
Khirsara – A Harappan Metropolis in Western Kachchh, Gujarat, India

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Abstract: *The four seasons of excavations at Khirsara (23°50'N: 69°05'E) a mature Harappan site in district Kachchh, Gujarat has opened a new chapter in the Harappan Archaeology. Archaeological reconnaissance here has revealed separate fortified enclosures for Citadel, Ware house, Factory area and Residential annexe within a general outer fortification. This single cultural site of Mature Harappan period can be classified into three phases. It has also revealed evidences of periodical floods that resulted to the raising of the heights of the settlement by the inhabitants. The results of these excavations are discussed in this paper.*

Keywords: Khirsara, Fortified Settlement, Citadel, Ware House, Factory Area, Residential Complex, Furnace

Introduction

Khirsara (23°50'N: 69°05'E) is a small village situated at a distance of about seven km south of Ravapar on the Bhuj-Narayan Sarovar State Highway and five km north of Netra in District Kachchh, Gujarat. The archaeological site here, locally known as 'Gadhvadi' is situated two km east of the village and is bordered by two seasonal streams on the northern and southern side which drains into the river Khari flowing at a distance of around 400m away (Figure 1). The restricted excavations by Nath *et al.* of the Archaeological Survey of India from 2009-13 has yielded a rich cultural debris belonging to the mature Harappan period (Nath, et.al 2012: 122-132). The evidences show five structural phases and damage caused by the flood in successive phases.

Town Planning

Khirsara is a double fortified settlement, roughly trapezoid in shape and the wall was plastered with mud. Measuring 308.26 m on the northern, 278.58 m on the southern, 225.92 m on the eastern and 232.74 m on the western axis, it was provided with

bastions at cardinals and salients at regular intervals. The site encloses the citadel in the south, ware house in the south east, factory area in the centre, residential annexes in the north and series of rock cut kilns on the east. All the units are provided with separate enclosures within a general external fortification, with an exception being the series of kilns – situated beyond the general fortification.

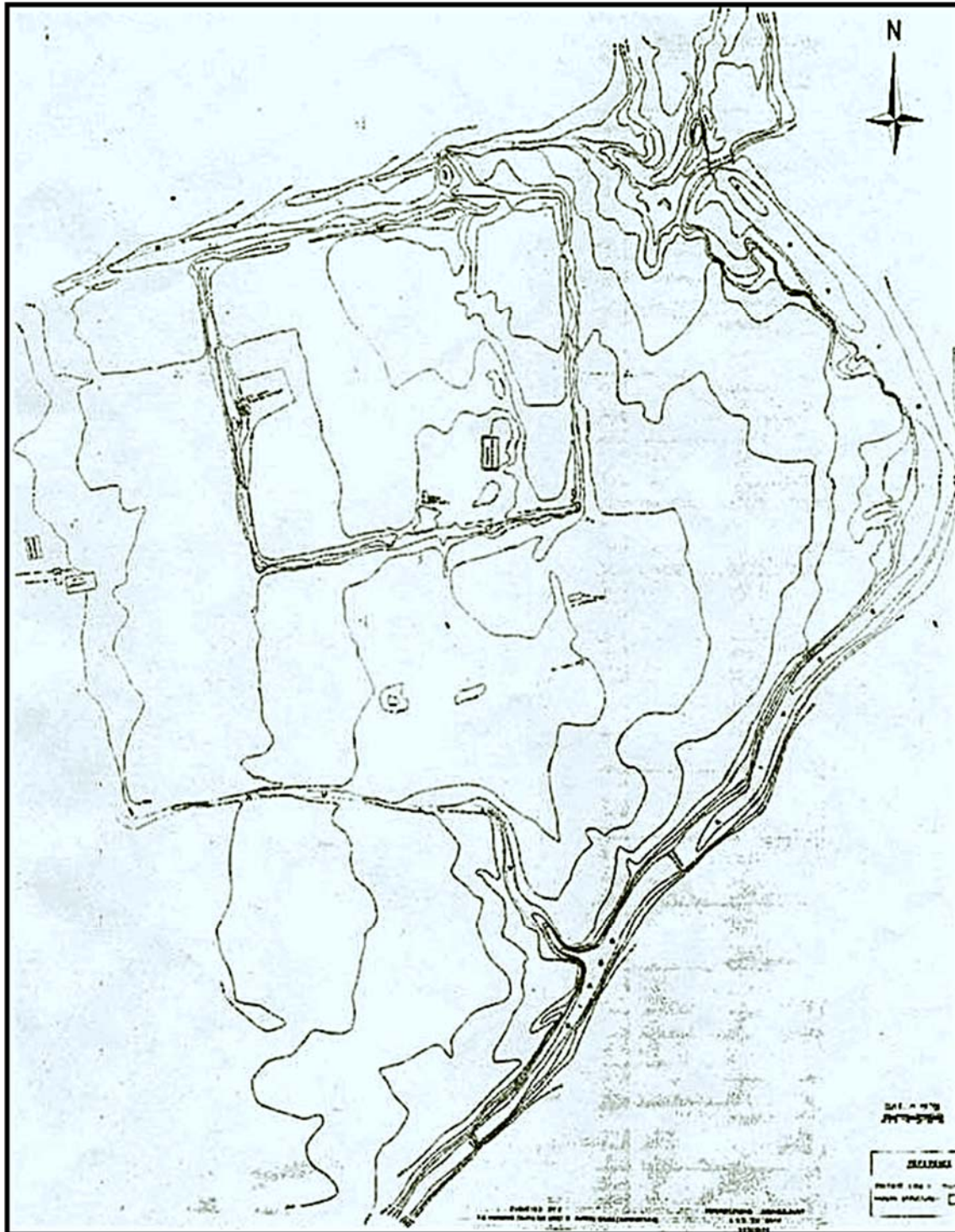


Figure 1: Khirsara, Contour Plan of the Site

Fort and Fortification

The foundation for the fortification was raised over the bed rock by levelling the same and laid with multi-coloured mud brick bats and mud brick materials. Over this, huge fair faced stones of various shapes were laid in ascending order. The inner core of the wall was filled with rubbles and mud bricks. In the earlier phase, the height of the wall was 4.80m and another 1.40m was added in the last phase.

The bastion provided on the south-east was partly damaged due to the trees and vandalism over time. It was built of dressed stones in random coursed masonry with mud mortar. Its extant height was 2.70m with off-sets measuring 4.25m x 6m x 15.50m x 3.80m. The north-east bastion was excavated to confirm the plan and architecture of the south-eastern one. Excavations have revealed that the bastion was off-set in plan, coursed to the outer edge and the core filled with rubble stones of various shapes. It measures 1.60m x 7.60m x 8.80m x 2.45m. The stones of the south-west bastion were vandalized leaving only the alignment. The excavations on the inner side revealed the way of filling the core of the fortification wall. In the initial stages, it was filled with multi-coloured mud bricks (40cm x 20cm x 10cm) with mud mortar, rubble stones, mud, bones, potsherds etc. and was covered with a rubble wall. It was encased with another wall of random un-coarse masonry. This wall runs into the core of the bastion facing north while another wall from east-west orientation bisects the above wall to makes it as an inner corner. It is worthy to mention here that the width of the general fortification wall varied with difference seen on the same side, a feature which requires further investigation.

Northern Wall

The width of the northern fortification wall measures 5.60m in the bottom and tapers to 3.40m on top with periodical reinforcements being made on the inner side. At a distance of 2.80m, from the main wall, another wall running parallel was noticed. The height of this wall is 2.30m and built in random rubble masonry, while that of the former is 6.20m. The space in-between them are filled with rubble stones and mud up to 40m, where a sandstone outcrop bifurcate the site. However, this distance gradually increases as it runs towards the north east and takes a turn towards east, where the distance between them at the north-eastern corner is 5.80m. This wall may have been erected to act as bolsters against periodic floods.

Salients were noticed at regular intervals. The first one, rectangular in shape was noticed at a distance of 125m from the north-west corner. It measures 1.85m x 6.45m x 1.25m, built of random rubble masonry with mud mortar and plastered with mud. Abutting the parallel wall, the corners of the salient were provided with polished stones, while the core was filled with rubbles. The aforementioned salient did not form a part of the initial phase of construction but was added later on. Another salient built of random uncoarsed masonry was noticed at a distance of 101.15m from the former and 50m before the north-east bastion. It is also rectangular in plan measuring 2.90m x 6.75m x 2.70m respectively.

At a distance of 78 m from the first salient, stones kept in straight vertical alignment (factures), intentional in nature were noticed. This is one of the important architectural features often noticed in the long and huge fortification walls to minimize the damage of the wall due to unforeseen natural calamities or in case of falling. The wall is 'squared, built to courses' masonry with fair face probably using mud as binding medium. The sandstones used in these structures are of various shapes, sizes, colour and texture. Though the upper portion of the wall is disturbed the actual width of the wall is 6.70m, with inner fillings of mud brick materials, chips and stones. The already mentioned parallel wall was noticed 5.10m away from the outer wall. Huge faunal remains in the form of mandible with teeth of bovine species was noticed in-between the outer fortification wall and the parallel wall. The purposeful dumping indicates that this area may have been used as a butchering area or slaughtering house in the later phase.

The evidences of flood deposits in the form of alternate bands of silt, sand and mud were noticed along the section in one of the index trench. Above this deposit, huge amount of charcoal, ashes etc were also noticed. It is interesting to note that the depth of this deposit coincides with the second phase flood deposit of the Index trench in the citadel area.

Eastern Wall

The excavation along the eastern fortification wall has revealed some interesting structures that are unheard from the other harappan sites. The wall on this side was not a continuous one and after running to a length of 153.50 m from the inner corner of north-eastern corner, it comes to an abrupt end, where a wall of 5.20m width bisects the fortification wall. This wall acts as an outlet discharging the water from the factory and ware house area and was closed in different stages. Initially a platform was raised to a length of 4.45 m and narrowed to 1.35m at the bottom. It was also closed later with mud bricks of brown and grey in colour with mud mortar up to 10 courses, where the mud bricks measures 40cm x 20cm x 10cm, mostly laid in stretcher. The already mentioned parallel wall that takes a turn from north was noticed at a distance of 21m from the main wall and encloses a series of furnaces / kilns. Due to the restricted nature of excavations, the further extension of this wall could not be identified, with the parallel wall exposed near the south-eastern corner being different in alignment and architecture. Even one of the deep trenches laid out here revealed the deposit of fine sand and silt against the fortification wall where the width of the wall is 5m at the base and 4.65m at the extant top.

Near the south-eastern corner, a closed entrance measuring 3 m along with a pathway was noticed. This pathway was provided with a flight of six steps at a distance of 7m from the entrance. Guard rooms were provided on both sides along the fortification wall and are parallel to the pathway. The one located along the east measures 3.80m x 2.40m and 3.50m x 2.50m, while the width of the second chamber reveals that it was a later addition. In the first, a huge storage jar was noticed in the north-east corner.

Further, a small square opening measuring 0.45m x 0.50m was noticed near the north-west corner of the chamber with a flat stone above. As the outer side was not opened for excavation up to that level, the actual purpose of the small opening could not be ascertained. Towards west, another jar surrounded by number of pots, basins and bowls kept inside as well as around the storage jar were noticed. With an entrance on the left side, the floors were laid with mud brick materials and multi-colour mud brick bats. On the north-west corner of chamber 2, a small storage tank / bin, square in shape was noticed. This chamber was further partitioned by a single course wall dividing it into two chambers.

Southern Wall

The southern fortification wall is more or less intact and 4.40m in width in the south-eastern corner but was reduced to 1.50m after 48m where the citadel wall bifurcates the outer fortification. Its extant height is 3m where it merges with the citadel wall. The southern wall of the citadel itself acts as the outer fortification wall for nearly 90m, i.e. the whole citadel area on the southern side which is discussed elsewhere. Series of guard rooms numbering four were noticed along this wall from the closed entrance. They measure 3.40m x 2.60m, 3.55m x 2.60m and 2.70m x 2.60m. The first one was actually raised along the fortification wall where the north-south wall bisects the main fortification wall. It has an entrance measuring 1m towards north, facing the 3m wide pathway. However, the remaining guardrooms were raised over the course of time and all are inter-connected. As the fourth one enters the unexcavated area, its character could not be ascertained.

Western Wall

The actual wall on the western side was almost intact and rose to a height of 5m from the ground level. Although, some architectural features like double wall and closed entrance were noticed, it was not exposed and studied. However, the excavation on the inner side of the north-western corner revealed a disturbed corner.

Bipartite Wall

An interesting structure encountered during the excavations was the bipartite wall, which encloses the 'Ware House' area on the north. This wall actually bifurcates the fortification wall on east. Raised with a 'squared, built to courses' masonry of fair face with mud mortar, the height of the wall is 3.10m. It was raised just above the levelled natural rock and laid with multi-coloured mud bricks and brick bats. However, this flooring was disturbed by a deep pit of later phase. The pit was again cut by another flood as the evidence indicates and was levelled with mud bricks.

The total length of this wall is 40m, where it comes to an abrupt end in the west and leaves 1.40m space for pathway between the citadel and the factory area. This bipartite wall, where it bisects the fortification wall was badly disturbed and subsequently repaired. The considerable additions made make this wall appear in a step like fashion and in course its width extends up to 6.55m. A closed drain square in shape and

encased with flat stones was noticed 2.00m away from the south-west corner. Further, two drains were also noticed on the south facing wall; one is 1.70m from the south-east corner and another is 2m away and was damaged. This drain was used as an outlet for the factory area. This bipartite wall was actually a huge covered drain which may have also been used to drain rain water outside the residential area where it joins the river Khari.

Residential Area

The excavations along the inner side of the northern fortification wall have revealed residential complexes with rectangular rooms, corridors, pillar bases and hearths. These rooms are interconnected and have multifarious entrances. The evidence of different phases of construction was noticed in all the trenches, where after every phase as usual the area was levelled using mud brick bats and materials. Further, a street running north-south and east-west of 8m wide, rammed with small rubble stones, pot shreds, bones and shell debitage was exposed. Apart from the usual Harappan antiquities and ceramics, two seals were also recovered from one of the complex.

Citadel

The citadel (Nath et al. 2015: 67 – 73) was situated south of the site where the ware house and factory area are situated east and north of the citadel. Built of random coursed masonry with mud mortar, the corners are applied with well-polished angular stones in Quoins (corner) stressed masonry while the top courses reveal evidences of later additions. Rectangular in plan, it measures 87 m on the north and 90 m on the south, 85m on the east and 78m on the west. It was provided with a 5m pathway all around – to keep watch and ward on the on-going activities of the settlement. However, as already mentioned elsewhere, the width of the wall on the southern side was nearly 10m due to periodical reinforcements. In the early stages, well-polished (dressed) sandstone was used to raise the wall, which was squared, built to courses masonry with mud mortar as binding medium. The evidences show that in the next phase, the height of the wall was raised along with the width and merges into the main inner wall of the citadel. The space in-between the actual outer wall and the above wall were filled with stones and soil while the upper surface was plastered with mud-brick materials and used as pathway. In the later stages, this area was filled with mud brick materials when the height of the wall was again raised. Likewise, the inner core of the second wall and the inner wall of the citadel were filled with multi-coloured mud bricks and bats with thin mud mortar as binding medium. These are laid in 'bricks on bed' where the plan and the eroded section revealed the same. The ratio also coincides with the usual Harappan sizes.

The foundation was laid by leveling the surface with mud brick materials. The strengthening wall was also raised like the former and was built of 'rough faced of random coursed masonry'. The section in the deep trench along the outer fortification wall reveals flood deposit against the wall for nearly one meter followed by mud filling

and rammed mud brick materials in ramp which was dug up to 3.85m. This shows that the inhabitants of Khirsara invested maximum effort to strengthen their walls against the threat. This sloppy way of levelling the wall indirectly gives more strength to the wall and allows water to not only recede quickly but also minimizes damage caused by the thrust of violent floods. All these evidences show that the main threat to the settlements (in the form of flood) was from the southern side. A flight of steps raised in different structural phases was noticed on the south-east corner of the citadel. As the natural soil was not reached and the steps still continuing, the exposed steps may be assigned to the second phase. These steps are provided to give access to the 5m wide pathway on the eastern side to have a look over the 'Ware house' situated there. These steps coincide with the entrance noticed in the index trench. The distance between the two is 4.10 m and it leads to the 2 m pathway with a huge door sill on the northern side. The length, width and the height of the steps are 2.75m x 0.38m x 0.25m, 2.78m x 0.30m x 0.25m, 2.80m x 0.30m x 0.25m and 2.75m x 0.26m x 0.25m. The section shows flood deposit and subsequent mud brick filling. Coupled with this, the early steps were buried inside the earth and new steps were provided on the top with stones of various sizes, which betrays the finishing of the early phase. Though the alignment was maintained, the width and the height were not maintained. These steps measure 2.80m x 0.32m x 0.50m, 2.78m x 0.30m x 0.15m, 2.80m x 0.20m x 0.28m and 2.80m x 0.40m x 0.20m. During the last phase, after a flood, new steps are provided with reduced sizes. Only two steps of this phase measuring 2.32m x 0.60m x 0.20m and 2.30m x 0.40m x 0.18m have survived.

Residential Complexes

The excavations in the citadel area have revealed two huge complexes with interconnected rooms. These complexes are identified and numbered as Complex A and B, although the evidences show that they are all same in the late phase. The index trench lay just near the complex A and the inner fortification wall has revealed evidences of closed entrances of the complex during all the five stages. The reason behind this are already discussed elsewhere. The structures of early phase were noticed as a single wall in both the complexes in the index trenches.

Complex A

Complex A (Figure 2) is situated in the south-eastern side and behind the modern tank. It is just 10.75m from the inner fortification wall of the citadel which runs east-west. This complex that was more or less intact with interconnected rooms, steps, door-sills, offsets, drains, hearth, post holes and entrances. The main entrance of this complex is on the east which opens into a passage with 2m width. This passage was provided with fine dressed doorsill of sand stone in the north. Post holes are noticed in almost all the rooms which indicate that the super structure might be of perishable materials.

Complex B

Complex B is separated by a small gully of 1.20 m from complex A. This complex with interconnected rooms, drains in each room, post holes etc. is more or less similar to

the former in plan. The height of the floor was raised by using the multi-coloured mud brick materials at the end of every phase. The structural activities of later phases are evident from the periodical fillings, change in orientation of structures and type of stones used in structures.



Figure 2: Khirsara, Complex A in the Citadel

Well

A well with an inner diameter of 3.40m has been exposed up to 5.65m in the heart of the citadel. It was excavated by scooping into the bed rock. The circular wall of the well rests over this bed rock and was encased with well dress sandstones. A rectangular trough with flat stones was provided on the western side of the well with an outlet. It measures 1.60m x 2.20m. Rope marks were also observed on the top course of the well.

Ware House

The excavations (Nath et al., 2015: 205 – 212) carried out in the south-eastern portion revealed the evidence of a 'ware house' (Figure 3). This structure, 'square built to courses' masonry of sandstone with mud as binding medium and was most probably plastered. Situated east of citadel, it measures 12m (north-south) x 28m (east-west) and consists of a series of 14 parallel walls laid in north-south orientation with an average length of 10.8m. The width of these walls varies alternatively from 1 to 1.55m and was bisected by three walls running east-west at regular intervals. Further, after the end of the complex, an extension of the same was noticed on the southern side. The areas in between the parallel walls were rammed with ceramics and bones.

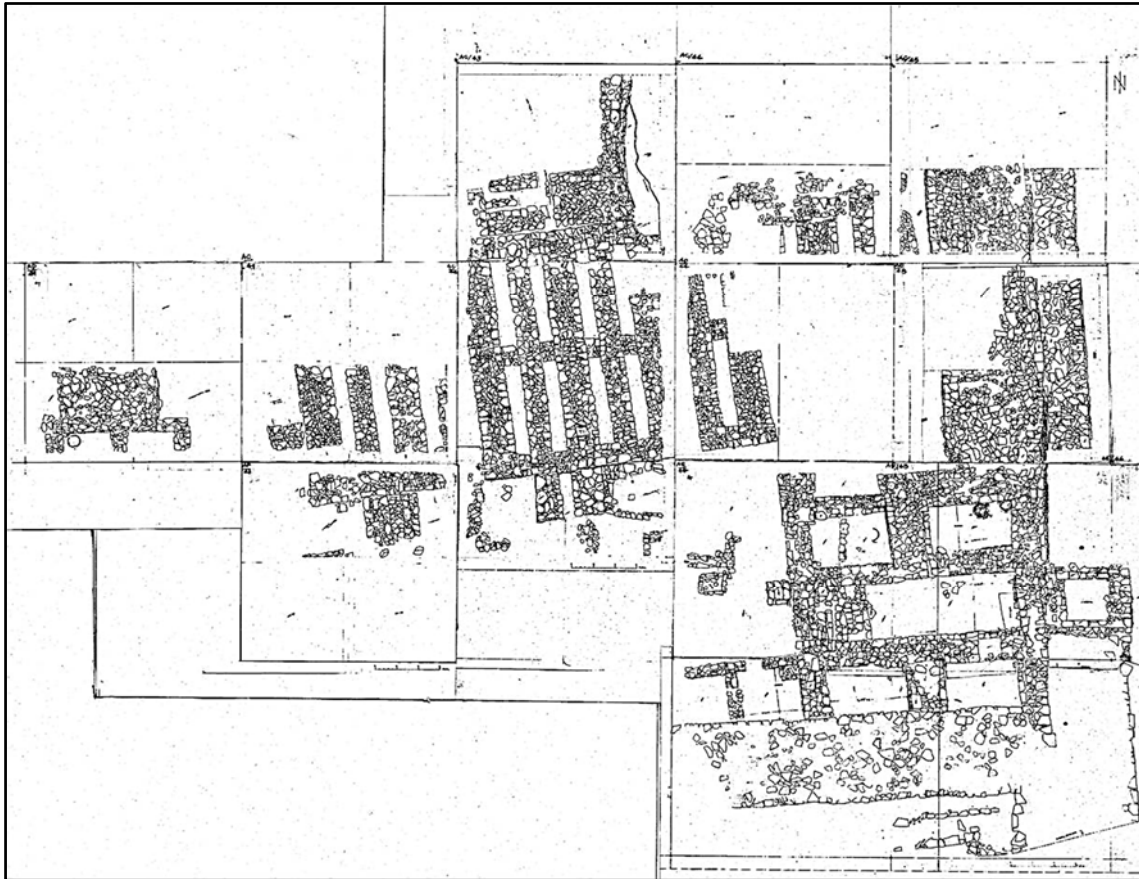


Figure 3: Khirsara, General View of Ware-house Area

A working platform of 2.20 m x 3.50 m was provided on the northern side of the ware house. The super structure of the ware house seems to have been made of perishable item like wood or wattle and daub. The space in between the parallel walls might have served as air duct for circulation of fresh air to protect the stored materials. The structure was purposefully raised in this part adjacent to citadel and close to the south-eastern entrance with a flight of steps and series of guard rooms. Its close proximity with river Khari might certainly have supported the riverine trading activities of the Khirsarans.

Factory Area

The factory area was located just opposite to the northern fortification wall of the citadel with a 5m pathway in-between them (Figure 4). It covers an area of around 6, 600 sq. m. which was half of the citadel area. The excavations here has revealed well planned complexes with spacious interconnected rooms, multifarious entrances, stone paved and plastered flooring, pillar bases, drains, water tank, series of storage jars, flight of steps, kilns, hearths, etc. The layout of the factory area in the early stages of the settlement at Khirsara is doubtful. However, early phase structures in the form of rooms with entrances of 0.80m, stone paved flooring and hearths were noticed in the index trenches. The structures are raised with sandstone of good quality in random

rubble course masonry with mud mortar. As these structures are extending into the unexcavated area, its actual plan could not be ascertained.



Figure 4: Khirsara, Factory Area

In the next phase, the whole site was reorganized. The factory area was redrawn or it was newly planned over the early phase structures. During this phase, a separate fortification of 3.50m was raised around the factory area with the main entrance on the north. The natural contour of the site was well tailored by the Harappans in raising these structures. Well dressed stones of similar sizes were used at the entrance while huge fair face sandstones were employed on the outer wall particularly at the base. This entrance was maintained throughout the occupation of the site though on a reduced scale during the later phases. With a guard room towards the east, the street was 4.70m in width running towards south. Another entrance with a flight of five steps was provided on the southern wall to access from the citadel pathway. The width and the height of the steps are equal in proportions. Meticulously executed third entrance was noticed between the complex 2 and 3 in geometric pattern. The cardinals of the factory were raised with angular stones and this makes the wall to be inclined. Throughout the second and third phase, the rooms are larger in size and polished sandstones are utilized. During the fourth phase, the sudden spurt of activities was noticed in the form of extension of the factory area beyond the fortification on the east, west and north-eastern side. Though the stones betray the early phase, the alignment was almost maintained. The entrance on the north was narrowed. Flat stones of various sizes were laid at the entrances to use as pathways. The eastern one was closed by raising a wall parallel to it while the southern was rebuilt. The guard room was

shifted outside and bifurcated. These rooms are semi circular in plan. The intense industrial activity was noticed in the form of hearths, charcoal, ash dump and discarded pottery scattered all over the area. The rooms are partition according to the necessity. The pillar-bases and post-holes in some of the rooms and even on the fortification wall in the form of embedded cylindrical pots show that the super structures might be of thatched roofs or of perishable materials. The floors are both laid with flat rubble stones and plastered with mud brick materials or rammed shell debitage or mud. One of the complexes was provided with flight of steps. Nearly six complexes and same number of platform along with furnace and hearths were identified and each has a specific role in the production of shell, bone, semi-precious stone beads, steatite micro beads, copper objects, etc.

Apart from the complexes and platforms separated with lanes and by-lanes, an interesting structure of this phase was a four chambered complex. Measuring 7m x 3.5m with inlets and outlets, provided on the north and south may have been used as 'dyeing vat'. In the last phase, the whole area was plastered/covered with mud brick materials with stones of the early phases being reused. Even the fortification wall was covered with mud brick materials and its actual purpose was ceased. The structures are of mostly single course without proper alignment. The rooms and floors with flat inferior quality sandstones are the only evidences of this phase (Nath et al., 2013: 424 – 437).



Figure 5: Khirsara, Kiln

Kilns and Furnaces

A series of kilns of various sizes were identified during the exploration along the eastern side of the outer fortification wall. These kilns are secured by 2.60m wide second fortification wall. Of them two were exposed. The first one is circular on plan and has two chambers, one above the other (Figure 5). Its longer axis along the mouth meant for supply of fuel had two hollow compartments. The fire reaches the upper chamber through 15 flues, all of which are interconnected. The walls on both the sides are mud plastered. Due to constant firing at high temperatures, the walls are vitrified. Except stray potsherds and ashes nothing was recovered from their inner chamber. It clearly indicates that most probably the objects were kept one above another on the top for baking. The evidences also shows that in the later stages, the use of the kiln was minimized in the form of raised inner wall in-between the longer axis and circular chamber and also in the form of few closed flues with flat stones on the outer surface. This kiln measures 3.8m in diameter and 5.42m in longer axis. The diameter of the flues ranges from 0.10m to 0.15m. The second kiln is also rock-cut one and circular in shape. With a fuel chamber in front – all are open. The interior of this kiln also shows the evidences of firing at a high temperature. The diameter of the chamber is 2.20m and the overall length is 3.60m (Nath et.al., 2015: 272 – 282).

The reason for constructing the kilns outside the main fortification wall shows the safety measures adopted by the Harappans in preventing fire hazards and secondly, the easy availability of raw materials from the nearby area. As the river is situated just near the site and the ground area is flat natural rock which is ideal to keep ceramics to dry when in leather hard condition.

Ceramics and Artifacts

The ceramics repertoire portrays red ware, coarse red ware, painted red ware, red slipped ware, buff ware, painted buff ware, perforated shreds, chocolate slipped ware, a vast variety of reserve slip ware, sand rusticated ware, incised and appliqué wares. The artifacts constitutes beads of terracotta, shell, faience, steatite, agate, carnelian, jasper, chalcedony, quartz, lapis lazuli, copper and gold (Figure 6), bangles of terracotta, shell, copper, faience, various shapes of inlays, weights of various denominations and materials, seals, terracotta toys and wheels, hop scotches, animal and bird figurines, anthropomorphic figurines, stone objects including quern, pestles, mullers, pounders, balls, pillar bases, chert blades, microlithic tools, drill bits and inlays, bone and ivory objects. The copper objects include bangles, rings, fish hooks, arrow heads, pins, knives, chisels, nails, needles and weights.

Palaeo-Botanical Remains

The study of palaeo-botanical remains revealed the double-cropping strategy as indicated by charred remains (Pokharia: Pers. Comm). The botanical samples collected has revealed the presence of *Hordeum vulgare* (Barley), *Triticum aestivum* (Wheat), *Eleusine coracana* (Ragi-millet), *Sorghum bicolor* (Jowar-millet), *Macrotylom uniflorum*

(Horse gram), *Linum usitatissimum* (Linseed), *Sesamum indicum* (Sesame), *Gossypium arboreum/herbaceum* (Cotton). Apart from these field-crops, a fraction of weeds and wild taxa have also been recorded.

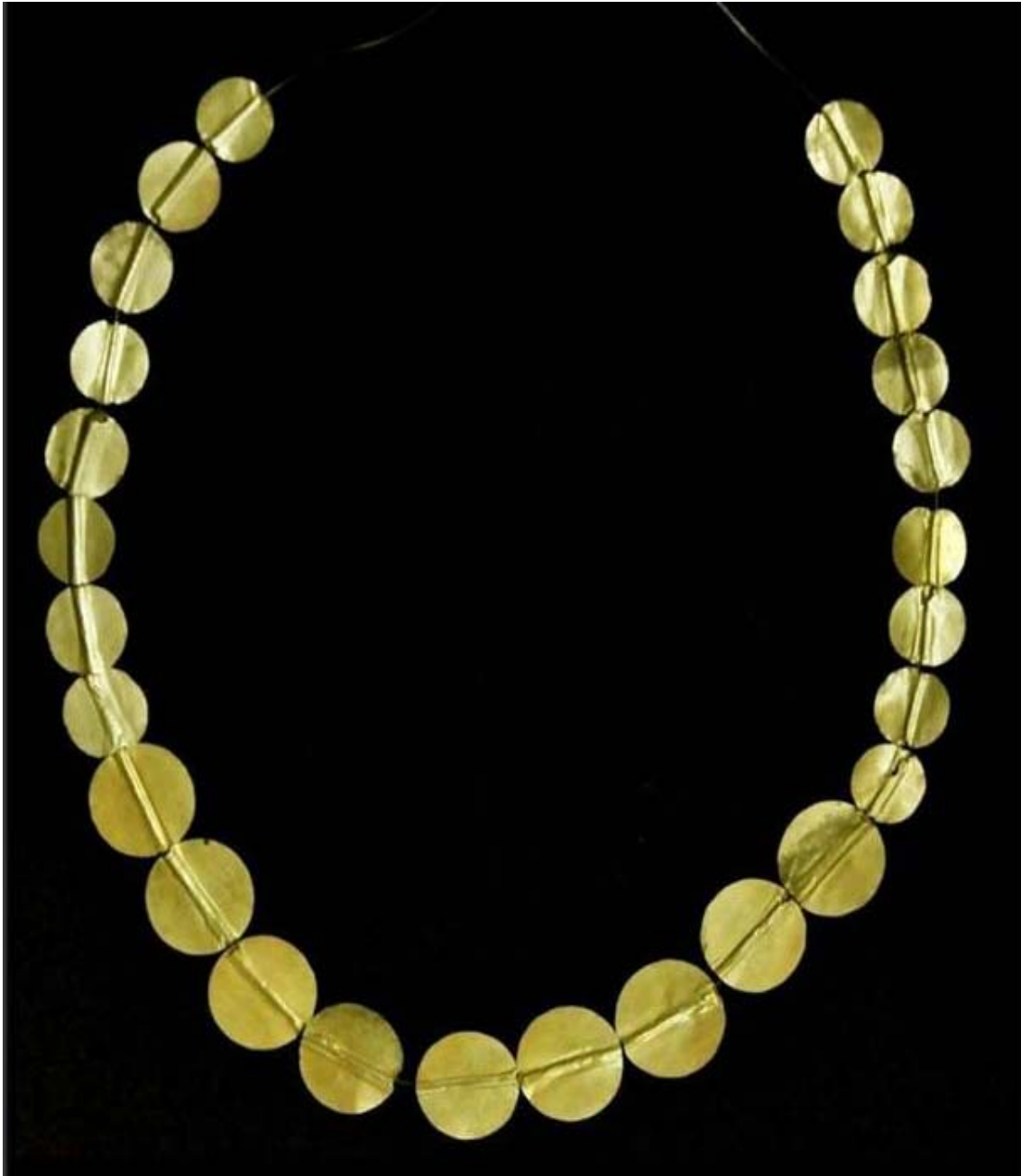


Figure 6: Khirsara, Gold Beads

Palaeo-Zoological Remains

The analysis of the archaeo-zoological samples by Joglekar (2013: 1 – 15) has revealed the presence of both domestic and wild species. The domestic species comprises of cattle (*Bos indicus*), buffalo (*Bubalus bubalis*), sheep (*Ovis aries*), goat (*Capra hircus*), dog (*Canis familiaris*), domestic pig (*Sus domesticus*), cat (*Felis catus*) and non mammals like

Indian Sawback turtle (*Kachuga tecta*), conch (*Turninella pyrum*), a crab species (*Scylla serrata*) and several varieties of fish. The wild species includes blue bull (*Boselaphus tragocamelus*), wild pig (*Sus scrofa*), spotted deer (*Axis axis*), gazella (*Gazella bennetti*), four-horned antelope (*Tetracerus quadricornis*), hare (*Lepus nigricollis*), Indian Elephant (*Elephas maximus*) and wolf (*Canis lupus*). Apart from this, domestic fowl (*Gallus domesticus*) was also identified.

Carbon Dating

The carbon dates received from Birbal Sahini Institute of Palaeobotany, Lucknow, India in respect of the sample collected from the mid-levels of the early phase of the index trench Z-38/1 fall in the range of B.C. 2565 to B.C. 2235. However, more charcoal samples are under study for which dates are awaited.

Conclusion

The excavations at Khirsara have for the first time revealed in the Harappan context different units having separate fortified enclosures within the general fortification. The location of the factory and the warehouse on the east and front of the citadel clearly demonstrates the direct control of the citadel over these two main economic centers. The 5 m pathway around the citadel with flight of steps clearly indicates the same. On the basis of the evidences encountered it could be said that there was a flash flood at the end of every structural phase or there were periodical floods that led to the raise of the height of the structures without major changes in the alignments.

The faunal remains also revealed the proportions of domestic animals were very large (98.61 %) in the total assemblage when comparing to that of wild species (1.04%). The major share is of cattle, followed by buffalo, sheep and goat. It contained both meat and non-meat bearing parts suggesting that the carcass processing activities were taken within the site from time to time, whereas in wild mammals they contain mostly meat bearing parts. This suggests that mostly these animals were butchered outside the settlement and only select meat-bearing portions were brought in the settlement.

Overall, the archaeological excavations have revealed that Khirsara was an important manufacturing hub in western Kachchh engaged in bead making, shell crafting and copper smelting meant for trading and most probably with the overseas people. A circular seal probably of Mesopotamian origin found from the settlement vouches the same.

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