Monks Mound Updates: Long-Awaited Projects on Monks Mound to be Completed Summer 1998

BY BILL ISEMINGER—EXTRACTED FROM THE SUMMER 1997 CAHOKIAN

Slump Repair

During 1984-85 there were major slumps on the east and west sides of Monks Mound. The east slump was repaired by filling in the large scar left by the descending mass of earth. The west slump stabilized after dropping about 2 feet, but reactivated in 1994-95 and the slippage increased along what is referred to as the Second Terrace, so that now the total drop ranges from 3 to 8 feet, and extends over nearly half the length of the mound. This was already an irregular area of ridges and valleys, which may, in part, be due to ancient slumping. The west slump was also very irregular, and could not be repaired in the same way as the east slump.

ORIGINAL WOODEN STEPS

In recent years, new technology has been developed and the plan is to install a number of Horizontal drains" along the west side. Perforated pipe will be drilled into place, starting near the base and arcing slightly upward into the mound. The purpose is to relieve the internal water content of the mound which appears to be the agent which activates and aggravates the slumps. New dirt will also be added to fill in the dropped areas and stabilize the surface, and to deter surface water penetration through the large cracks that have formed. natural. Above that height it affords no structural evidence bearing on the question whether it is of natural or artificial origin; but the form plainly indicates the work of man, and not of geological processes.
It is highly probable that the mound in its natural condition was much lower and broader than at the present, and was a rounded, almost drumloidal form, similar to the smaller ones of the group which now surround it. By cutting down its margin to the level of the surrounding plain its builders obtained | material to raise the mound to perhaps two or three times its former height without making excavations beneath the level of the plain and without carrying material from the bluffs, 2Uz miles distant. There is no evidence that material was obtained by either of these latter means. [Fenneman 1911: 12]

NEW STEPS

NEIL RANGEN, SITE MANAGER FOR CAHOKIA MOUNDS HISTORIC SITE, STANDING NEXT TO NEW STEPS UNDER CONSTRUCTION ON MONKS MOUND.

Concrete steps, toned and textured with a central railing, are replacing the wood steps up Monks Mound. The wooden steps were initially installed during the early 1980s and repaired in the mid 1980s. Even though made of treated lumber, they have suffered from decay and splitting and have shifted and tilted in several areas, primarily due to erosion of the soil beneath the steps by rainwater washing through and beneath them.
The stair project first involved archaeological investigations where support footings where poured, then the surface was contoured, stabilized, and the pre-cast concrete stairs set in place. These will be stronger, more stable, and the solid nature of the steps will prevent water from running through them.

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SIUE Monks Mound Project: 1997-98 by Bill Iseminger

As you may have noted in the last couple Cahokians, repair work has been taking place on Monks Mound. New, permanent steps are being installed up the front of the mound and horizontal drains are being installed on the west side to relieve internal water that has contributed to slumping.

In conjunction with these projects, Southern Illinois University at Edwardsville Office of Contract Archaeology, under the direction of Dr. William I. Woods, conducted excavations of areas to be impacted by construction and continually monitored all other related activities on the mound. In the stairway area, they excavated the narrow trenches where concrete footings have been placed to support the precast step units and examined areas where the soil had to be leveled for sidewalls and stringers. In the slump area they excavated a deep 2x2 m. unit where a water collection basin will be placed and they monitored the installation of the drain system. Jimmie Burns, Steve Fulton and Andrew Martignoni II have been the primary supervisors and field crew for most of the project.

Excavations on the South Ramp, the lowest one, showed little in the way of features, although there was possible evidence of two ramp construction. In front of the bottom of the ramp, they did find evidence of an Emergent Mississippian (AD 800-1000) surface that may have been capped when the Grand Plaza was leveled and filled, and later covered even more by the ramp extensions and additions.

On the First Terrace, at the base of the second flight of stairs, they found two large, deep refuse pits dating to the French Colonial period, probably about 1730-1750. This is the time when there was a French chapel on the First Terrace and presumably a small Illini village. There was a tremendous amount of animal bone, perhaps a result of feasting, including numerous deer mandibles, bear bones and teeth, bird bone, very large fish such as catfish, gar and drum, and numerous turtle shells. Analysis of the faunal materials is being done by Dr. Terry Martin of the Illinois State Museum. Artifacts recovered included glass and bone beads, many French clasp knives, gun parts, gun flints, French ceramics, copper wire, kettle fragments and more.

As had been seen in the earlier excavations in this area by the University of Illinois, “buttresses” of clay soils were at the base of the slope, and the soils up the slope were coarser and appear to have been intentionally mixed prior to dumping here, perhaps to facilitate drainage. There were possible “drain” of special soils. Zones and small clumps of oxidized iron were noted throughout the fill, especially at the interface of different soil types or basketloads of soil. Basketloading was evident in all areas and there was no tamping of the soil.

The 2x2 meter unit at the base of the west slope revealed some interesting stratigraphy. At the deepest level, nearly two meters from the present surface, were the bottom portions of an Emergent Mississippian refuse pit, house basin and some posts. These had been truncated when the former surface had been stripped away, perhaps to use the soil for an early stage of Monks Mound or to ritually clean and level the area before mound construction.

Above that was a thick zone of thinly laminated layers of coarse soils that had been rapidly deposited and not trampled upon, apparently soil eroding down during rainstorms when the Second Terrace was under construction. Above that were two zones of coarse soils representing a period of stabilized surface on the mound with only slow erosional deposition trampled upon by occupational activity. Near the surface were materials perhaps dating as late as the Sand Prairie phase, around A.D. 1400.

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The most intriguing discovery occurred when the drilling rig, used to install the horizontal drains, encountered a deposit of stone within the mound, nearly 140 feet into it, and about 40 feet beneath the surface of the Second Terrace. It shouldn't be there! The drill passed through about 32 feet of stone (before the drill bit broke off), thought to be "cobbles" in excess of six inches in diameter. Was it a ritual platform? Early erosion control? We do not know at this time how is or the extent of it in other directions, or even what kind of stone it is. SIUE hopes to do some remote sensing and vertical coring this summer to better identify the extent and nature of this feature in the mound. Unfortunately, it is too deep to excavate.

As the Monks Mound repair projects are coming to a close, we can see the benefits of close monitoring. We have gained additional information about the construction and the history of the mound, as well as having raised additonal questions about it. The more we see the more we appreciate the capabilities of the Mississippians who built this "stupendous pile of earth." through them.

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December, 1998 by Bill Iseminger

If you had not heard, Monks Mound is finally reopened, after more than a year of work on the steps and other projects. The original contractors were finally pulled from the job after failing to complete certain repairs or doing them improperly. New Contractors have remedied most of these problems as well as making improvements to the handrails and landscaping. The only remaining project is to install grates in the lower landings of each flight of stairs so that rainwater cascading down them enters already installed drains, rather than eroding the paths at the base of the stairs. The installation may require closing the stairs for a day or two.

Of prime interest to many people, is an update on the stone mass under the west side of Monks Mound. This past summer, a joint effort between archaeologists from the Edwardsville and Carbondale campuses of Southern Illinois University resulted in remote sensing tests using resistivity and magnetometry to try to define the limits and shape of the deeply buried stone feature that was encountered while drilling to install horizontal drains in the mound. The resistivity tests were nonproductive, but the magnetometry yielded some intriguing results.

These tests revealed tow "anomalies" 20 - 25 meters apart, running east and west beneath the Second Terrace, one of them directly above where the stone was encountered in the drilling last year. Each anomaly is about 2 meters wide and 3 - 6 meters deep. They are above the stone itself, which is 6 - 9 meters deep. Whether these anomalies are associated with the stone feature or the result of some natural formation has yet to be determined. Hand-augering tests went down over 30 feet, still about one meter above the stone, and encountered lots of organic root matter, perhaps from a compacted surface of an earthen structure covering the stone. There are many possible interpretations of the evidence, but further field school tests are planned for the spring, under John Sexton of SIUC, and summer, under Bill Woods of SIUE, including and extension of the magnetometry tests, and seismic testing. Hopefully these will better define the size and shape of the stone feature and vertical coring will reveal the type of stone and soil stratigraphy above and below the feature.

December, 1999 by Bill Iseminger

To recap the story about "the stone in the mound," in 1998, contractors were drilling from ground level horizontally into the west side of Monks Mound to install drains to relieve the internal water that was causing severe slumping. In one of the transects, the drill operator went through 32 feet of stone, approximately 150 feet into the mound and some 40 feet below the present surface of the Second Terrace. The operator told archaeologists from Southern Illinois University at Edwardsville (SIUE) who were monitoring the project, that it felt like cobbles of soft stone (such as limestone or sandstone), based on his experience in other drilling projects. How far the stone mass extended in other directions was unknown.

Subsequently, SIUE under Dr. William Woods, and SIU-Carbondale, under Dr. John Sexton conducted a series of remote sensing tests, using magnetometry and electronic resistivity, hoping to determine something about the dimensions of the stone mass. However, those tests were inconclusive as the stone was apparently deeper than these methods would penetrate. The magnetometry did show two linear anomalies about 20 meters apart and apparently above the stone, but what they are is unclear at this time.

SIUE did hand auger down over 30 feet and did not hit the stone but did hit a water saturated layer (the water actually rose 10 feet in the hole) and below that a dense black clay which had a lot of compacted organic matter. This may represent a clay mound over the stone that eventually had some vegetation cover. An opportunity occurred in mid-December, 1999, when a coring rig

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bottom of the old auger hole, but the water and soil that had collapsed into it, making it impossible to drill properly. They came back and spent a half day drilling a new core and got down 43 feet, but did not encounter stone. They did get a couple feet into the dense black clay at the elevation where the stone was expected and may be just above it. Unfortunately, the drilling team had to get back to Wisconsin and could not take the hour or two needed to go down a few more feet, so that will have to wait until a future date.

Despite the disappointment, important information was retrieved as a soil column was recovered which will provide information about the stratigraphy and soils of that part of the mound. Future remote sensing tests are planned that should penetrate deeper into the mound and hopefully reveal information about the size and shape of the stone mass. We will keep you updated when this takes place.

2000

SIU Edwardsville continued its program of trying to understand more about Monks Mound, following up on work they began with the repairs to the west slump and the installation of the new stairs up the front over the past few years.

Dr. William Woods led the project, which involved field school students from SIUE, SIU Carbondale under Dr. John Sexton, and also students from the University of Goettingen, Germany. Most of their project at Cahokia focused on the First Terrace of Monks Mound to test the hypothesis of its being a late addition to the front of the mound. They also are trying to identify other possible features, such as structures or pits, that lie below the surface. Excavations during the 1960s-70s had identified historic period (mid 1700s) occupation, burials and a French chapel location on the west side of the First Terrace, all relating to an occupation by Illini (Illinois) Indians long after the Mississippians had left. The testing for the new stairway in the late 1990s also identified some large refuse pits near the center of this terrace, full of the remains of deer, bear, turtles, swans, fish, and other animals, as well as French period ceramics, gun parts, glass and knives. Recently, SIUE and SIUC have been using resistivity and other methods on the eastern portion of this terrace to see if they can identify additional features. They also have been taking vertical cores across the terrace. The preliminary results seem to confirm that the First Terrace was indeed a late addition to the front of the mound, based on detected soil changes and angles of slope. The other resistivity test results are still being analyzed, but it will be interesting to see what they determine. No additional testing was done in the area of the stone mass under the Second Terrace, due to time and equipment restraints, but some work may be done this fall.

Preserving Monks Mound's East Slope and the Fourth Terrace (2007)

by Bill Iseminger, John Kelly, T. R. Kidder, Tim Schilling and Mark Esarey

If you drove by Monks Mound in August, you may have noticed heavy machinery and large areas where digging was in progress. What you were seeing was the repair to slumping problems on the east side and the northwest corner of the mound. A slump occurred on the northwest corner in 2004 and the east and west sides slumped again in 2005. The site and its parent agency, IHPA, requested a state capital project to study the problem. The engineering consultants advised us that the problem was quite serious. The scars created by the northwest and east slumps were steadily getting worse due to erosion from rainstorms and were threatening to eat into the top of the mound, so we decided to conduct repairs in order to preserve the mound's summit.

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There is evidence from testing done by the Illinois State Museum after the 1984 slump, that these slope failures were an ancient problem, and 1971 excavations by the University of Wisconsin-Milwaukee in one of the "East Lobes" also had revealed evidence of ancient slumping. The modern history of slumping goes back to the mid-1980s, when large sections of the east and west sides of the mound slumped following three very wet years. Apparently, as water percolates down into the mound it tends to accumulate in several perched water tables over hard clay layers that may be older mound surfaces. As the water migrates to the sides of the mound, it weakens those areas and with all the weight of the mound above, sections eventually collapse, creating the slumps. Slumps are not surface erosions. The slip face along which the slump moves starts nearly vertically down into the mound and moves out towards the slope edge in a curving arc and the slump moves as if on the end of a pendulum, almost like an earthen glacier.

We initially repaired the east slump in 1988, when IDOT had a surplus of bluff loess soil they had to dispose of from a temporary highway project. They donated that soil to us and rebuilt the four mounds along the entrance road to the Interpretive Center and also bulldozed the soil up the slope of the east slump to fill in the scar there and also built up the toe of the slump to help anchor the repair. However, the bulldozer was not able to get completely up to the very top of the scar. Over time, this repair settled and moved a little and eventually failed again. The soil engineers said that the technique and the loess soil used were not the best choices for a repair and contributed to the failure.

Through the Capital Development Board (CDB), the Illinois Historic Preservation Agency (IHPA), which administers our site, and with funds left over from previous mound repair projects, professional engineering and geotechnical firms were selected to examine the slumping problem and recommend solutions. Oates and Associates, Inc. was hired to do the engineering study. They also surveyed and made a new precise contour map of Monks Mound. Shively Geotechnical, Inc. was hired to do the studies and monitoring of the slope failures and to come up with recommendations for repairs and stabilization. For nearly two years there were in-depth studies of the problem and soil cores and test probes were made of the slump areas on Monks Mound by Shively and also a geomorphologist, Ed Hajic.

A list of 15 possible solutions to stabilize the mound and repair the slumps was submitted, but most of these would have had more impact on the mound than the slumps did, such as driving pilings, creating stone piers, pinning the slopes, etc. The solution that seemed to have the least impact and greater chance of success was the one finally selected.

We decided to repair the northwest and east slumps, as the west slump was much more complex and also less of a threat to the top of the mound. The selected procedure for the east side was to remove the soil that was placed in the 1984 slump in 1988 and the soils that had been displaced by recent slumping, This would be about 90% of the soil removed. The remaining 10% would be removed by terraces or "steps" cut back into the intact mound fill to help prevent future movement. These would be cut back a few feet behind the "slickensides" created by slump movement using a trackhoe bucket and all work was to be monitored and documented by archaeologists. Then bottomland gumbo clay soils were to be placed in one-foot horizontal layers over a geotechnical grid and compacted with special machinery. Once the slope was repaired it would be seeded with special grass and geotechnical matting applied over that, through which the grass will grow. This would help anchor and stabilize the surface.

This procedure was initially done to repair the northwest corner and some amazing stratigraphy was revealed. One could clearly see numerous alternating horizontal layers of light, medium,

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and dark fill zones of sandy, silty clay, and clay soils. The layers were deposited as three distinct zones consisting of similarly composed basketloads or layers of soil. Basketloading was consistent within zones and distinct between zones. Construction must have advanced at a rapid rate since no erosion was evident between layers. It is not known if the layering was an intentionally engineered feature of Monks Mound or if the layering resulted due to the availability or sources of fill material. Within the fill layers we observed ancient fault zones and filling, suggesting that the builders of Monks Mound were combating slump problems in the very distant past.

As we got into this project on the east side, it soon became apparent that some of the slip surfaces were deeper than anticipated and the terracing had to be larger and deeper than first planned. Eventually, a 15 m (50 ft) wide and 20 m (65 ft) high area of the east side was exposed and we knew this was one of the few times we would ever have the opportunity to see large sections of the interior of the mound and we needed to thoroughly document it. Dr. John Kelly, who coordinated the archaeological monitoring, with Tim Schilling as the field director, contacted other local archaeologists and students available to map, photograph, take soil samples, and further document the exposed terraces. The east side also looked very different from the northwest corner. In some areas you could see classic “basketloading” deposits of soil, and in others more of the horizontal layering but not quite the same as on the northwest corner. Evidence from the building layers indicates episodes of construction were followed by periods of settling and erosion requiring filling and repairing before the next part of the mound was added.

Dr. T.R. Kidder, an archaeologist from Washington University, and a specialist in soil studies, and his students collected over a hundred soil samples, especially from the interfaces of different soil layers and slip zones, and will be analyzing all this information shortly. He also compiled over 1000 detailed digital images of all the exposed terraces and profiles and features. Dr. Michael Wiant, director of Dickson Mounds Museum, also collected soil samples for comparative studies with soils taken from previous corings into the mound that he has been studying, and which can lead to information about the sources of the soils. Dr. Paul Welch from SIU-Carbondale, visited a couple times and provided valuable insights, as did Dr. Timothy Pauketat from the University of Illinois, Dr. Susan Alt from Indiana University, Dr. Neal Lopinot from Missouri State University, Dr. Bonnie Styles, director of the Illinois State Museum, and her husband Dr. Tom Styles, a geomorphologist, Dr. Greg Vogel and Michelle Vogel from the Center for American Archaeology in Kampsville, and Drs. Julie and Henry Holt from SIU Edwardsville. A number of other colleagues also visited, such as Nelson Reed, whose work on the Fourth Terrace will soon be published by the University of Illinois, and members of the Washington University archaeology faculty, Professors David Browman, Fiona Marshall, Gayle Fritz, and Carrie Hritz , with Drs Fritz and Hritz spending time to help map. CMMS board members, Terry Norris and Ken Williams also visited and lent a helping hand to some of the profiling. Site manager Mark Esarey was on site frequently and helped with mapping, and Bill Iseminger spent six days scraping and mapping profiles.

One thing that became apparent in the profiles is that the east side of the mound has had a long history of instability. We could see several areas where ancient gullies had eroded down the slope and had been refilled and repaired by the Mississippians. There were also old fault scars and displaced soils in several places. It seems they must have constantly been repairing the mound. We believe we are able to identify at least one, and possibly up to three former mound-top surfaces or stages. In several instances these surfaces appear to have been exposed long enough for considerable erosion to take place before the

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next stage was added. We also detected a layer of soil that had been laid down at a steep (~40 degree) angle that we are interpreting as the face of one of the final mound stages. This soil was a densely compacted light-colored silty clay that, if continued over the entire mound surface, would have presented a viewer with a dramatic image of a nearly white mound.

One intriguing and unexpected discovery was a grouping of limestone slabs and some uncarbonized wooden log fragments. We were only able to expose what was extending out of the profile, which is just one end of this feature, so we do not have an idea of its complete shape, dimensions, or function. We were only able to examine the exposed portion and not excavate further into the mound. There have been several possible interpretations, such as a charnel structure, a ritual platform, erosion repair, etc., but at this point we can only conjecture. The structure had been displaced by an ancient slump as the rocks were partially disrupted. One sample of the preserved wood has initially been identified as bald cypress by Dr. Neal Lopinot of Missouri State University. It is not clear if the logs were originally vertical posts or if they had been laid horizontally or snapped off by the mound overburden and movement. The structure may have been displaced since some of the slabs were not consistently oriented in a horizontal direction as would be expected if the feature was pristine. In addition, it is likely the structure once stood on a former mound surface. The surface was quite temporary as it lay just beneath the mound face. It was as though in the process of building the mound that this feature was created, perhaps for a very short period of time. It clearly collapsed in the distant past. Analysis of soil samples from the limestone feature will aid in understanding how the feature came to be where it is. The feature was mapped and photographed in great detail; a few samples of the limestone and wood were collected for analysis, and the structure was left in place.

Many thanks to all the people who helped with this project. Most days there were 15-20 people working to scrape the terrace faces, map, and document the profiles. We were pressed for time on this project as we did not want to leave such a large area exposed to the weather. Fortunately, it did not rain during the two weeks this was open—unfortunately, it was the hottest period of the summer with temperatures ranging from 97-105 degrees. Fortunately, the site and CMMS staff brought out much welcomed cold water and watermelons during this project. We did have the contractors stop for a couple days in order to get ahead of their backfilling progress and some workers put in 12-hour days to get the mapping completed. Much new information and data was recovered about Monks Mound, especially a small a section of the east slope, and we look forward to the results of all the analyses.

Some people have expressed concern about the use of heavy machinery to do this work, but that is the only feasible way it could have been done in the time frame available. This was primarily an emergency repair project to help preserve the mound and it was necessary to remove the displaced soils in order to have an effective repair. As the exposure expanded, then the archaeological work and documentation became a critical factor and every effort was expended to do this properly.

The final stage of the stabilization project at this time is to fill the numerous depressions and irregularities on the summit of Monks Mound, as these areas around the edges tend to channel rainwater into gullies or collect water, increasing the chances for more failures. New gumbo clay will be used for this. The old grass will be killed and the stubble burned, the new soil added and seeded, then the geotechnical matting will be applied over the entire mound summit. The end result will be a better, more even shedding of surface water and less potential for erosion.