

Conservation and Restoration of Angkor Wat and Ta Prohm Temple, Siem Reap, Cambodia





Devender S. Sood





Outline of the presentation

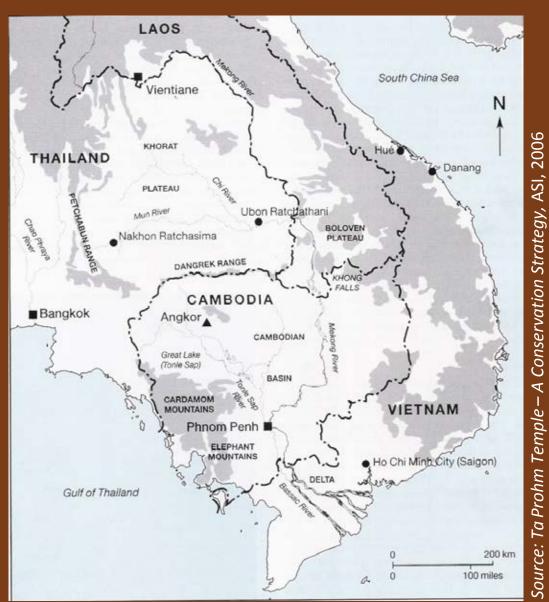
Introduction – ASI's foray in Cambodia

Conservation works – Angkor Wat (1986 – 93)

Ongoing Conservation Works – Ta Prohm (2004 onwards)







Fact File:

Cambodia is primarily a large depressed basin and a major part of the country is covered with tropical evergreen forest;

Hot and Humid Climate;

Bordered by Thailand, Vietnam and Laos;

Capital: Phnom Penh;

Tourism the main contributor to the Cambodian Economy;

Angkor region in proximity to the great Lake Tonle Sap, fed by the waters of Mekong river





India – Cambodia Cooperation

India – Cambodia (*Kambujadesha*) cooperation goes back to approx 5th – 6th Century CE;

Trade and Commerce established cultural relations between the two regions;

Khmer emperors (9th – 15th Cen CE) adopted Indian religions, Hinduism and Buddhism, and patronised art and architecture reflecting tenets of Indian iconography and architecture; Many temple complexes within the Angkor region;

Government of India's cooperation with the R.G of Cambodia continues from mid-1980s by providing technical assistance for the conservation of Angkor Wat (1986 – 93) and Ta Prohm (2004 – till date)





Conservation and Restoration of Angkor Wat and Ta Prohm Temple, Siem Reap, Cambodia







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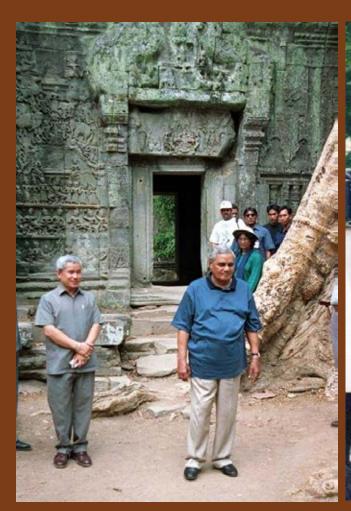






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Conservation and Restoration of Ta Prohm Temple, Siem Reap, Cambodia







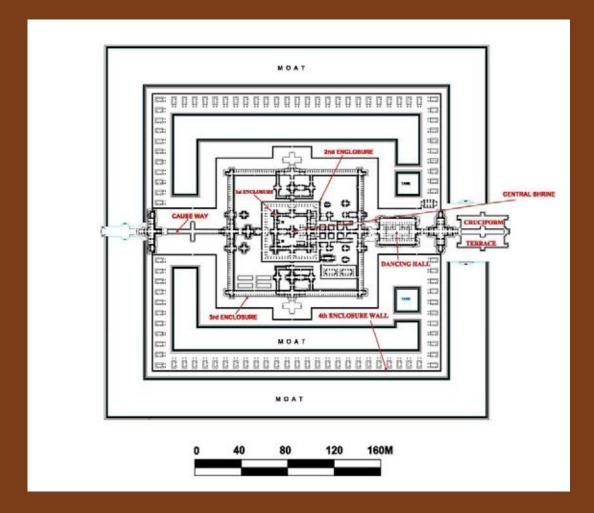


Background

Project launched in **February 2004** by Secretary Culture, India;

Funded by the Ministry of External Affairs, Government of India;

Currently team from **Archaeological Survey of India (ASI)** is working onsite.

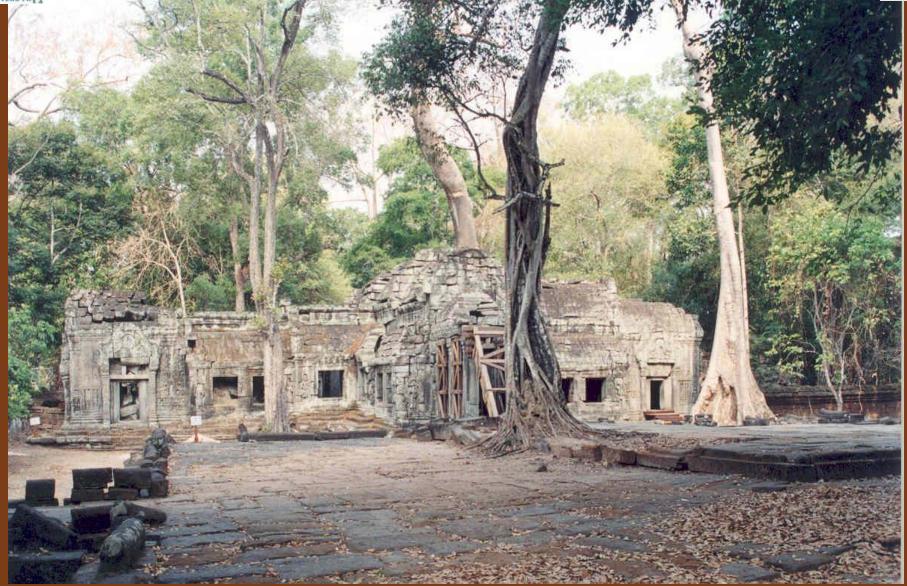


Located to the North east of the famous Angkor Vat temple enclosed within an area of 1105m x 663.00m

five rectangular
enclosures with gopuras
(gateways) and moats.
The statue of
"Prajnaparamita"
personification of mother
of Buddha was placed in
the central shrine.







GOPURA ON FOURTH ENCLOSURE (EAST), TA - PROHM, TEMPLE



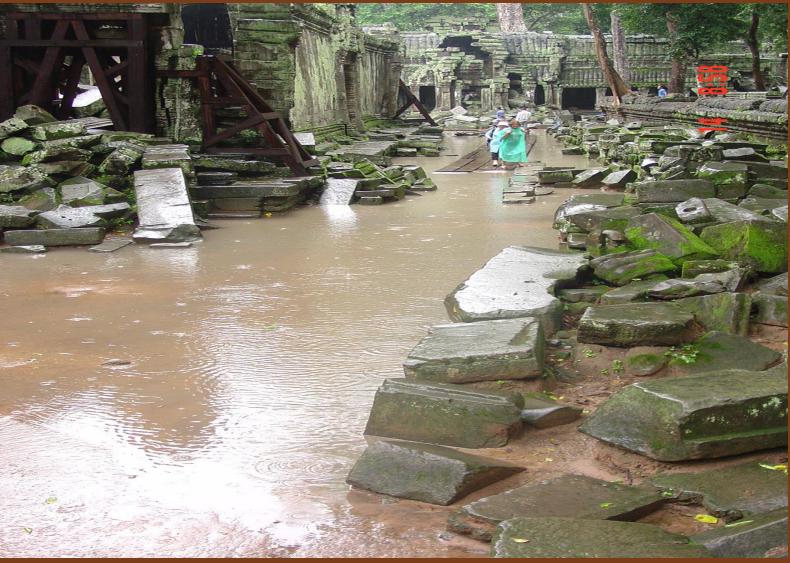




The Entwining Tree Roots, TA- PROHM, TEMPLE







Stagnated Water in TA-PROHM, TEMPLE







Stagnated Water in TA-PROHM, TEMPLE







Wooden Bye-pass Bridge over Outer Moat (West side), Ta- Prohm ,Temple







Collapsed third Enclosures Gallery on North East, Ta- Prohm, Temple







Hall of Dancers in Ta- Prohm ,Temple







South Gate, Ta-Prohm, Temple





Conservation Strategy

Archaeological Survey of India (ASI) has adopted a multidisciplinary integrated scientific approach for the conservation and restoration of this Temple.

Aims

- To <u>protect the tangible and the intangible values</u> of this temple;
- <u>Maintain the OUV</u> by <u>preserving the authenticity and</u> <u>integrity</u> of the temple complex and undertake minimum interventions;
- Protect and preserve the natural and the built heritage and ensure its sustainability and maintain the symbiotic relation;
- Make the site <u>more accessible</u> and <u>ensure safety</u> of the visitors;
- To enable <u>transfer of skills and training</u> of local Cambodians





The Multidisciplinary team

Archaeologists, Engineers, Epigraphists, Historians and Architects, from Archaeological Survey of India (ASI)

Engineers from Indian Institute of Technology and Larsen and Toubro, to address the issues of structural stability and ensure effective monitoring of the site

Hydrologists and Engineers from Water and Power Consultancy Services (WAPCOS) to address the issue of water stagnation in the temple

Scientists, Botanists and Arboriculturists from Forest Research Institute (FRI) and Indian Council for Forest and Education (ICFRE), for the conservation of the trees



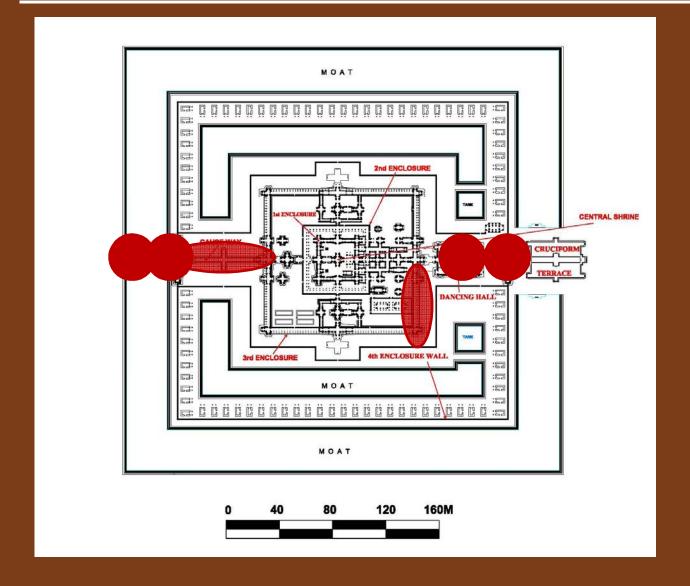


Technical Studies Undertaken

Study of the Structural Systems of the Temple
Structural behavior of the Corbelled vaults
Geotechnical studies
Hydrological studies
Botanical and Arboriculture studies
Material testing
Ground Penetrating Radar Survey
Monitoring mechanisms







Site Plan ,Ta- Prohm, Temple







Collapsed third Enclosures Gallery on South East, Ta- Prohm, Temple







Causeway Between Third and Fourth Enclosure on West Ta- Prohm, Temple



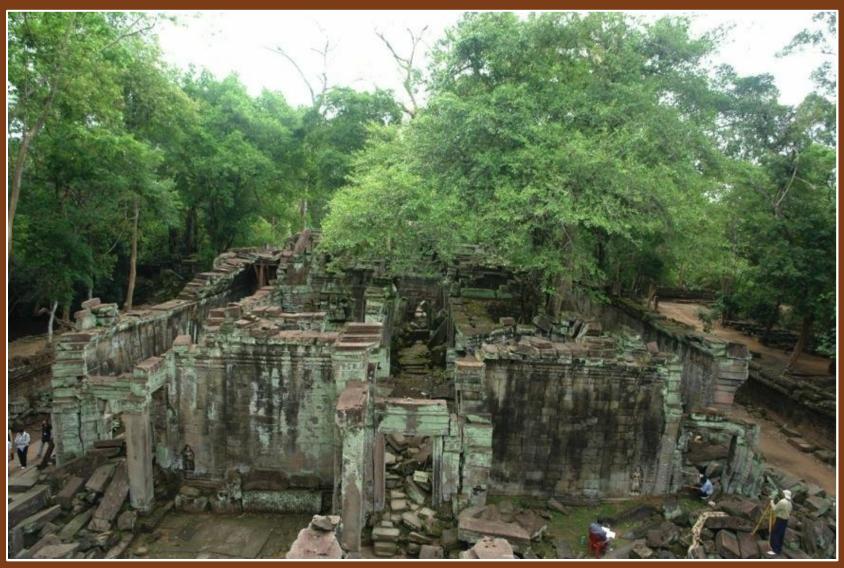




Fourth Enclosure Gopura on West, Ta-Prohm ,Temple







Hall Of Dancers, Ta- Prohm, Temple





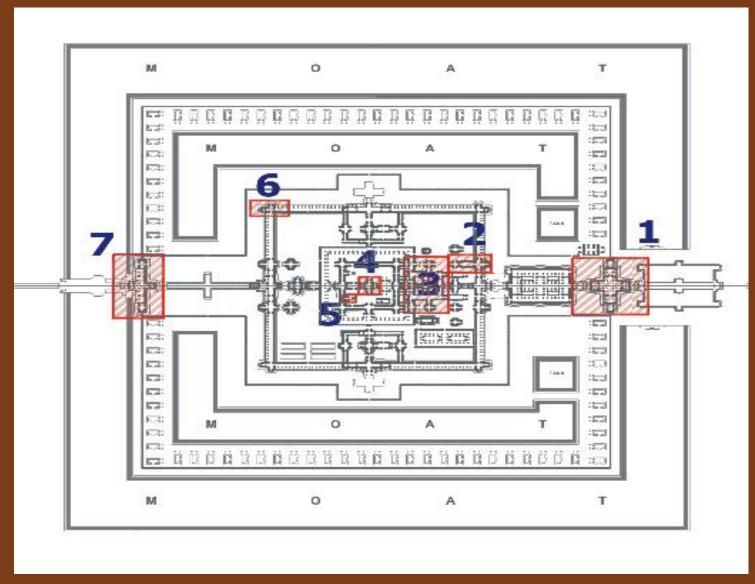




Laterite Wall Along with Gate on Fifth Enclosure (West), Ta-Prohm, Temple







CRITICAL LOCATIONS, TA-PROHM, TEMPLE











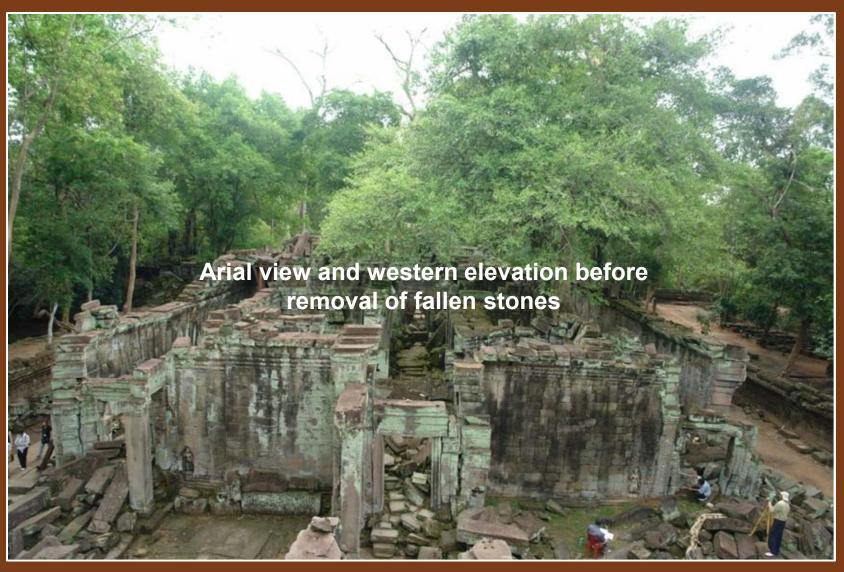




Ongoing Conservation Work of "Hall of Dancer"







HALL OF DANCERS ,TA-PROHM,TEMPLE



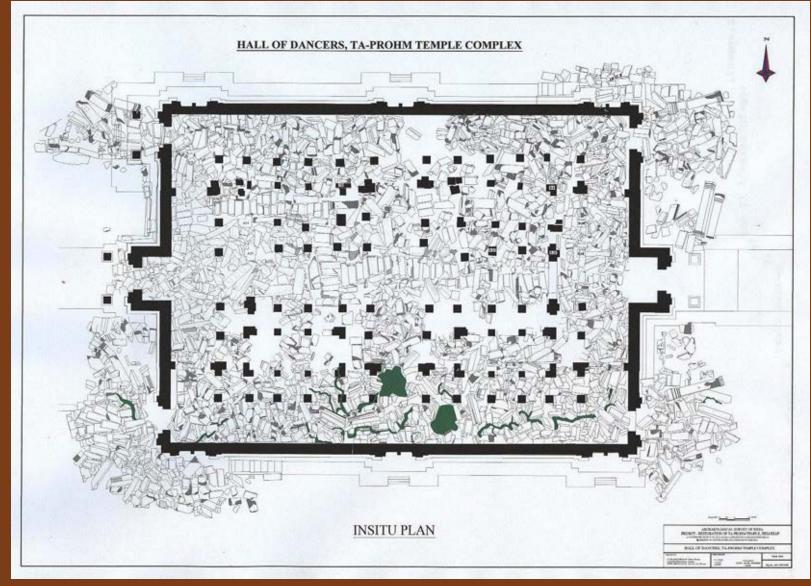




North-east corner before dismantling inclined wall and removing fallen stones



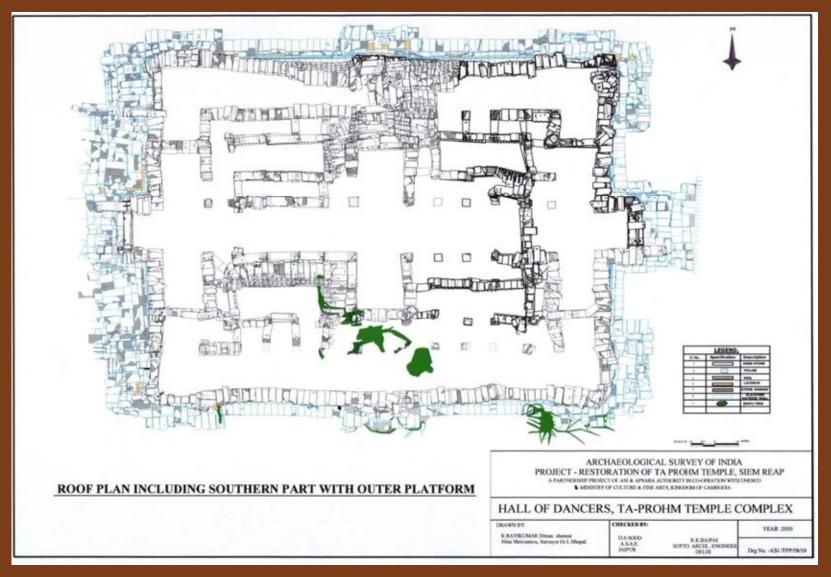




In situ plan before removal of fallen stones



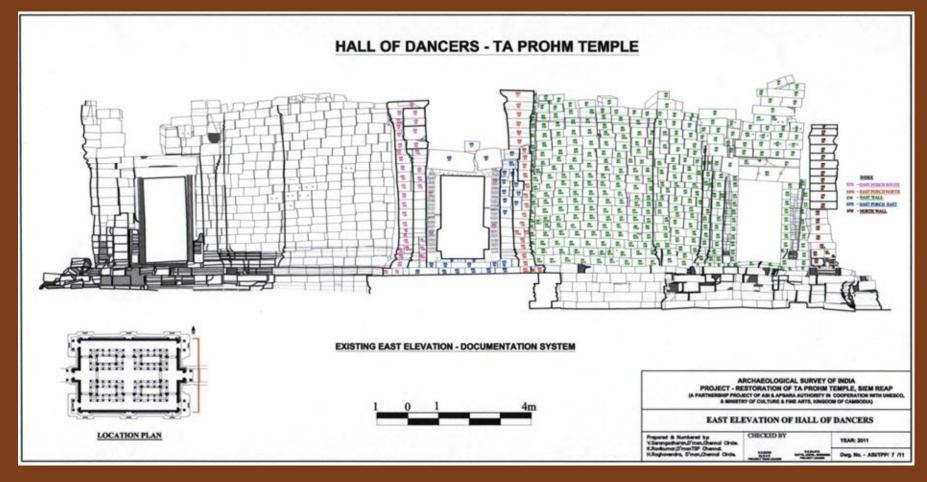




Hall of Dancers - Existing top plan



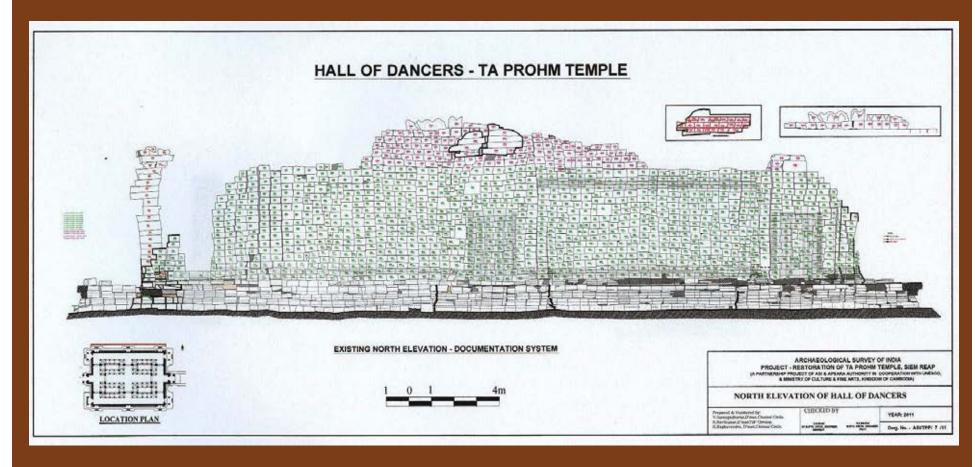




Hall of Dancers - Elevations



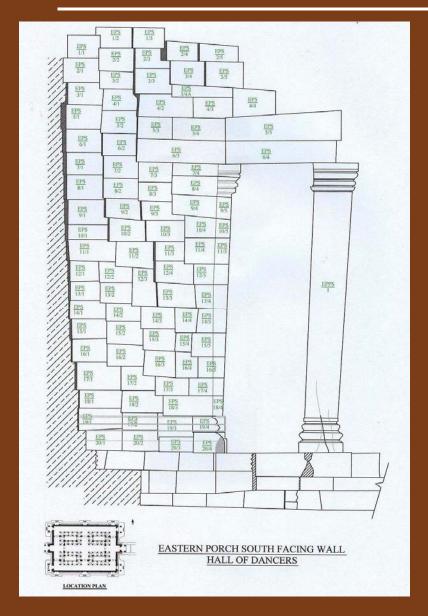


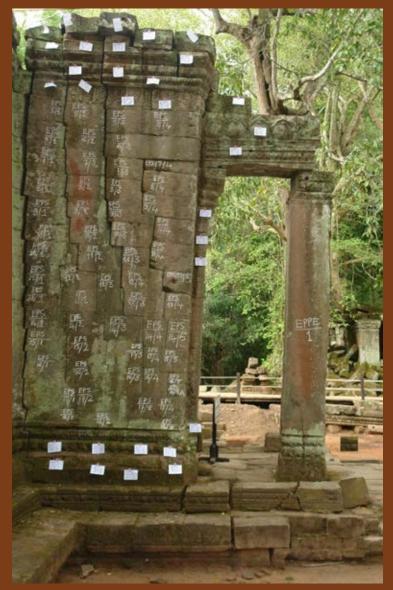


Hall of Dancers - Elevations





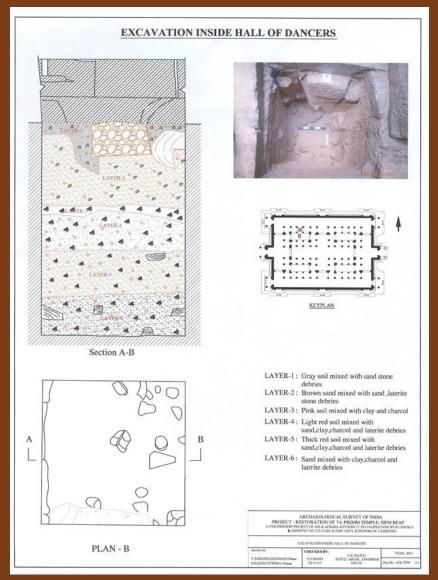


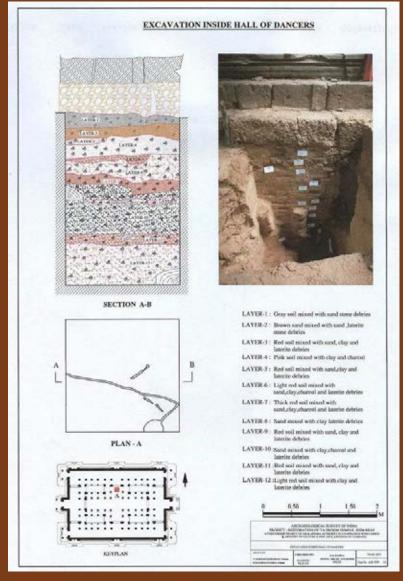


Hall of Dancers - Elevations









Hall of Dancers . Soil Investigations





Conservation Approach

Conservation based on Anastylosis;

Partial restoration of the Hall of Dancers to reflect the restored structure as well its earlier condition (as it was found);

Essential retrofitting and consolidation of the structure and stone members (structural and ornamental);

No structural corrections+, to follow the natural undulations of the surfaces;

Minimal intervention; to retain its archaeological value





Methodology

Comprehensive documentation of the structure and *in*situ and stone by stone documentation;

Partial dismantling of the exterior walls (east, north and west sides) and strengthening of the foundations;

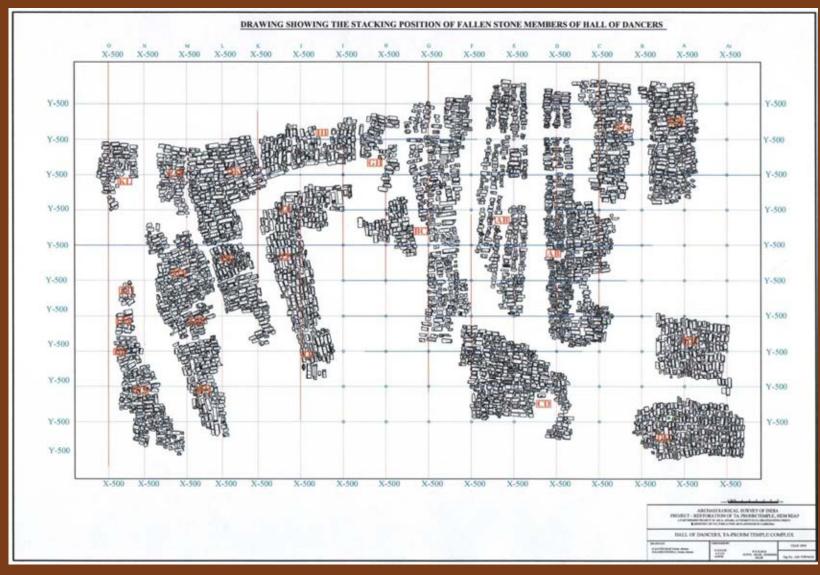
Floor strengthening; Opening up the original two drains;

Repairs and joining of stones (Columns, lintels, pediments, etc., wherever necessary after due strengthening including strapping, etc., original and new interventions clearly discernible;

Repairs to the semi-vaulted roof (on-going)



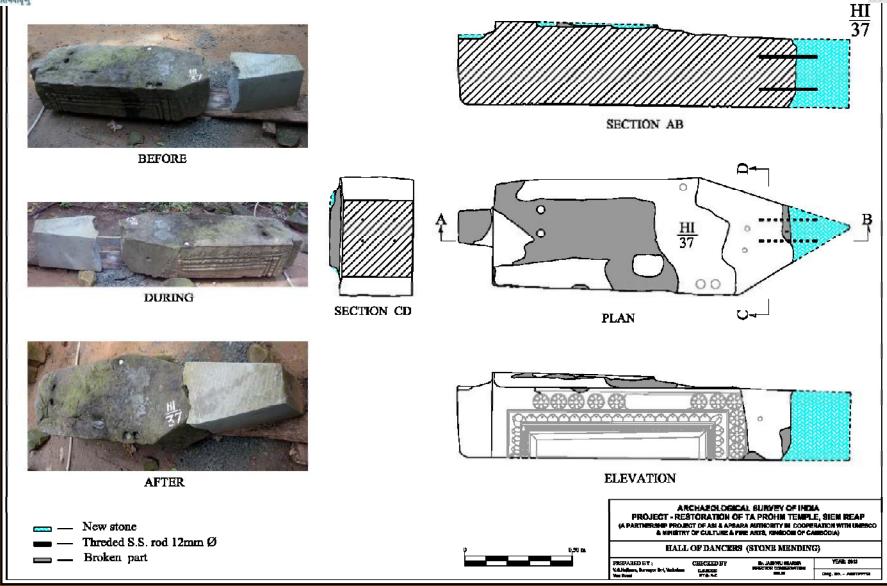




Plan showing the stacking position of fallen stones





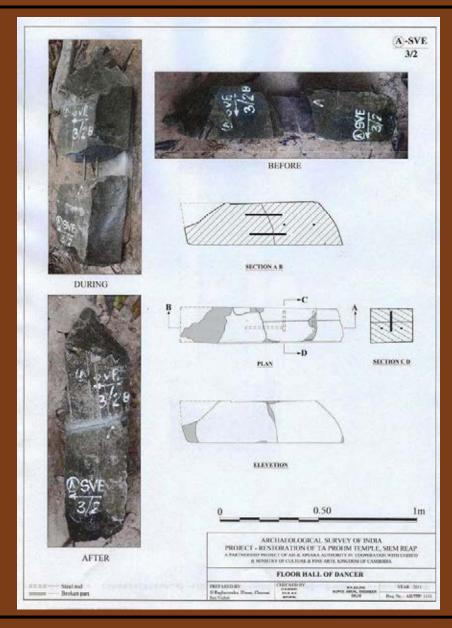


Stone mending Documentation

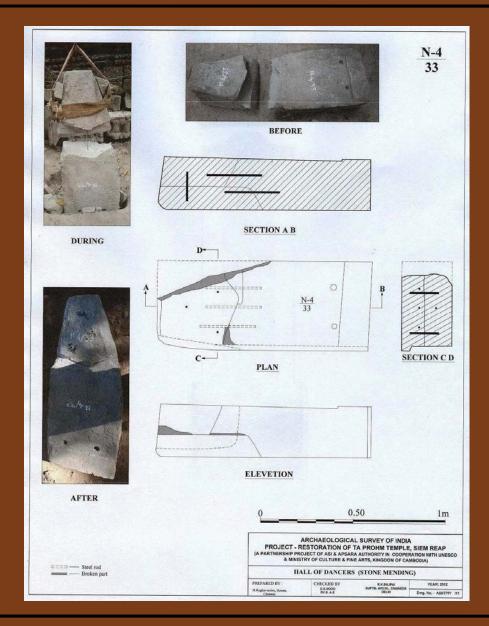
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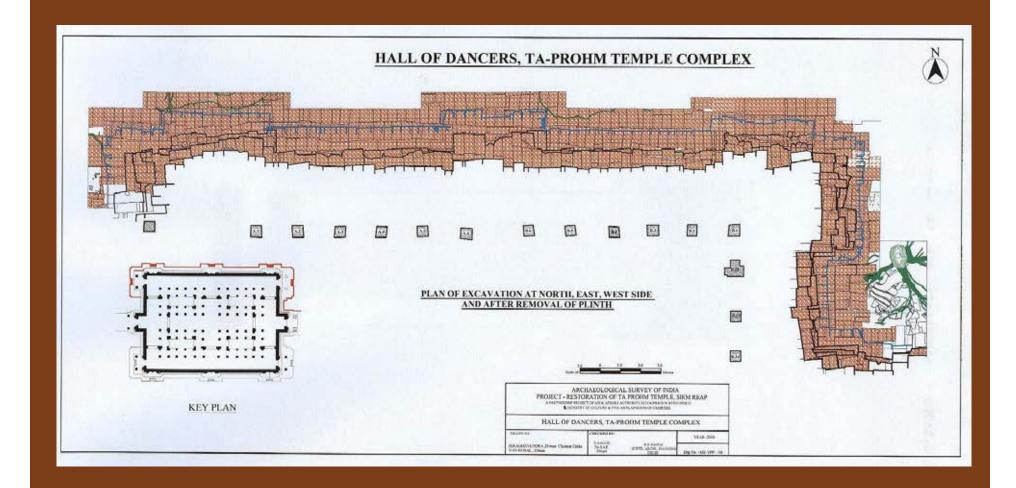
Hall of Dancers - Mending of broken plinth stones with epoxy, threaded stainless steel rods and polymer.



Hall of Dancers - Mending of vaults with epoxy, threaded stainless steel rods and polymer.



Hall of Dancers - Mending of broken plinth stones with epoxy, threaded stainless steel rods and polymer.



Hall of Dancers - Exposed laterite apron along the north east plinth.



Hall of Dancers - Filling plinth foundation with lime and sand.

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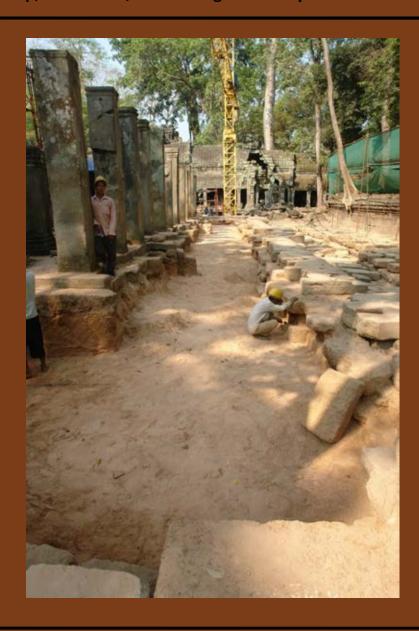


Hall of Dancers - Inter northern floor after removal of sandstones and laterite stones.

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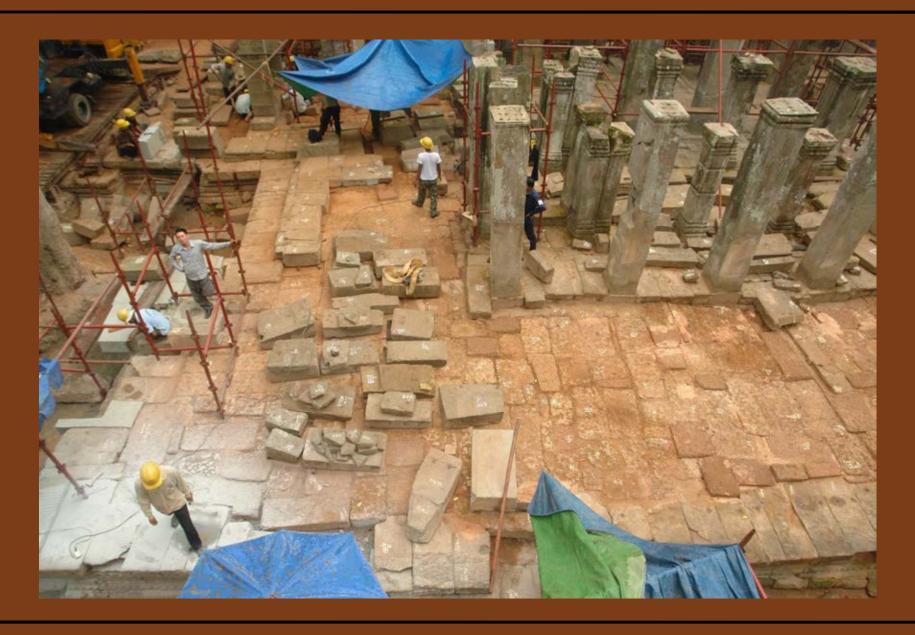
Hall of Dancers - Consolidation of interior northern floor foundation.



Hall of Dancers - Compaction of soil under the floor.



Hall of Dancers - Re-laying of interior northern laterite core after consolidation.



Hall of Dancers - Resetting of sand stone wall on eastern side.



Hall of Dancers - Resembling of main entrance gate on eastern porch.







Before-2010





During-2011-12

During-2013-14

Eastern Entrance, Hall of Dancers









Before-2010 During-2011-12



During-2013-14

North-East corner, Hall of Dancers







Before-2010



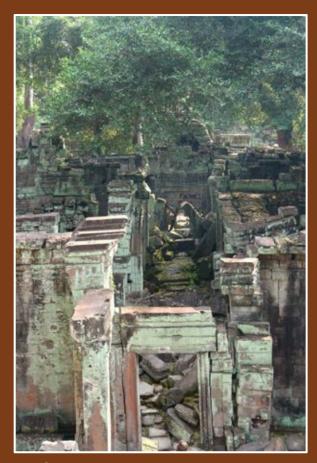
During-2011-12

During-2013-14

North-West corner, Hall of Dancers











Before-2010

During-2011-12

During-2013-14

North-Western Corner Entrance, Hall of Dancers









Before-2010

During-2011-12



During-2013-14

Western Entrance, Hall of Dancers







Before-2010 During-2011-12



During-2012-13

Interior of the Hall of Dancers (main passage)











Before-2010

During-2011-12

During-2013-14

Interior of Hall of Dancers (North-east)







South-west Corner (Discernible distinction - original and restored portions)









Before-2010



During-2011-12

During-2013-14

Hall of Dancers (Northern Passage restoration)







Pre-Conservation



During Conservation

Interior elevation before and after removal of fallen stones









Before-2010

During-2011-12



North-west corner restoration - Hall of Dancers









Before-2010

During-2011-12



During-2013-14

Hall of Dancers (north-west corner)









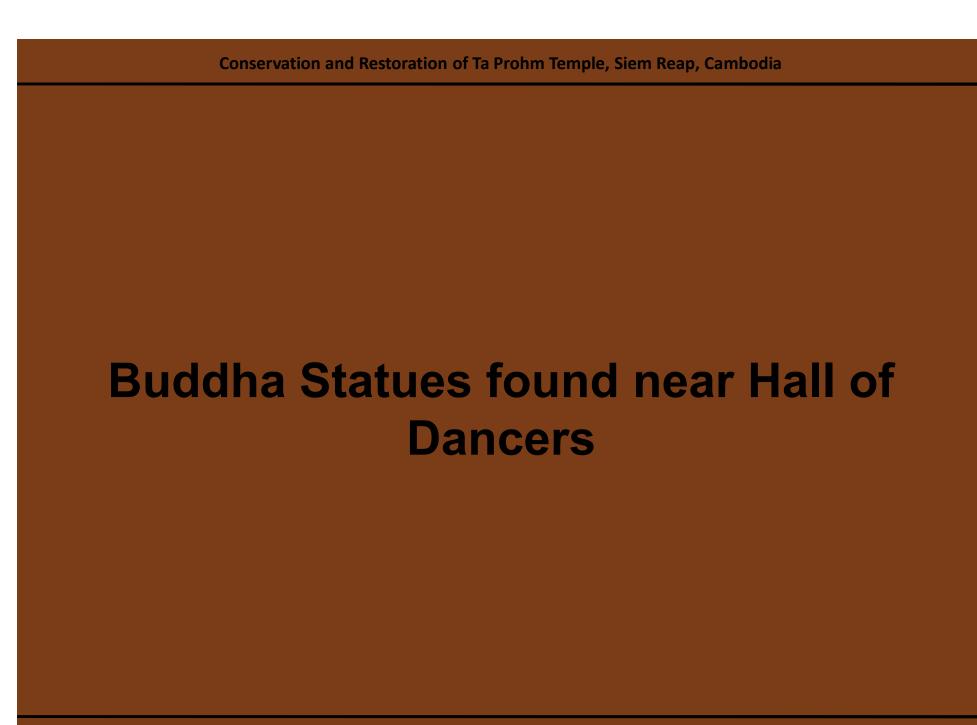
Before-2010

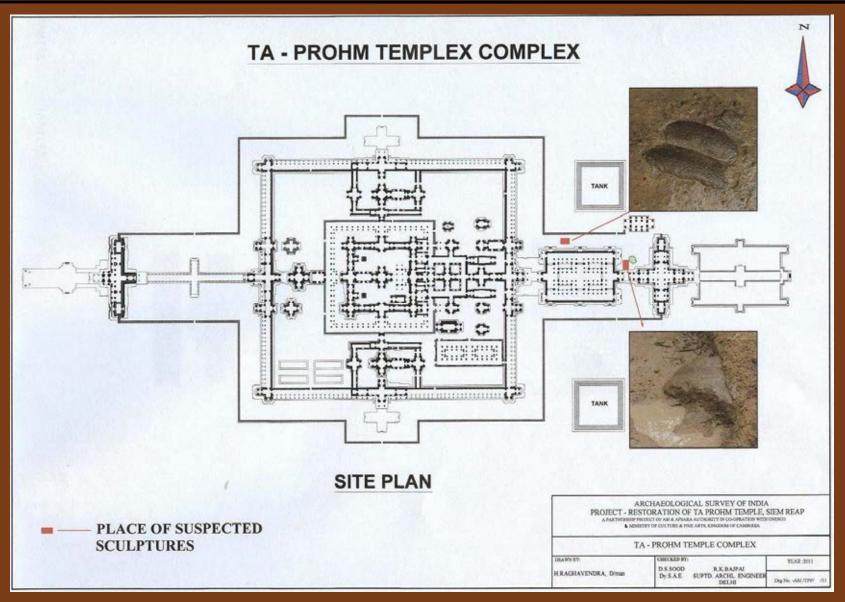
During-2011-12



During-2013-14

Hall of Dancers (North-east Corner)





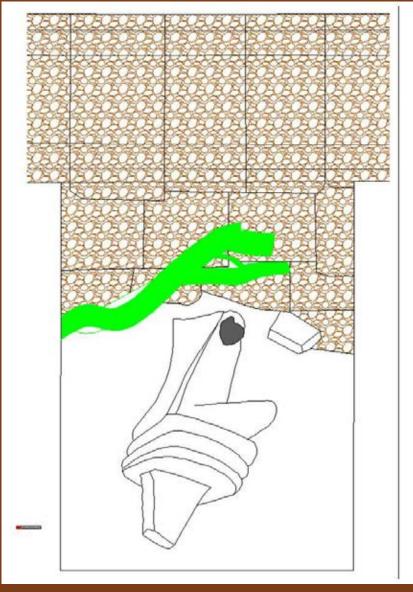
Hall of Dancers – Site plan showing location of suspected sculptures



Buddha statue surface exposed after heavy rains near laterite wall.



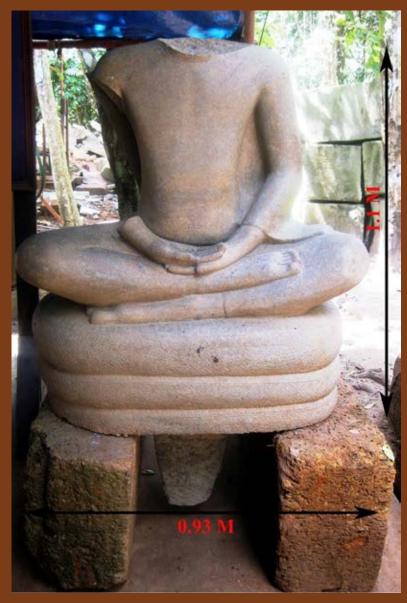
Buddha statue surface exposed after heavy rains near laterite wall.



Buddha statue (Small size)



Hall of Dancers - Aerial View of Small Buddha



Headless Buddha statue (Small Size)



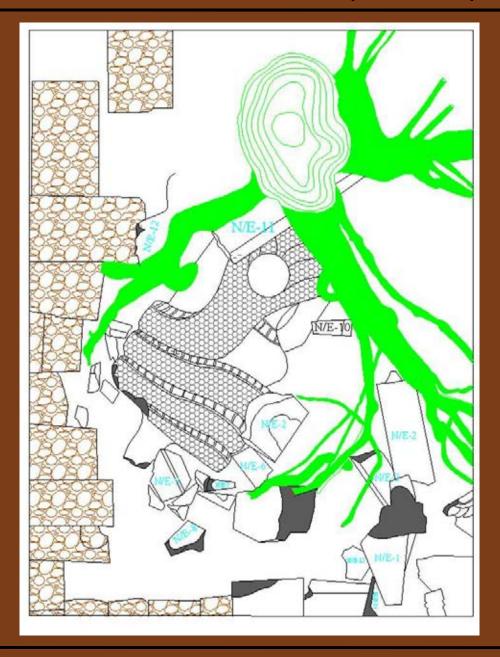
Buddha statue (Big size) exposed after heavy rains

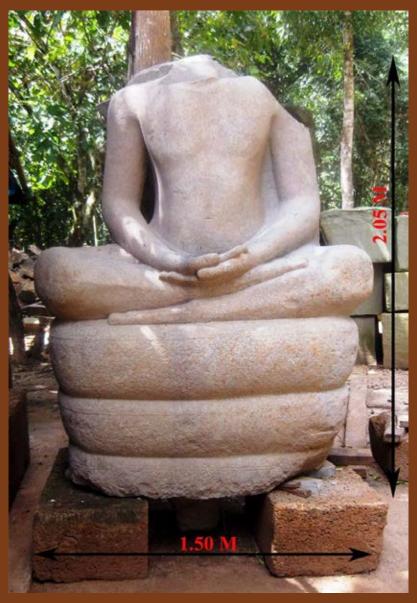


Hall of Dancers - Aerial View of Big Buddha

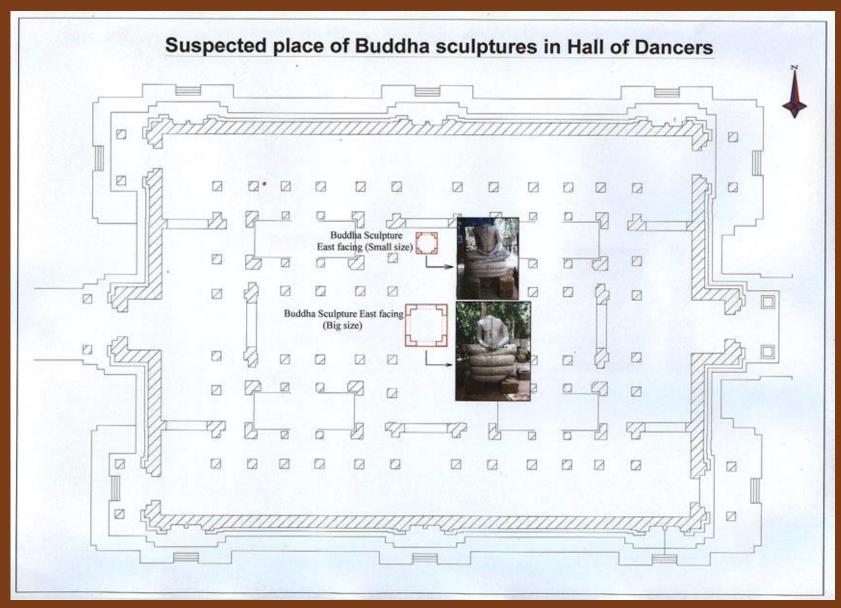


Recovery of Buddha sculpture

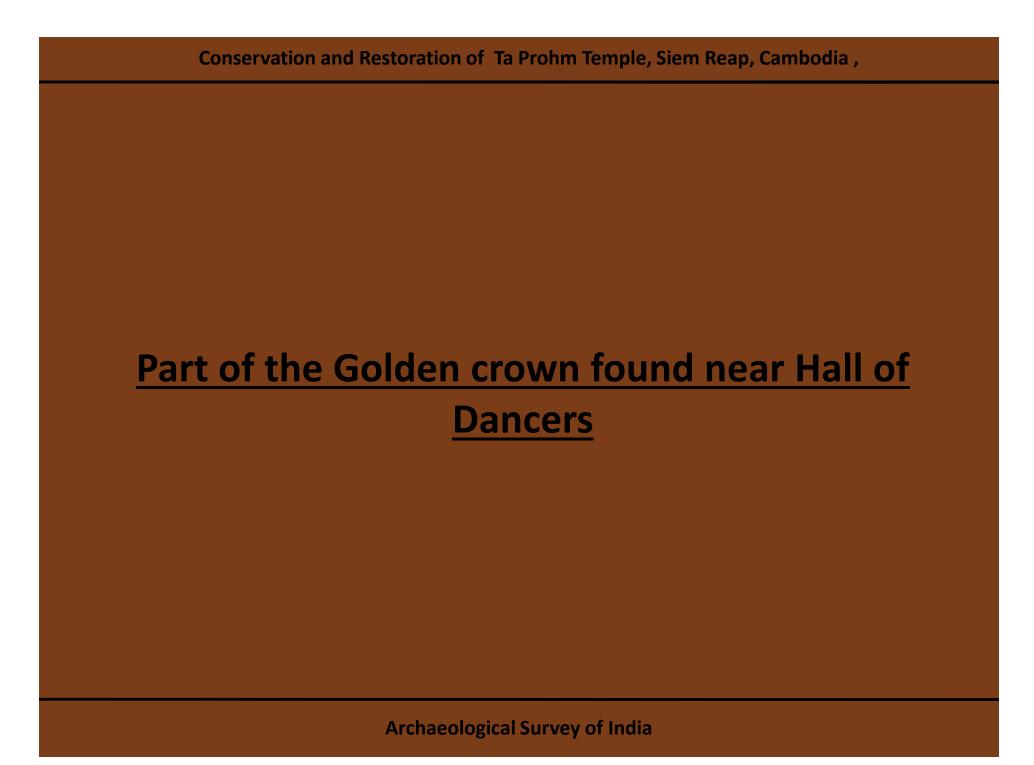


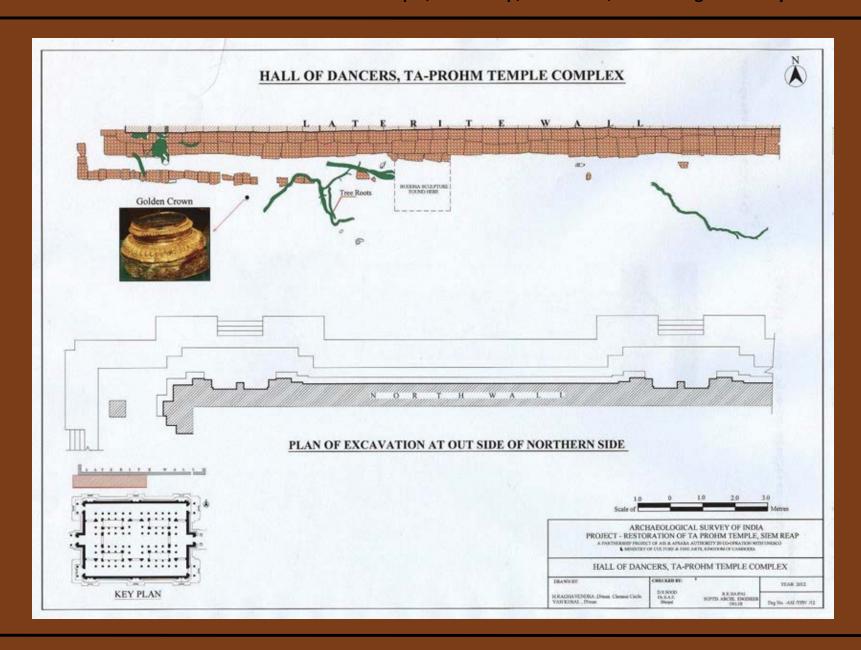


Headless Buddha statue (Big size)



Suspected place of Buddha Sculptures in Hall of Dancers





Location plan – Part of Golden Crown





Visibility part of golden crown - After removal of second layer silt from the laterite floor.







Recovery part of golden crown from deposit silt - In presence of HE. R.K.Sachdeva, Ambassador of India and APSARA officials.





Part of the golden crown - Cleaning process in APSARA office. In presence of HE. Bun Raith, D.G. APSARA Authority





Part of golden Crown - After cleaning with weight





Golden Crown









Pre-Conservation



During Conservation

After Conservation

Third Enclosure Gallery, Eastern side South wing







Pre-Conservation



During Conservation



After Conservation

Third Enclosure Gallery, Eastern side South wing







Pre-Conservation

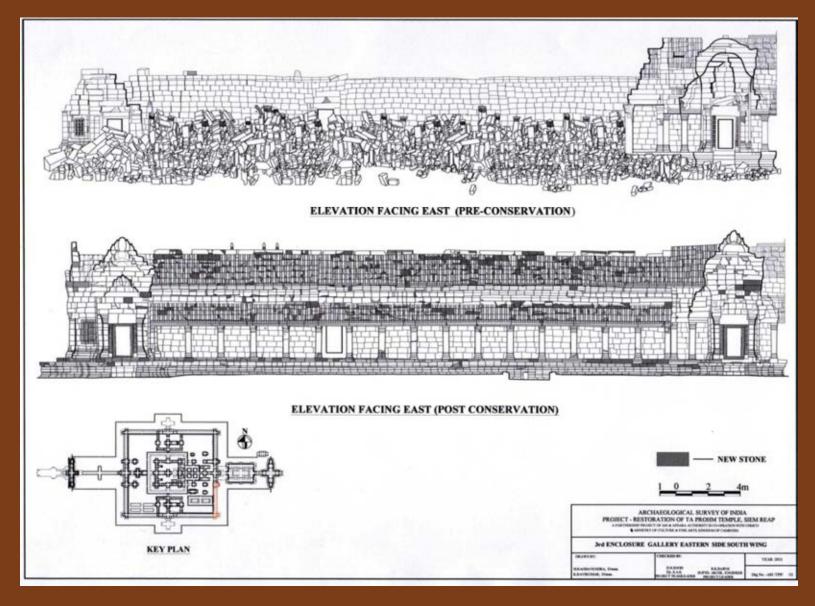


After Conservation

Third Enclosure Gallery, Eastern side South wing



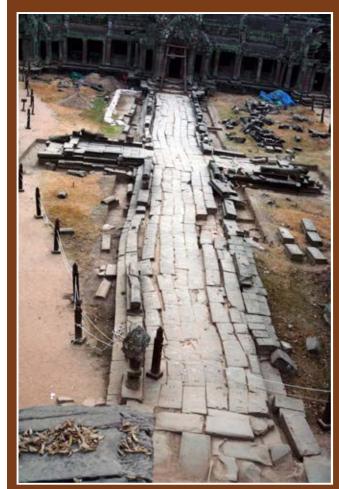




Third Enclosure Gallery, Eastern side South wing







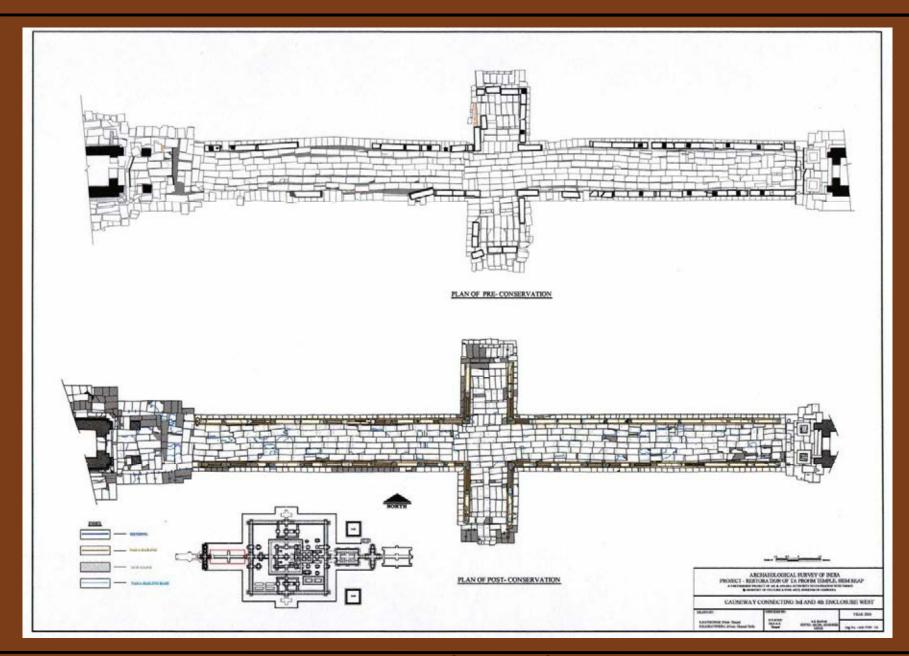


Pre-Conservation

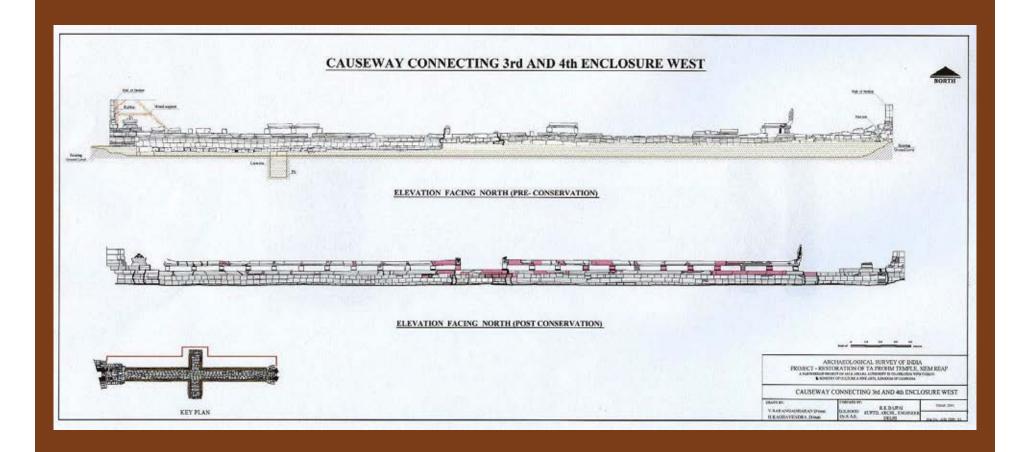
During Conservation

After Conservation

Causeway connecting 3rd and 4th Enclosure West



Causeway connecting 3rd and 4th Enclosure West



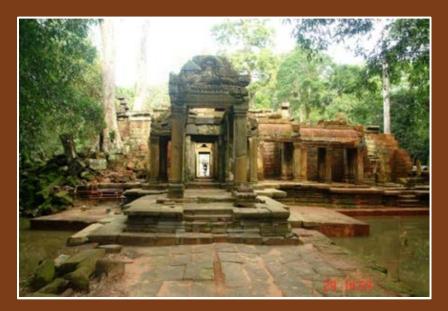








Pre-Conservation



During Conservation

After Conservation

Entrance Gopurum of 4th Enclosure West







Pre-Conservation

During Conservation

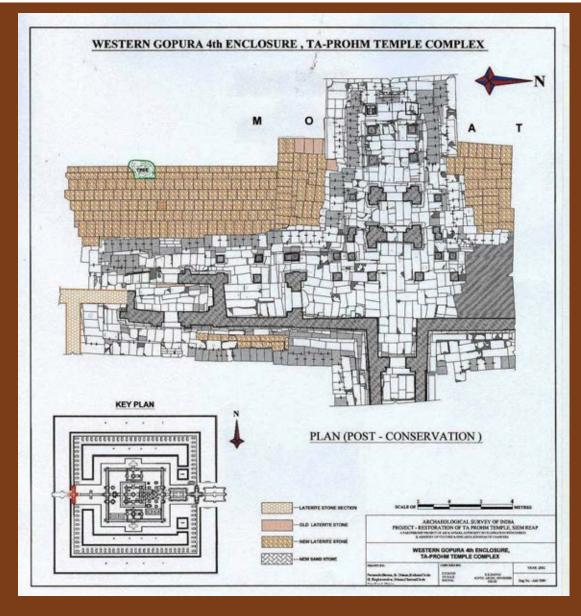


After Conservation

Entrance Gopurum of 4th Enclosure West



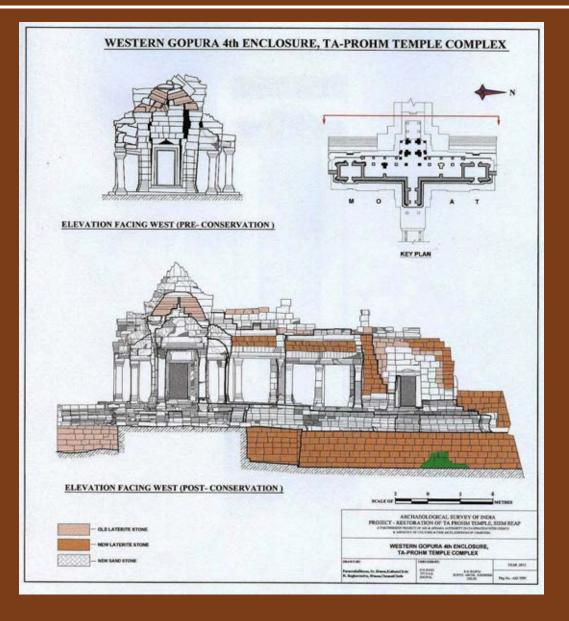




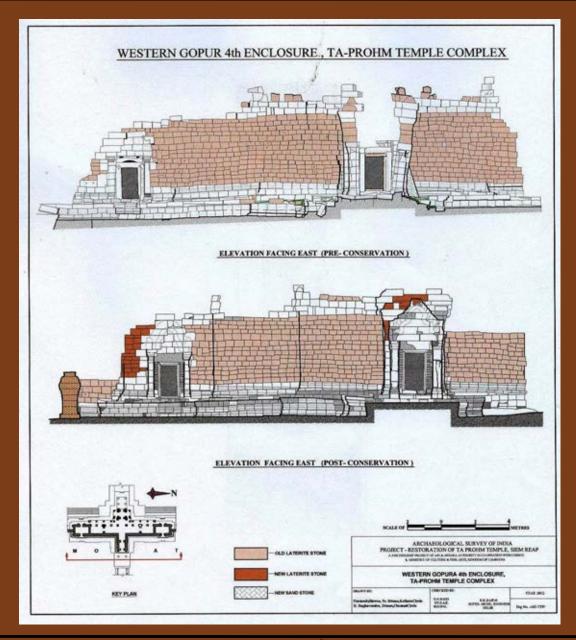
Entrance Gopurum of 4th Enclosure West



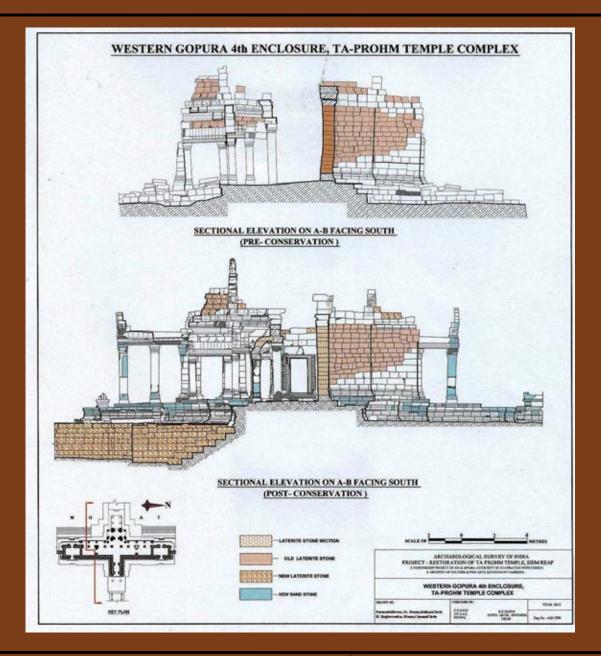




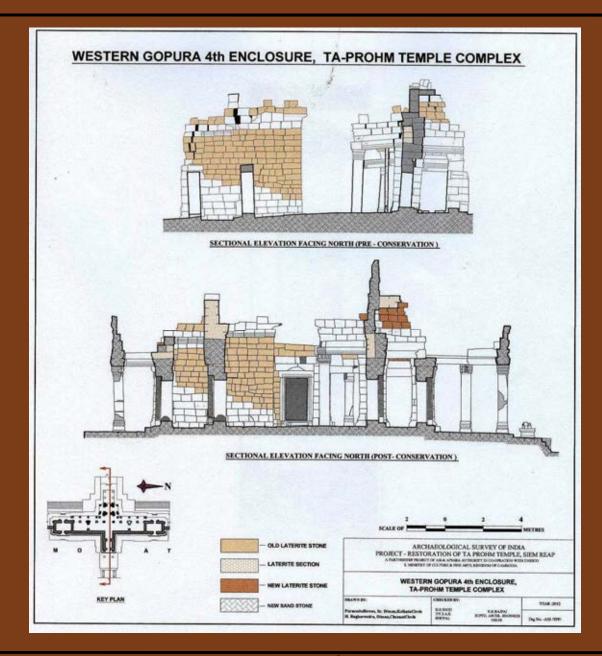
Entrance Gopurum of 4th Enclosure West



Entrance Gopura of 4th Enclosure West



Entrance Gopura of 4th Enclosure West



Entrance Gopura of 4th Enclosure West







Pre Conservation

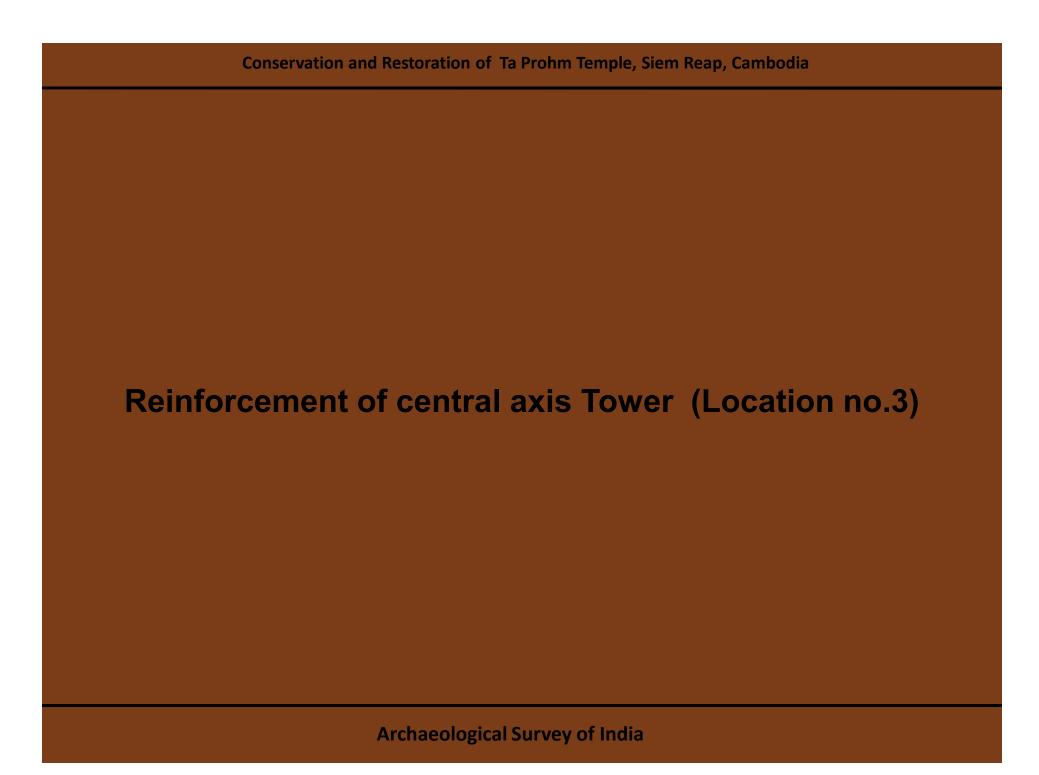


During Conservation



After Conservation

Laterite Enclosure Wall - Entrance Gopurum of 5th Enclosure West







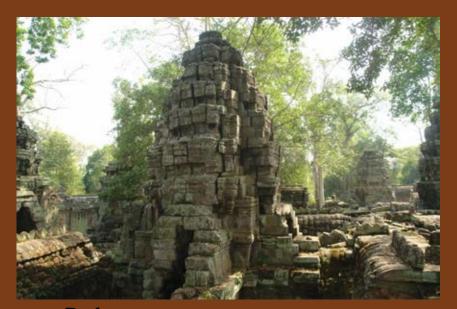
Before

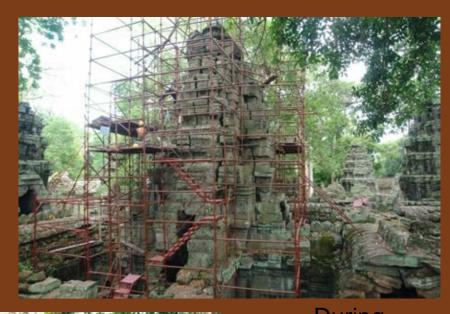


During

After

Tower along central axis (Location no.3)





Before



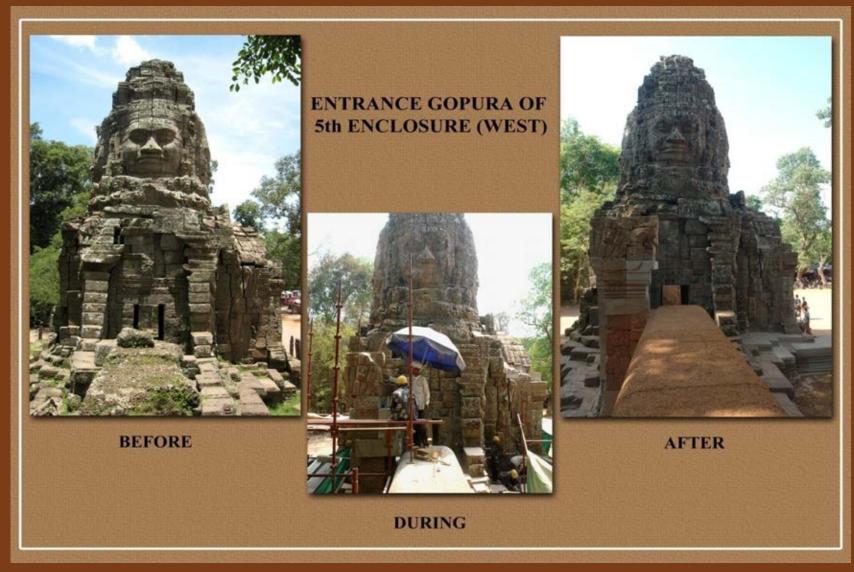
During

After

Tower along central axis (Location no.3)

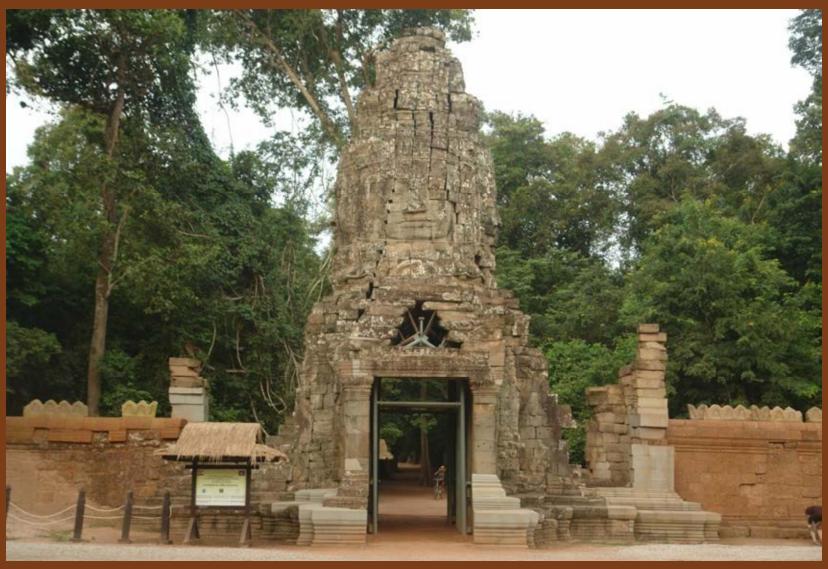




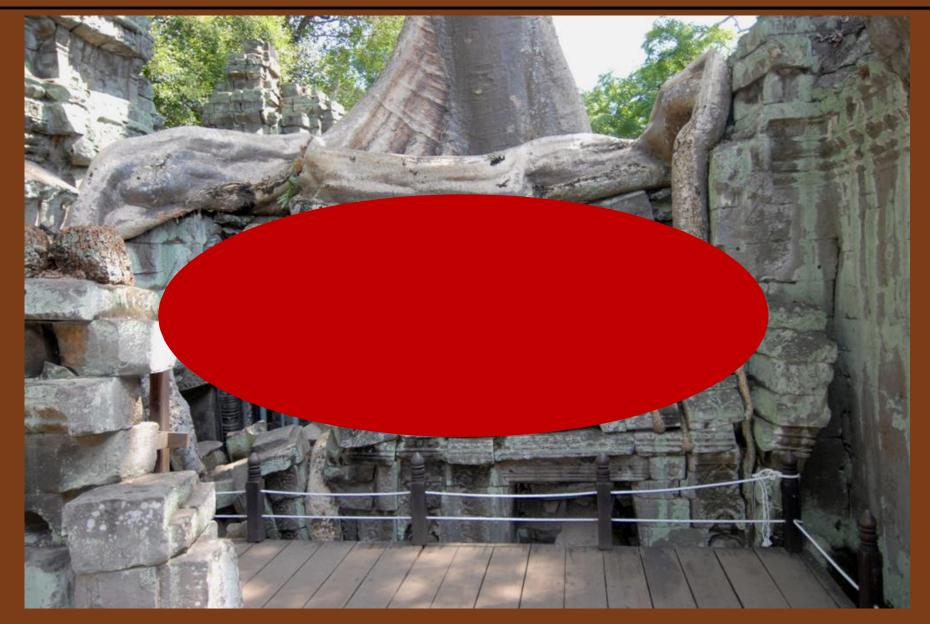








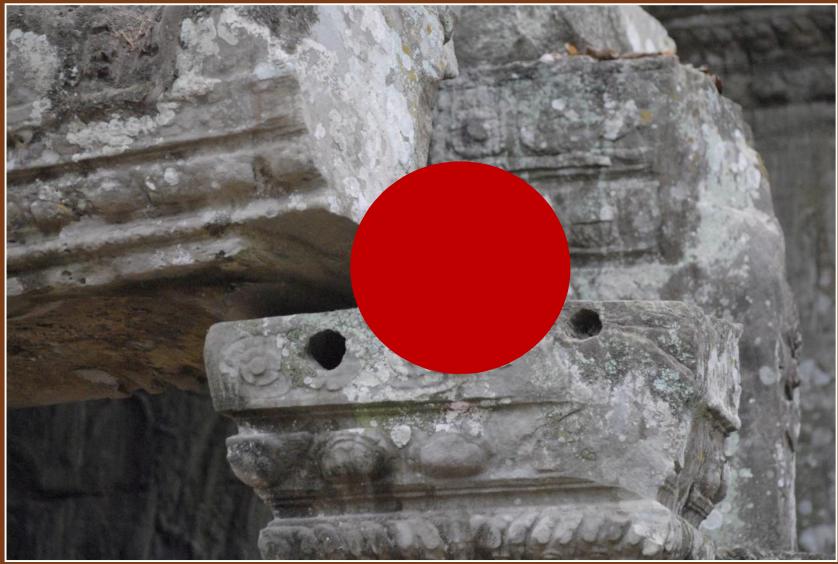
GOPURA ON FIFTH ENCLOSURE (West), TA-PROHM, TEMPLE



Reversible supports





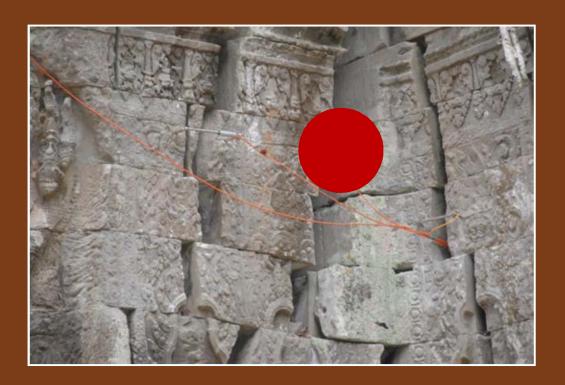


Tilt meters at 4 locations to monitor rate of inclination









Crack meters installed at 4 location to determine rate of movement











Tree Support along with weather station







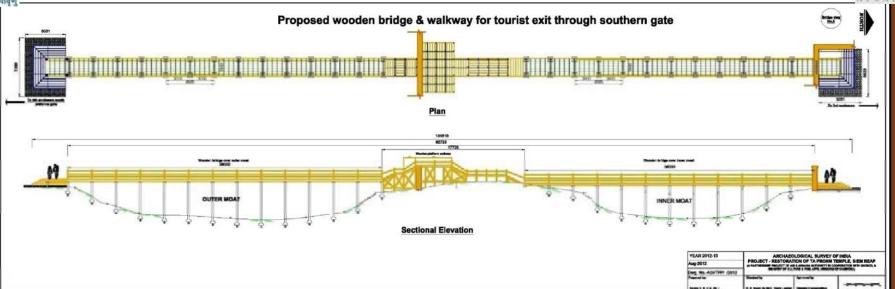






Wooden Walkways









Before

During

Construction of bye pass bridge for exit from south







Construction of bye pass bridge for exit from south







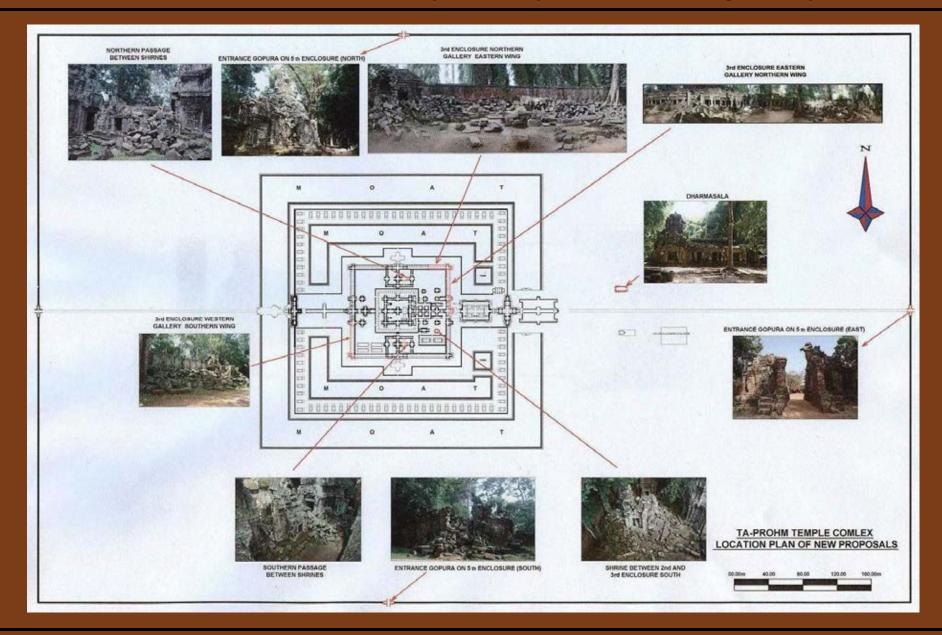
FIELD WORKER (ASI),TA-PROHM,TEMPLE





Future Conservation Works to be undertaken by ASI (Phase III)

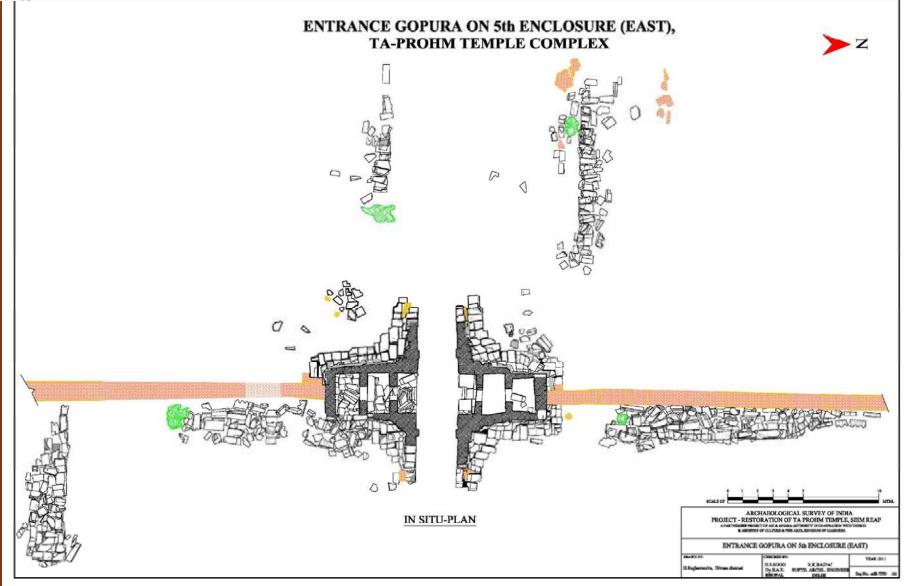
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Ta Prohm Temple – Location plan of new proposals



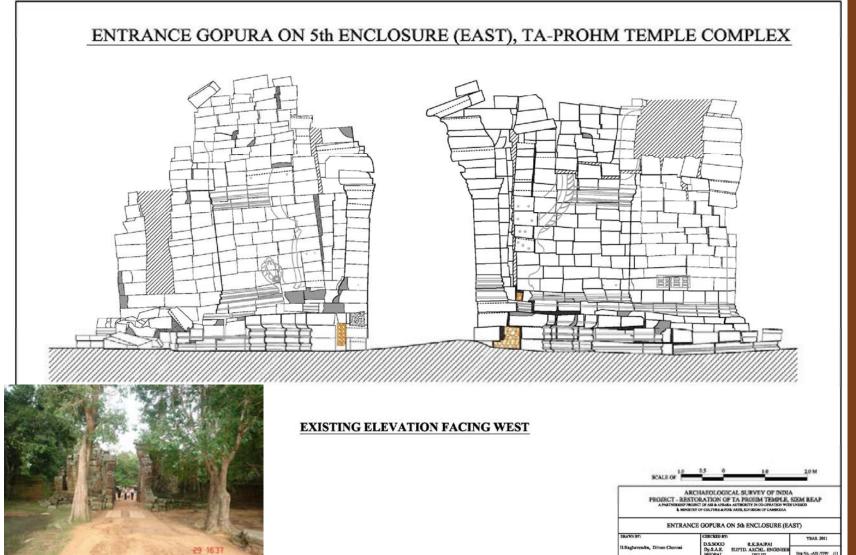




Plan of Eastern Gate



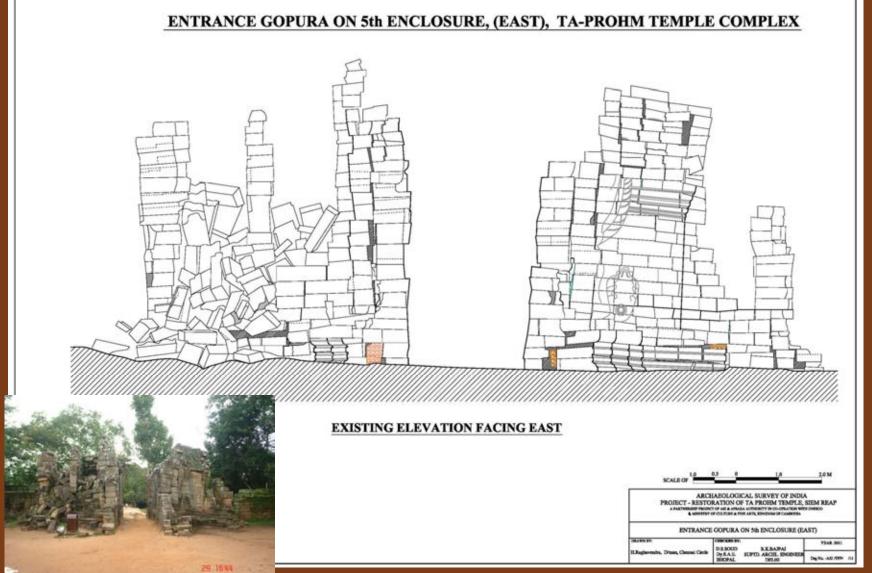




East Gate Facing West



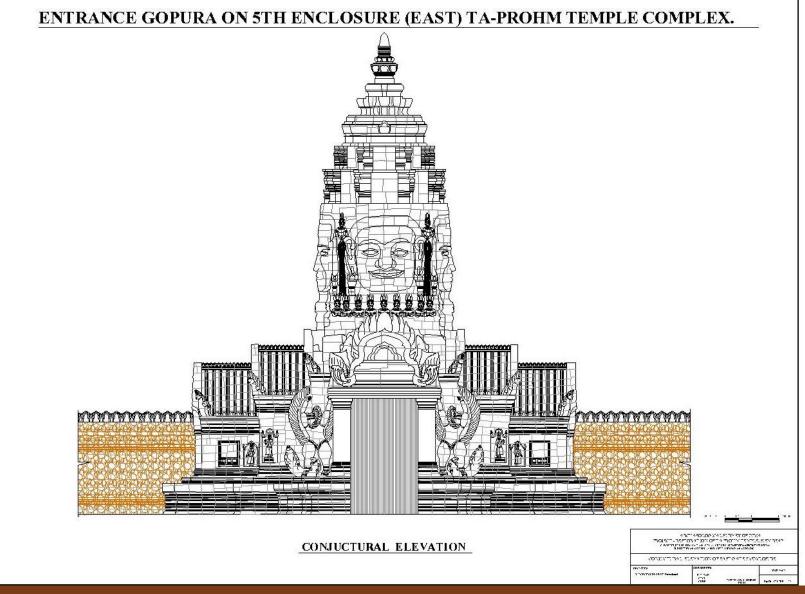




East Gate Facing East



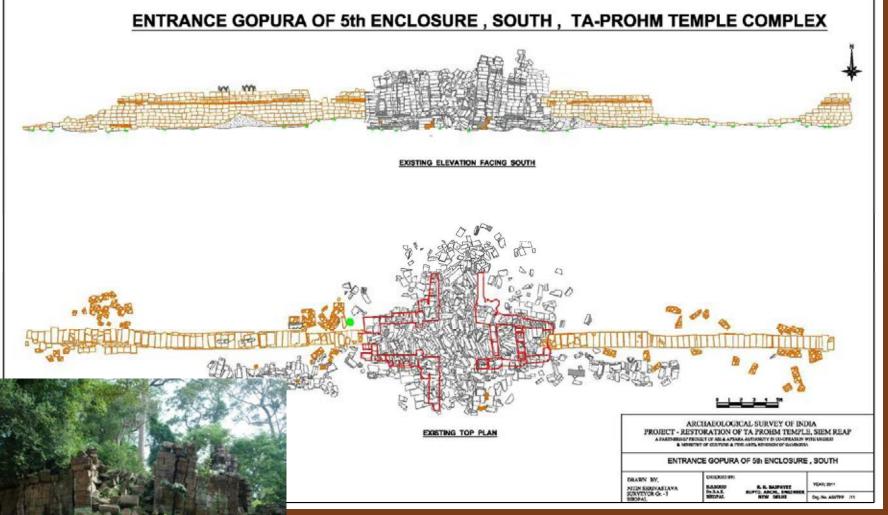




Conjectural Elevation of East Gate



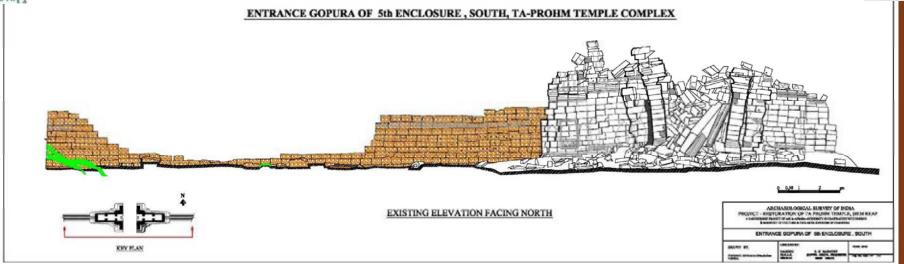




South Gate (facing South)









South Gate - facing North





Thank you for kind attention....