise date of the kiln phase cannot be established, since the radiocarbon dates calibrate to a broad bracket of time covering nearly two centuries. One may estimate the life span of each kiln at 10-15 years maximum, but probably more than one kiln was in use at any given time.







	Sample 4	*Sample 5*
SiO_2	9.61	22.23
Al_2O_3	1.75	5.08
TiO_2	0.10	0.22
Fe_2O_3	91.88	72.07
MgO	0.28	0.45
CaO	0.48	0.96
Na_2O	0.00	0.00
K_2O	0.38	1.28
MnO	0.60	0.61
P_2O_5	0.15	0.18
LOI	-5.55	-3.26
Total	99.51	99.71

Notes:
1. Oxide data are quoted in weight percent oxide.
2. Values below the (2s) detection limit are quoted as zero.
3. Please note that the negative LOI reflects the oxidation of ferric to ferrous iron during the fusion band process. Also the iron reported here is expressed as total ferric iron.

Figure 4.43 -- Results of the surface scans of slag samples 1-3, and the chemical analysis of slag samples 4 and 5.

The major question posed by the kilns is their function; it seems reasonable to assume that the "slag" does represent the output of the kilns, either as waste or more likely as the desired end product, judging from the high content of iron. The problems are manifold :

--If the kilns did indeed function in some manner for the smelting of iron ore, why are the slag deposits so small ? On most iron smelting sites, slag deposits are massive.

--How did the kilns operate ? There is no possibility that molten iron ever flowed in the channels, since numerous crevices have no traces of metal.

--Why was the site chosen ? There are only insignificant occurrences of iron in the vicinity, certainly not sufficient raw product to run an industry on the scale of the operation in evidence. Was fuel the main consideration ?

--Why are there no crucibles, tools and other articles necessary in a smelting centre ?

--If the channels were not for the product of the kiln, what purpose did they serve?

The kilns are unlike any described in historical sources, or reported from China. The grooves in the floor indicate that something was meant to flow out of the kiln; in some ways the kilns seem more appropriate for the production of an organic substance, such as resin or charcoal, or even lime. But the fact that they were burrowed into the DG and their shape suggest that a higher temperature was required than what would be needed for charcoal production. It was first considered that they might indeed be an evolution from the Tang lime kilns, with slaking of the lime inside the kiln after the firing. But the structure of the kilns is at variance with such an interpretation, and both Tang and Ching lime kilns and those from other regions invariably are larger, open at the top, and usually have a grill or grate to separate the firing chamber from the load.

The questions and difficulties in interpreting Ha Law Wan as an iron smelting site are not fully resolved; the clue may yet be found in the unexcavated areas, especially the small ravine between FC7 and FC13. The best indication at present is the "slag", and the fact that it has such high iron content must indicate that it is the product of the kilns rather than an accidental by-product. It is also clear that molten iron never flowed in the channels on the floor, since these are quite coarse and porous, but have no trace of iron. Perhaps the iron ore was sintered, or only partially smelted, resulting in the formation of the pellets embedded in the slag matrix. These slag clumps would then have been manually broken up, and the true slag pushed downslope. The steepness of the ravine would then, over time, have eroded the slag deposits.

Clearly, this reconstruction is largely speculative, and has many problems. The final word on the site must await future excavation. A late modification in the design for the new airport has made it possible to preserve the kiln complex at Ha Law Wan for future display and research. This is a most fortunate development, since the site is the only one of its kind in Hong Kong and it is still something of a mystery.