Conservation of Phnom Bakheng, Angkor, Cambodia
December 2012 Progress Report

World Monuments Fund's conservation project at Phnom Bakheng is generously funded by the US Department of State's Ambassadors Fund for Cultural Preservation and the US Embassy in Phnom Penh, the Robert W. Wilson Challenge to Conserve Our Heritage, and the Ralph E. Ogden Foundation. All work at Phnom Bakheng is carried out in full partnership with APSARA National Authority. From July to December 2012, work at the site concentrated on continuing conservation on the central shrine and completion of the conservation of two of the brick shrines that surround the temple. In addition, at the request of APSARA, WMF began conservation of a significant element of the Phnom Bakheng site known as the Buddha's Footprint, which is of tremendous cultural importance to Cambodians. Its conservation will allow this artifact to be more accessible to the public.

One of the goals of the Phnom Bakheng project has been to utilize as many of the existing stones scattered around the site. As has been described in earlier reports on the work at the site, WMF received permission from APSARA to collect stones found immediately adjacent to the temple and those visible down the side of the hill. Given the history of Angkor durin the Khmer Rouge period, it was necessary to receive governmental approval to demine one side of the hill at Phnom Bakheng before stones could be retrieved from the incline. In the second half of 2013, after the completion of the demining activities, stones were collected, documented, and their suitability for inclusion in the conservation program was determined.

A crucial element of the collaboration with APSARA at Phnom Bakheng has been the incorporation of site management measures into the conservation program. Now, in tandem with the physical work on the site, the visitor experience and site presentation matters are addressed regularly. As is well known, overcrowding of Phnom Bakheng at sunset had become a problem to that point that WMF felt the conservation program would be ineffective unless solutions were found to reduce the number of people climbing the central shrine at sunset. After a series of very productive workshops and meetings, APSARA placed more guards at Phnom Bakheng, a maximum number was established for peak periods, and viewing platforms were constructed so that visitors could watch sunset from the Phnom Bakheng hill but did not have to ascend the shrine to see Angkor Wat. World Monuments Fund and APSARA agreed in 2012 to investigate more fully the drainage issues at Phnom Bakheng and understand in greater depth storm run off that has caused erosion problems around the temple and brick shrines.

Highlights of recent work demonstrate that the Khmer professional team is fully engaged in the conservation program and progress is steady. At the northeast corner of the temple, conservation of level F is nearing completion. The bedrock was repaired and the wall reassembled. Bedrock repair and waterproofing measures have required particular attention at levels E, D and C. At Level E, the bedrock underneath stone

shrine E12 has been repaired, the wall reassembled and the waterproofing of the area has commenced. At Level D, the waterproofing measures have progressed on the terrace and underneath stone shrine D11. At level C, the activities have focused on the removal of soil and mitigating decay of bedrock. The northeast corner of level B has been partially dismantled to remove concrete insertions placed there several decades ago and now decayed. The general stability of this portion of the terrace is being analyzed, as it is not made of bedrock but of a mixture of soil and gravel. In 2013, further studies will be done of this area to determine the best conservation treatment. During autumn 2013, accurate graphic documentation of the pavers and mapping of stone conditions of this area was undertaken.

Masonry and foundation stabilization of brick shrine G10 is complete an scaffolding was removed at the end of 2012. Attention has shifted to brick shrine G5. While WMF does not intend to conserve all brick shrines, WMF did agree in 2010 to document, analyze, and repair a representative selection of brick shrines, since they are such a significant feature of Phnom Bakheng and this work will also assist APSARA with conservation efforts at other brick shrines in Angkor Archaeological Park. Waterproofing of level E continued through the end of 2012. To complete bedrock repair, 20 stones and 8 laterite blocks were inserted to improve stability. The eastern wall was reassembled where necessary utilizing 34 stones and 5 laterite blocks. A PVC waterproofing membrane was placed on top of the bedrock to provide an additional layer of protection for the temple. At level D, after finishing reassembly of the wall and bedrock repair, the terrace slope was adjusted to facilitate more effective shedding of water to prevent runoff erosion. After the conclusion of repairs and waterproofing activities, pavers were reinstalled on top of these additional membranes. Thus these additional protective layers are not visible once the pavers are installed. Work at level C focuses mainly on the removal of soil and accumulated debris from the exposed bedrock. Over time, rain water run off has infiltrated the bedrock through crevices and imperfections in the temple structure. Trapped moisture and deposits carried by the water have created imperfections and problems that can be addressed once the debris is removed. This process also allows fuller inspection of bedrock conditions. The team has completed debris removal, which in some areas measured between 2 and 3 meters in depth.

Dismantling of the southern and eastern wall of level F was completed, allowing the team to stabilize the terrace through the insertion of 57 new laterite blocks to mitigate problems created through decay. After bedrock repair, reassembly of the southern and eastern walls commenced. Sandstone blocks were returned to their locations after documentation and cleaning, new laterite blocks were inserted between the stone blocks and the bedrock. Since September, 75 stone blocks and 69 laterite blocks have been reassembled.

Priorities for 2013 will be to continue conservation of the central shrine and to continue the reassembly of areas where bedrock repairs are completed. Brick masonry consolidation will continue at brick shrine G5 and key members of the conservation team are writing a report in Khmer and English on the work at brick shrines G10 and G5 to be shared with APSARA and to be available to others through WMF's website. This report will serve as documentation of the work completed and will also provide useful information for those interested in the construction, materials, and potential conservation solutions of other brick shrines at Angkor. The Buddha's footprint project will be completed in 2013, responding effectively to APSARA's request to include this scope of work in WMF's Phnom Bakheng project and providing another element of interest to visitors to the site. In 2013, WMF will present more information to APSARA and UNESCO's Ad Hoc Experts on water management issues at the site. WMF will also update signage at Phnom Bakheng in 2013.

WMF is grateful to the support it receives for its continuing work at Angkor Archaeological Park. WMF's team has matured considerably over the course of the 20 years since WMF first began work at Angkor. While international preservation professionals continue to provide general guidance and experts are brought to the site for consultation on specific technical matters, project leadership has increasingly shifted to the Khmer team and the work at Phnom Bakheng is an exceptional example of the capacity of local professionals.