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ARCHAEOLOGICAL EXPLORATION IN KOH KER, PRASAT KRACHAP TEMPLE AND SURROUNDINGS, 2014–2015

Introduction

After the completion of the systematic site survey and trial excavations (BELÉNYESY 2013) begun in 2011, and the KALC-LiDAR programme,¹ we then continued archaeological exploration in the area on the basis of the 5-year cooperation agreement we had concluded with APSARA and the research plan that formed a part of that agreement (Figure 1).

In March 2014 we commenced digs in 3 new trial trenches (Trial Trenches 15–17) within the temple area and on the north side of the double wall that surrounded the area of the shrine. Exploration of the area enclosed within the walls and that outside them was intended to study—as we had done with the previous trenches on the south side—the strata belonging to the construction history of the group of buildings, as well as the links between them and the other parts of the settlement identified around it (Trial Trenches 15 and 17). So in effect, we obtained a complete north-south cross-section of the structure that surrounded the Prasat Krachap

¹ See the article by Róbert Kuszinger in the present volume on the processing of the LiDAR survey data



Figure 2: Trial Trench 15 from the north



Figure 3: Trial Trench 15 from the south

shrine area. In addition to data about the construction of the temple, we also hoped to obtain information from the new trenches that would make an important contribution to the complete exploration of the ruins because, during the restoration that will follow the excavations, we will certainly have to follow the original path levels, which are presently covered by significant quantities of soil and rubble. The management and deposition of that material, along with the resulting changes in the structural stability of the temple, may have a significant impact on the planning of the archaeological exploration and the subsequent restoration of the historic monuments. Taking these latter aspects into account, we definitely hoped to extend our knowledge with data from within the shrine area and opened a small trench on the northern side of the central brick shrine (Trial Trench 16) with the principle intention of ascertaining the internal pathway levels,).

The results of those explorations are summarised below.

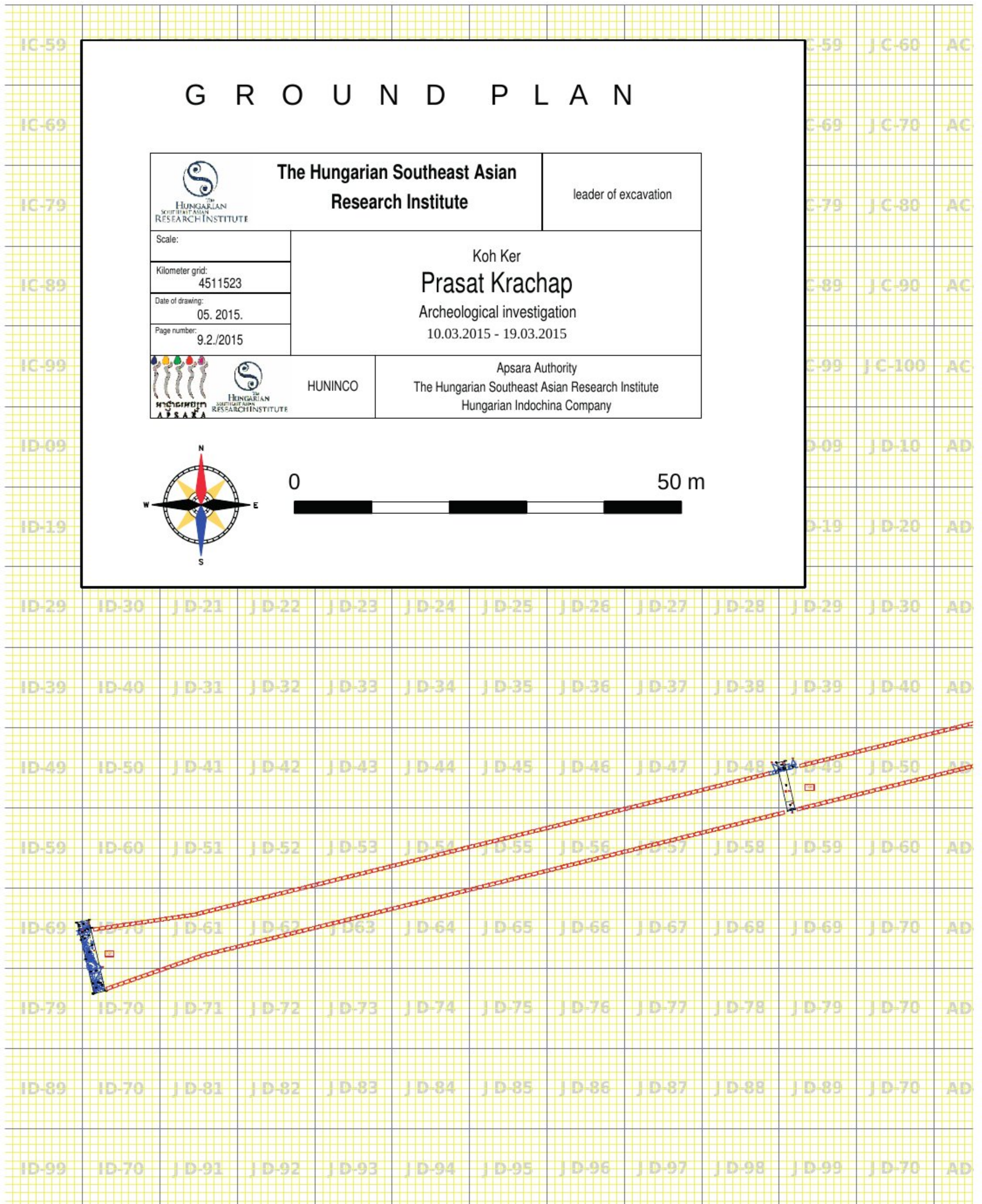


Figure 1: Summary layout plan, Prasat Krachap 2014-2015

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| -51 | AC-52 | AC-53 | AC-54 | AC-55 | AC-56 | AC-57 | AC-58 | AC-59 | AC-60 | BC-51 | BC-52 | BC-53 |
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| -81 | AC-82 | AC-83 | AC-84 | AC-85 | AC-86 | AC-87 | AC-88 | AC-89 | AC-90 | BC-81 | BC-82 | BC-83 |
| -91 | AC-92 | AC-93 | AC-94 | AC-95 | AC-96 | AC-97 | AC-98 | AC-99 | AC-100 | BC-91 | BC-92 | BC-93 |
| -01 | AD-02 | AD-03 | AD-04 | AD-05 | AD-06 | AD-07 | AD-08 | AD-09 | AD-10 | BD-01 | BD-02 | BD-03 |
| -11 | AD-12 | AD-13 | AD-14 | AD-15 | AD-16 | AD-17 | AD-18 | AD-19 | AD-20 | BD-11 | BD-12 | BD-13 |
| -21 | AD-22 | AD-23 | AD-24 | AD-25 | AD-26 | AD-27 | AD-28 | AD-29 | AD-30 | BD-21 | BD-22 | BD-23 |
| -31 | AD-32 | AD-33 | AD-34 | AD-35 | AD-36 | AD-37 | AD-38 | AD-39 | AD-40 | BD-31 | BD-32 | BD-33 |
| -41 | AD-42 | AD-43 | AD-44 | AD-45 | AD-46 | AD-47 | AD-48 | AD-49 | AD-50 | BD-41 | BD-42 | BD-43 |
| -51 | AD-52 | AD-53 | AD-54 | AD-55 | AD-56 | AD-57 | AD-58 | AD-59 | AD-60 | BD-51 | BD-52 | BD-53 |
| -61 | AD-62 | AD-63 | AD-64 | AD-65 | AD-66 | AD-67 | AD-68 | AD-69 | AD-70 | BD-61 | BD-62 | BD-63 |
| -71 | AD-72 | AD-73 | AD-74 | AD-75 | AD-76 | AD-77 | AD-78 | AD-79 | AD-80 | BD-71 | BD-72 | BD-73 |
| -81 | AD-82 | AD-83 | AD-84 | AD-85 | AD-86 | AD-87 | AD-88 | AD-89 | AD-90 | BD-81 | BD-82 | BD-83 |
| -91 | AD-92 | AD-93 | AD-94 | AD-95 | AD-96 | AD-97 | AD-98 | AD-99 | AD-100 | BD-91 | BD-92 | BD-93 |

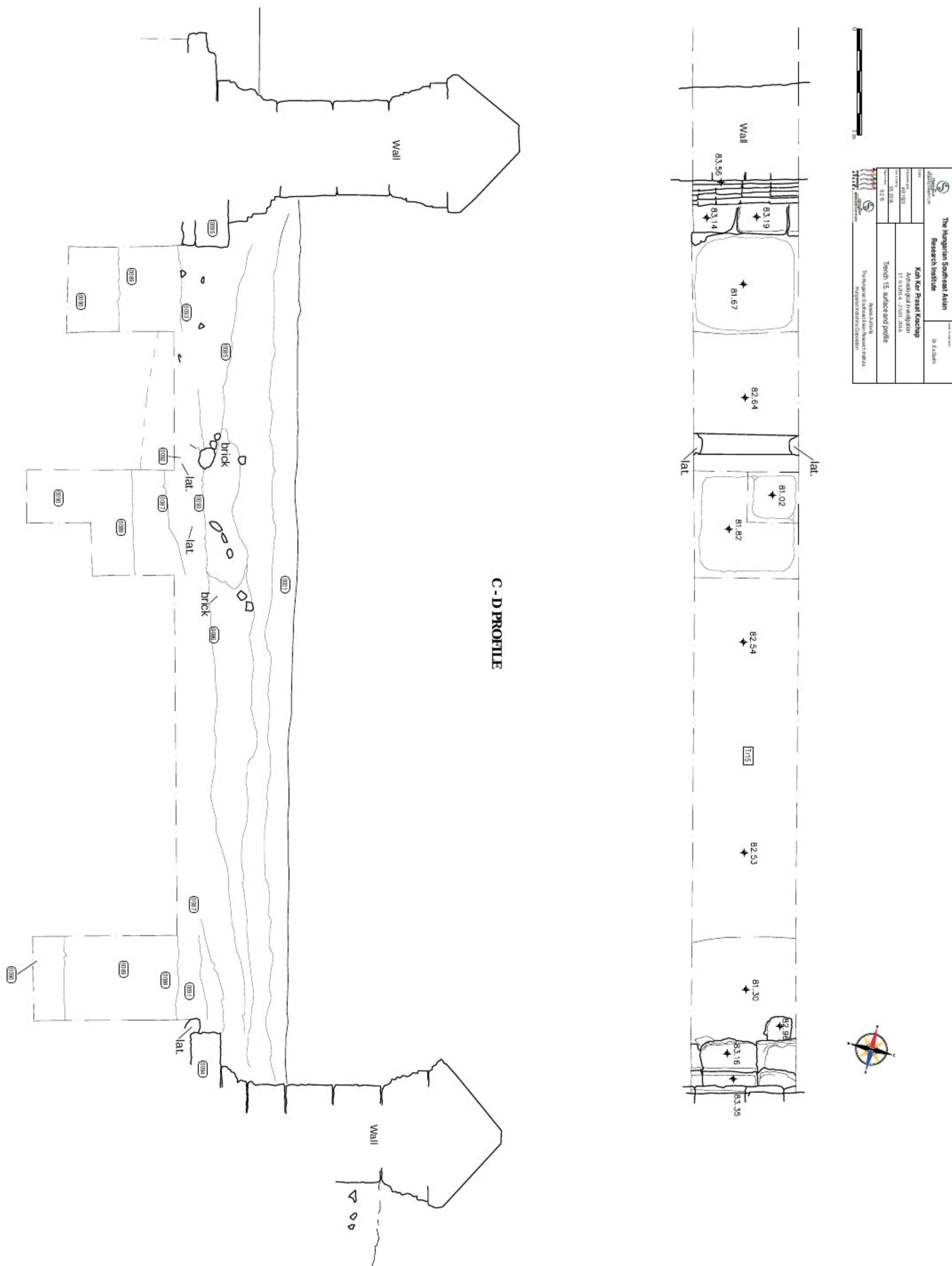


Figure 4: Top-down and cross-section drawing of Trial Trench 15

RESULTS AND FINDINGS

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Trial Trenches 15 and 17

The trench at Trial Trench 15 was begun in the space between the double perimeter wall built from laterite blocks roughly on the northwest-southeast central axis of the complex (Section BC93, figures 2 and 3).

During the excavation we found that the original ground levels, which matched the profiled pillar footings, were covered by some 40-50cm of material. Beneath that we observed an approximately two metre deep artificial strata of sand, established prior to construction, and a highly compacted layer formed from a mixture of clay and laterite granules (Figure 4). In the area between the walls, some 2.5 metres from the external perimeter wall—similarly to Trial Trench 9 to the front of the south facade of the western range of galleries—we once again identified the remains of a wall structure built from small laterite blocks running parallel to the connecting walls (Figure 5).

The cross-section of the trench shows clearly that—as we observed in the trench at Trial Trench 9—the strata of the foundation of the external perimeter wall abutting to the line of laterite blocks, so they can be assumed to be structurally related (BELÉNYESY 2013, pp. 26-29). The structure also indicates that the external perimeter wall was built following the completion of the shrine and the internal laterite perimeter wall. The majority of objects found were roof tiles from the buildings that had once stood there, which were also found in large numbers in the compacted clay and laterite granule composite layer under the perimeter

laterite block walls. The presence of rubble—largely roof tiles—in the foundation layer implies an earlier settlement and, in connection with the line of laterite stones and the foundation layers of the external perimeter wall, it may even indicate an earlier building phase.

In trench 17, which followed the line of trench 15 (Section BC92, figures 6 and 7) on the far side of the wall, we were also able to identify the construction layers that



Figure 5: Foundation layers of the external perimeter wall in Trial Trench 15

essentially corresponded to those excavated on the inside (Figure 8). Household ceramics were found in large quantities among the material covering the original ground level, as well as the strata below it, which indicates a settlement in the area. At the end of the trench, almost 6 metres from the external perimeter wall, we were lucky to find a complete vessel (figures 9 and 10). The soil pressure had impacted on it, which had cracked it, so we were unable to remove it in one piece. What makes it special is that we actually found it in situ at the boundary between the highly compacted clay-bearing stratum that was made prior to construction and the laterite granule stratum that joins the pillar footings. So it is presumably the same age as the external perimeter wall. In view of the fact that it is a slightly splayed, reddish vessel with a simple rim and a curved bottom made by hand for the storage of liquids, it must date to the period from the 10th to the 12th century.²



Figure 6: Trial trenches 15 and 17 photographed from the top of the external perimeter wall



Figure 7: Trial Trench 17 from the north

Trial Trench 16

As mentioned above, in order to examine the original floor levels and the layer of rubble, we dug a smaller trench inside the area of the shrine, on the northern side of the brick central shrine (figures 11 and 12).

In the 1 x 1.5 m exploration trench, under an apparently homogeneous layer of rubble, at a depth of some 1–1.2 m beneath the present surface level, we

² Special thanks are due to Dr. E.A. Darith for identification.

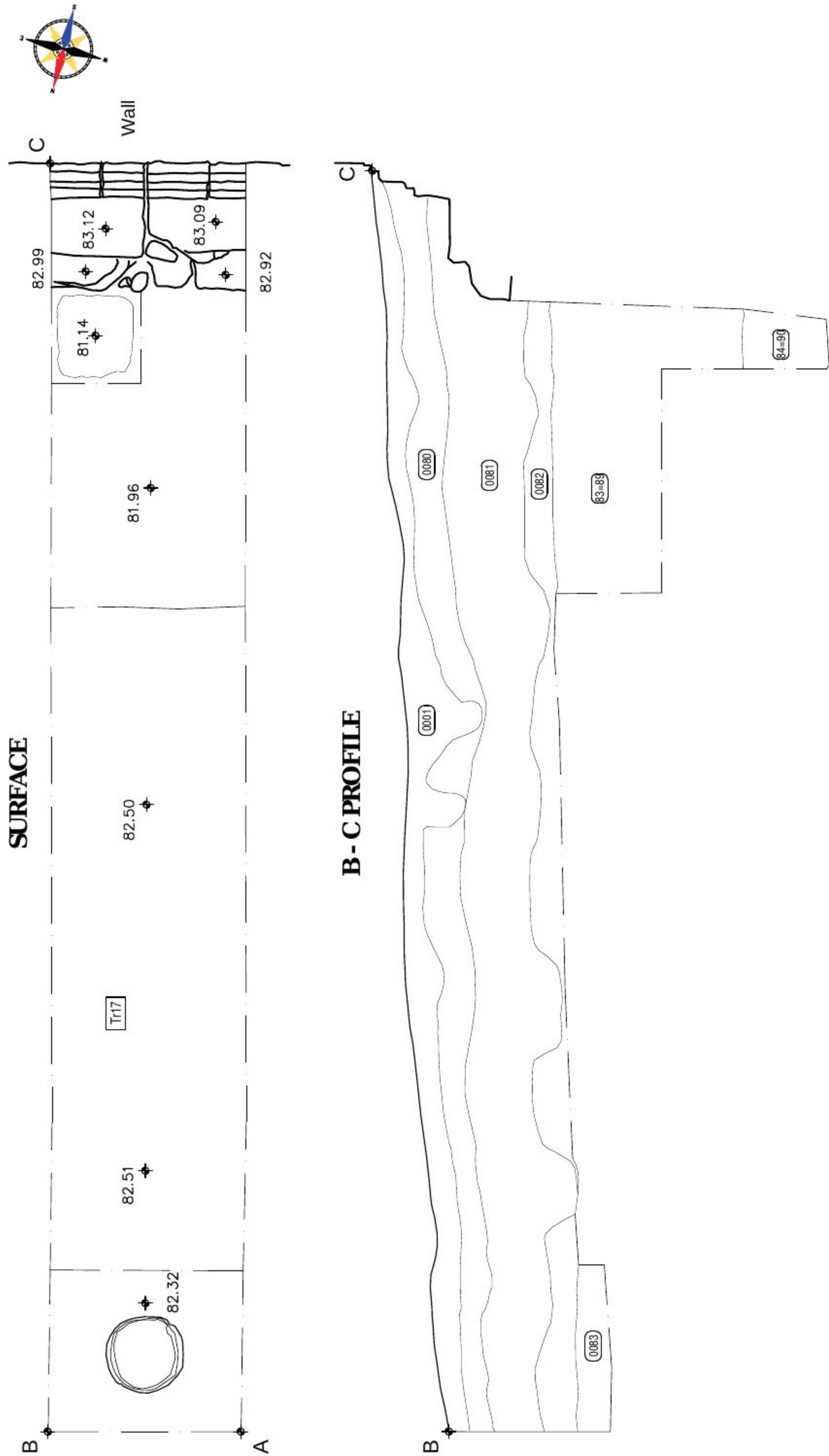


Figure 8: Top-down and cross-section drawing of Trial Trench 17

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|  The Hungarian Southeast Asian Research Institute | Leader of excavation: Dr. Ea Darin | |
| | Koh Ker Prasat Krachap Archeological investigation 17. 03. 2014. - 25. 03. 2014. | |
| Scale: Kilometer grid: 4511523 Date of drawing: 05. 20 14. Page number: 8. 2. 17. | Trench 17. surface and profile | |
|  Apsara Authority The Hungarian Southeast Asian Research Institute Hungarian Indochina Corporation |  HUNGKOR | |



Figure 9: Complete vessel found in the north end of Trial Trench 17



Figure 10: Complete vessel found in the north end of Trial Trench 17



Figure 11: Trial Trench 16 on the north side of the central shrine

identified the original floor built from sandstone slabs (figures 13 and 14). The absolute level of the floor, comprising of 50x50 cm carved slabs, corresponded with that of the footings found at the perimeter walls. The rubble only yielded a side fragment from a brown glazed vessel and a piece from the rim of a red, unglazed one. The information gained by identifying the original floor level is very important.

The good condition of the sandstone slabs and the over one metre thick layer above them indicates that under the rubble covering the shrine area the original footing levels and floors may have been preserved in rather good condition (Figure 15). Naturally, the thickness of the rubble layer also allows us to determine the volume of soil to be removed and deposited during restoration by modelling the current surface.³

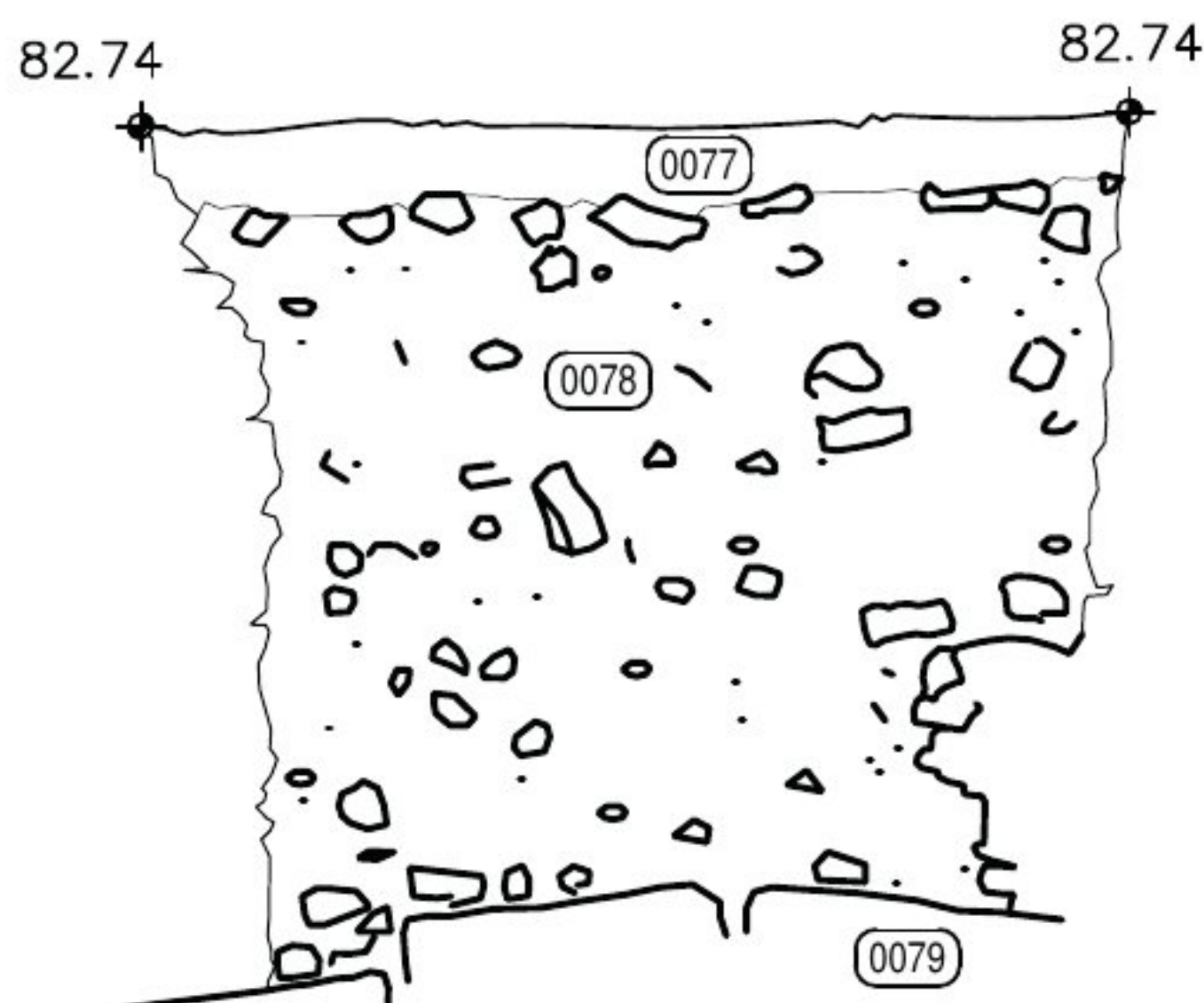
³ With the cooperation of APSARA, the contour mapping of the shrine area and the structural risk mapping of the buildings and their environment are in progress and appropriate solutions are being planned.

SURFACE



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PROFILE



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|  The HUNGARIAN SOUTHEAST ASIAN RESEARCH INSTITUTE | The Hungarian Southeast Asian Research Institute | Leader of excavation: Dr. Ea Darith |
| Scale: | Koh Ker Prasat Krachap Archeological investigation 17. 03.2014. - 25.03. 2014. | |
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Figure 12: Top-down and cross-section drawing of Trial Trench 16

As we have described in our publications and a number of lectures, the exploration in and around the Prasat Krachap temple has two important principle aims.

Naturally, the first is the exploration of the complex of buildings and the entire constructed environment in tandem with restoration; while the second is to research the settlements that can be identified in the vicinity of the complex, and their relationships with the complex. The 2011 fieldwalking and archaeological survey already indicated the significance of the latter avenue of research (Figure 16). The processing of the LiDAR survey data of Koh Ker brought important developments in the study of the relationship between the extensive network of settlements whose existence had been assumed on the basis of the finds obtained from the fieldwalking, the excavations and from Prasat Krachap temple.

Essentially, the data obtained through traditional archaeological methods only allowed us to draw conclusions concerning the immediate surroundings of Prasat Krachap, but without systematic fieldwalking surveys covering a larger area; the patchy data did not form a consistent, comprehensive picture. The LiDAR data, on the other hand, highlighted the anthropogenic environmental changes that, together with the archaeological and historical sources, shed new light on our previous notions concerning Koh Ker and the environment of Prasat Krachap (Figure 17).

The processing of the imaging data led to the clear identification of the unique structures that indicate earlier settlements built from perishable materials, road networks and the ancient, planned water management measures that partly connect to the complex and align with the walls. From



Figure 13: Floor level with sandstone slab paving



Figure 14: Floor level with sandstone slab paving

that perspective, the identification of unique, often insular shapes, individual buildings, plots and water reservoirs associated with plots is extremely significant, as they can be connected with archaeological research. The rich range of finds, indicating a bustling existence in the past, from the area outside the perimeter wall of Prasat Krachap constitute direct archaeological evidence for the historical stratum of settlements identified using remote sensing methods. In these circumstances, the archaeological finds do not simply confirm that settlements once existed here; they also provide a definite chronological reference for



Figure 15: Floor level with sandstone slab paving

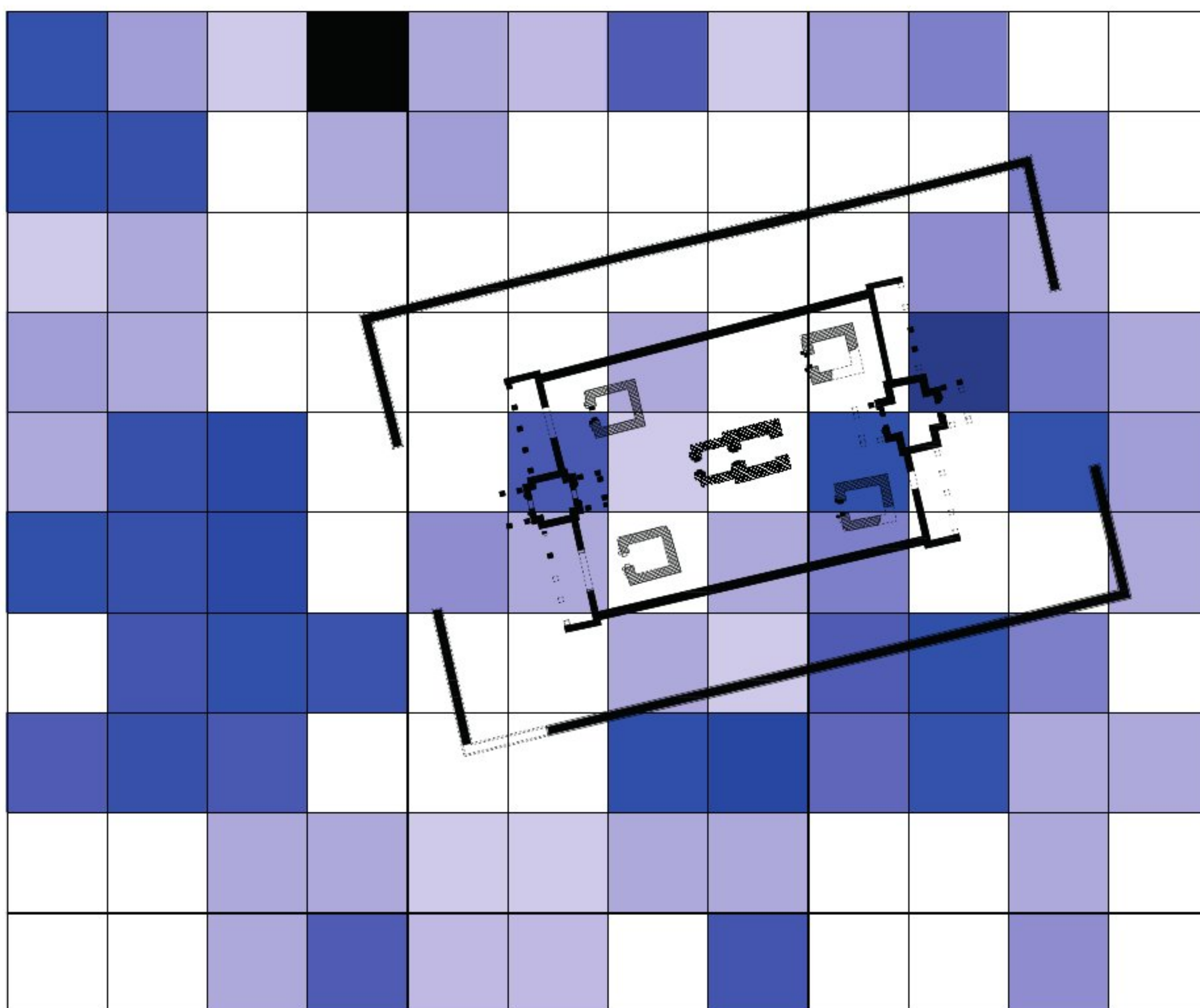


Figure 16: Intensity of surface finds in the environment of Prasat Krachap, based on the data from the fieldwalking survey of 2011, BELÉNYESY 2013, 16, Fig. 7.



Figure 17: Prasat Krachap and its surroundings in a LiDAR image

interpreting the anthropogenic environment clearly identified in space and its interconnections (Figure 18).

Continuing the above reasoning, it seems a clear-cut conclusion that the anomalies on whose basis differences between the individual settlement strata are inferred perhaps indicate chronological differences, which leads us to suspect that there were several construction periods or that some parts of the settlements were abandoned. As yet we have no archaeological proof of that, but due to the characteristic shapes indicating changes in the settlements identified near Prasat Krachap,

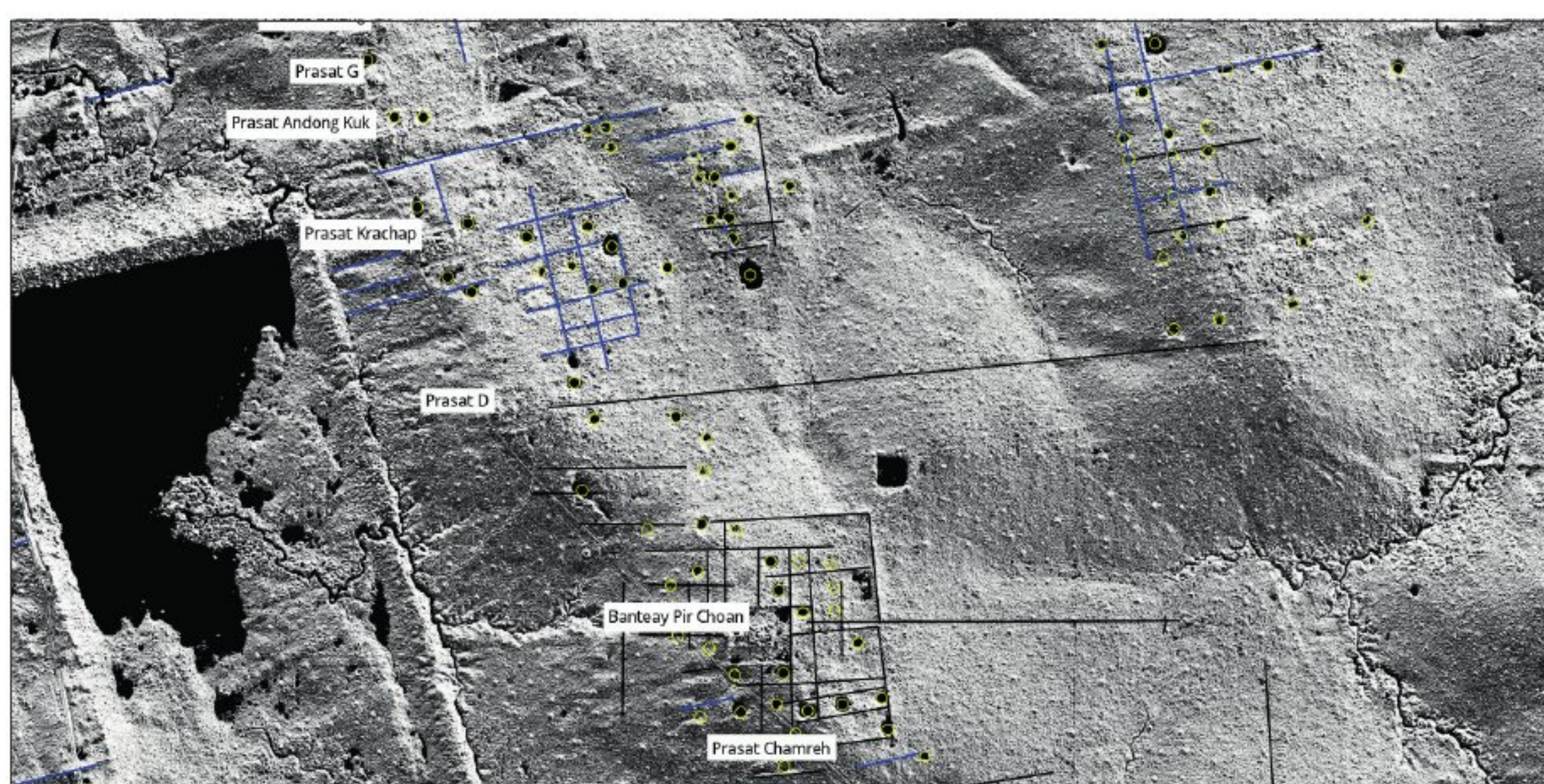


Figure 18: Insular fragments of settlements and small water reservoirs in the LiDAR image



Figure 19: The road aligned with the east-west axis of Prasat Krachap in the Lidar image

we have extended our research into those areas, too.

Based on available data, our interest focussed on the linear (road?) structure that crosses the east-west axis of the temple (Figure 19). The imaging data suggests that the settlements that once surrounded Prasat Krachap may have lain principally on an east-west line, and clearly connect the temple with the Rahal reservoir. The anthropogenic character and level of construction of that east-west linear system was clear from the LiDAR images, too. In 2011 we succeeded in excavating a building opposite the eastern gate of the temple and the remains of a set of steps on the same axis, towards the Rahal (BELÉNYESY 2013, pp. 29-24). Consequently, we assumed that at one time there had been an attractive link between the water reservoir and Prasat Krachap, and we began to identify it in June 2014.

Although the growing season did not favour fieldwalking surveys, in the forest between Prasat Krachap and the Rahal we managed to identify the remains of an almost 5-metre-wide representative road lined with laterite blocks along a length of 180m (Figure 20). Some of the large laterite blocks had carved cavities in their tops for wooden pillars (Figure 21). The contour of the surface where the road met the western embankment of the Rahal indicated a terrace construction, near which we found the remains of a lion carved from sandstone (Figure 22). Whilst fieldwalking, we endeavoured to examine all traces of anthropogenic intervention and consequently found signs of stone quarrying at a sandstone outcrop a short distance from the axis of the road (Figure 23).

Later, in March 2015, we began excavations at 4 new Trial Trenches with the intentions of



Figure 20: The curb of the former road made from carved blocks of laterite in the forested area between the Rahal and Prasat Krachap



Figure 21: The curb of the former road made from carved blocks of laterite in the forested area between the Rahal and Prasat Krachap



Figure 22: Remains of a sandstone lion on the bank of the Rahal



Figure 23: Surface traces of quarrying in the forested area between the Rahal and Prasat Krachap

examining certain parts of the road structure identified by the 2014 LiDAR survey, as well as seeking further information concerning the signs of stone quarrying.

As we have mentioned repeatedly, the road we identified was aligned

with the east-west main axis of Prasat Krachap, and in the forest we clearly identified some parts of the former structure. First of all, we cleared the area of undergrowth completely along the line of the road. Placement of the individual trenches was intended to focus on those areas most important for interpretation: for example, the steps of the building found beyond the eastern gate of Prasat Krachap as the starting point (Trial Trench 18), and what is presumed to be a terrace at the junction of Rahal and the road as the eastern end point (Trial Trench 21). In addition, we began excavating at the previously discovered roadside stones which display carved cavities for wooden beams (Trial Trench 20).

Trial Trench 18

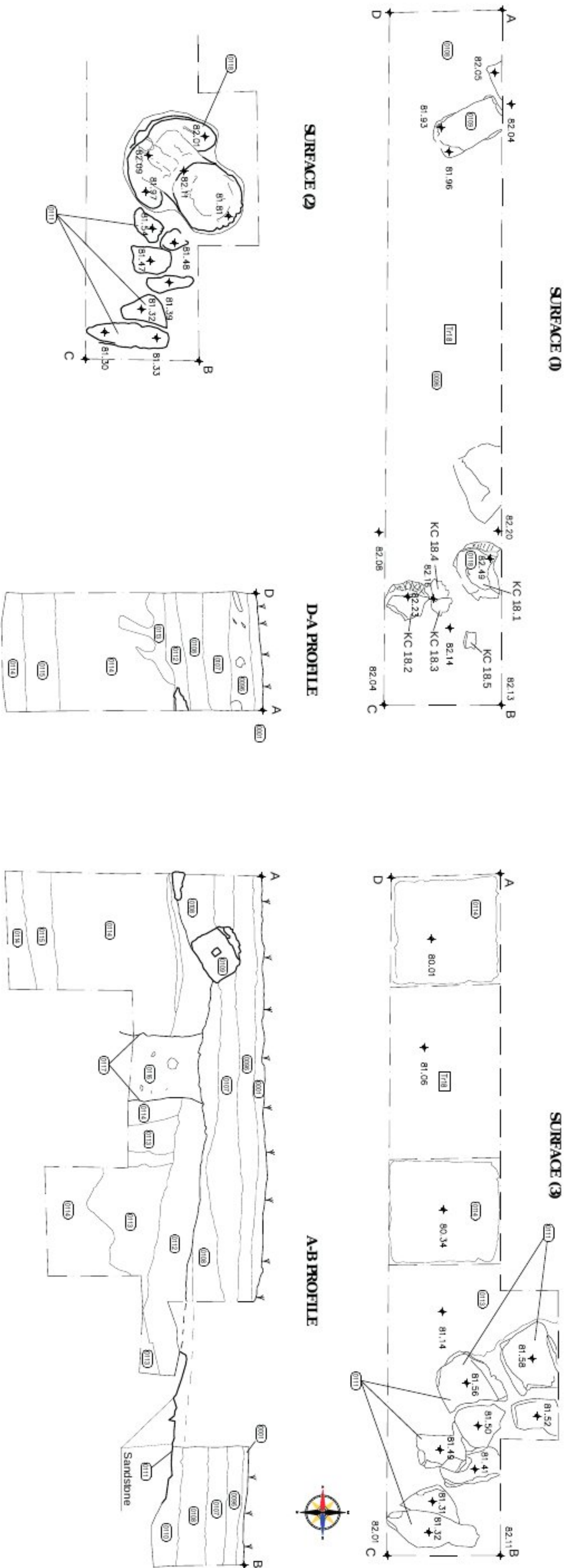
We placed the trench to the east of the steps found in 2011 (BELÉNYESY 2013, p. 19), approximately at the presumed junction of the steps and the road structure, where small fragments from a sandstone lion were found on the surface (Figure 24).

On the northern side of the trench, some 20cm below the surface, we found the laterite blocks from the kerb of the road, dislocated from their original positions. On the southern side, as the trench was deepened after the surface fragments of the lion had been documented, we excavated and lifted out a larger, unbroken piece of the body of the sandstone lion (figures 25 and 26). Although the fragments of the lion had been displaced from their original location, we assumed that they were very close to it.

The fragments of the body were in effect found at the original ground level (Figure 27). This indicated that the approx. 4.8m wide road—which slopes slightly to the south, and whose foundation is made of sand, clay and laterite granules—had been paved with irregular slabs of sandstone. This confirmed our previous conjectures concerning the road, when during our previous fieldwalking survey of the forest, where the fallen trees had interfered with its original structure we found several fragments of irregularly shaped sandstone slab (Figure 28). We thought then that they may have been connected with the original paving, but it was at Trial Trench 18 that we first found definitive evidence of the original strata and the *in situ* ground level.

Trial Trench 20

In the trench that we opened to examine the presumed upright wooden





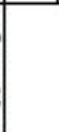
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| Date of work: 05.2015. | | | |
| Project number: 82.18. | | | |
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Figure 24: Top-down and cross-section drawing of Trial Trench 18



Figure 25: Fragment of a sandstone lion in Trial Trench 18



Figure 26: Fragment of a sandstone lion in Trial Trench 18

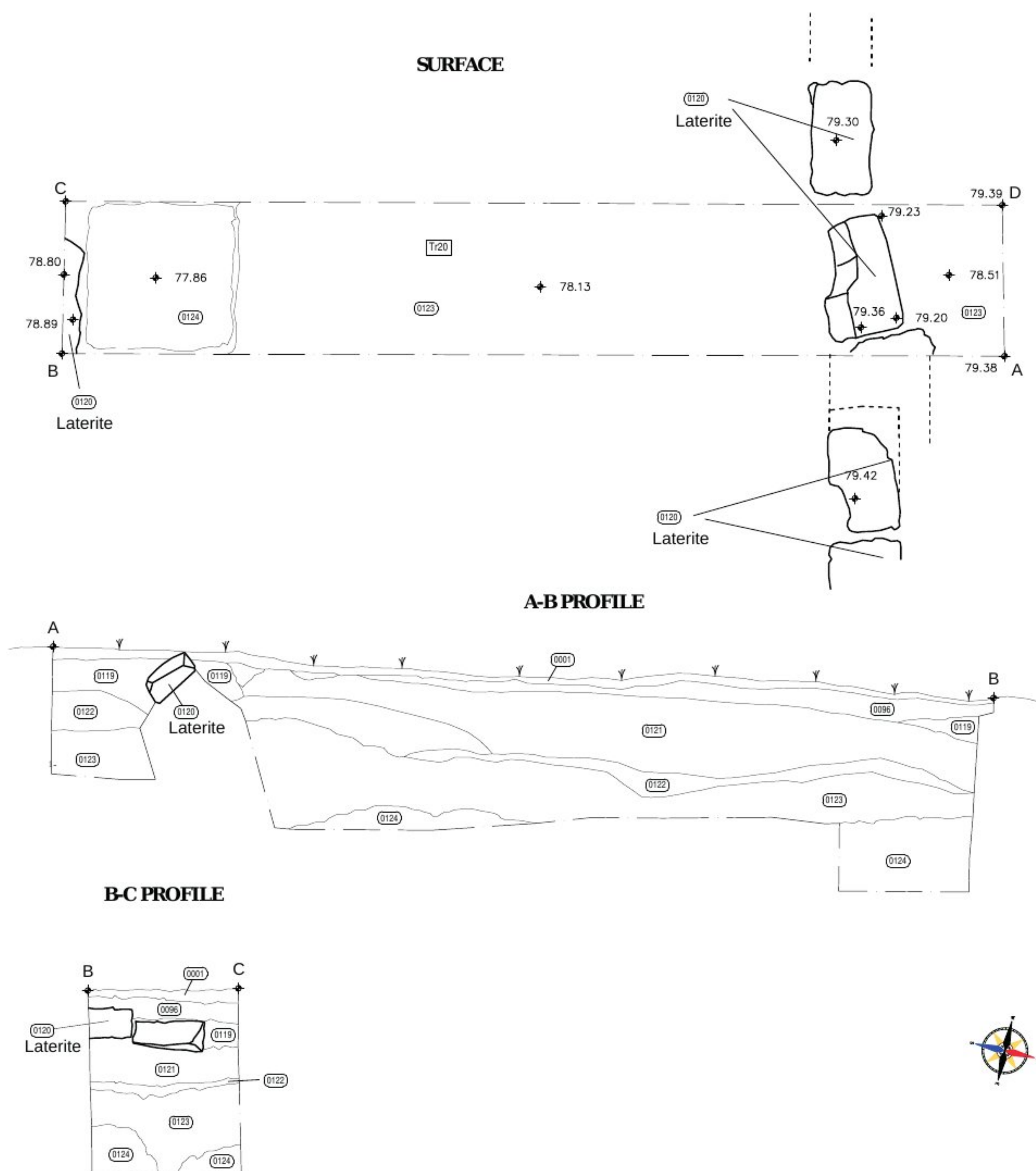
structures and the road strata in the midsection of the road that runs downwards to the Rahal, we essentially found a set of strata similar to those in Trial Trench 18, with the exception that the original ground level was actually at the surface along that section (figures 29 and 30). The area had been heavily impacted by erosion and other external effects, and apart from a few traces of the original sandstone paving it was almost entirely gone. Similarly, despite the beam receptacles found on the laterite blocks, we found no indication whatsoever of any former upright structures (Figure 31). The only evidence of their probable existence, and the type of covering of the roof, which was probably held by wooden pillars, came in the shape of many roof tiles on both sides of the road. Based on the contours carved into the stone blocks, the columns were spaced at 1.7 m (axis to axis).



Figure 27: Fragment of a sandstone lion in Trial Trench 18 with remains of the former road



Figure 28: Flagstones over the roots of a tree



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Figure 29: Top-down and cross-section drawing of Trial Trench 20



Figure 30: Trial Trench 20 from the north



Figure 31: Trial Trench 20 from the south

Trial Trench 21

During the site survey in 2014, the outline of a terrace was identified where the road meets the eastern embankment of the Rahal. After clearing the undergrowth, we were unable to test that assumption because the area of the possible terrace had been completely overgrown by trees, thus a genuine survey would also require the felling of large trees. On the other hand, during the clearing of the embankment from the terrace towards the Rahal, we discovered an original, stone construction that is clearly related to the road and the aforementioned terrace (Figure 32).

As soon as the undergrowth was cleared, the *in situ* remains of a 30 x 15 cm set of steps built from laterite blocks and aligned with the axis of the road became visible, accompanied on the northern side by a much larger skirting made from carved laterite blocks. The same skirting had been damaged to the south by the trees standing there, but the almost 8m width of the steps was still identifiable (figures 33-35).

Under a small quantity of soil, on the northern side of the reasonably well preserved steps that presumably connected the terrace and the old bed of

28 the Rahal, we also discovered a small section of the original embankment, built from variously sized laterite and sandstone blocks (Figure 36).

Trial Trench 19

Ever since we found them in 2014, we have been planning to perform an archaeological exploration of the area around the traces of stone quarrying discovered not more than 40m from Prasat Krachap. The trench dug in the area was primarily intended to find more evidence of local stone quarrying. We cleared the natural outcropping of sandstone where the traces of quarrying had been observed, and once those were documented, we excavated the southern side of the man-made surface over an area of 5 x 2.5m (figures 37 and 38).

In the course of that work, we found traces of the cutting of four 50 x 150 cm stone slabs and preparations for the cutting of two more of a similar size on the original sandstone surface. In the lines around the slabs, we also found traces left by the metal quarrying tools used (figures 39-41). During the excavation there, it was also established that the quarry had been abandoned and systematically refilled after use. The cuts in the stone were filled with the same material made of laterite granules mixed with fragments of roof tiles that had been found repeatedly during the excavation of the road and the foundation layers of buildings.

The carefully levelled and heavily compacted layers indicate that the landscape wound created at the site presumably by the quarrying of



Figure 32: The excavated steps from the terrace

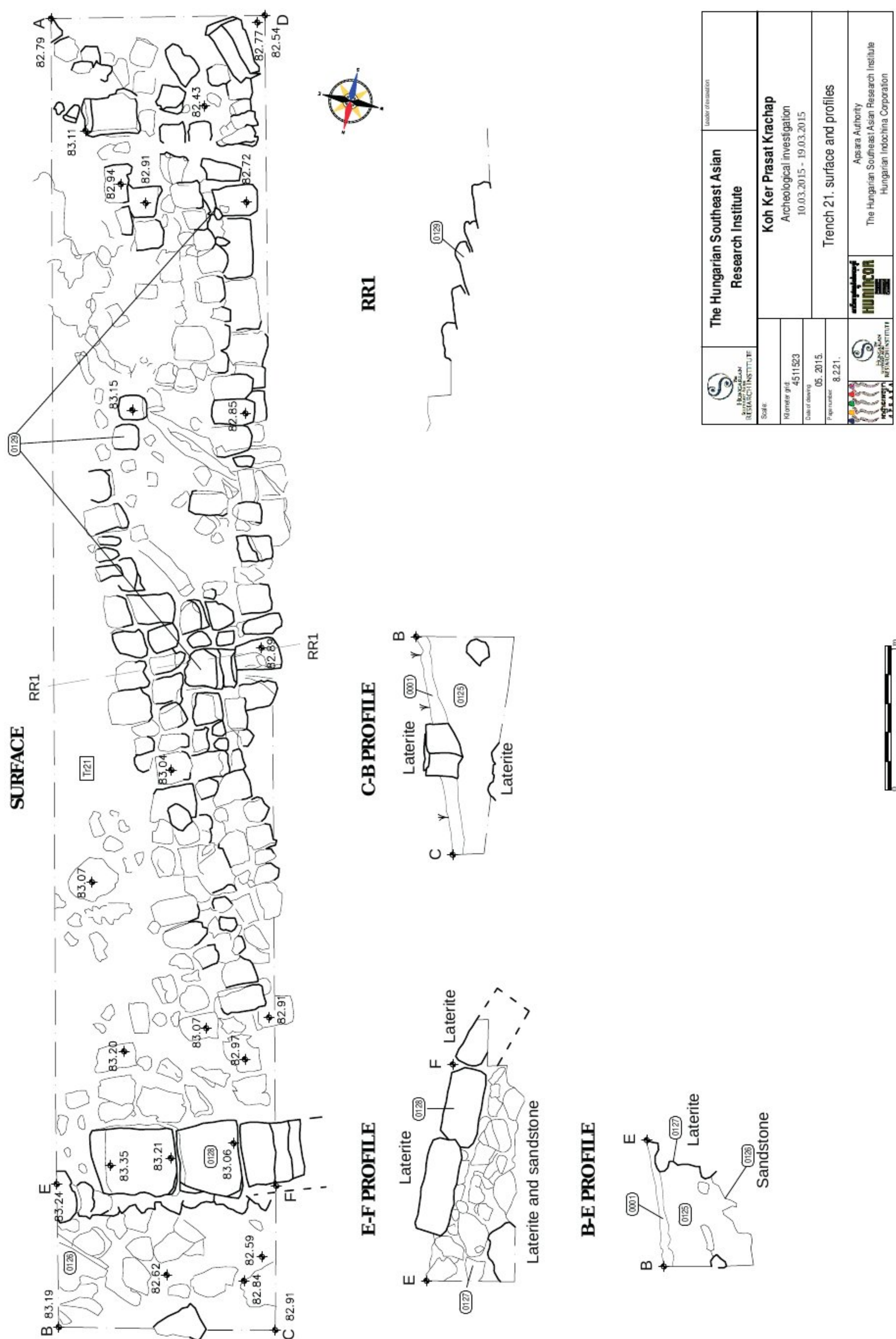


Figure 33: Top-down and cross-section drawing of Trial Trench 21



Figure 34: The laterite stone structure of the stairs



Figure 35: The embankment during excavation



Figure 36: The embankment during excavation



Figure 37: Surface traces of quarrying in Trial Trench 19

stone for the building of Prasat Krachap was systematically covered over as part of a larger landscaping effort (Photo 42). So we are correct in assuming that in the course of the construction of the temple, along with the conscious use of the features of the original natural environment (Figure 43), it was also in some places transformed. Thus even radical transformations of the original natural landscape are possible as far as the environments of both Prasat Krachap and other temples are concerned.

Summary

The general conclusion of our research in 2014 and 2015 is that our conception of Koh Ker and our research strategies have been significantly transformed in the light of the LiDAR survey results. The knowledge and use of the LiDAR data have become a definitive starting point in both interpreting existing results and directing future research. This has also



Figure 38: Trial Trench 19 fully excavated



Figure 39: Trial Trench 19 during excavation, with traces of quarrying



Figure 40: Trial Trench 19 during excavation, with traces of quarrying



Figure 41: Trial Trench 19 fully excavated, with Prasat Krachap in the background

resulted in the extension of our knowledge of the history of settlements at Koh Ker and the possibilities of its interpretation. Based on the new data, the once significant settlement is best imagined as a characteristic network of settlements. Previously, research concentrated on the main constituents of that network, the individual temples and the visible phenomena, but the areas between the main nodes of the network remained uncharted. They contained intensive systems of connections (roads, water system) and the structures around the temples (such as settlements or industrial sites), but their interrelations are unknown. Yet those details are highly significant in an understanding of the construction of the area (Koh Ker) and its function. We may be able to obtain more accurate models



Figure 42: Southern cross section of the fully excavated Trial Trench 19

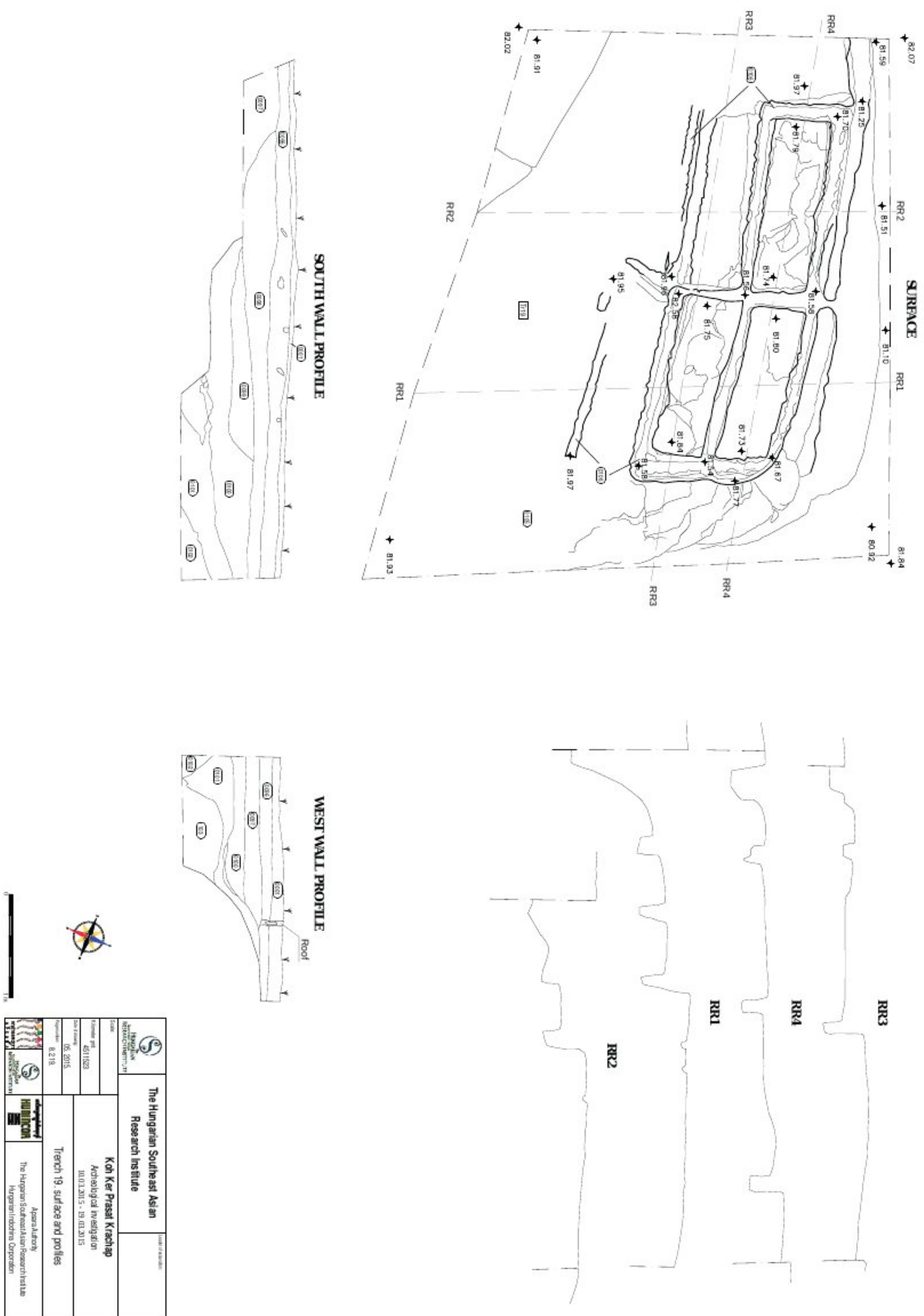


Figure 43: Top-down and cross-section drawing of Trial Trench 19

and interpretations of the extent and nature of the transformation of the natural environment and the way the area was settled and inhabited. Therefore, in the next period of excavations we intend to continue to concentrate on the road aligned with the east-west axis of Prasat Krachap. We plan to complete the exploration of the terrace above the Rahal and the identification of the continuation of the road to the east. During that part of the work, remote sensing and archaeological exploration will work hand in glove. So there is no question of giving up traditional methods of exploration, since the chronological markers for our current interpretation may be furnished, along with epigraphical data by the finds.⁴ In addition, scientific studies and low-impact systematic sampling also have significant potential for uncovering the underground features of Koh Ker.

Having accomplished the trial trenching, we cleaned and selected the collected finds, then processed them at the HUNICO base in Siem Reap. We prepared the description and photography, and drew the most characteristic artefacts from the find material. We then stored all the finds in plastic boxes at the APSARA centre. The original printed copies of the English language documentation about the on-site excavations, as well as the processed finds, together with a digital version of the documentation were handed over to the APSARA archives.

Finally, I would like to express my thanks to all our Khmer and Hungarian colleagues whose presence and persistent work have assisted with the successful completion of our architectural explorations and the publication of this volume.

Bibliography

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| JACQUES | <i>Koh Ker Project Interim report for ICC TC 2011.</i> |
| BELÉNYESY | <i>Koh Ker Project. Annual Report 2011.</i> |

⁴ I must also mention here that at present we are able to date the largely uncharacteristic finds from the strata of the road, the building and the quarry largely on the basis of epigraphic data. If the quarry is related to the construction of Prasat Krachap, and its abandonment and refilling took place when the building was completed, then the finds from there may not be older, on the basis of the epigraphy of the temple, than from the first third of the 10th century (Jacques 2011, pp. 3-4).
