

Taxila

2055

Archeological Master Plan

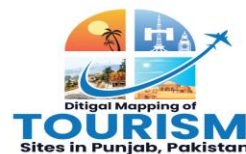


The Urban Unit

Urban Sector Planning & Management Services Unit (Pvt.) Ltd.



Tourism, Archaeology
and Museums
Department,
Government of the Punjab



Taxila

Archaeological Heritage Master Plan



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Summary

Taxila, the cradle of the Gandhara civilization and home to the world's oldest university, was declared a UNESCO World Heritage Site in 1980 and, in 2025, has been designated as a Pakistan Heritage City.

The city of Taxila is a great legacy of the Gandhara civilization and Buddhist heritage. According to Pakistan Tourism Development Corporation (PTDC), around 2000 Buddhists visit the archaeological sites located in Taxila yearly. Even though Pakistan houses 70% Buddhist religious sites, the number of visiting pilgrims is nearly no way close to that of visiting other countries that promote the Buddhist religious tourism. Prime Minister Task Force conducted the International Gandhara Symposium in July 2023 in which the potential of religious tourism in Pakistan was discussed along with plans of investing in Gandhara tourism, creating job opportunities for the locals and bringing in foreign exchange.

The Taxila Museum showcases artifacts found on site during the excavations done by Sir John H. Marshall under a sustained 21-year campaign, every year from 1913 to 1934. These excavations were recorded on film and contribute to the protection and management of key sites and monuments in Pakistan and South Asia in the present. The UNESCO recognized archaeological sites (since 1980), visited frequently by Buddhists, local tourists, and heritage enthusiasts alike, are still not promoted on the international scale and hence, are also not integrated in the city in a manner that celebrates them and invites the visitors to delve into the history of the city.

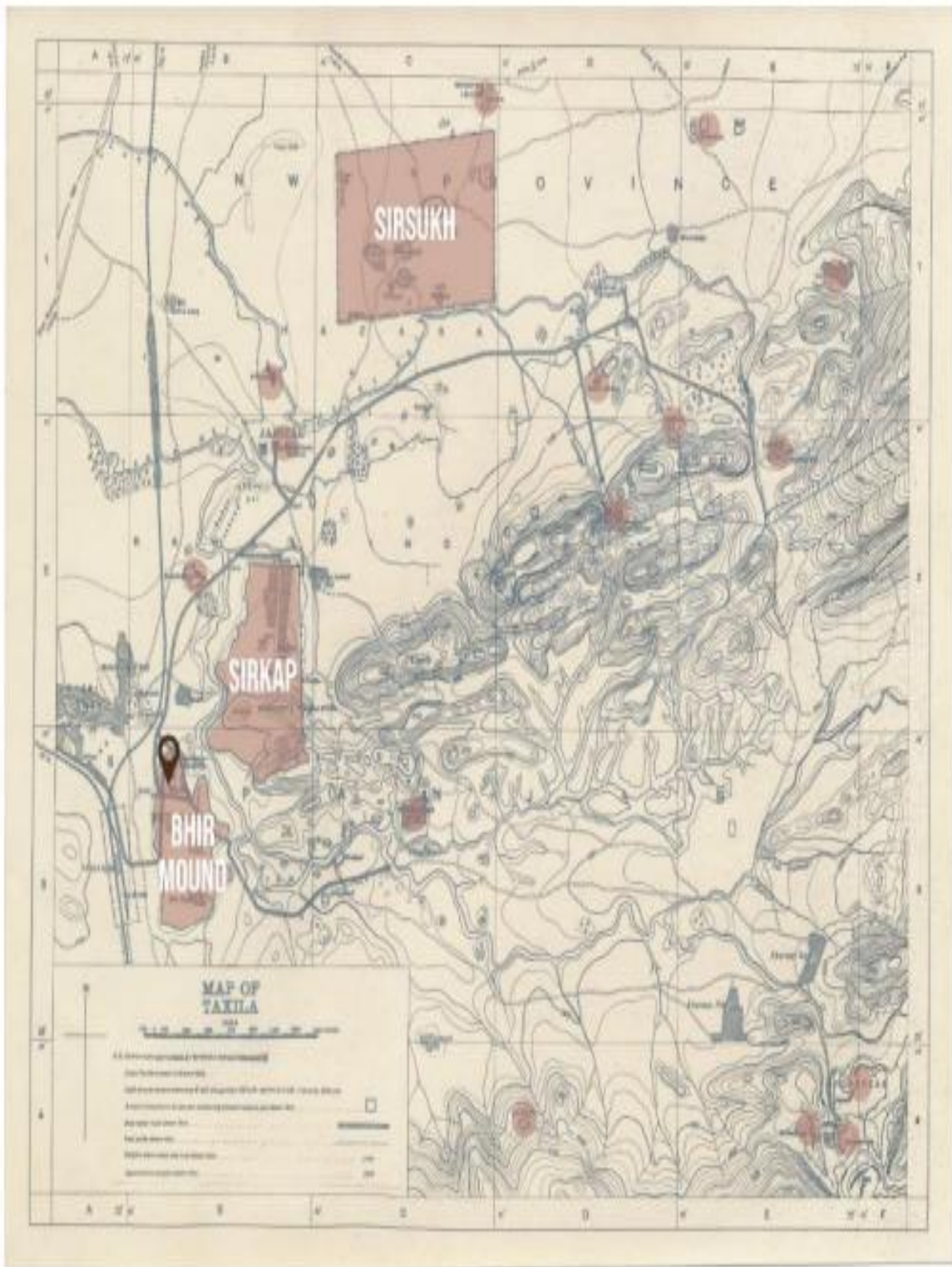
The obtained relics and artifacts from the excavation sites are now displayed in the collection of Gandharan Art at Taxila Museum which was established in 1928. With minimal additions of one gallery to the museum building, this archaic presentation of the heritage of region is frequented by local (educational trips etc.) and international tourists (religious tourists, foreign delegations, etc.) but the country fails to tap into the full potential of religious tourism of the city and its surrounding archaeological sites. The course of history and development of the city from its conquest by Alexander the Great to the Mauryan rule to then the Indo-Greek occupation and eventually by Shakas, Parthians, and Kushans, respectively, could have been celebrated to emphasize on the richness and significance of the region. The Taxila Museum falls short in depiction of the phases the ancient city has seen and tying together a journey to the archaeological sites.

The archaeological sites also remain as they were found with the addition of approaching stairs and ticket counters, but no threshold space as visitor's facilitation center can be found that guide the tourists visit to the city. This neglect and lack of celebration of the city has created a gap between past and present of the city where Taxila has become sidelined as a popular destination for Buddhists, heritage enthusiasts and leisure seekers alike.

Today most of these sites are fragmented and mostly linked through a chaotic path winding through busy overcrowded roads, ill planned urban fabric, broken or extinct pavements, shabby shops and ignorant dwellers who think these structures and ruins are alien to this part of land.

Taxila, 32 kilometers away from the federal capital, was once the ancient city of Takshashila – city of cut stone, widely known as the capital city of the Gandhara civilization, hosted one of the world's first universities, founded in the 6th century BCE. It was a major center of learning for over a thousand years, attracting scholars and students from all over the world. It was a cosmopolitan settlement lying on the junction of strategic trade routes, Silk Road, of Indian subcontinent and Central Asia. The city has gone through various political controls, built remains of which still exist and there are many more that lie under these ancient ruins. Unfortunately, we are unable to buy established iron age mounds like Hathial, only comprising 8 Kanal 15 Marla land in private ownership. Such places are on the verge of extinction as for private owners, almost 9 Kanal worth of agriculture is more important than ancient culture.

This Master Plan aims to overcome these shortcomings through careful planning to formulate a journey for the tourists, from past to the present. It will explore the notions of path and journeying in experiencing the course of time the city has lived through.



1. The Historic Taxila

Taxila, one of the oldest living cities in the sub-continent, lays its origin in the Neolithic period (mid 4th millennium BC). The Taxila Valley gained significance with discovery of evidence from its Harappan phase (3100- 2500 BC) at sites such as Sari Kala followed by Jhang, Pind Nauseri, Khada and Hathial. These discoveries confirmed Taxila Valley's role in broader cultural and urban development associated with the Harappan civilization. The cultural assemblages of the early Harappan phase in the Taxila Valley exhibit a remarkable consistency in stone tool technology and ceramic art, aligning closely with those found at contemporary sites stretching from the Gomal Valley to Sindh Province (UNESCO World Heritage Centre, 2010).



Figure 1: AI generated image of Sirkap

The earliest rulers of Taxila were the Takshakas-ancestors of the modern Taka tribe-whose name originated from their worship of Takila, i.e. serpents. The city's name Taxila, correctly Taksha-sila, i.e. the hill capital of the Takshakas. Interestingly, its Persian equivalent is Margalla from Mar (serpent) and Qila (fort). Taxilla is situated on the western side of the Margalla Hills, along with the bank of a local river known as Tamra nala-

more accurately Dharama-nala (Dharma meaning "Buddhist moral law). This river's name is believed to be derived from a nearby Buddhist stupa, called Dharmarajika stupa, the first of its kind erected by the Mauryan emperor Asoka about the middle of the 3rd century B.C. (Dani, 2010).

Most of the Buddhist stupas and monasteries date from 1st to 5th century AD although the Dharmarajika Stupa was founded by Asoka in 3rd century BC. The most important structures are Jaulian, Mohra Muradu, Piplan, Kalawan, Kunala and Mankiyala. Sir John Marshall, through his extensive researches, placed Taxila in its true historical and cultural perspective. The excavated material has helped us gain valuable information about arts, crafts, social and economic system, customs, creeds rituals and architecture of the area, spanning from 6th century BC to the 5th century A.D.

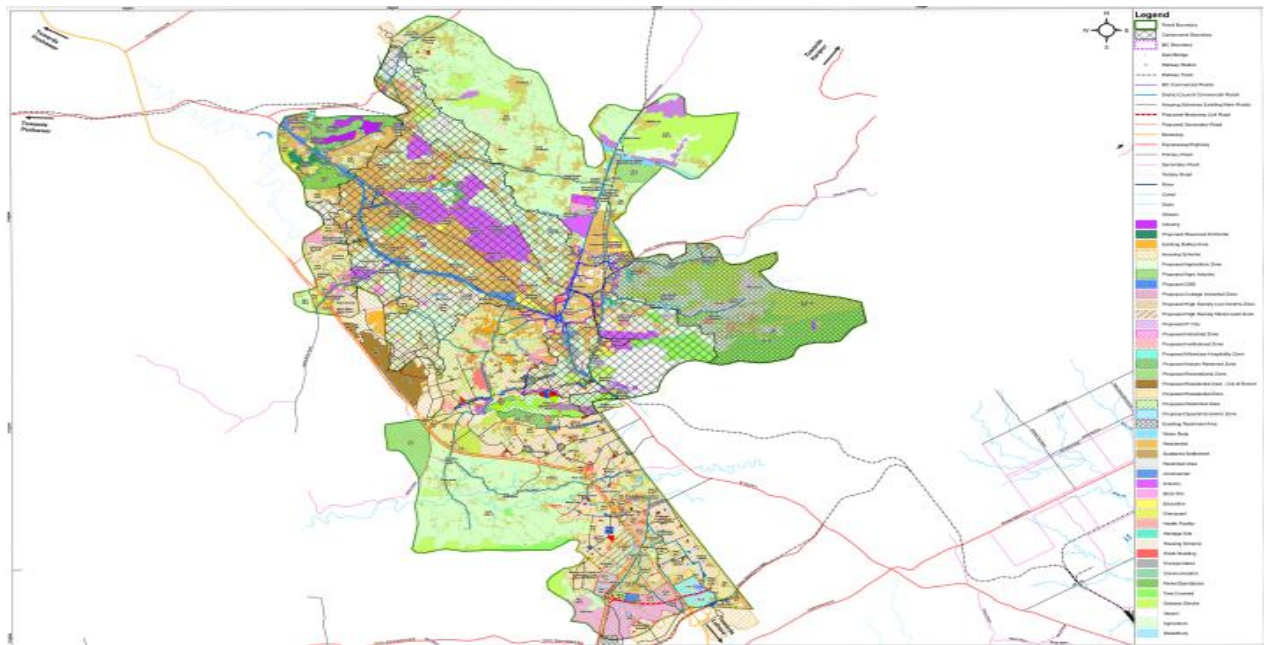


Figure 2: AI generated image of The Ancient Taxila

The ruins of Taxila consist of many different parts of the city buildings and Buddhist stupas which are spread in almost 100 hectares. The main ruins of Taxila are divided into three major cities, each belonging to a distinct time period. The oldest of these is Bhir Mound, associated with the historic event of the entry of Alexander the Great into the city, which dates to 6th century B.C.E. The second city of Taxila, built by Greco-Bactrian kings in the 2nd century B.C., is located at Sirkap. The third and last city of Taxila is at Sirsukh and relates to the Kushan kings. In addition to the ruins of city, a number of Buddhist monasteries and stupas also belong to Taxila area. Some of the important ruins of this category include the ruins of stupa at Dharmarajika, the monastery at Jaulian, the monastery at Mohra Muradu, in addition to a number of stupas (UNESCO World Heritage Centre, 2010).

2. Present Day Taxila

Present day Taxila is one of the seven Tehsils (sub-district) of Rawalpindi District. The tehsil of Taxila is administratively subdivided into 10 Union Councils. According to the 1998 census, it had a population of 371,140 and 739,244 in 2023 (City District Government, Rawalpindi, 2024). It is spread over an undulating land in the periphery of the Potohar Plateau of the Punjab. The industries include heavy machine factories and industrial complex, ordinance factories of Wah Cantt and cement factory. Heavy Industries are also located here along with, small, cottage and household industries of stoneware, pottery and footwear. A hotel of the tourism department offers reasonably good services and hospitality to the tourists. Taxila has many educational institutes including University of Engineering and Technology (UET). Taxila Museum, dedicated mainly to the remains of Gandhara civilization, is also worth visiting.

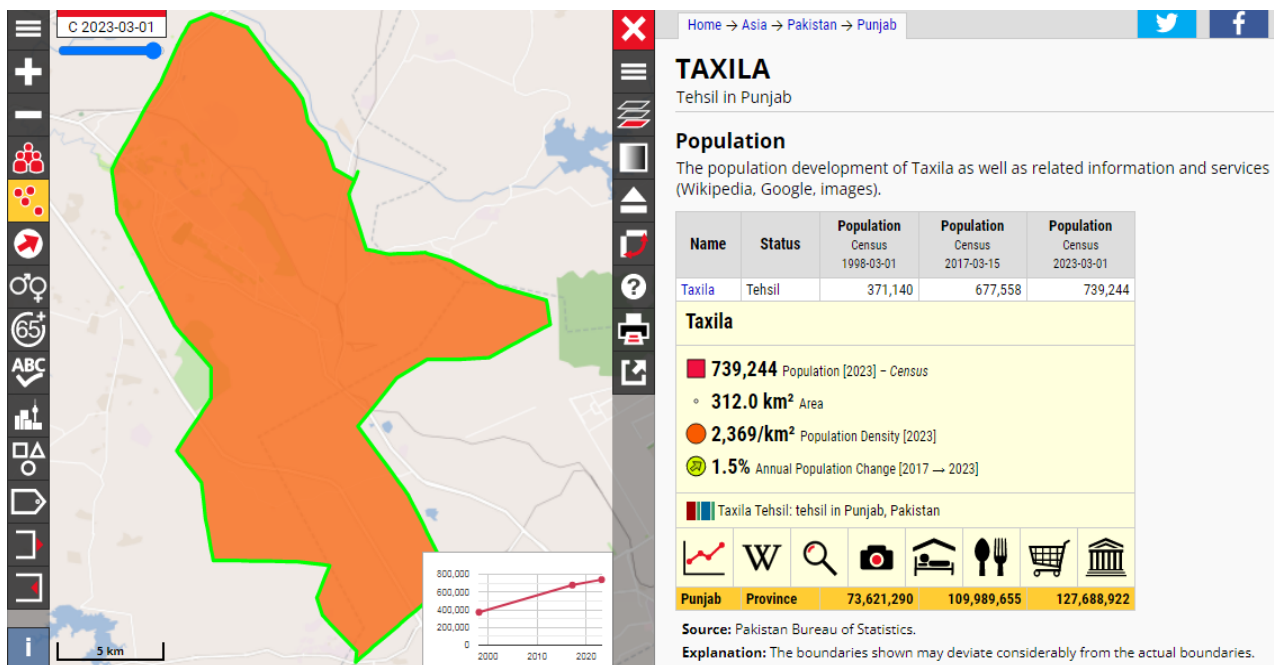


2.1. Administrative Structure

Department of Archaeology, Museums & Tourism, Ministry of Culture, Government of Pakistan is responsible for management of the site. The administrative setup of the site includes Deputy Director, Archaeological Engineers, Curators, Archaeological Conservators, Conservation Assistants, Clerks, Masons and Attendants. Planning Department of Ministry of Finance, Government of Pakistan monitors and audits the utilization of funds.

2.2. Management plan

As a management tool, planning helps protected area managers to define and then achieve the mandate of the protected area under their care. A Management Plan can be defined as a written, circulated and approved document which describes the site or area and the problems and opportunities for management of its nature conservation, land form or landscape features, enabling objectives based on this information to be met through relevant work over a stated period of time (Eurosite, 1999). The Management Plan is outcome of structured planning process, outlining the adopted management approach, the decisions taken along with their rationale, and providing clear guidance for future management efforts. This Management Plan should cover the entire protected area. It should contain information on what the management seeks to achieve and the rationale behind the management decisions made (Eagles *et al.*, 2002).



As noted by UNESCO, a management plan for site has been developed but it is not implemented accordingly. The Management Plan of property contains the administrative set up for its preservation, conservation and protection since its declaration as a protected registered monument. The present management plan is, however, not sufficient to look after the entire Taxila complex (UNESCO World Heritage Centre, 2010). It needs to be strengthened on international standards as well as scientific and modern approaches. Moreover, for a management plan to be effective, it must be implemented and monitored accordingly — specifically in this context when Taxila is being declared as Heritage city, with an intention for its inclusion on UNESCO World Heritage Cities list.

2.3. Buffer Zones and Boundaries of the World Heritage Site

Buffer zones are an important tool for conservation of properties inscribed on the World Heritage List. All along the history of implementation of the World Heritage Convention, the protection of the “surroundings” of the inscribed properties was considered an essential component of the conservation strategy, for cultural and natural sites alike. As with most management tools for the protection of World Heritage sites, a buffer zone is meant to protect the Outstanding Universal Value of a site as identified during the nomination process and confirmed by the decision of the World Heritage Committee (Martin and Piatti, 2009).

In order to be effective, however, it is necessary to ensure that it has a logical and clear boundary, and that regulations and policies have been developed which provide for all of the necessary protection of the Outstanding Universal Value of the World Heritage site. Further, buffer zones should be seen as part of a large integrated planning process which brings together the concerns for heritage along with the needs of development and improved quality of life. This planning process and its resulting management system should be effectively implemented and monitored over time, and where necessary, regulations and policies should be adjusted in order to make improvements (Martin and Piatti, 2009).

In case of Taxila, the borders and buffer zones of the property are not adequate. Few years back, a sports stadium was constructed on the protected area of Bhir Mound, Taxila. However, following a notice from Director General of the World Heritage Center, the construction of the football stadium was halted, and the removal of the boundary wall and gate associated with the new construction was ensured. According to state of conservation reports of various years, presence of heavy industries and stone quarries can also have a negative pressure on integrity of sites.



These constructions are located outside very limited buffer zones of the property. For this purpose, a stone quarry has been closed to reduce its negative impact on remains of the Jaulian site- Dharmajika Temple and Bhir Mound (UNESCO World Heritage Centre, 2010). The World Heritage Site of Taxila is under increasing pressure from surrounding resident population. Moreover, there is no proper law enforcement and monitoring for protection of boundaries and buffer zones. Only a few sites are fenced, and even those are being improperly used as stables.





2.4. Financial Resources and Investments

The Department of Archaeology and Museums collect funds through different resources, such as the Gate Money/Tickets and other resources as national budget, which are utilized for protection of the property. The Department of Archaeology & Museums Government of Pakistan carries out the conservation of sites and monuments under two types of budgets: Normal Budget and Annual Development Program. The main source of funds for the Department of Archaeology & Museums for the conservation and protection of Cultural Heritage is allocation from the National Budget.



Figure 3: Department of Archaeology & Museums, Taxila

Normal budget is provided annually which is used for the conservation, management and repair of the sites. Moreover, urgent issues and problems concerning conservation of the sites are also dealt with. Under the Annual Development Program, Government provides funds to the Department of Archaeology & Museums on the already approved schemes and provides annually according to the approval phasing of the scheme.

It's been observed that all these budget grants are either insufficient or not utilized properly at sites. The hired lower staff is lethargic and non-technical and mostly under paid. They always complain of insufficient facilities, pay, etc. It's also noted that complains regarding weeding chemicals complain are also very high, as quantities provided seems insufficient, resulting in damage to sites. Absence of staff from the site is quite common, as we witnessed fires in the weeds-either caused by caretakers or visitors-which is not permissible. Furthermore, fenced compounds were observed being used as grazing grounds or stables, causing damage to the monuments.

2.5. Visitor Management

Visitor management is defined as an ongoing process to reconcile the potentially competing needs of the visitor, the place and the host community (Kuo, 2002). Visitor management refers to tracking the usage of a public building or site (a protected area as a national park or heritage in this case). By gathering increasing amounts of information, a visitor management system can record the usage of the facilities by specific visitors and provide documentation of visitor's whereabouts. Visitor management, traditionally, has been concerned largely with visitor impacts and emphasis has been placed on managing negative consequences of tourism. The increasing number of visitors to the natural areas and inappropriate behavior by the visitors has led to a number of negative impacts on environment such as habitat destruction, changes to the wildlife behavior, and pollution within recreation settings. Visitor management has involved managing visitor numbers, attempting to modify visitor behavior and also modifying the resource. Visitor management planning includes providing visitors with information and education about environmental conservation in one hand and applying restriction to limit harmful activities in other (Thomas and Middleton, 2003).

Since Taxila's inscription on World Heritage List by UNESCO, large number of local and foreign tourists are attracted to the area. Department of Archaeology and Museums has made several efforts to facilitate the visitors. For this purpose, a number of published materials are provided for information of tourists in the shape of Leaflets, Books and Information Booklets. However, **there is no proper visitor management plan** for the site, according to international standards. There is little restriction to buy entry tickets especially for local visitors but law enforcement is absent. Local people from the surroundings often gather at the site without entry tickets and pass leisure time there specially in Bhir and Sirsukh. This situation puts ecological pressures on the site. A comprehensive visitor Management Plan is required for proper management of area.



A Master Plan for the Development and Restoration of Archaeological Sites from Taxila to Swat Valley was approved with the cost of Rs. 200 million. Conservation work in different sites of Taxila has been completed under this project. These conservation works include removal of vegetation, placing of sign boards, fencing the important structures, conservation of ancient monuments, improvement of visitors' facilities and reorganization of Taxila Museum. No doubt, much has been done, but it is not enough. A great deal more is required—especially considering that Taxila Heritage City is being proposed first on national level and then for inclusion in the UNESCO World Heritage Cities program.

2.6. Information, Education and Social Awareness Regarding World Heritage Site Taxila

Valley map indicating different sites and their distance is placed at Museum campus gate. Sign boards indicating historical sites and their status as World Heritage Site are well placed on the main roads and entrances. These indicating boards are written in both English and Urdu. Besides, information and explanations regarding cultural heritage inside the sites are also available. Every part of the site has a plate explaining history, usage and purpose of that place.



Figure 4: Signboards at Taxila Valley

Moreover, several print materials for information about the heritage sites, in form of leaflets, brochures and guides are also available. During research, face to face interviews were conducted with decision-makers, including management authorities and beneficiaries comprising local population and tourists. In these interviews, questions were asked to different persons in order to measure the awareness level. The most important purpose of these questions was to find out the knowledge of people living or visiting the area regarding status of the area as WHS. Unfortunately, majority of locals have no or very little information regarding these monuments. Most of them have no clue of what it is, and quite a few believe it to be the work of aliens. Every person has its own story to tell regarding these monuments. Majority of the people knew about importance of the area as historical place but were not aware its status as WHS. There are many reasons of this ignorance like illiteracy and lack of information regarding this issue.

2.7. Laws & Regulations for Protection of Property

Antiquities Act 1975 of Pakistan provides adequate remedies for protection of the property. For all World Heritage Sites, the International Conventions/laws concerning protection of Cultural Heritage are also applicable, which provide additional guarantees for its protection. The following Laws and Regulations are concerned with protection and management of cultural properties in Pakistan:

1. Antiquities Act, 1975
2. Excavation & Exploration Rules, 1978
3. Conservation Manual of Sir John Marshall
4. Dealing in Antiquities Rules, 1989
5. Export of Antiquities Rules, 1979
6. Immovable Antiquities (mining, quarrying and blasting in restricted areas) Rules, 1979
7. Admission of Public into Immovable Antiquities Rules, 1982
8. Cinematographical Filming Rules, 1980

The existing Antiquities Act of 1975 has some flaws, which are being removed. The proposed amendments will certainly make the law strong enough to deal strongly with the violation of the relevant laws concerning protection of cultural heritage (UNESCO World Heritage Centre, 2010).

It is observed that, despite existence of a bundle of laws and regulations, none are being effectively implemented. Practically, at each site, two individuals deal with everything from tickets to cleaning, spraying, safeguarding and other tasks. We were told that staff has been drastically reduced but we found profound differences site to site. Julain and Bhamala were maintained to international standards, Dharmarajika, Mohra Moradu, Piplan and Sirkup were up to the mark. Mankiala fencing is being used as stable; Badalpur was cleaned of weeds by setting fire to it. Lal Chack is left to erode by itself. Bhir Mound is used as playground and is deteriorating very speedily. Thanks to their location Ghiri, Bhallar and Kunala are a bit too far away from population, hence in safe hands of nature. Although no official actions are being taken, Sirkukh is being excavated by locals for stones. Old maps indicate the presence of Hathial range but today only a mound measuring 8 kanal 15 marla is standing in private ownership and under risk of being leveled for cultivation purposes. Jandial mound is eroding. During our visits, we found no one at majority of these sites unless prior arrangements had been made for it.

2.7.1. Observations

It has been observed that safeguarding these monuments is not solely a matter of laws, regulations, or funding-it is the genuine interest in their preservation that truly matters. Therefore, we must develop a mechanism to cultivate this interest among management authorities, local communities, the general public, and visitors if we wish to preserve these sites for the future.

2.8. Threats and Pressures in Taxila World Heritage Site

There are a number of threats and pressure which have become hurdle towards conservation activities. These can be categorized as follows:

- Major problems of conservation at World Heritage Site of Taxila are wild growth of vegetation, weeds, lichen, fungus, mosses, termites, etc. Although removal of wild vegetation has been done in recent project, it has grown back again. Growth of wild vegetation causes deterioration and disappearing of important archaeological structures. The impact of wild vegetation is most prominent in the sites of Sirkup and Sirsukh. It is necessary to take serious steps to overcome this issue. A long-term policy must be formulated involving local community instead of short-term projects. For this purpose, effective management plan and continuous monitoring is necessary. One of the simplest forms of monitoring is that carried out by communities and the general public. However, to be effective, this monitoring requires an awareness-raising program to highlight the significance of the heritage and the importance of identifying and reporting change (Collete, 2007).



Figure 5: Growth of wild vegetation on important Archaeological structures

- Changes in climatic indicators have adverse effects on both natural and cultural World Heritage properties. The Archaeological remains at Taxila lie under tropical climatic conditions. Due to their constant exposure to air use as well as the weather effects, like temperature, rain, storm, etc., the remains developed cracks, leaned, bulged out, collapsed, or decayed considerably (UNESCO World Heritage Centre, 2010). Moreover, due to heavy rain, several sites also face deterioration due to excess of humidity. To overcome the effects of climate, serious steps must be taken in order to achieve the conservation status of an international level. There is a need for more research on effects of climate change on both the physical heritage and the social and cultural processes that they are a part of. If a Management Plan is specifically designed and structured as a dynamic working document that can

be regularly updated, it can serve as a key tool for the effective stewardship of World Heritage sites threatened by climate change. This approach also allows flexible integration of climate change response actions throughout the document (Collete, 2007).



Figure 6: Deterioration of site due to climate change (particularly heavy rains)

- The World Heritage Site of Taxila is also facing serious environmental pressures from local residents. The local people spend their spare time in the heritage site without any restriction e.g. Bhir Mound, the oldest recorded city, is used as a cricket ground. This creates environmental disturbances in the area. Moreover, activities like construction and animal grazing around the heritage site also damage the site. We interviewed locals who consider their monuments as work of aliens and have no social or cultural attachment to these; hence, they do not hesitate to destroy these without even thinking. Our team held a meeting with University of Engineering Technology students and faculty regarding their internship program and we brought them in contact with Deputy Director for social awareness program.



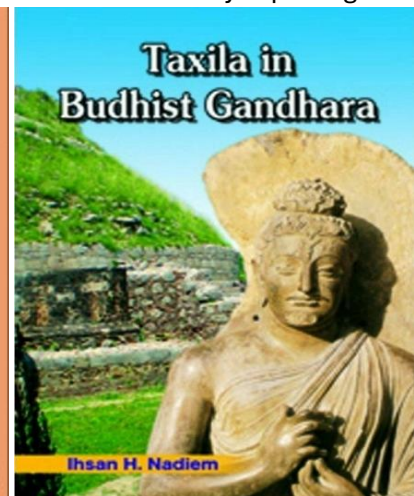
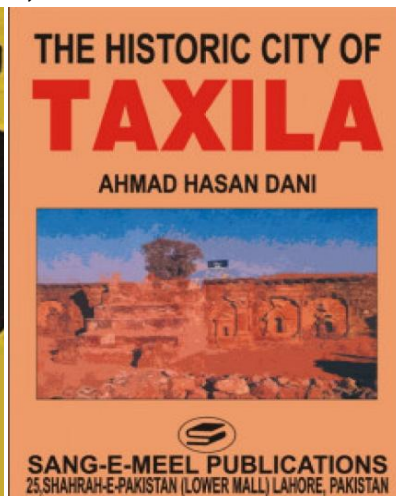
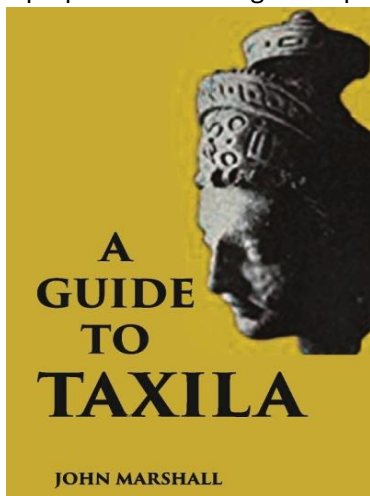
Figure 7: Use of Archaeological site as a sports ground by local community

- The roads approaching various sites in the area are not in good condition. During rainy season, these roads are flooded with rainwater, making access to sites very difficult. During field work, it was observed that main road connecting several sites needs to be repaired.
- Moreover, several improvements are desirable, such as provision of facilities to the visitors, research facilities for scholars, information leaflets/books in National Language for school-going children and general public.

3. Recommendations & Suggestions

A number of problems persist and need to be overcome. Recommendations and suggestions have been made in light of the collected data during this research. These can be outlined as:

- Basic reason of the problems related to World Heritage Sites is lack of proper implementation of management plan. Effective enforcement of management plan is necessary for management of the area according to international standards. Moreover, participatory and holistic approach to prepare management plans for World Heritage Site is necessary to deal with related issues more efficiently. **(Creation of Taxila Heritage City Authority)**
- Development of buffer zones is an important tool for conservation of properties inscribed on the World Heritage List. Conservation and protection measures can be strengthened by identifying buffer zones to prevent construction activities in the areas adjoining World Heritage Sites. There is a strong need to develop adequate buffer zones in order to reduce pressure from the site. As observed, very few monuments have a defined boundary. Buffer zone may be existing in papers but they are absent in case of Ghiri, Jandial, Hathial, Lal Chack, Badalpur, Kalawan, Sirsukh etc. The remaining monuments, although enclosed by physical boundaries, were observed to have cattle grazing and people moving about within the premises. **(Bhir open air Museum, Restoration and preservation of Monuments)**
- It is necessary to develop and implement an efficient Visitor Management Plan for the site. With a proper visitor management plan, visitors are forced to travel in a restricted manner by improving their



knowledge, attitudes and behavioral variation towards protected status of the area. Thus, many historical ruins and natural features can be protected from the harmful effects of increased visitor numbers. **(Gandhara Tourist Trail)**

- Strong efforts should be made to increase the awareness of local population living in the vicinity of World Heritage Site about significance of the site. For this purpose, information regarding values and benefits of the sites must be advertised in effective mode. Participation of relevant institutions, agencies and organizations to arrange public training programs on conservation activities can contribute a lot in this concern. **(Institutional involvement form of UET Taxila internship Program with Public sector)**
- It is not possible to conduct conservation activities steadily, without support of the local population. Moreover, problems concerning this topic can be resolved more easily and promptly by formulation of continuous active protection measures and constant supply of financial resources. **(Public Private partnership in form of Gandhara Crafts Street & up gradation of Gandhara Art Village)**
- The following specific actions to adapt to climate change may be necessary at the regional or local level to ensure the ongoing refinement of adaptation strategies as climate projections become more accurate: Enhancement of appropriate education and traditional skills; rigorous ongoing monitoring and maintenance; research to support national/regional decision-making; planning for emergency preparedness; re-evaluation of management priorities in response to climate change; training on the various problems and possible responses to climate change in all aspects of conservation activity namely, development of traditional skills, monitoring, management and emergency preparedness (Collete, 2007). **(Training of onsite staff)**
- The access roads must be constructed, especially main Haripur Road which connects various important sites of Taxila WHS. There should be integration between different departments of government to achieve this target. **(Ceremonial gate and landmark at GT road and remodeling of all access roads)**
- For proper conservation and management skilled persons must be hired. Moreover, workshops and seminars should be conducted to skill the persons already working with involvement of experts. A major campaign needs to be launched to make public aware of this treasure nationally and internationally **(Gandhara Websites and Apps)**
- The Taxila Museum is relatively small compared to the vast number of artifacts it holds. Moreover, aside from basic displays, it lacks the use of modern technologies such as holograms, 3D modeling, AI, or audio/visual installations. It is imperative to upgrade the museum to match international standards by incorporating cutting-edge technologies. **(Expansion of Taxila Museum)**
- At present hardly any tourist facilities exist in Taxila. TDCP operates a very minimal boarding facility while no information or guidance offices exist apart from Museum but its presence is minimal. Tourist infrastructure needs to be uplifted on international standard. **(Tourists Facilities)**
- Apart from human-made activities, cultural heritage sites are also vulnerable to extreme natural catastrophic events. For example, earthquakes have caused considerable destruction to heritage sites in South Asia and across the globe throughout human history. Pakistan has a rich seismological history, evidenced by numerous significant earthquakes. Notably, 'the Great Earthquake' in the early first century CE that destroyed Taxila, and the 2005 Kashmir earthquake with a magnitude of 7.6,

which impacted the entire region, underscore the high seismic risk faced by World Heritage sites in the country. However, no geophysical studies have been carried out at the WHS that offer advantages over the traditional archaeological surveys due to their time, cost effectiveness and especially non-invasive nature, which is always a pre-requisite to avoid any damage to heritage site. The horizontal-to-vertical spectral ratio (HVSR) geophysical method has extensively been used in geo hazard related studies; however, it has rarely been employed in archaeological studies. Owing to the location of WHS in a seismically vulnerable Taxila city and their cultural importance, there is a strong need for the HVSR investigations to evaluate its seismic vulnerability. **(Seismic Vulnerability Studies and Implementation)**

- Case of *Dharmarajika* and *Hathial* specifically need attention of authorities. Hathial mound, measuring 8 kanal 15 marla, is owned by a private owner and if not bought it will soon be giving way to cultivation, as rest of Hathial range has done. Dharmarajika is surrounded by the private land and the property owner has constructed a boundary wall and gate, effectively restricting access to the stupa, claiming that the original path now ran through his land. Land from both landlords must be bought and brought to public domain to safeguard very important monuments. **(Purchase of land consisting monuments or access to monuments)**

4. Taxila Master Plan Highlights

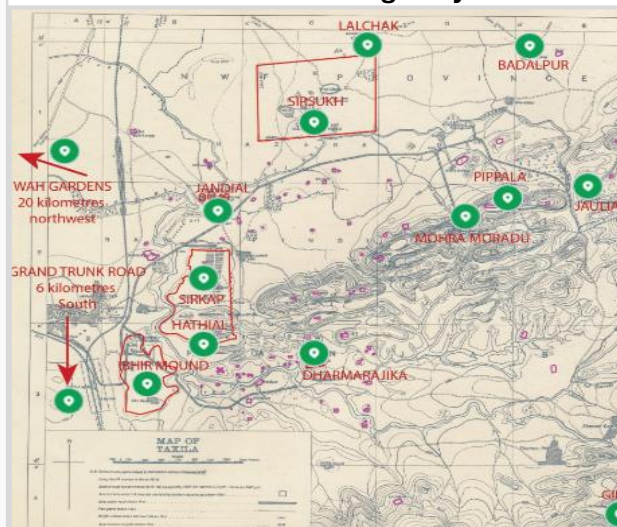
4.1. Creation of Taxila Heritage City Authority

At present, Taxila Heritage is divided into the provinces of Punjab and KPK administratively; nearly half of the monuments exist in Punjab, while rest are in KPK. Although these monuments are located less than a kilometer apart, their lack of physical and administrative integration prevents them from forming a cohesive Heritage City. Currently, the two halves fall under different administrative jurisdictions, which poses a significant obstacle to establishing the Taxila Heritage City at the national level and may further complicate its future inscription under the UNESCO World Heritage Cities Program. Hence, it is proposed that monuments from both the provinces be united and a new administrative structure be formed as TAXILA HERITAGE CITY AUTHORITY on lines with LAHORE WALLED CITY AUTHORITY. All future development and upgradation shall be carried out keeping in view of this setup jointly as one Heritage City.

Taxila Heritage City

Monuments/ Sites at Taxila Punjab

1. Taxila Museum
2. Bhir Mound
3. Dharmarajika Complex
4. Kalawan Complex
5. Giri Fort
6. Giri Stupa
7. Giri Mosque
8. Sirkup Cluster
9. Kunala Complex
10. Mohra Moradu Complex
11. Mankiala Stupa
12. Bhallar Stupa



Gandhara Art Taxila

1. Gandhara Art Village
2. Gandhara Art Street

Monuments/ Sites at Taxila KPK

14. Jandial Zoroastrian Temple
15. SaraiKhola Mound
16. Hathial Iron Age Mound
17. Sirkup Cluster
18. Piplan Complex
19. Julian Complex
20. Badalapur Complex
21. Jinan Wali Dheri Complex
22. Lalchak Complex
23. Tofkian mound
24. Bhamala Complex
25. Few minor Sites

This Authority shall be completely independent of existing administrative structure and shall be fully responsible with a given goal to enable Taxila Heritage City to be inscribed to **UNESCO WORLD HERITAGE CITIES PROGRAM** which at present have almost 300 member cities across the globe.

Achieving this goal will require several significant measures over time, as it is not a short-term objective. However, the current aim of establishing **TAXILA HERITAGE CITY** at the national level demands a series of strategic and well-reasoned actions, which are outlined in this Master Plan.

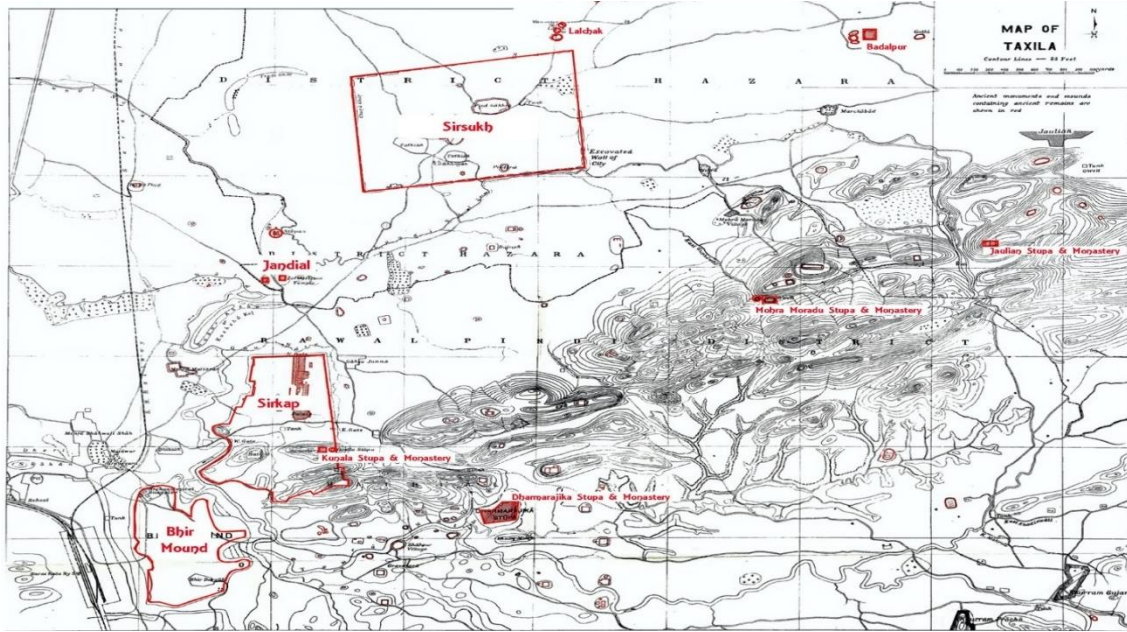


Figure 8: Map showing Taxila Heritage City sites

An early 20th Century map of **Taxila**, created by Sir **John Marshall**, shows the various archaeological sites in red. The conceptual map below illustrated the possible boundaries of **TAXILA HERITAGE CITY**.



4.2. Expansion of Taxila Museum

Taxila Museum holds one of the most significant and comprehensive collection of stone and stucco sculptures from the Buddhist Art of Gandhara Civilization. The museum is located in the middle of numerous archaeological sites scattered around the Taxila region and boasts a rich collection of Gandharan artifacts.

The Museum's core collection was discovered from the excavated sites of Taxila Valley, such as the settlement sites (capitals) of Bhir Mound, Sirkap and Sirsukh, as well as from the Buddhist stupas and monasteries at Dharmarajika, Mohra Moradu, Jaulian, Kalawan, Bhamala, Tofkian, Bajran and Giri to name a few.

Currently, approximately 7000 artifacts are displayed at the Taxila Museum and around 30,000 are preserved in the reserve collection. The collection includes sacred relics of Buddha, stone and stucco sculptures, stupas, relic caskets, inscriptions, beads, jewelry, coins, tools, pottery, utensils, and numerous other architectural and household objects.

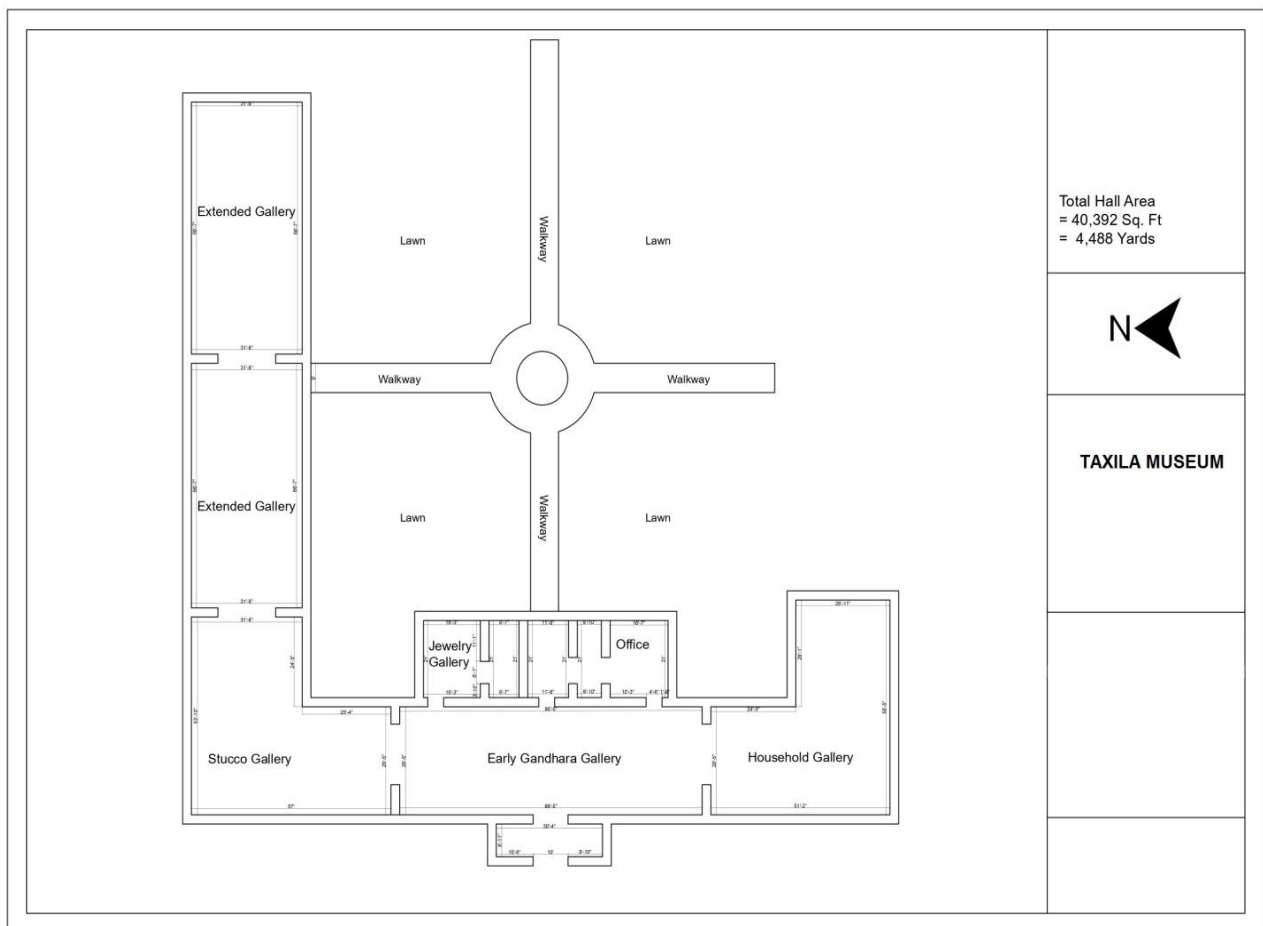


Figure 9: Existing layout of Taxila Museum

Construction of Taxila Museum started in 1918, its foundation stone laid by Lord Chelmsford, Viceroy of India in 1918. Construction was completed in 1928 and the museum was opened for public by Sir

Muhammad Habibullah then Minister for Education. Sir John Marshall, who was going to retire from the post of Director General of the Archaeological Survey of India in 1928, could not complete its original plan. The government of Pakistan constructed northern gallery in 1998.

Since 1998, no further expansion was done till today. It is proposed to complete the Taxila Museum to its original design created by Sir John Marshall who even left land for expansion of Museum. Below is the proposed layout of Taxila Museum.

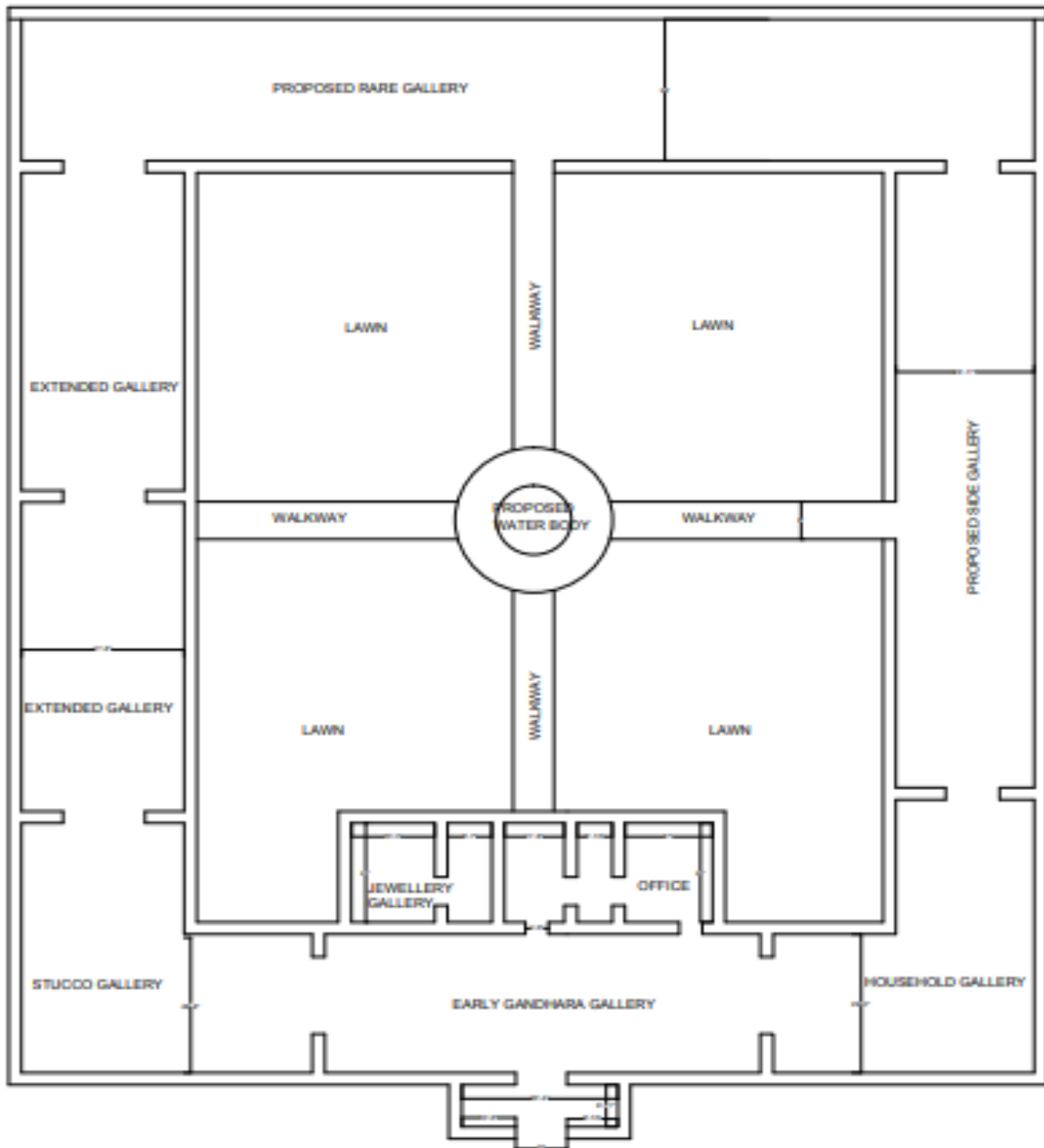


Figure 10: Proposed layout of Taxila Museum

On the right-hand side and at the back, new galleries will not only provide much-needed space for the display of artifacts but will also feature an AV/AI gallery, bringing cutting-edge technologies to the forefront of museum presentation through use of holograms, 3D models, and more. A complete restoration of all colonial buildings will also be carried out. Sir John Marshall's residence, which acts as a Guest House, is being restored nowadays.



Figure 11: Sir John Marshalls residence

4.3. Bhir Open Air Museum

An archaeological open-air museum is a permanent institution featuring full-scale outdoor architectural reconstructions, primarily based on archaeological evidence. It holds collections of intangible heritage resources and provides an interpretation of how people lived and acted in the past; this is accomplished according to sound scientific methods for education, study and enjoyment of its visitors.

There are about 300 archaeological open-air museums in Europe. Their history goes from Romanticism up to modern-day tourism. With the majority dating to the past 30 years, they do more than simply present (re)constructed outdoor sceneries based on archaeology. They have an important role as education facilities. Many of them showcase archaeology in a variety of ways. As compared to other museum categories, archaeological open-air museums boast a wide variety of manifestations.



Figure 12: AI generated picture of Ancient Taxila



Figure 13: Location map of Bhir Mound

The proposed **ARCHAEOLOGICAL OPEN-AIR MUSEUM at BHIR MOUND**, the earliest city site of ancient Taxila, is located between the railway station and the Tamra Nala and are partly occupied by the Taxila Museum Complex on the southern side. According to local tradition, Bhir Mound was the most ancient of all the sites in Taxila, and this tradition has been fully confirmed by excavations, which shows that the city had already been destroyed thrice and rebuilt before the Indo-Greeks founded a new capital, now known as Sirkap.



According to Sir John Marshall, Bhir Mound dates from 6th to 2nd century BCE. During his time, only two portions were unearthed here. Later excavations have also revealed structures in two small areas. The eastern complex, quite a large area, is composed of houses, city streets and lanes with a drainage system, and sanitary arrangements etc. The western complex excavated by Marshall was identified as a temple or shrine.

The layout of the city was haphazard, the streets for the most part being narrow and tortuous. No defensive walls of the city have been attested. The exposed remains comprise residential and commercial structures, divided by streets and lanes. Each house in Bhir Mound had a soak-well in its courtyard. A large open courtyard stood in the center and 15 to 20 small rooms were arranged around the courtyard. The houses had windows, and it seems that the roofs were made of wooden beams arranged side by side and covered with mud. It is presumed that this area with the houses belonged to elite. The structural remains are mostly built of combined limestone and Kanjur.

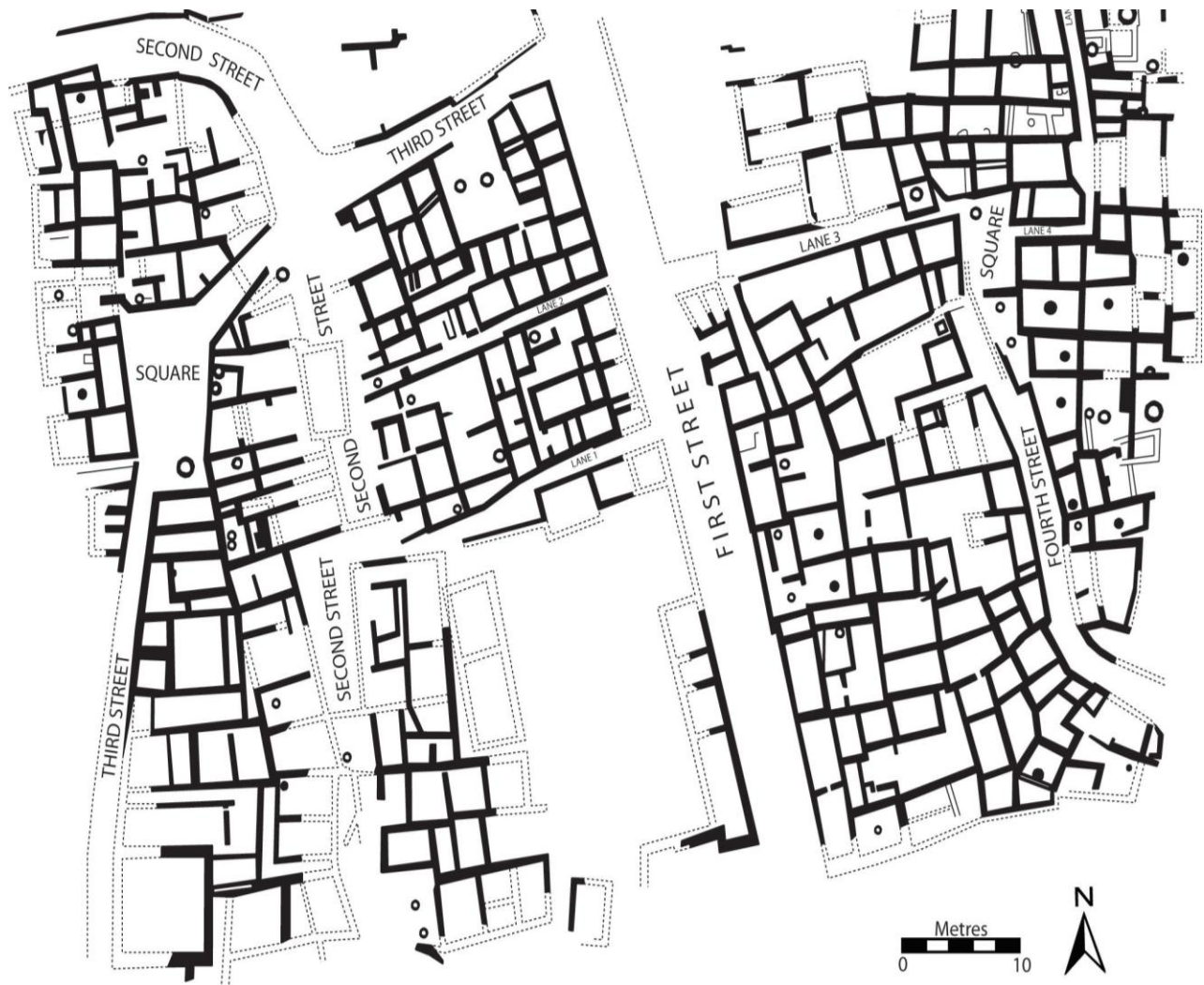


Figure 14: Redrawn illustration of Marshall’s plan of areas excavated at Bhir Mound. Courtesy of Durham UNESCO Chair

The discoveries from Bhir Mound including a bent bar coin currency, Aramaic writings which provided the origin of punch marked coins and inscriptions in a local script known as Kharoshti. Numerous other artifacts such as household pottery, large storage jars, terracotta toys, toilet trays, beads of semi-precious stones, glass, bone and ivory objects, stamp seals, metal objects and several articles of daily use have also been unearthed from the site.

Bhir Mound has undergone numerous excavations. Sir John Marshall and his colleagues excavated Bhir Mound from 1913 to 1925, Sir Mortimer Wheeler from 1944 to 1945, Dr. Muhammad Sharif in 1967 to 1968, Mr. Bahadur Khan from 1998 to 2001, and Dr. Ashraf Khan from 2002-2003. During Dr. Ashraf Khan’s work, the remains of two distinct cultural periods, the Achaemenian and the Mauryan, were revealed.



The Achaemenian Emperor Darius-I conquered Gandhara in 6th century BCE and founded Bhir Mound as the provincial capital city. After defeat of Darius-II, Taxila became independent under the local ruler Ambhi, who surrendered to Alexander the Great in 326 BCE. At that time Bhir Mound was a prosperous city of Taxila. Here, Alexander received envoys from King Abhisares of Nikator and forced him to enter into an alliance with him.

The death of Alexander in 323 BCE broke the very fabric of his vast empire. Prince Chandragupta of the Mauryan dynasty, taking advantage, united Indians under his flag, drove the Greek garrisons out of Taxila and proclaimed himself as sovereign king of India. In 305 BCE, Chandragupta defeated Seleucus under Mauryans, Taxila enjoyed the status of a provincial capital and a great educational and trade center. The Crown Princes of the Mauryan Empire like Susima, Ashoka and Kunala also governed the city. After Ashoka, the Mauryan Empire disintegrated and in 2nd century BCE Gandhara and Bhir Mound were overrun by Indo-Greeks, who shifted the city capital of ancient Taxila from Bhir Mound to Sirkap.

Bhir Mound has been included in the UNESCO World Heritage List in 1980 under the convention concerning protection of world cultural and natural heritage.

4.4. Restoration of Dharmarajika Complex

The name Dharmarajika comes from the term ‘Dharmaraja’, a title associated with Buddha’s role as Lord of Law, as per Marshall. It is thought that the term ‘Dharmarajika’ is derived from the name ‘Dharmaraja,’ a description given to Mauryan Emperor Ashoka. The stupa is also commonly referred to as Chir Tope, or “Scarred hill.”



Figure 15: Dharmarajika Stupa

The Dharmarajika Stupa was built in the 3rd century BCE. It was originally constructed as a memorial to the Buddha’s parinirvana, or death. The stupa was built on the site of an earlier stupa, which was destroyed by the Huns in 5th century CE. The Dharmarajika Stupa is made of brick and is surrounded by a stone railing. The stupa is decorated with carvings of animals, flowers, and other symbols. Inside the stupa is a relic chamber, which contains several artifacts related to Buddhism.

The site was devastated by the White Huns in 5th century CE, and then abandoned. Subsequent rulers, such as the Hun king Mihirakula, persecuted the region’s Buddhists. Under his reign, over a thousand Buddhist monasteries throughout Gandhara are said to have been destroyed. The White Huns destroyed not only Taxilan sites, but also devastated nearby Peshawar city.

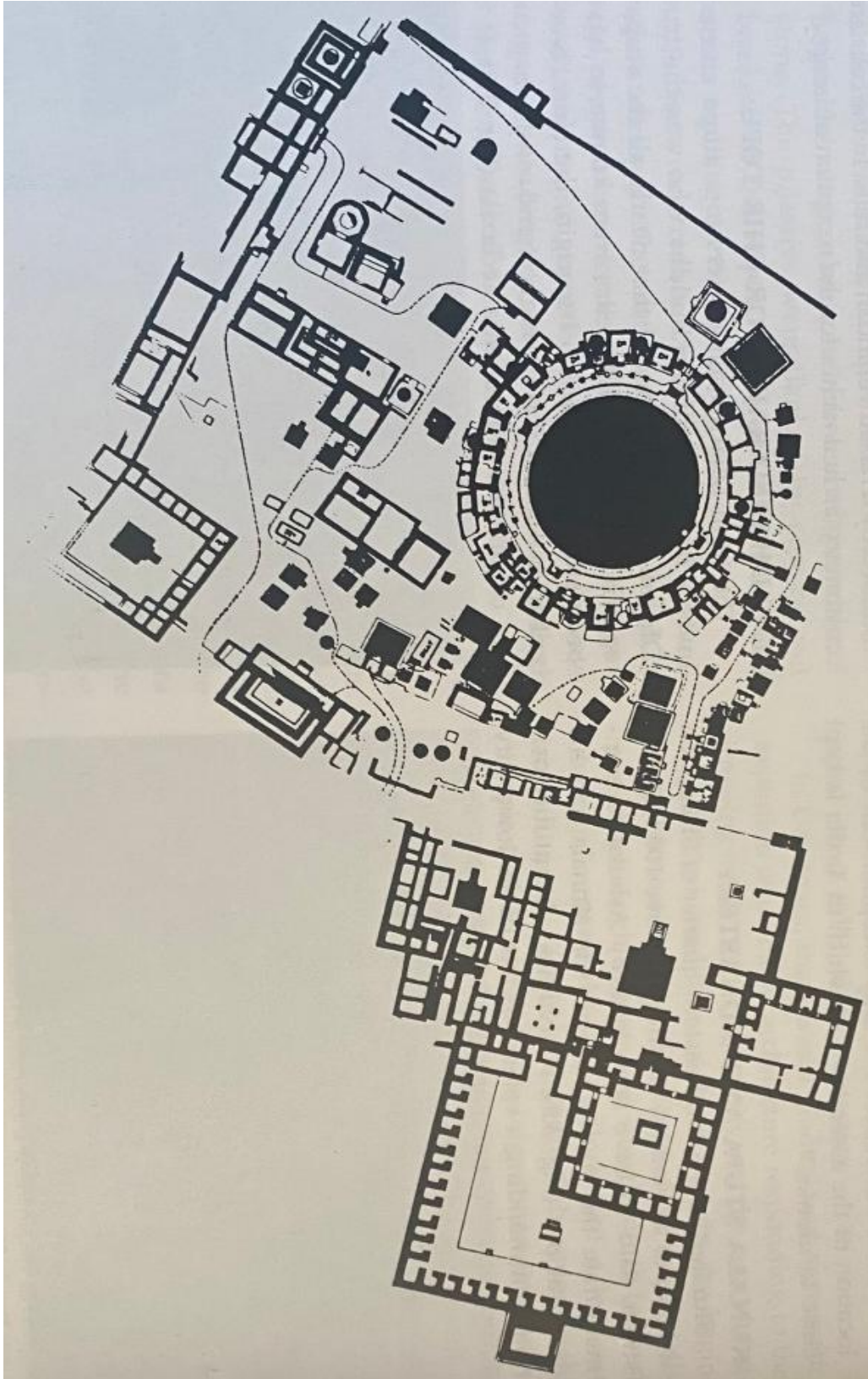


Figure 16: Complete Plan of Dharmarajika Stupa & Monestry

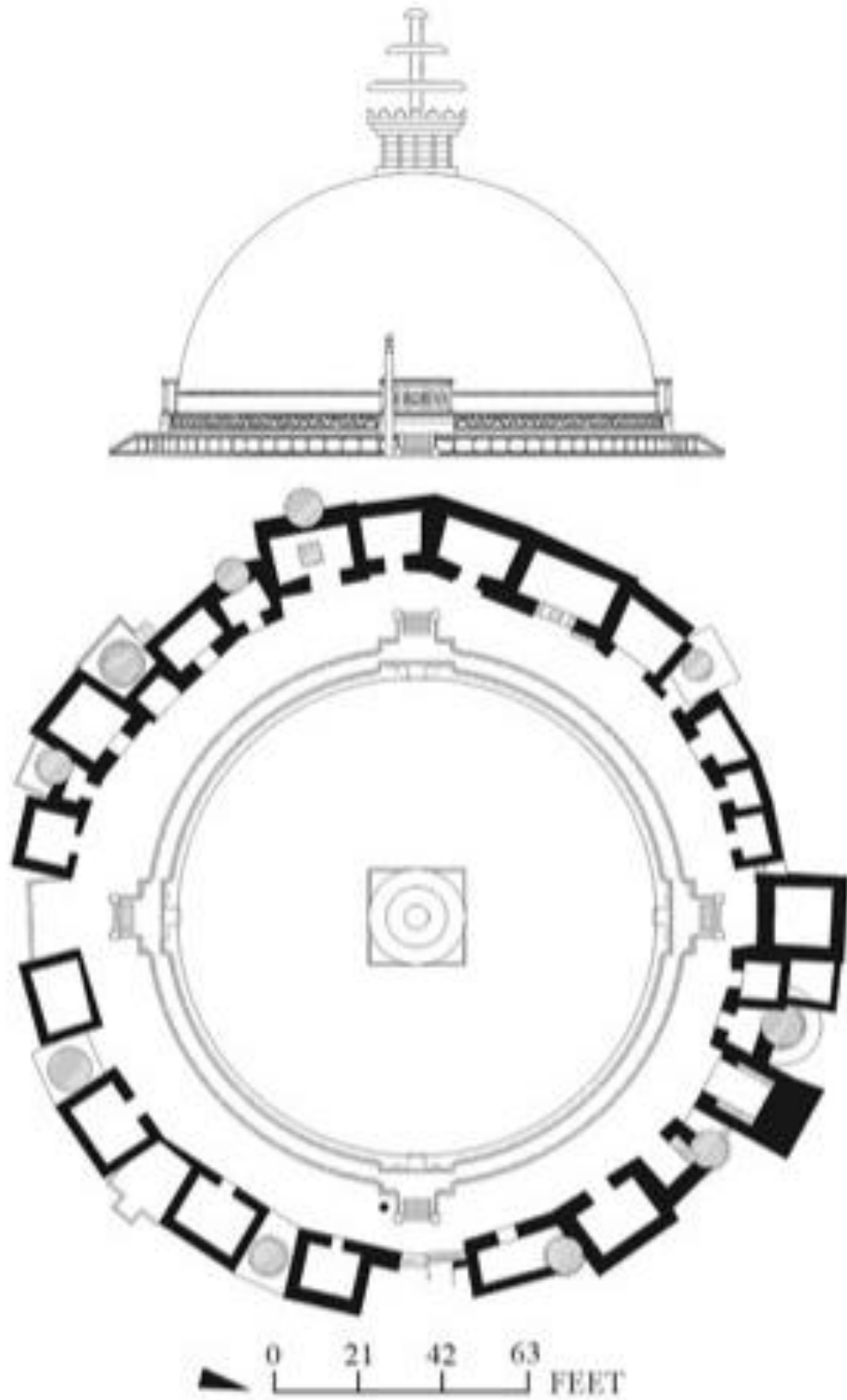


Figure 17: Plan and Elevation of Dharmarajika Stupa

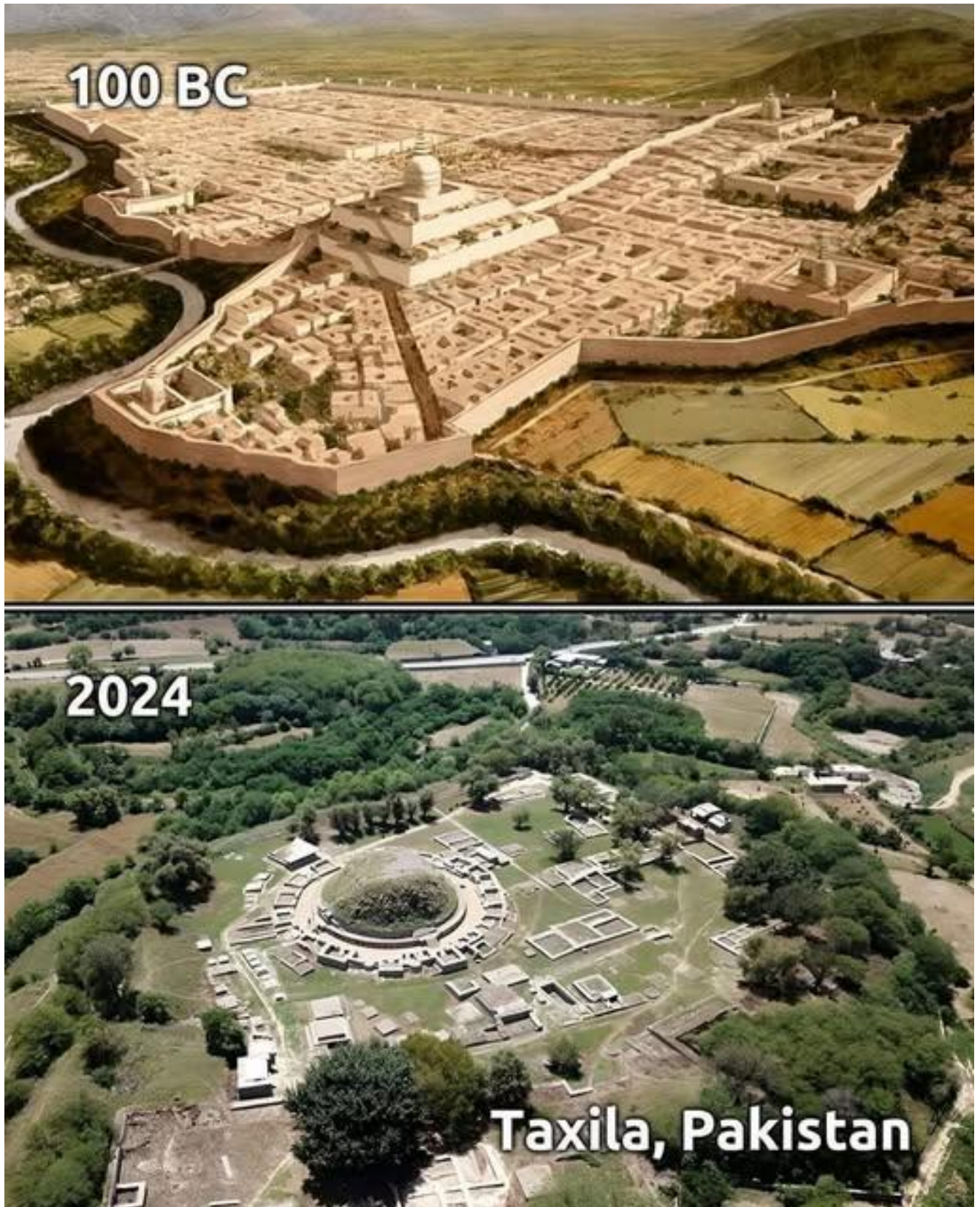


Figure 18: AI Conjecture of Dharmarajika Complex Taxila

4.5. Restoration of Manikyala Stupa

Manikyala stupa is believed to have been built during the reign of Kanishka between 128 and 151 CE. It is located in the village of Tope Mankiala, near the place named Sagri and 2nd near the village of Sahib Dharmyal. It is 36 km southeast of Islamabad.



Figure 19: Manikyala Stupa

The stupa was built to commemorate the spot where, according to the Jataka tales, the Golden Light Sutra, and popular belief, Prince Sattva-an earlier incarnation of the Buddha, sacrificed parts of his body to feed seven starving tiger cubs.

An alternate theory suggest that the stupa is one of 84 such buildings, built during the reign of Mauryan emperor Ashoka to house the ashes of the Buddha. It is said that Emperor Kanishka used to visit this stupa often, to pay respects to Buddha during his campaigns.

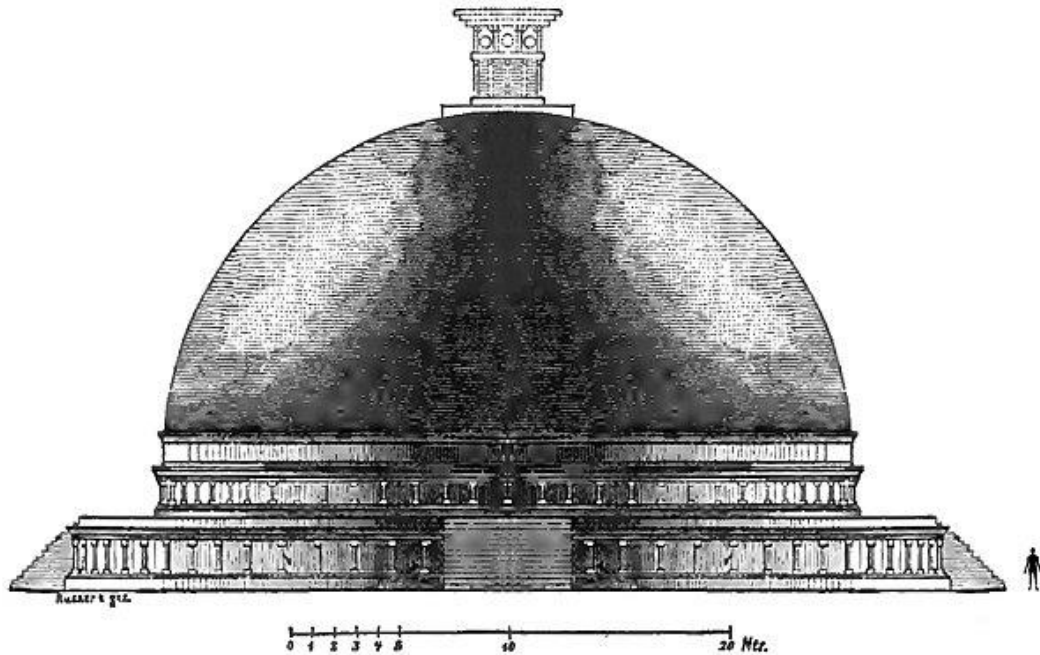


Figure 20: A Restored View of Manikyala Stupa

The stupa was discovered by Mountstuart Elphinstone, the first British emissary to Afghanistan, in 1809– a detailed account of which is in his memoir Kingdom of Caubul (1815). Mankiala stupa's relic deposits were discovered by Jean-Baptiste Ventura in 1830. The relics were then removed from the site during the British Raj, and are now housed in the British Museum. The stupa contains an engraving (as shown in below Figure) which indicates that the stupa was restored in 1891.

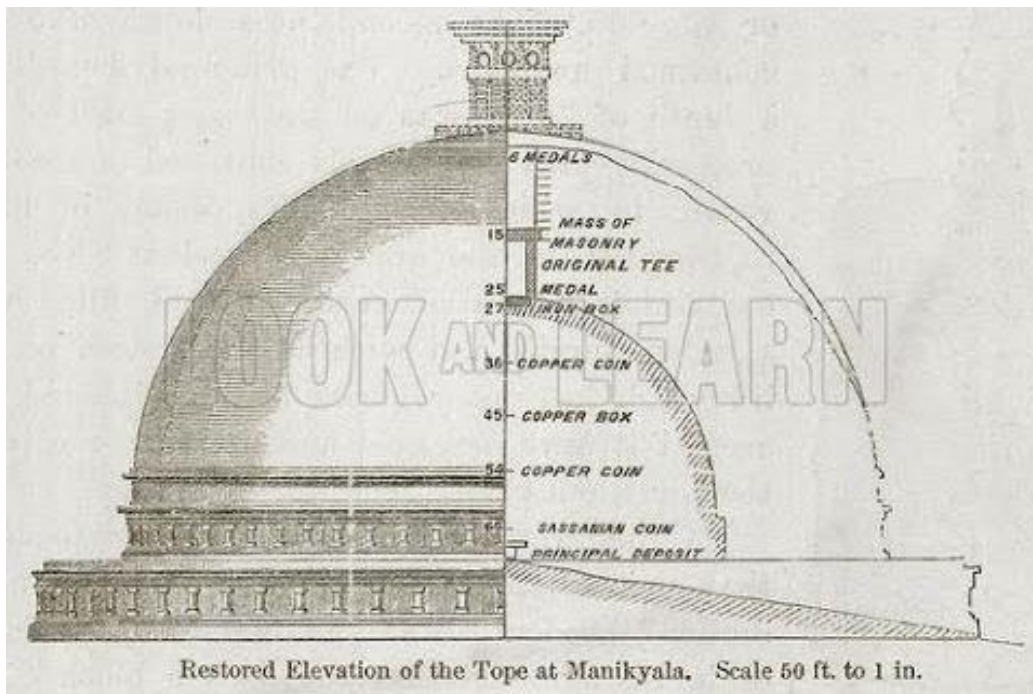
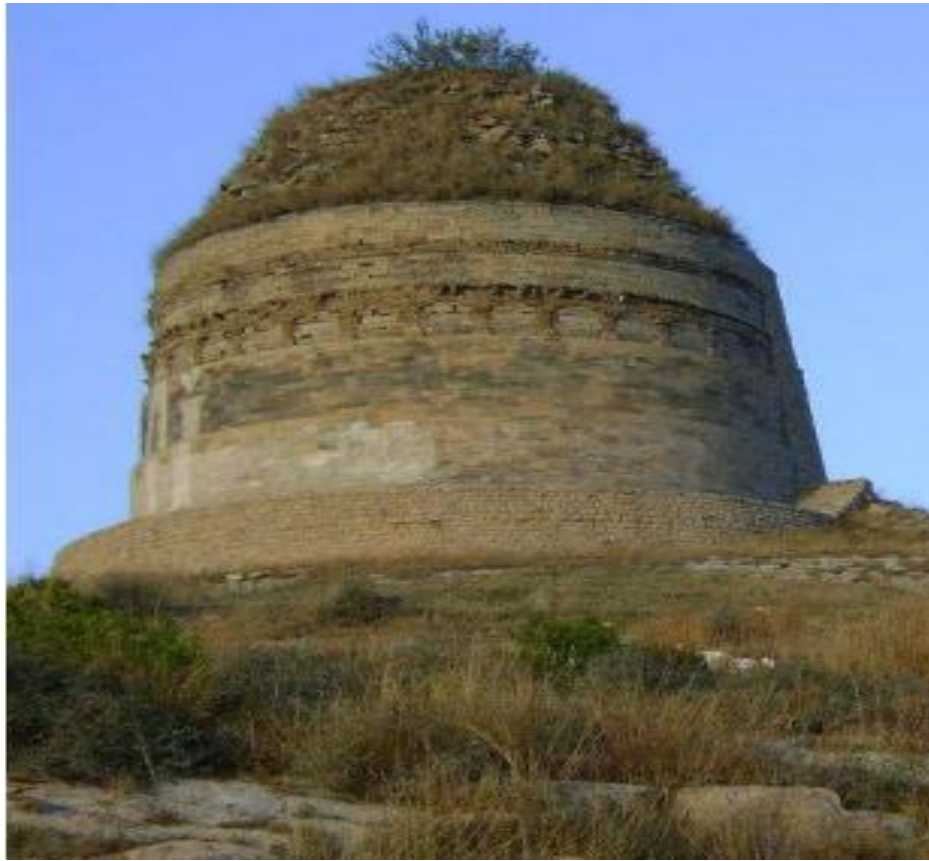


Figure 21: Engravings on Stupa

4.6. Restoration of Bhallar Stupa

Bhallar stupa located on the Sarada Hill, just beyond the Haro River, along the route from Mechanical Complex to Haripur, holds a commanding position. It proudly stands as the tallest stupa in Taxila.



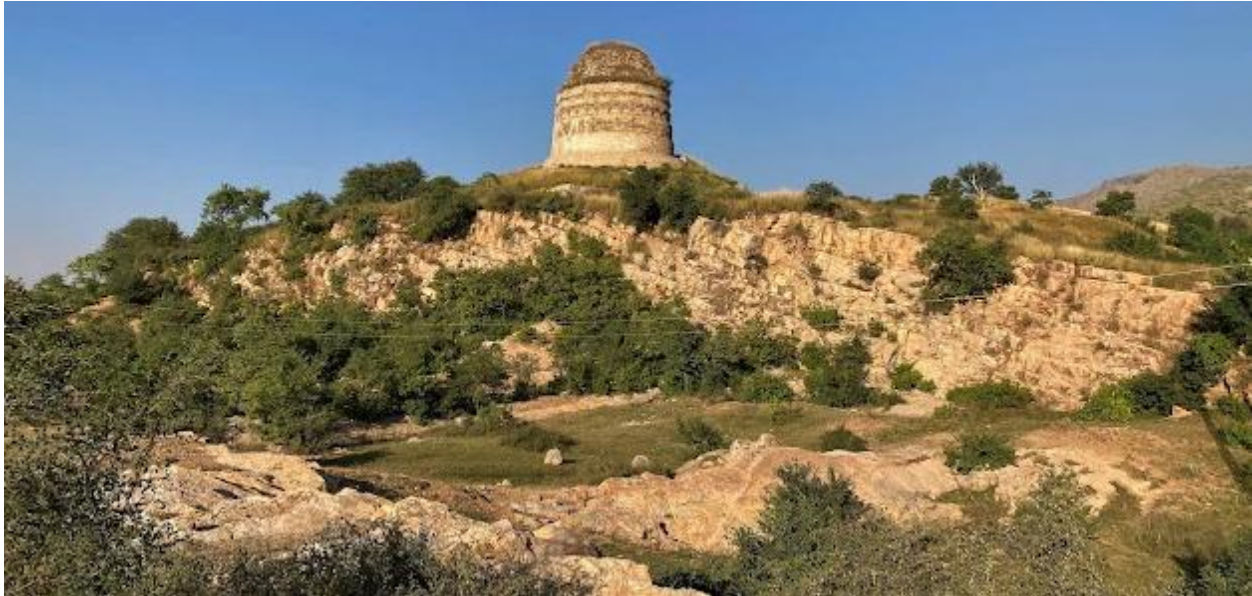


Figure 22: Bhallar Stupa

Constructed during the "medieval period" following the Hun era, this magnificent structure comprises a grand stupa, surrounded by votive stupas, shrines, and a monastery. It served as the place where the Buddhist monk Kumaralabha composed his treatise.

The main stupa, though now broken on its northern face, once stood on a majestic oblong base. A flight of steps on the eastern side leads up to this base. The stupa consists of a plinth base, a drum, a dome, and originally, umbrellas. The drum is adorned with Corinthian pilasters, freezes, and dental cornices, beautifully divided into six tiers.

It is required to make the following reference to Fa-Hien's Record of Buddhist Kingdoms in 942–957 BE to explain the significance of Bhallar Stupa:

"Fa-Hien and his fellow monks traveled to the Kingdom of Taxila in the east over seven days. The name translates to "the cut-off head" in Chinese. Buddha gave a man his head in this location when he was a Bodhisattva. And because of this tale and the aforementioned, the kingdom received its name. Fa-Hien and the other monks reached the village where the Buddha, as a Bodhisattva, sacrificed his body to feed a starving lioness after trekking for two days further to the east. Maha stupas were built in both locations to honor the sacrifices made by the Bodhisattva. On every level, the stupas were exquisitely adorned. Kings and ministers from neighboring kingdoms would deliver gifts to keep the stupas. Regular visits from regular people meant that the area was filled to the brim with flowers and illuminated with lighting. These four stupas were known as the four Maha Stupas; the other two were already mentioned in an earlier chapter. The history of Bhallar Stupa was also documented similarly by the Department of Archaeology and Museums:

4.7. Restoration of Mohra Moradu Complex

Dating back to the Kushana period, the Buddhist complex at Mohra Moradu was built in the 2nd century and extensively renovated during the 4th and 5th centuries CE. The remains of Mohra Moradu are situated in a valley at the back of the village of Mohra Moradu, about 1.6 kilometers to the south-east of the city Sirsukh. It was excavated under the supervision of Sir John Marshall by Abdul Qadir in 1914-1915 and was included in the UNESCO World Heritage List in 1980.



Figure 23: Mohra Moradu Complex

Inside the glen, an oblong terrace was constructed by the Buddhist builders, and side by side on this terrace a stupa and a monastery were erected. Both the main stupa and monastery proved to be remarkably well preserved, standing to a height between 4.5 and 6 meters and still retaining many admirably executed reliefs in stucco on their walls.

The monastery, connected with the stupa, is in the form of a rectangular court. It comprises several spacious chambers on its eastern side. The entrance to the rectangular court is on the north and is approached by a broad flight of steps with a landing at the top leading into a small portico. On the west wall of the portico is an arched niche containing a well-preserved group of figures in high relief, namely the Buddha in the center and four attendant worshippers on either side. Passing from the portico into the interior of the monastery we find ourselves in a spacious court with twenty-seven cells arranged on its four sides. In some of the cells, there are small niches for lamps. In the middle of the court, there is a 2 feet depression with steps descending into it from all four sides. This was a bath (jantaghara), an indispensable adjunct of every Buddhist monastery.

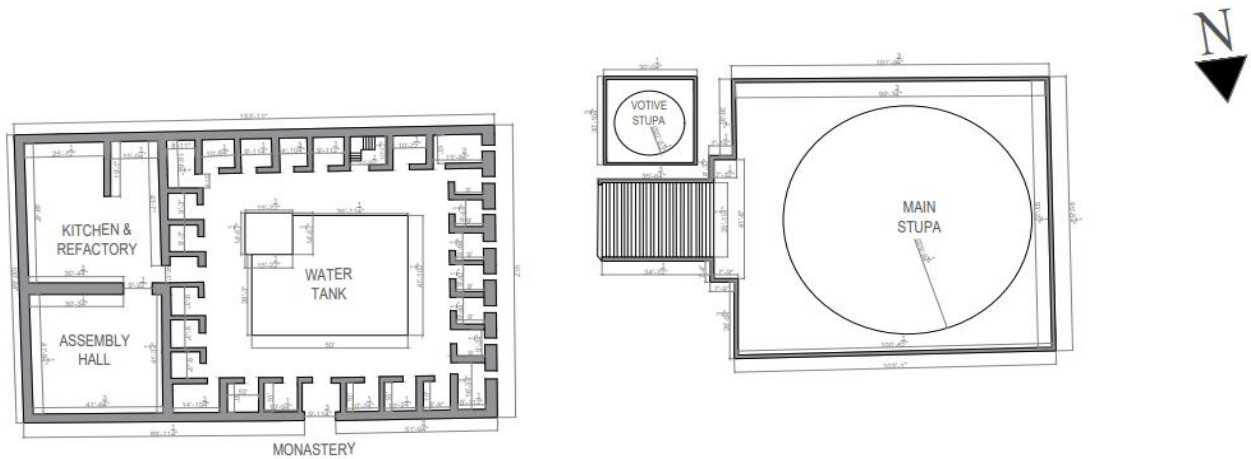


Figure 24: Mohra Moradu Stupa and Monastery

One of the best collections of stucco sculptures at Taxila was discovered from Mohra Moradu. This is a group of Buddha and Bodhisattvas sculptures which have now mostly been shifted to Taxila Museum.



Figure 25: Stucco sculptures

The walls of the stupa were decorated with many of these stucco reliefs. Presumably, the whole surface of the structure up to the top of the drum was covered with these figures. Among the many detached heads, found around the base of this stupa and now displayed in the museum, several are in an unusually good state of preservation. Over the surface of these sculptures is a fine slip, applied apparently before the final definition was given to the features. The faces of these statues were left white, but the lips, edges of nostrils, folds of eyelids, folds of the neck and earlobes were all painted red. The hair was of a greyish black color. The polychrome, however, has now mostly disappeared.

Another valuable find is a small votive stupa, almost complete in every detail, found inside cell no. 9 on the left side of the monastery, built in the memory of a respected teacher or monk. A replica of this stupa has been erected in Taxila Museum.

4.8. Restoration of Jandial Zoroastrian Temple

Jandial, near the city of Taxila, is the site of an ancient temple well known for its Ionic columns. The temple is located 630 meters north of the northern gate of Sirkap. The Temple was excavated in 1912–1913 by Sir John Marshall. It has been called the most Hellenic structure yet found on Pakistani soil.

The Temple is considered as a semi-Classical temple. Its design is essentially that of a Greek Temple, with a naos, pronaos and an opisthodomos at the back. Two Ionic columns at the front are framed by two anta walls as in a Greek distyle in antis layout. It seems that the temple had an outside wall with windows or doorways, in a layout similar to that of a Greek encircling row of columns (peripheral design). The dimensions of the Temple were around 45 x 30 meters.

However, inside the temple, between the naos and the opisthodomos, there is a heavy wall with stairs, leading some scholars to suggest that it may have been designed to support a ziggurat, similar to those found in Zoroastrian or Magian temples.

Besides the Pataliputra capital (3rd century BCE), the Ionic style is a rare occurrence in the Indian subcontinent, and it almost disappeared afterwards, apart from a pillar in Ahin Posh, which seems to be more Parthian than truly Hellenistic. It seems to have disappeared with the weakening of direct Greek presence in India, to be exclusively replaced by the numerous instances of Corinthian art that can be found in the Indo-Corinthian capitals of Gandhara.

The Ionic capitals of the Jandial temple seem to be a rather provincial and dry version of the Ionic Temple of Artemis in Ephesus. However, the design of the bases is quite pure, as are the wall moldings. Also, the drums

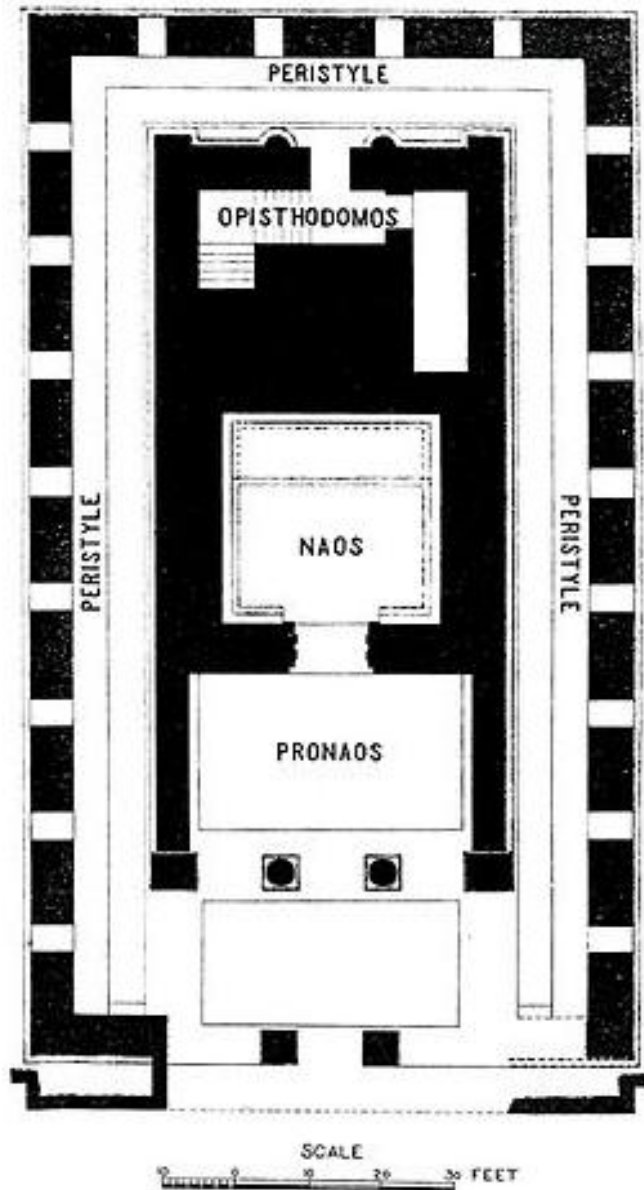
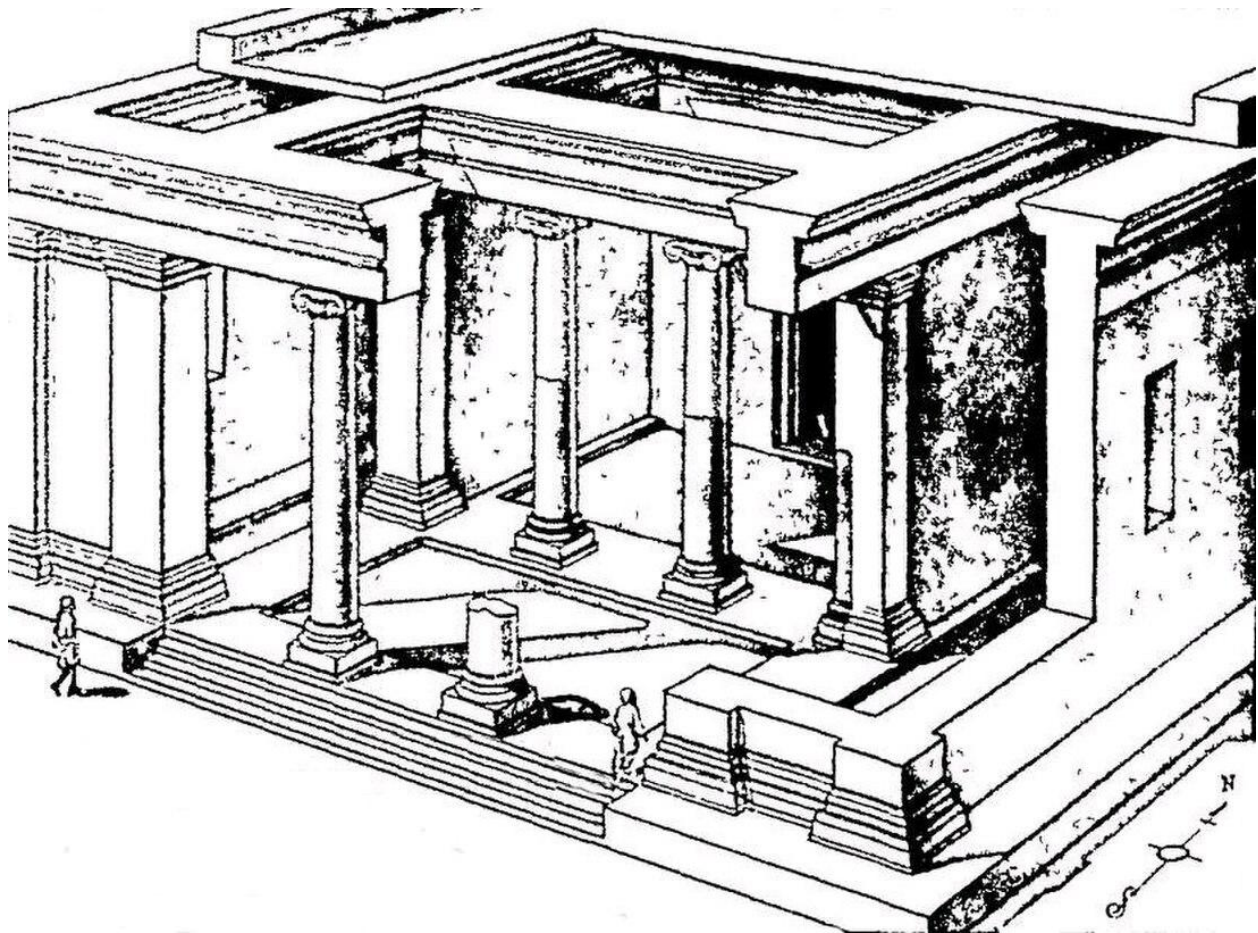


Figure 26: Jandial Temple Plan

are finely joined with dowels. All this suggests work which was done under Greek supervision, or maybe by Greeks directly.

The Temple may have been built in the 2nd century BCE under the Greeks in India (Indo-Greeks). Exact alignment of the Temple with Sirkap leads some authors to think that it may have been built during the main occupation period of Greek city, and that it may have been the work of an architect from Asia Minor, or from Greece or an architect trained in Greek techniques.



Alternatively, it may have been built under the Indo-Parthians in the 1st century BCE in order to practice the Zoroastrian faith, possibly right after their invasion of Hellenistic lands, using Greek manpower and expertise. Alternatively, it may be the construction of a Greek devotee of Zoroastrianism, as it is known that in India the Greeks easily followed other faiths, as exemplified by the dedication to Garuda made by a Greek envoy on the Heliodorus pillar in Besnagar.

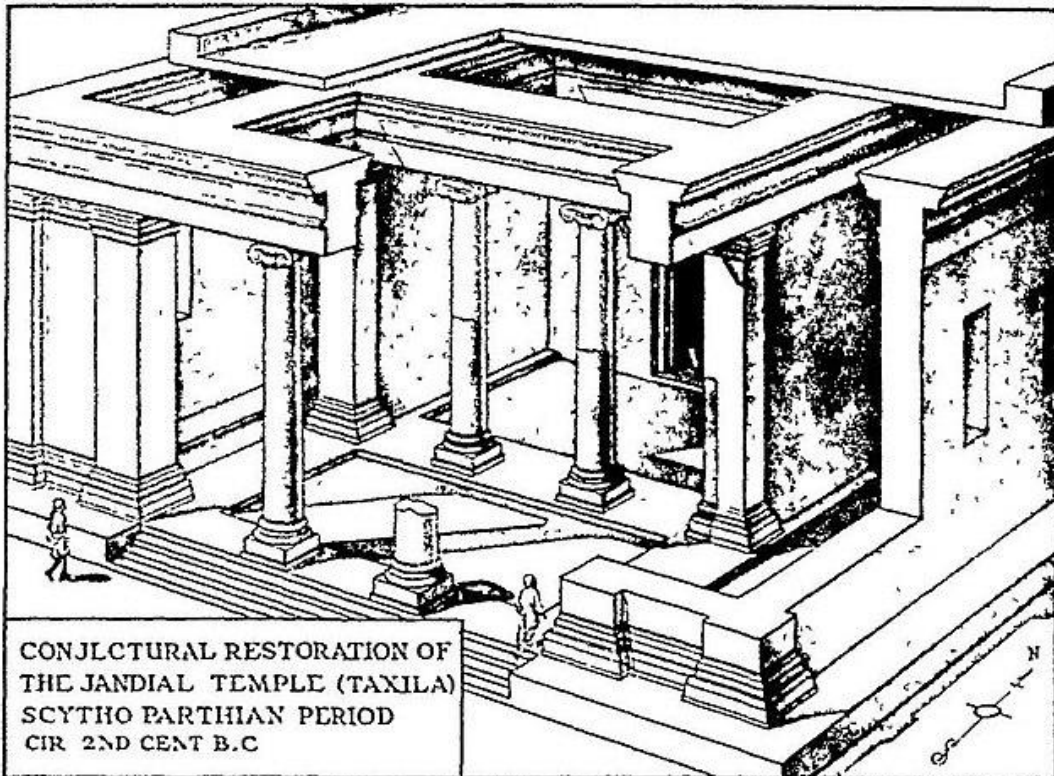
A coin of the Indo-Scythian ruler Azes I was found in the rubble of the Temple, which may suggest that construction occurred during his reign.

The Jandial Temple may have been the one visited by Apollonius of Tyana during his visit of the subcontinent in the 1st century CE.

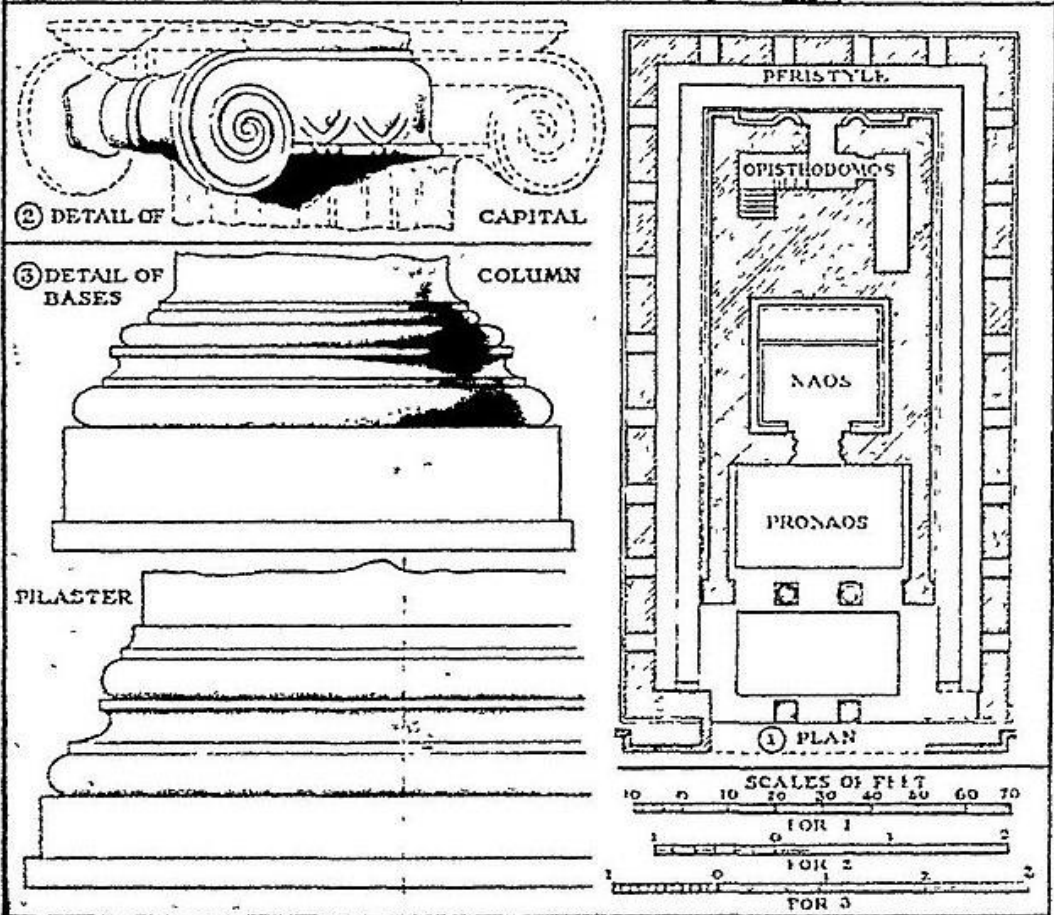
"Taxila, they tell us, is about as big as Nineveh, and was fortified fairly well after the manner of Greek cities; and here was the royal residence of the personage who then ruled the empire of Porus. And they saw a Temple, in front of the wall, which was not far short of 100 feet in size, made of stone covered with stucco, and there was constructed within it a shrine, somewhat small as compared with the great size of the Temple which is surrounded with columns, but deserving of notice. For bronze tablets were nailed into each of its walls on which were engraved the exploits of Porus and Alexander."

— "Life of Appolonius of Tyana", Philostratus 2.16-20





CONJLCTURAL RESTORATION OF THE JANDIAL TEMPLE (TAXILA) SCYTHO PARTHIAN PERIOD CIR 2ND CENT B.C



4.9. Preservation of Sirkup City

The second fortified city of Taxila, Sirkap, has long been subject to archeological and art historical inquiry. It was named after a character in a folk legend, 'Raja Rasalu and seven demons', who lived and ruled here. Sirkap includes the extreme western end of the Hathial Spur and is situated on the bank of the Tamra stream, at a distance of almost two kilometers from Taxila Museum. It has been declared a World Heritage Site by UNESCO since 1980.



Figure 27: Sirkup Complex

The excavations at Sirkap were carried out only in the part covering about one-eighth of the city. Mr. H. Hargreaves excavated the remains during 1912 - 1930 under the direction of Sir John Marshall. In 1944 – 1945, second excavation was carried out by Sir Mortimer Wheeler. As a result of these excavations, seven successive strata of remains can be identified, extending below from the surface to a depth of between 18 and 23 feet, representing three to four centuries of occupation.



Figure 28: Redrawn illustration of Marshall’s plan of areas excavated at Sirkap. Courtesy Durham UNESCO Chair

After the abandonment of Bhir Mound, Sirkap became the main city of Taxila in 2nd century BCE. The ancient city was well planned, fortified and surrounded by a city wall with the length of approximately five kilometers or 6000 yards. Due to its characteristic gridiron planning, it has been associated with Hellenistic cities.



Figure 29: Aerial view of Sirkup

The main street, running in the middle of Sirkap, was surrounded by architectural structures such as houses, shops for citizens and worship places and shrines like Apsidal Temple, Sun Temple, Double-Headed Eagle Stupa and King’s palace. Aramaic inscriptions of Ashoka and other artefacts such as coins, jewelry, toilet trays, and household objects discovered from Sirkap, all indicate cultural contacts and exchanges with the western Asian and Mediterranean regions.

Textual accounts also indicate this: for example, according to the 3rd century CE Acts of Thomas, the Christian apostle Saint Thomas, came to Sirkap in 40 CE and found himself in service of the Indo-Parthian king, Gondophores. Furthermore, the fictional journey of Apollonius of Tyana to Taxila in the 1st century CE, as imagined by Philostratus in the 3rd century CE, also mentions cross-cultural interaction and goes on to describe the ancient city as follows: ‘Taxila, as they tell us, is about as big as Nineveh and fortified well in the manner of Greek cities.’

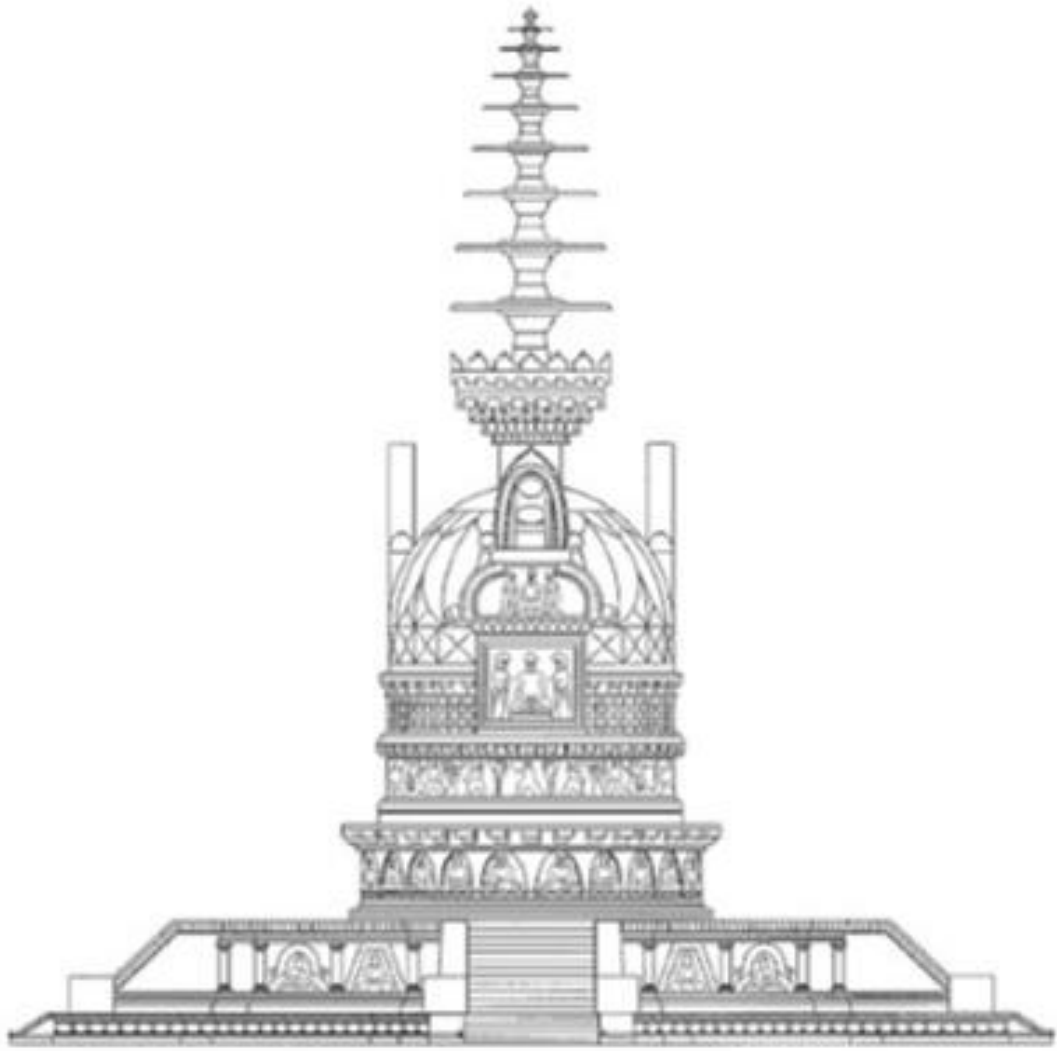


Figure 30: Round Stupa in Sirkup



Figure 31: AI generated image of Sirkup



4.10. Preservation of Kunala Complex

Kunala Stupa is a Kushan-era Buddhist stupa and monastery complex located to the southeast of Taxila, situated on a hill about 200 meters south of Sirkap. It is believed to date back to the 2nd century CE. It is located on a hill overlooking the ancient Indo-Greek city of Sirkap.

The story of Kunala, son of Emperor Ashoka and the legitimate heir to the throne, is associated with this magnificent stupa located atop the city of Sirkap, which was founded by the Greeks in 2nd century BCE. He was named Kunala because his eyes were small yet beautiful. He was gifted with a sweet voice. However, Ashoka's jealous queen, Tishyaksha, conspired to have an order issued for Kunala's eyes to be taken, but the ministers hesitated to carry out the command. When the prince learned of the royal decree, he insisted on obeying his father's order, and a hot iron was applied to his eyes. He then wandered with his wife far from his father's kingdom," the official narrated, adding, "until one day, Ashoka recognized his son's voice in the royal court. On learning his queen's treachery, Ashoka ordered to put her to death and Kunala was restored to the court. According to legend, Prince Kunala's eyesight was restored by a famous surgeon who got his education in medicine in Taxila, then famous for training and knowledge of medicines, mathematics, grammar, archery, languages, and astronomy etc.



Figure 32: Kunala Complex

Archaeological remains of Kunala's Stupa do not co-relate with the story. The masonry style of this Stupa belonged to 2nd century AD whereas Kunala was appointed in Taxila in 4th century BC. The origin of the name 'Kunala Stupa' has not been fully confirmed and requires further investigation and study. It is believed that Buddhist pilgrims with visual impairments visited the stupa in the hope of being healed.

However, it is a well-established fact that Taxila was renowned for advanced eye treatment in ancient times. Several antiquities related to ophthalmic care have been discovered at the site, including surgical instruments, some of which are on display at the Taxila Museum for the public.

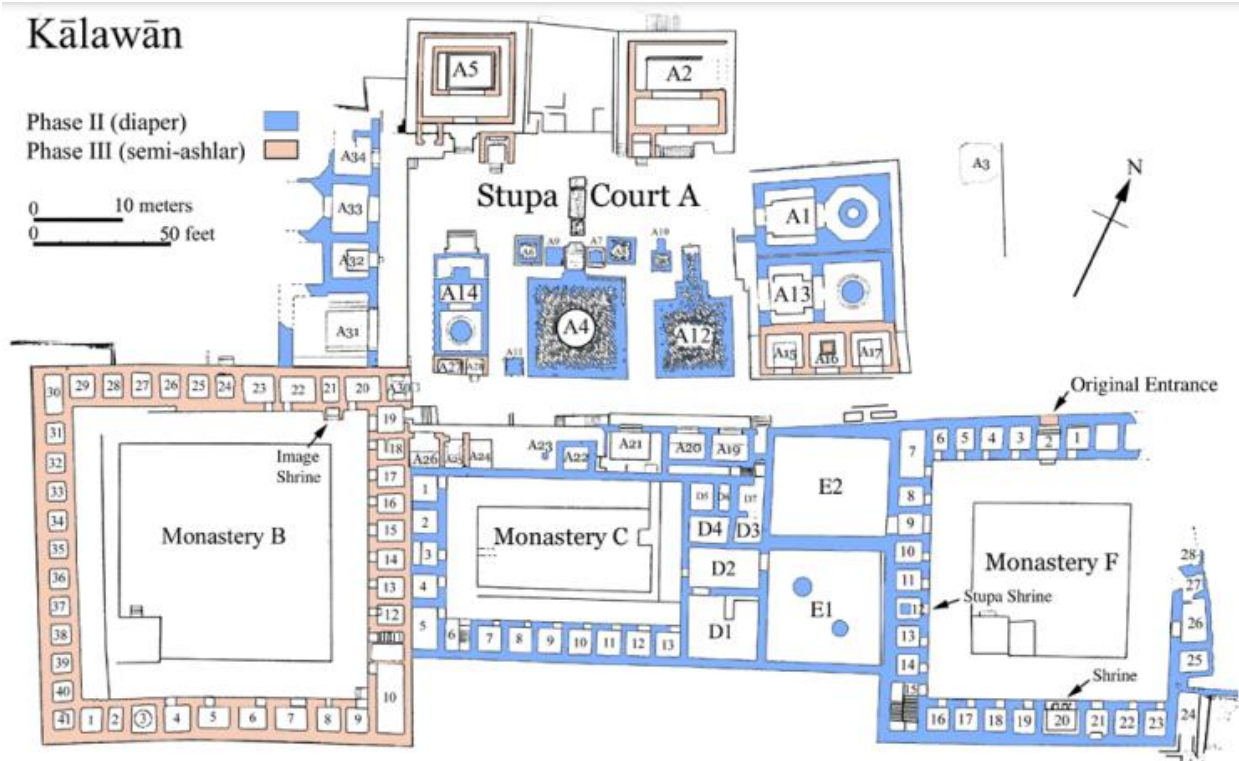
The site is located 2 km north-east of Taxila Museum in Sirkap village at the top of Hathial spur and can be approached via National Highway 125-Sirkap road from Taxila Museum. One has to cross the walkways of Sirkap City and cross the Walkway and fields to reach the Kunala site. Kunala monastic establishment consists of a monastery and a stupa on its east. Originally, there was a small stupa which, according to Sir John Marshall, was erected during the Saka-Parthian period. It is now incorporated within the structure of the present larger stupa. It lays in its north-west corner and was perched on a small rocky eminence well inside the city wall. Kunala Stupa dates back to the 2nd century AD. It was made of rough blocks of limestone and consisted of a square plinth with drum and dome above, measuring 9.3 m in height. The enlarged stupa is built of semi-ashlar masonry and is standing on a lofty rectangular base, measuring 19.5 m east to west and 32m north to south, with a step projection on the northern side. The base rises in three terraces: the lowermost one is relieved by a series of Corinthian pilasters, the middle one is plain but covered with a coating of plaster, and the uppermost one, exceptionally high, follows the design of the lowest terrace. This type of stupa is typical of this late period. The monastery on the west is not planned directly in relation to the stupa, except that its main entrance faces the stupa on east. This anomaly was probably due to the nature of land available here.



The monastery consists of a large rectangular court and a smaller (assembly) hall on its south, with the eastern wall of both following the same alignment. These two together measure as 61 m. The smaller hall, which had four pillar bases in the center, obviously for supporting the roof, has a doorway on the west leading perhaps to other facilities that are no longer traceable. The main court has an open quadrangle in the center and a veranda around and a range of cells behind it, nine cells on each of the four sides, only the corner cells being bigger. They may all be approached from the quadrangle, which has steps on each of the four sides and the remains of a bath at its south-west corner. A drain has been provided to take water out of the quadrangle.

4.11. Preservation of Kalawan Complex

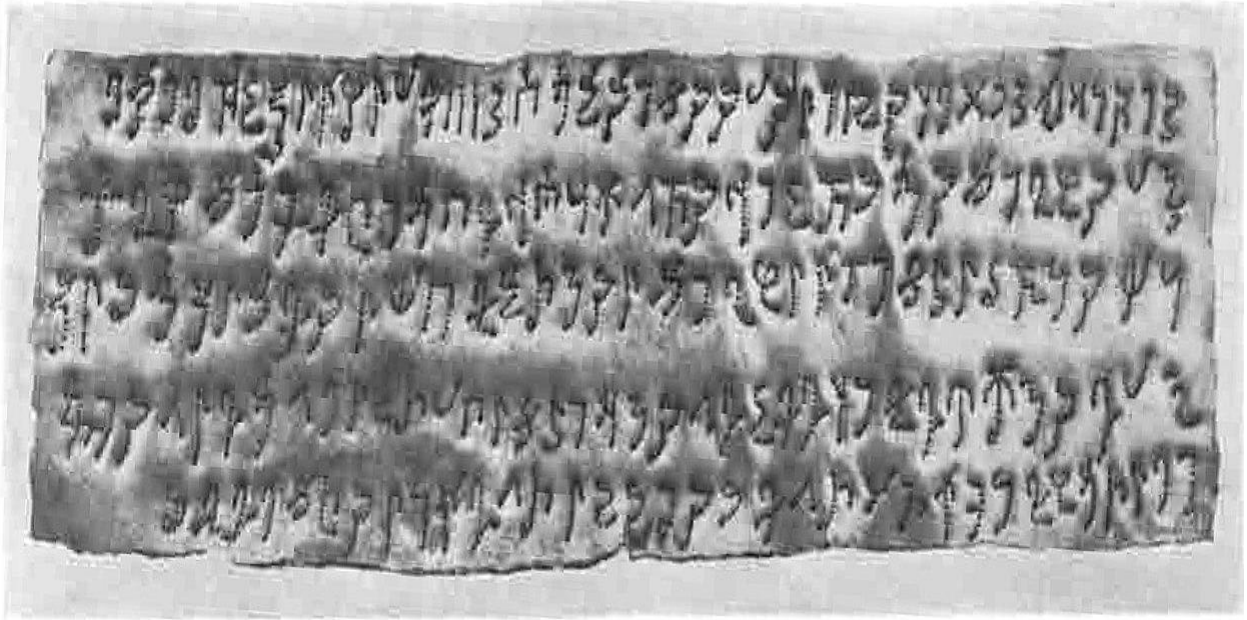
The Buddhist settlement at Kālawān is the largest in Taxila and one of the largest in the North-West too. It is located on northern side of the Margala spur, approximately one and a quarter mile southeast of the Dharmarājikā, and just under two miles from the Bhir Mound city. From an inscription found on the spot it appears that in ancient days its name was Chaḍaśilā, but no trace of this name has been preserved among the surrounding hamlets. Today the place is known as Kālawān or 'the Caves', from the presence of three small caves in the hillside, which the farmers use for storing hay and grain. Near these caves, jutting out from the steep face of the spur, are various natural ledges of rock, of which three are occupied by Buddhist buildings: largest of the three in the middle, and the smaller ones above and below it.



Kalawan has a vihara monastery, which is the largest in northern India. An inscription, recording the enshrinement of relics as a gift to the Sarvastivadin School, was found in a *chaitya* hall mentioning the date of "the 134th year of Azes," which corresponds to 77 CE.

Small stupas were found inside the monasteries. The Kalawan monastery, together with the *Dharmarajika*, displays an original kind of architectural arrangement in which an image of a shrine is there opposite the entrance. It is thought that this architectural pattern was initiated in the northwest and then became the prototype for later development of monasteries with shrines in Devnimori, Ajanta, Aurangabad, Ellora, Nalanda, Ratnagiri, and others.

KALAWAN COPPER-PLATE INSCRIPTION OF THE YEAR 134.



Sir John Marshall'S excavations brought a Kharoshthi inscription, which throws light on difficult question of the eras used in a series of Indian Kharoshthi inscriptions belonging to the Pahlava and Kusāna periods.



The location was well chosen, offering the advantage of being on the cooler side of the hill and providing a remarkable view-overlooking the valley to north with its winding stream and terraced fields, and the rugged, towering heights to the south. Additionally, it offered the monks a convenient route of escape into the Murree Hills in case of hostile invasion. Water was obtained from a well which still exists about 130 yards from the western foot of the hill. Carrying the water up the steep hillside must always have limited its supply, though it was doubtless regarded as a valuable exercise and discipline for the novices to whom this duty fell.

The remains on the middle terrace cover an area some 450 ft. from east to west by 270 ft. from north to south, and comprise a stūpa-court (A) on the north, with three large courts of cells (B, C and F) and other monastic rooms or halls to the south.



4.12. Preservation of Giri Complex

Nestled in the historic region of Taxila, the Buddhist Giri Remains stand as a profound testament to the rich tapestry of ancient Buddhist culture that once flourished in this area. Recognized as a UNESCO World Heritage Site, this archaeological treasure offers an intimate glimpse into the life and practices of early Buddhists. The remains consist of a series of stupas, monastic complexes, and intricately carved stone relics that date back to the 1st century CE, showcasing the architectural prowess and spiritual devotion of the time. Giri complex contains a ruined fort, two stupa and monastery complex sites and two Muslim shrines in total.

East-south-east from the Dharmarājikā Stūpa, the two villages of Khurram Prāchā and Khurram Gujar can be seen nestling into the hillside at the foot of the Mārgala spur. Between these villages, a rocky defile through the hills leads to a small, secluded valley and then, by way of a rough torrent bed, to the glen of Giri, where a perennial spring of excellent water flows, and nearby, there is Ziārat.

Above this glen, the hills of the Margala spur rise approximately 1,500 feet to the south, but only about 400 feet on the other sides. Such a location, secluded from the world, sheltered from the winds, and blessed with a generous supply of running water, must have held great appeal for the Buddhists. It is, therefore, not surprising to find here the ruins of two significant groups of stupas and monasteries: one situated on a terrace just above the spring, and the other on the lower ground, a couple of furlongs to the west. These Buddhist monasteries and stūpas, however, are not the only remains that invest this spot with interest.



Figure 33: Giri Complex

On southern side of the valley, between it and the glen of Giri, lies a rocky hill measuring over 500 yards from east to west and about half as much from north to south. This hill is separated from the main spur by a steeply scarped *Nālā* to the west, a broader depression to the south, and a shallow saddle to the east, while its northern side features a combination of steep bluffs and more gently sloping bays.

In old days, this naturally strong position was further strengthened by a bastioned wall, of which a considerable section, some 550 yards in length, can still be seen in a ruined condition at its eastern end, while other short sections are traceable here and there over the western half of the hill-top. Along the south side this wall is between 10 and 11 ft. in thickness and faced with a late type of semi-ashlar masonry. Not far from the south-east corner is a narrow gateway. The bastions, which are semi-circular in plan, are placed at regular intervals along the curtain of the wall, as well as at the salient and re-entrant angles.

As you wander through the site, you'll encounter serene ambiance that permeates the area, inviting contemplation and reflection. The remnants of Buddhist art, including exquisite carvings and inscriptions, transport visitors back in time, allowing them to appreciate the profound significance of this once-thriving center of learning and spirituality.

This archaeological site of Giri comprises of monastic buildings divided in two groups. First group area measures 110 m from north to south and 55 m from east to west. The large stupa is in a dilapidated condition. The monastery on south contains 20 rooms and is well preserved and eighteen cells are ranged on four sides of the court with niches in walls. Hall of assembly is also traceable in ruined condition. The other monastic settlement is set on a raised terrace at the western end of the glen, with the hillside sloping steeply down to it on west and a torrent bed skirting on south and east - a position that has proved anything but favorable to the preservation of the buildings. The first court of the cells is a small one comprising a vestibule and eight cells arranged on the north-west and east sides.

The ancient Giri mosque is located inside the Giri Complex of Monuments. Emperor Ghauri is credited with constructing this mosque in early 13th century CE. Giri Mosque is a rectangular in plan, roughly measuring 10x6 meters and oriented from east to west. Prayer hall roughly measures 6x5 meters. The mosque is a simple one-room structure with not much decoration and embellishment.



Figure 34: Giri Mosque in Giri Complex constructed by Emperor Ghauri

According to local legend, Emperor Ghauri, while crossing this area camped at this site where he constructed this mosque. Some sources also claim that the mosque was originally a Hindu temple, which was later converted to a mosque. A roughly square prayer chamber with fluted dome raised on round drum with four sunken domlets and pointed finial is visible. Interiorly mosque has simple Mehrab designed with pointed arch and squinches have been provided around the drum interior.



Figure 35: Interior view of Giri Mosque

4.13. Preservation of Bhamala Complex

The huge Buddhist complex of Bhamala is surrounded on all sides by Bhamala hills and the only opening is towards northeast i.e. Khanpur Dam. It comprises Main stupa Complex, the Monastic Complex and other religious and secular buildings, of Bhamala is unique, having cross plan of a giant square base for dome, the projections of which can be seen from all four sides. The stupa has a characteristic cruciform plan, with flights of stairs in the four cardinal directions, which is one of the last steps of evolution of the Gandhara stupa. The main stupa is of cruciform shape and it is considered to be the biggest surviving example of this shape in entire Gandhara region including Taxila. This stupa is cross-shaped resembling an Aztec Pyramid. Standing in the big courtyard, this main stupa is surrounded by nineteen votive stupas and image chapels on the southeast and southwest. This unique stupa with a cruciform plan consists of a tall square base for the dome above which offset projections for the steps can be seen on all four sides. The Corinthian pilasters divide the plinth into bays.

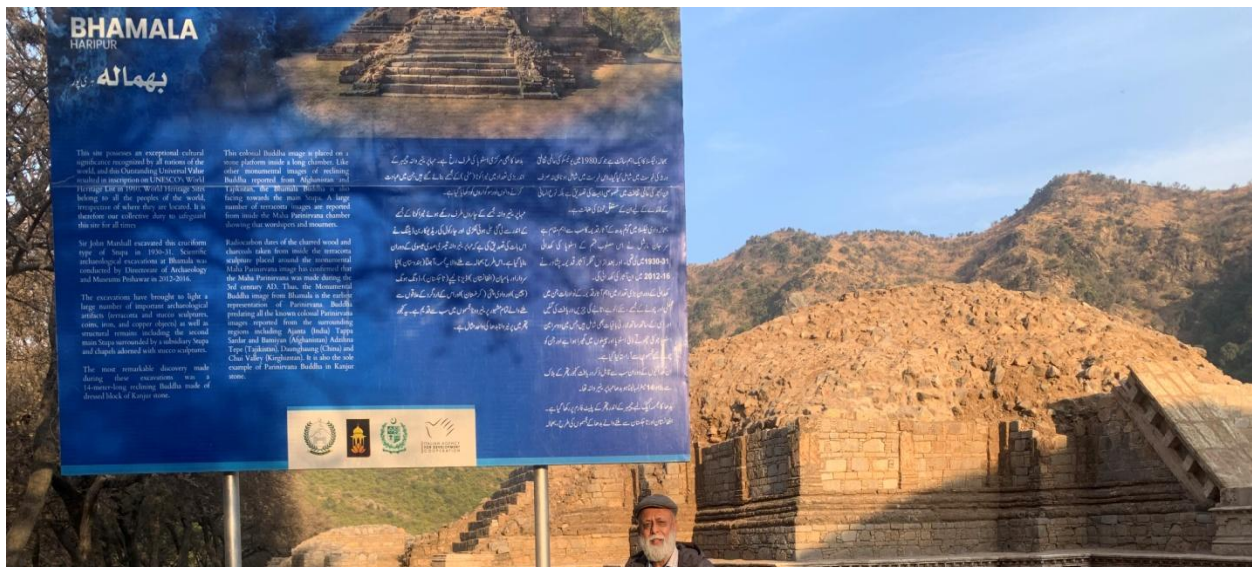


Figure 36: Bhamala Complex



In the north-northwest of the main stupa, world's largest 'Maha Pari Nirvana' statue was discovered, carved in Kanjur stone, measuring 14 meters in length, and placed on a 15-meter-long platform within a long rectangular chamber west of the main stupa, facing east. This remarkable find represents the largest statue of its kind ever uncovered in archaeological history of the greater Gandhara region. The head of this sculpture was probably removed by illegal diggers long ago and it was found headless. Its left leg and arms were also found in a damaged condition. Unfortunately, the precious and unique statue has been very badly damaged and broken into pieces. The chamber that inhabited the huge *Maha Pari Nirvana* image can be accessed through three openings in the eastern wall on regular intervals. The chamber is made of stone in semi ashlar masonry. The monastery is located on south of the main stupa complex with a big courtyard or open space between the main stupa court and the monastery with monk cells. There is another stupa court in extreme north with a big ruined stupa and chapels on north, south and east.

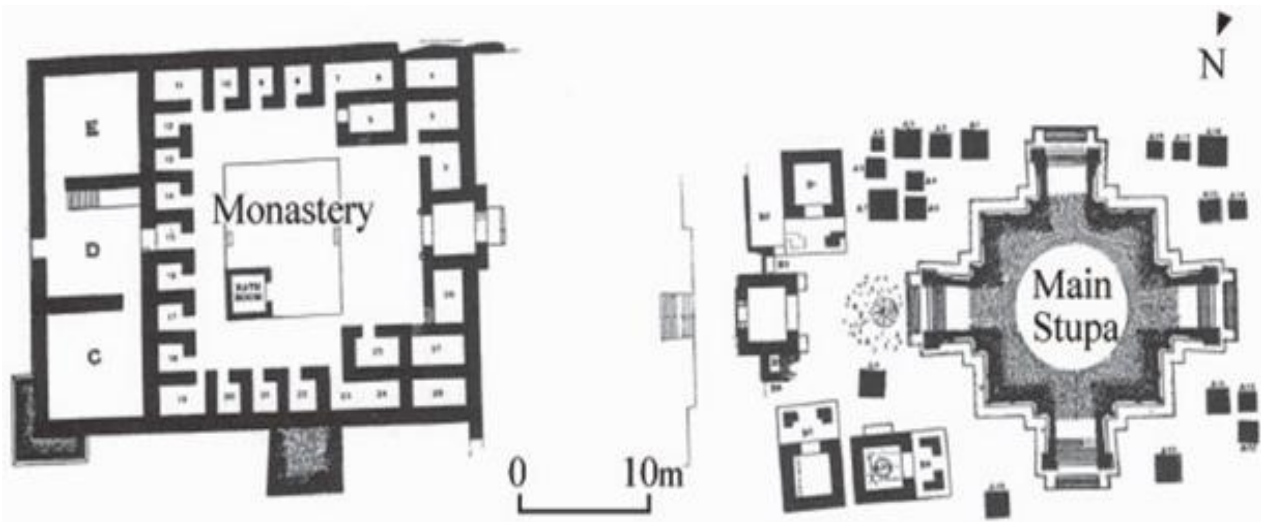


Figure 37: Plan of Bhamala in Taxila (modified from Marshall, 1951)

Sadly, southern and southwestern sides of smaller Stupa are severely damaged. The upper portion of the stupa up to the podium was also found missing. In contrast, its northern and eastern sides in a better state, with chapels on the eastern side. The lower part of the stupa was once covered in lime plaster, and stucco

sculptures surrounded the stupa's perimeter. Traces of the lime plaster and stucco fragments of sculptures have been found.

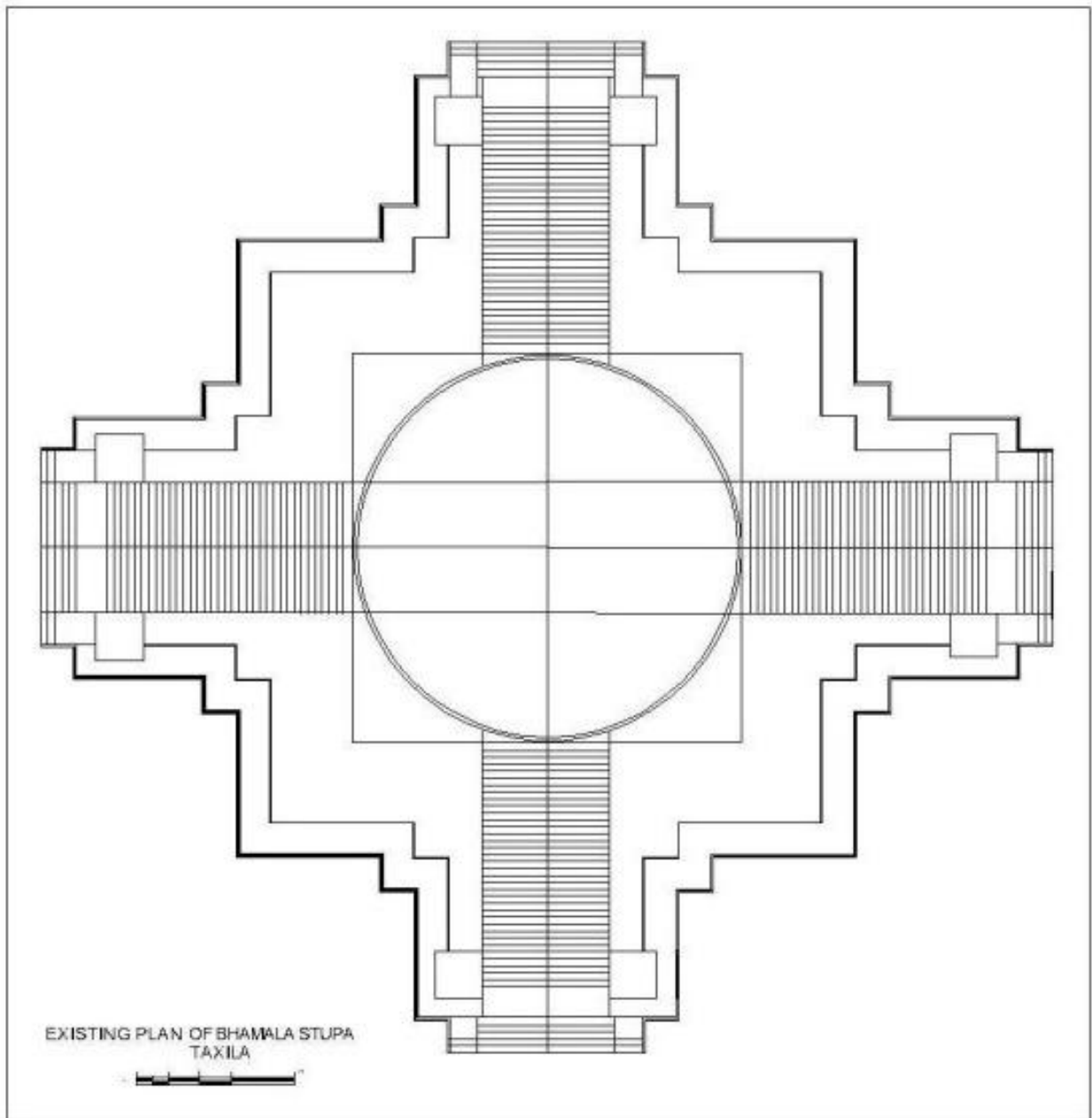


Figure 38: Existing Plan of Bhamala Stupa, Taxila

The Cruciform Stupa, enjoys a very rare design. It still has an elevation of 30 feet in its ruined condition, meaning that its tall square plinth and four flights of stairs (corresponding with the four directions) are extremely tall. There is also a *Dharmachakra* design at the eastern flight of steps. (Marshall 1951:394) The podium is 9 feet high above the plinth and was relieved by Corinthian pilasters with small stucco figures of the Buddha. It is theorized that a circular drum and dome and umbrellas would have been built above the

podium. The drum was probably decorated with figural sculptures, as there is one draped figure from the stucco relief on top of the podium.

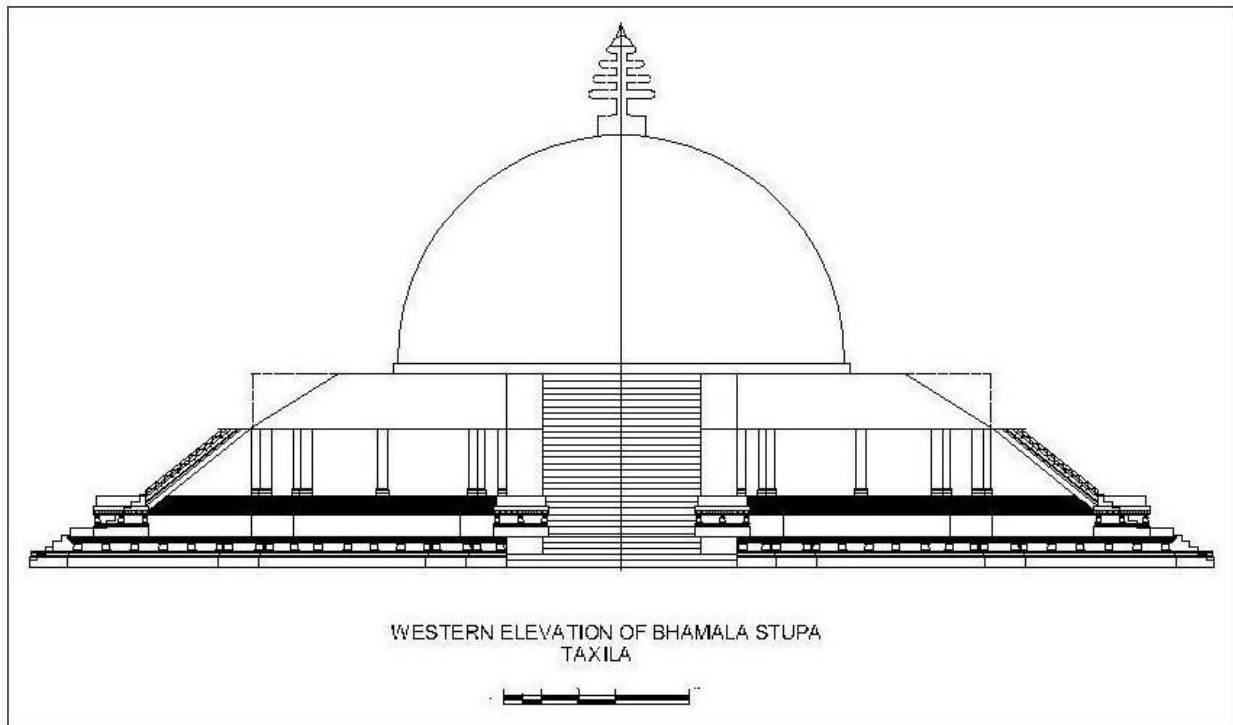


Figure 39: Western Elevation of Bhamala Stupa, Taxila

The center is built of semi-ashlar masonry and heavy blocks of limestone with small stones and mud filling, which are common characteristics of 4th to 5th century architecture. There are several figures of Buddhas on bays, and the cruciform stupa is surrounded by 19 votive stupas. Soft Kanjur stone was used for molding the plaster, with a thick face of lime applied on most of the architecture and figures festooning it. The projecting podium is decorated by a series of panels separated from one from another by poorly designed Corinthian pilasters (why they were rushed is not certain).

Some panels remain bare while others have Buddha images (including the Parinirvana scene), triple Buddhas, and the Buddha in the dhyana or siksha mudras. Other pieces of Kanjur stone, such as a lion head and pieces of an umbrella, were also reported.

The monastic establishments at Bhamala are located to the east on stupa, and were excavated during first season. The monastery is built in the late semi ashlar kind masonry. As usual, the interior walls were covered with clay plaster, much of which was converted to terracotta after a great fire (perhaps by earthquake or perhaps by malign conduct) destroyed this structure.

After the first season's excavation, Sir John Marshall gave a detailed description of the Monastery, which is as below:

In planes the cells are standing up to the height of 10 or 12 feet and in one of the cells (no 6—7) the doorway including the stone work over the lintel, was exceptionally well preserved, but the windows, which for safety's sake were invariably placed near the roof, have all disappeared.

(Marshall 1951:394)

Outside the north wall and near its middle, is what at first site looks like an unusually massive buttress, but was more probably that base of a watch-tower similar to the one on the north side of the monastery G at the Dharmarajika. But there is also a true buttress at the north-east corner of the monastery, which was once evidently in danger of collapse. Both the watch tower and buttress are built of same kind of masonry as the main body of the structure, and must have been added at no great length of time after its erection.

The monastery to the east is designed on the usual plan with a large court of cells in front, and an assembly hall, kitchen (D) and refectory (E) in the rear.

(Marshall 1951:395)



There are two exceptional features in this monastery. One is the veranda along western side of the court of the cells is broader than typical ones, and there are two extra cells on two corners of the veranda such are not found in other monasteries. The other exceptional feature is the only flight of stairs giving access to the

upper floor is located in kitchen instead of in one of the chambers of the court of the cells, though it may be that there was a second flight in then court of the cell which was made of wood and has perished.

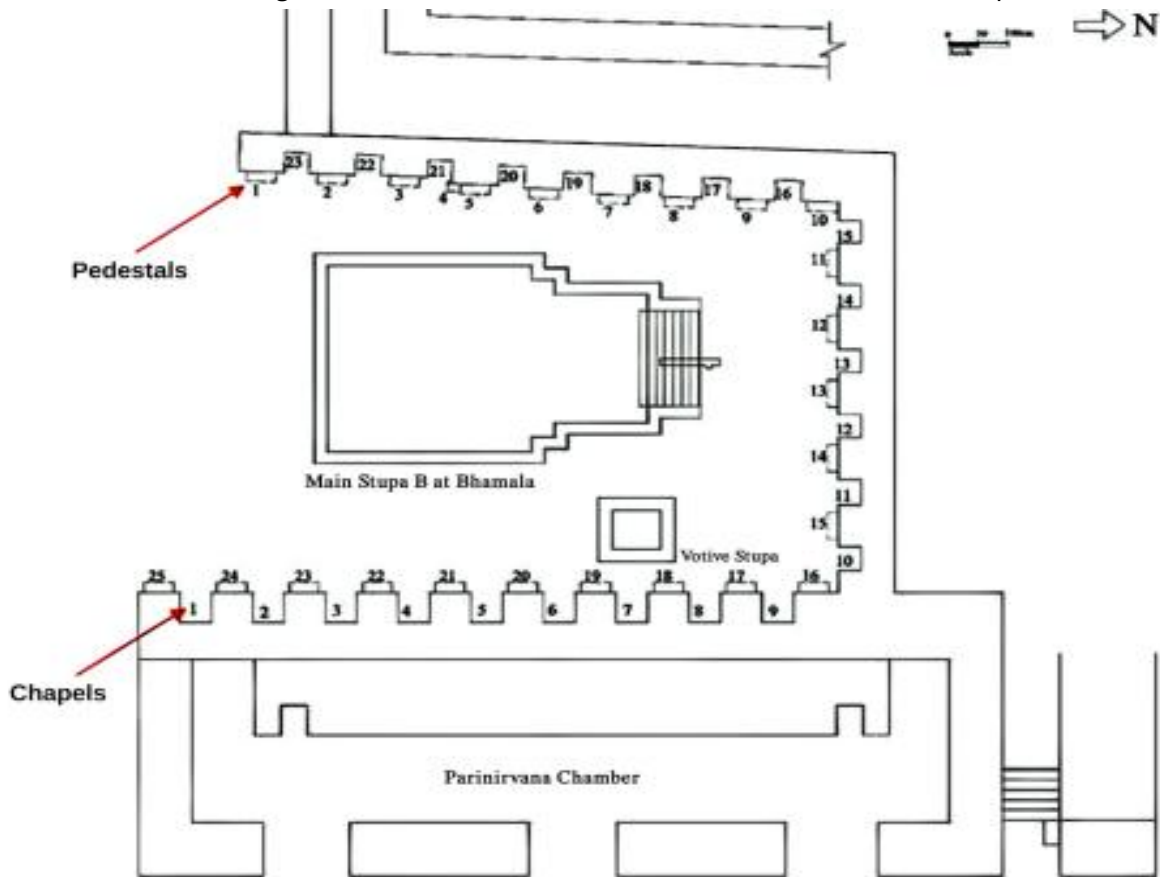


Figure 40: Main stupa B at Bhamala surrounded by chapels and a subsidiary stupa

A second major cruciform stupa was also discovered, surrounded by subsidiary stupas and chapels adorned with numerous stucco sculptures. The most remarkable find was a 14-meter-long reclining Buddha (Parinirvana), believed to be the largest of its kind in the world. Many terracotta images were also discovered from inside the Parinirvana chamber showing worshipers and mourners. Made of dressed Kanjur stone blocks, the colossal Buddha statue is seated on a stone platform inside a long mourning chamber and, like other monumental images of reclining Buddha reported from Afghanistan and Tajikistan, the Bhamala Buddha also faces the main stupa.

Radiocarbon dating was carried out on charred wood and charcoal taken from inside the terracotta sculpture placed around the monumental Parinirvana image. Laboratory reports estimate the Parinirvana was made during the 3rd century CE. This means the monumental image from Bhamala is the earliest representation of Parinirvana Buddha. Evidence suggests it predates all known colossal Parinirvana images reported to date. Thus, the Bhamala site is older than Ajanta in India, Tappa Sardar and Bamiyan in Afghanistan, Adzihna Tepe in Tajikistan, Daunghaung in China and the Chui Valley in Kirghizstan. Furthermore, it is the only example of Parinirvana Buddha in Kanjur stone to date.

4.14. Digital Modelling of Taxila Monuments – Example Badalpur Complex

The use of digital technology in field of archaeology allows analysis, documentation and reconstruction of data, historical sites and artefacts to be conducted through non-intrusive methods, allowing archaeologists to preserve the data and cultural heritage held within these archaeological findings.

As the Information Communication Technology available within the field of archaeology develops through technological advancements, archaeologists are able to obtain further access to these technologies, allowing greater amounts of archaeological data to be accurately documented and analyzed. The technology currently available has allowed data to be efficiently disseminated, processed and supplied to public archives, with the use of infield surveillance techniques allowing a greater amount of on-site data analysis to be conducted by archaeologists.

The use of 3D modeling technology within digital archaeology allows researchers to accurately model archaeological sites, providing further information to formulate archaeological perspectives and promoting the communication between the cultural heritage of archaeological sites and the public population.



Figure 41: A 3D Reconstruction of Taxila University

Following is a reconstruction of Badalpur Complex, largest in Taxila region.

3D Reconstruction of Badalpur Complex, Taxila

The archaeological site of Badalpur is situated at the edge of the boundary of Taxila. The site comprised of a monumental stupa and a monastery. The site is rectangular in plan and covers an area of 2.9 acres. The site has an imposing rectangular main stupa on the west, which measures 233 feet north-west and 196 feet

east- west. Two votive stupas in front of the main stupa on its eastern side, encloses around the stupa courtyard comprising of chapels of different sizes.



There is a huge monastery with 38 monk cells with two openings, one at its western and other one at its southern side, which measures 267 feet north-south by 256 feet east-west, kitchen, store and assembly hall is situated on southern side of the monastery. Additional small monastery is situated on west of assembly hall area. The stupa is made up with lime stones and built up in semi-ashlar and semi-diaper style with mud mortar inside and Kanjur stone has been used in moldings. Recent studies have shown that the square based stupa is one of the largest in Taxila region measuring 80 x 75 ft and having a speculated height in excess of 70 ft. with the Chattravali included. The site remained occupied between 2nd– 5th Century BC.

Reconstruction – Badalpur Complex - Plan

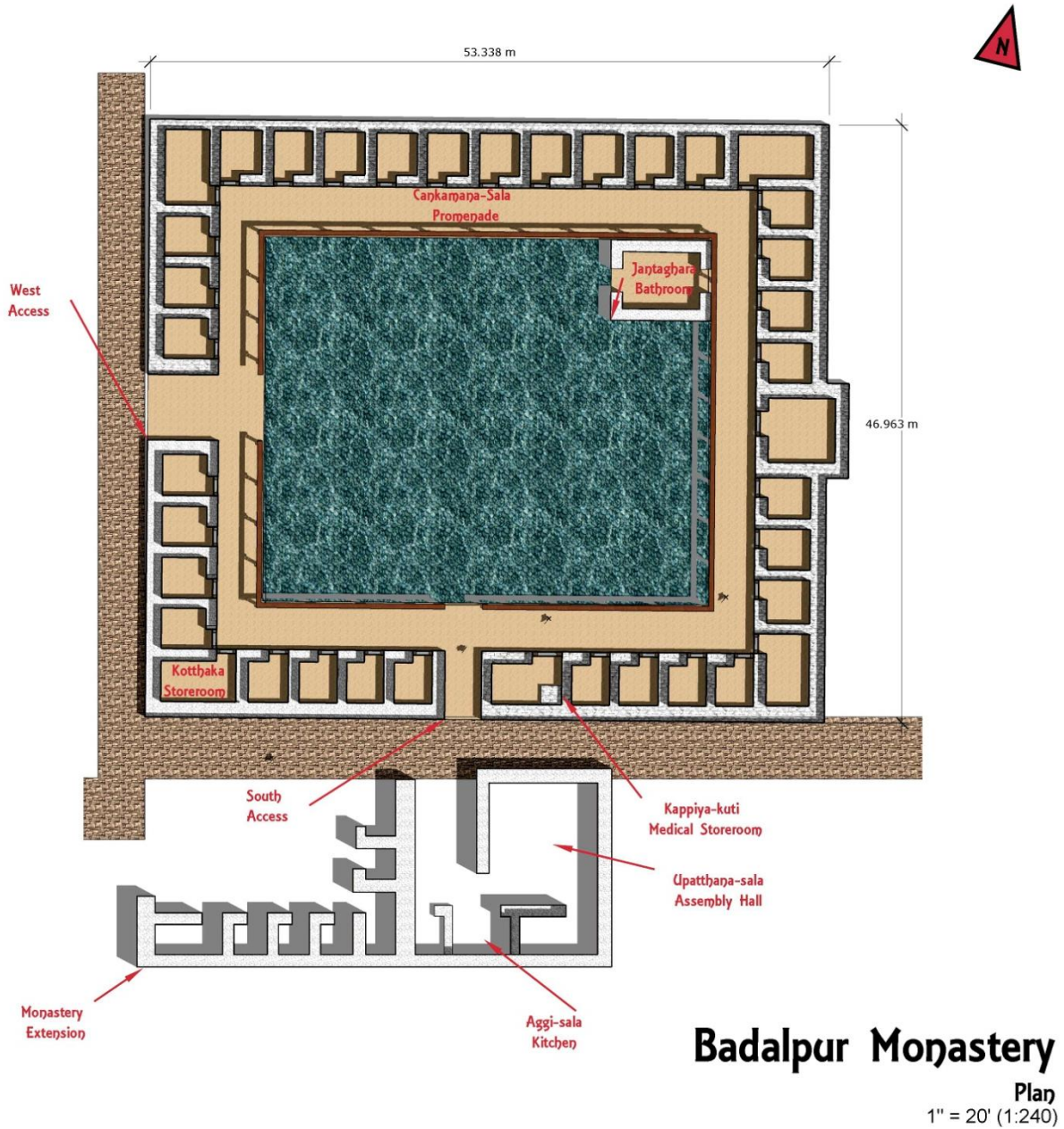
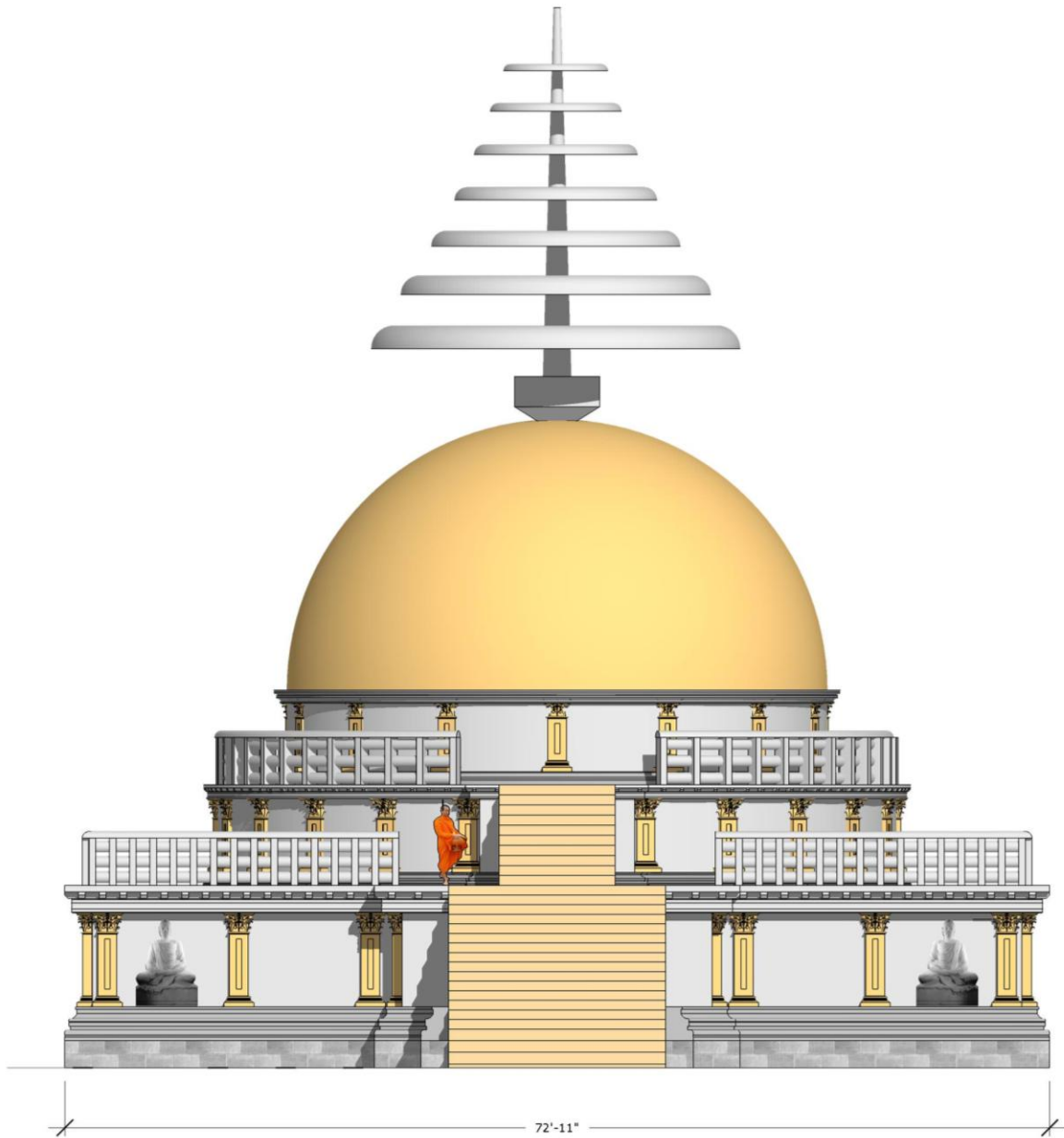


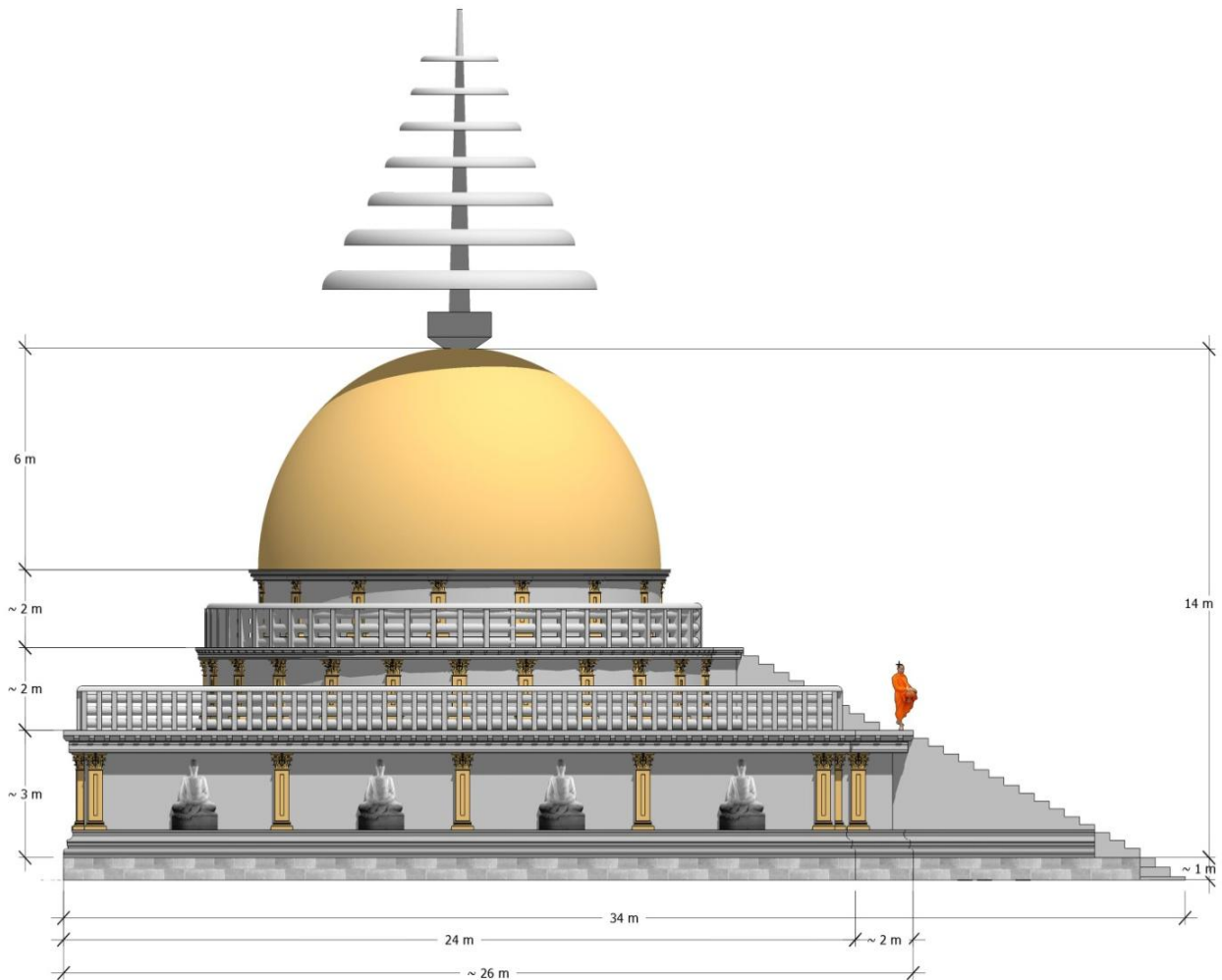
Figure 42: Plan of a typical Gandharan Buddhist monastery at Taxila from the site of Badalpur. Dated to 2nd - 5th Cent CE

Reconstruction – Badalpur Complex - Elevation



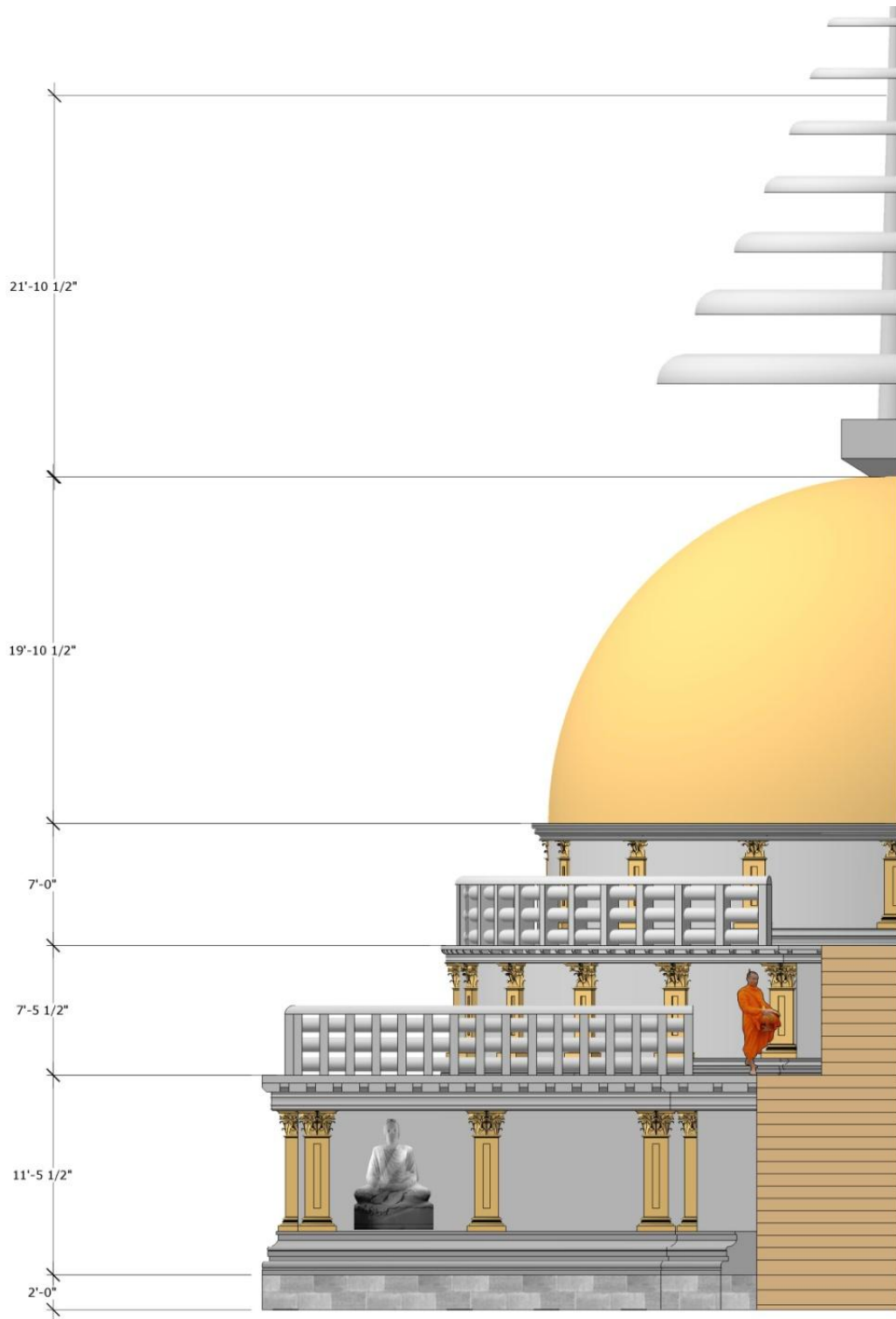
The square based stupa of Badalpur is one of the largest in the Taxila region measuring 24.4 m x 23 m (80 x 75 ft) and having a speculated height in excess of 21 meters (70 ft.) Dated to 2nd - 5th Century CE.

Reconstruction – Badalpur Complex – Side Elevation



The square-based **stupa** of Badalpur is one of the largest in **Taxila** region, measuring 24.4 m x 23 m (80 x 75 ft) and having a speculated height over 21 meters (70 ft.) with the Chattravali included. Dated to 2nd - 5th Century CE.

Reconstruction – Badalpur Complex – Detail



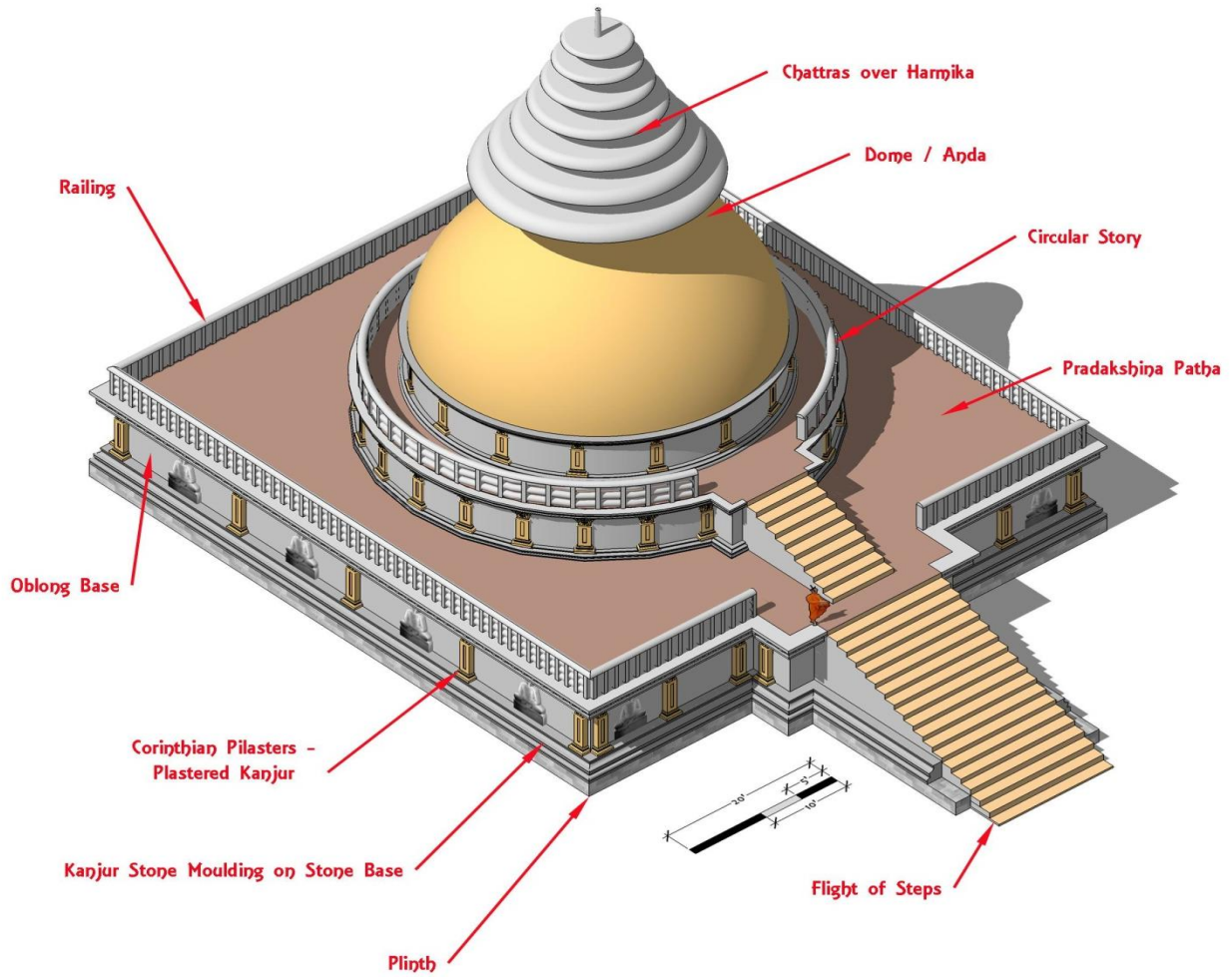
A detailed view of the front of a typical Gandharan **stupa** from **Taxila** on the site of Badalpur. Dated to 2nd - 5th Century CE

Reconstruction – Badalpur Complex – 3D View



A partially complete reconstruction of the **Stupa** in Badalpur, one of the largest stupas in **Taxila** region, dated to 2nd -5th century CE.

Reconstruction – Badalpur Complex – Isometric View



An isometric image of Badalpur **stupa** showing various elements that make up a stupa. Dated to 2nd - 5th Century CE.

4.15. Ceremonial Gate and Landmark at GT Road and Remodeling of all Access Roads

Today, travelling on GT road from Rawalpindi or Peshawar to Taxila one usually misses the turning towards Taxila. The only visible landmark is the Nicholson Memorial atop a hill along the GT Road; however, the entry to Gandhara Civilization remains completely obscured. Visitors are forced to take a dangerous U-turn on the GT Road, which is often congested with heavily loaded crush trucks that rarely yield the right of way.

Hence following improvements are proposed

1. Flyover from GT Road to Taxila Road in order to resolve traffic flow
2. A Landmark to commemorate the beginning of Taxila Heritage City
3. A Ceremonial gateway to the city of Gandhara
4. Remodeling of main and access roads removing all hurdles and installation of proper signboards and guide boards

Ceremonial gates or landmarks are made to celebrate or commemorate something important in the culture, in ritual or worship, or in personal life. In Buddhism gates are nothing new: many Buddhist temples, including urban ones, have a “gate” representing one's entrance to the Buddhist path.

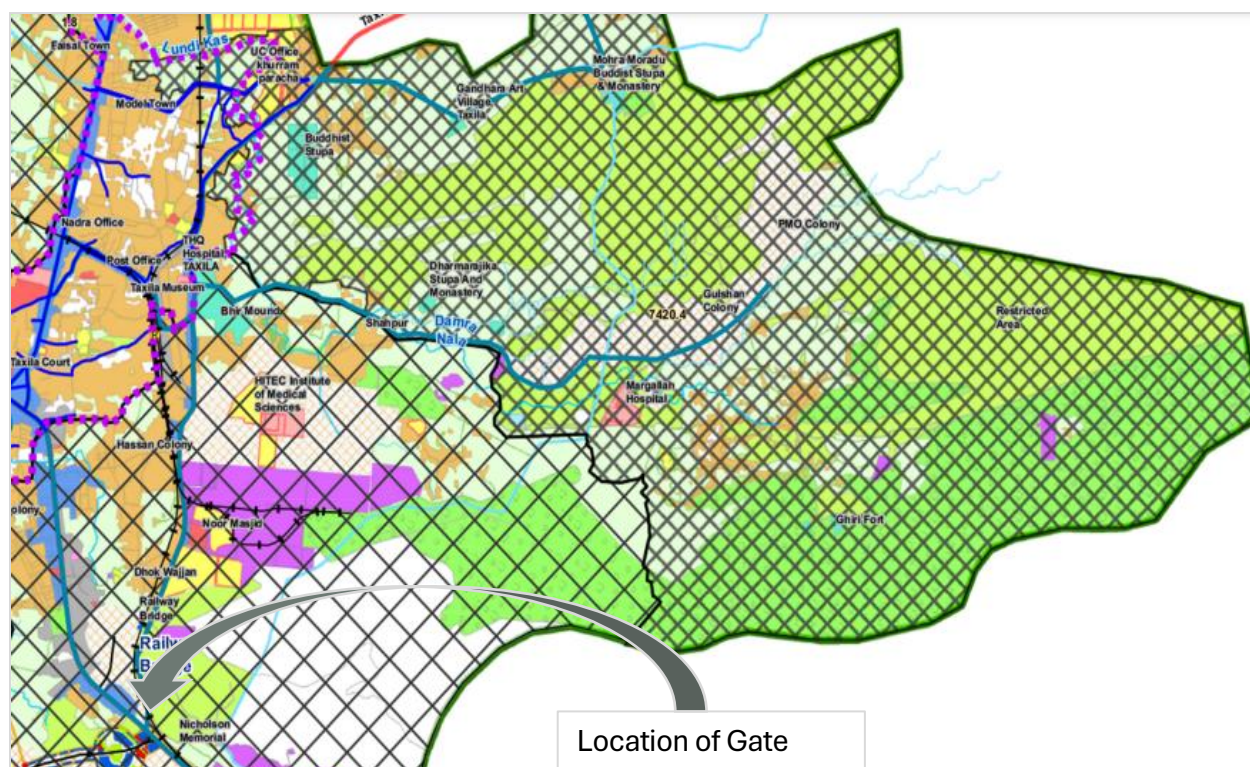


Figure 43: Proposed location of Ceremonial Gate at Entrance of Taxila Heritage City

Entrance to a Buddhist shrine or stupa in subcontinent is called **Torana** which is a Stone gateway. It is a free-standing ornamental or arched gateway for ceremonial purposes. Toranas can also be widely seen

in Southeast Asia and parts of East Asia. Chinese **Shanmen** gateways, Japanese **torii** gateways, Korean **Iljumun** and **Hongsalmun** gateways, Vietnamese **Tam quan** gateways, and Thai **Sao Ching Cha** were derived from the Subcontinent **torana**. They are also referred to as **vandanamalikas**.



Figure 44: Torana Sacred Gateway in Buddhist Architecture; an example of ceremonial gate

Torana is a sacred or honorific gateway in Buddhist architecture. Its typical form is a projecting cross-piece resting on two uprights or posts. It is made of wood or stone, and the cross-piece is generally of three bars placed one on the top of the other; both cross-piece and posts are usually sculpted. Below is Torana from famous most Sanchi Stupa.

In Buddhism, a Monument symbolizes honor for the Buddha and his teachings, representing the respect for spiritual practice and the ongoing pursuit of enlightenment for followers. Mostly stupas act as monuments in Buddhism.

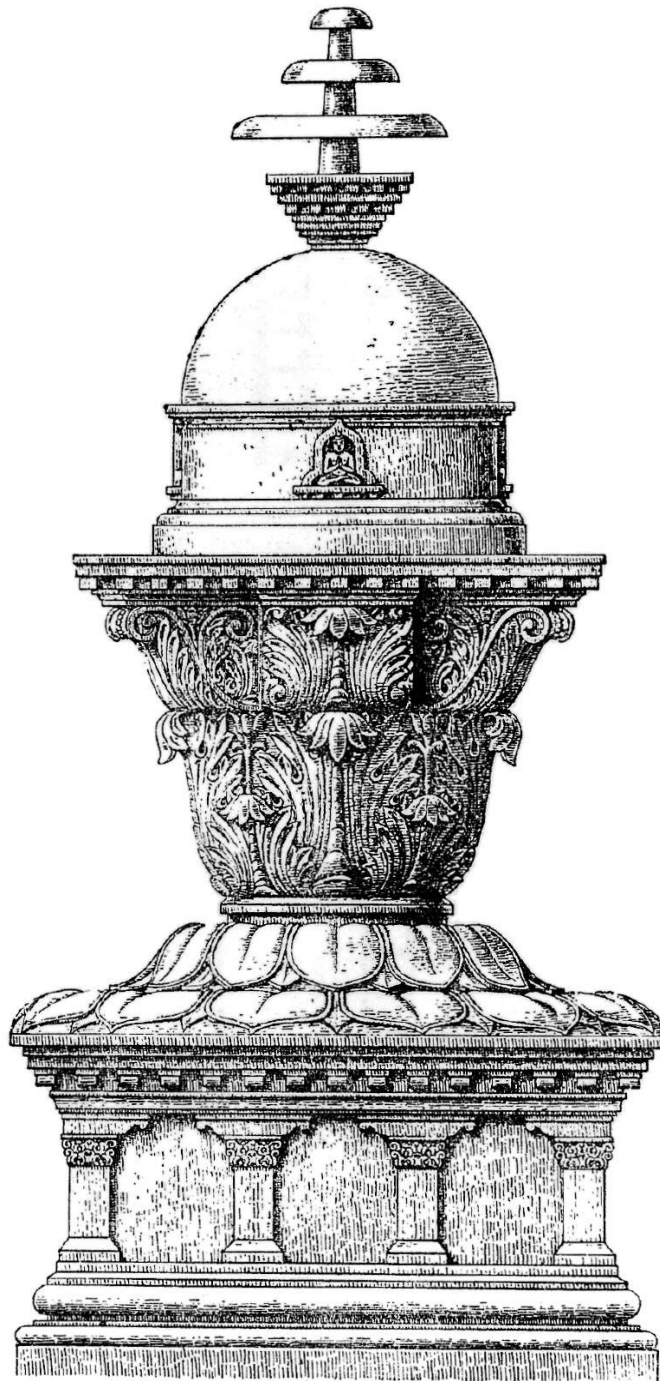


Figure 45: Model stupa in Taxila with a Corinthian capital supporting the dome. 2nd century BC.

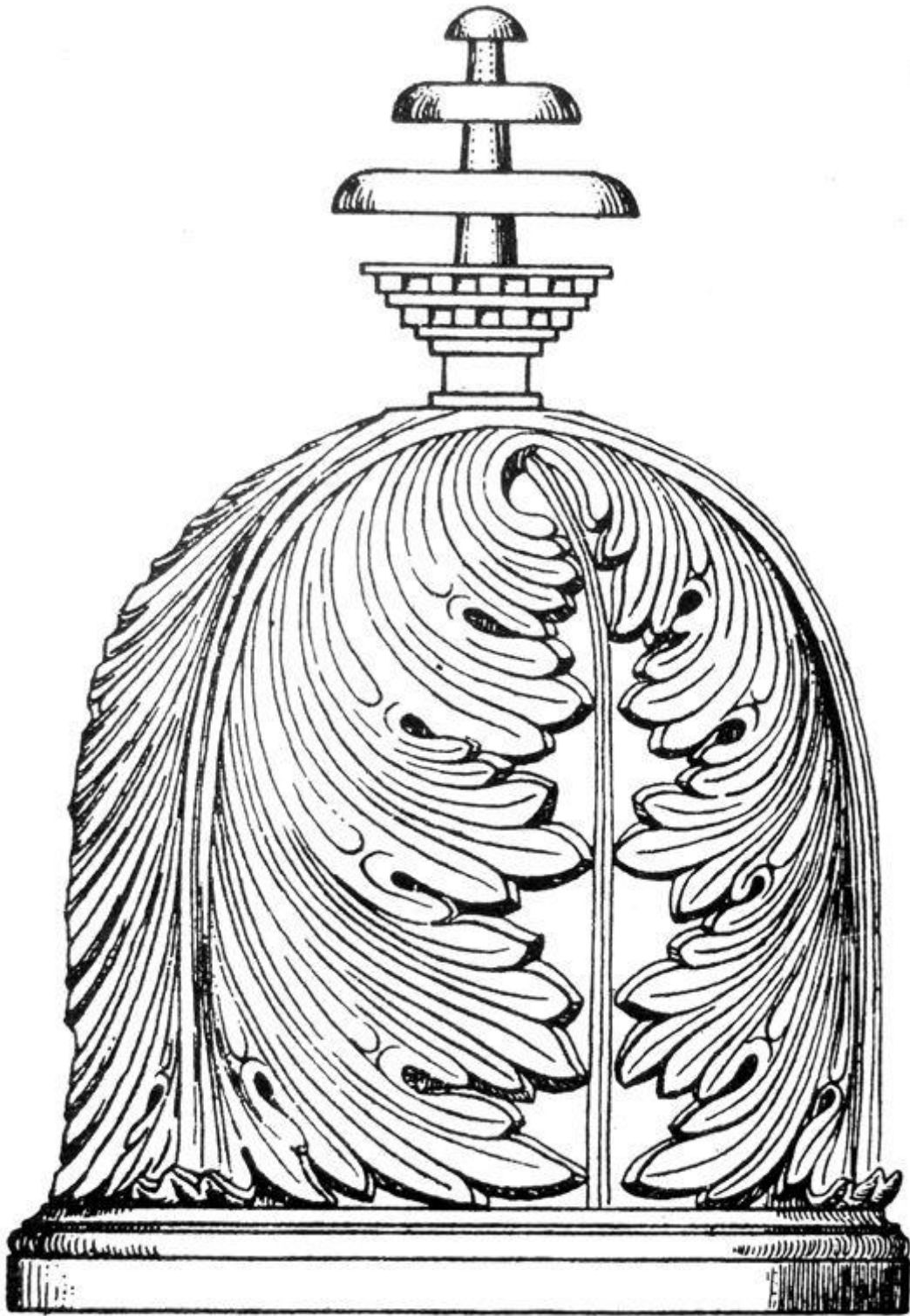
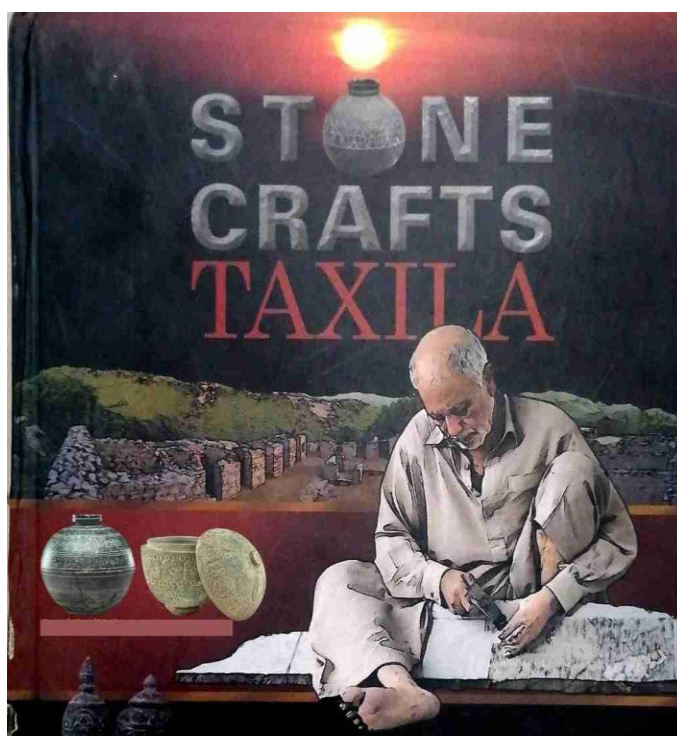


Figure 46: Model stupa decorated with classical acanthus leaves, from Taxila. 2nd century BC.
(After *Taxila*)

4.16. Gandhara Crafts Street & Upgradation of Gandhara Art Village

One of the most important reasons to support traditional crafts is to preserve cultural heritage. These art forms are a tangible link to the past, representing the traditions, beliefs, and values of a particular community. The arts & crafts are highly regarded in every culture around the world. It's not just important for artists, but crucial for every person's growth and development. Creativity, such as in art or crafts, is foundational to human development because it teaches us to see the good in the world. By keeping traditional crafts alive, we are preserving our ancestors' cultural heritage and helping ensure that future generations have access to these essential aspects of their heritage.



Gandhara Art Village - Problematic

Though it is very easy to point out weakness in **Gandhara Art Village** as limited functionality, lesser adherence to objectives, poor infrastructure, no artist residency program despite availability of accommodation facilities, negligible community participation and top of all no training for preserving centuries old art and craft traditions, less connection to international art forms and platform, lower tourist value is fading the need.

With the same we find more pluses in this village which includes 21 workshops of almost all possible stone crafts under one roof including, carving, tile work, mortar-pestle, chisel work, engraving, etc. etc. availability of all sort of trained craftsmen within this compound, manufacturing almost all stone craft apart from Buddhist replicas at site. A large emporium which could be used for multiples usages, training hall,

functioning offices, parking, working dispensary at site, accommodation which could be used for national or international residencies, a beautiful water less pond which may be filled and used as lotus pond following the Buddhist traditions.



Despite having a poorly designed large structure and thousands of square feet of covered area its merely acting as small fragmented factory shops, dump of waste, storage space for large businesses on a very low or subsidized rent.



Despite its shortcomings, this complex holds great potential to be effectively transformed into a true Art Village. Located in Taxila, the land of one of the world’s oldest civilizations, home to the ancient university, and a cradle of the oldest surviving craft, stonework, it offers a unique opportunity to promote and enhance stone craftsmanship. The presence of skilled local stone artists and numerous nearby stone factories further strengthens its potential as a hub for cultural and artistic revival.

It is deeply unfortunate that the locals, who were once the torchbearers of stone craftsmanship, are now largely unfamiliar with the craft. The artistic essence of this trade has either completely vanished or is merely surviving in the shadows of neglect and deprivation.



The plan is to boost the growth potential of the village with proper marketing support, aid for infrastructure development, training for product diversification, training of younger artisans and craftsmen and sustainable income to manage a sustainable facility that can showcase the cultural and artistic heritage of Taxila for tourists as well as the ones who are interested in learning and exploring the craft, art forms and culture.



The Way Forward

The way forward is not an easy or short-term task but a continued effort will bring all the desired results following is a brief of few of the actions required as discussed.

Creation of Gandhara Art Institute

1. Creation of Gandhara Art Institute in the existing facility of Gandhara Art Village
2. As first step Initiation of training program for interns with a duration of 6 months and compulsory for all 21 craft shops to train 5 interns every 6 months
3. In second stage program may be elaborated for a longer duration of time
4. Incorporation of national and international Art Residency Program utilizing existing accommodation facility
5. Provision of all missing facilities into village



Gandharan Craft Street

A Gandharan Craft Street is proposed, extending from Taxila Museum to the Mohra Moradu Complex Road, or possibly up to UET Taxila, to connect entrance trails to all major Gandharan monuments.

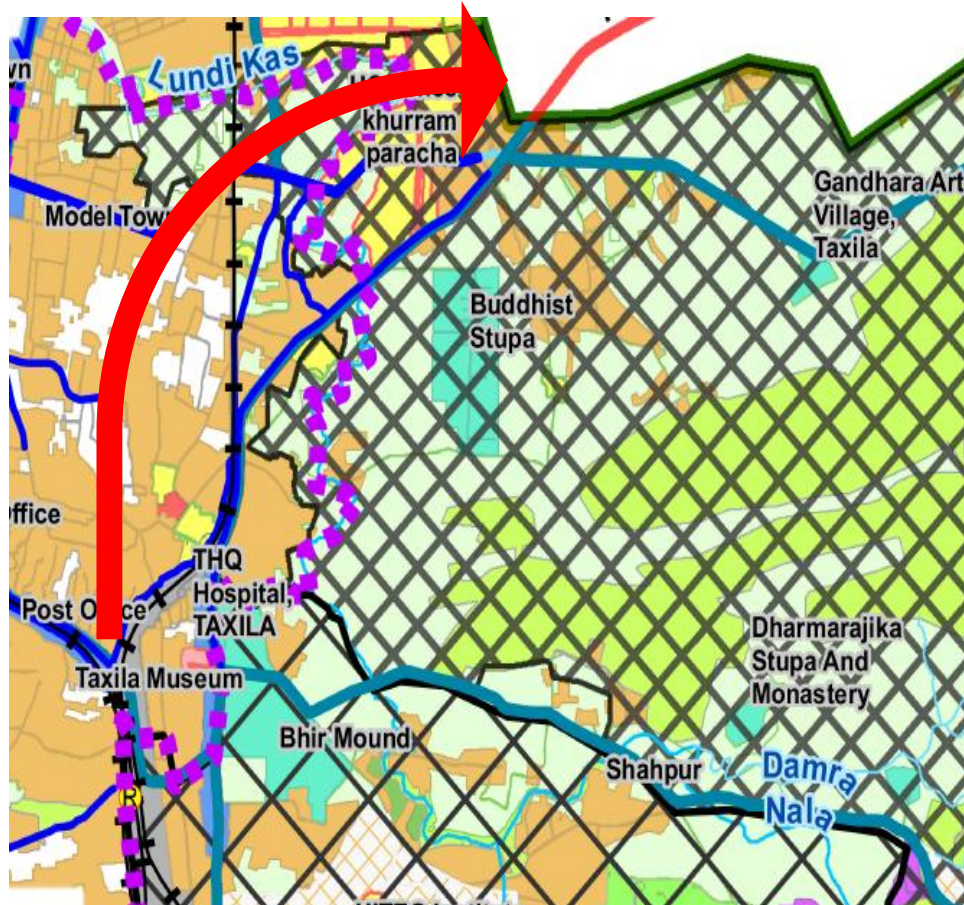


Figure 47: Proposed location of Gandharan Craft Street

It is proposed that **Gandhara Crafts Street** and **Gandhara Art Village** be a representation of **Gandhara Architecture in Taxila**. For Crafts street a uniform Street fascia is proposed as below made out of **Ashlar Stone Masonry**.



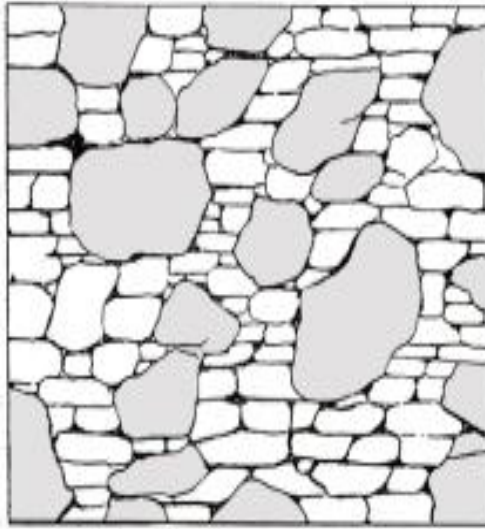
Figure 48: Proposed Street fascia of Gandharan Craft Street

It is further proposed that all shop fronts in **Gandhara Craft Street** and **Gandhara Art Village** be kept representing construction techniques used in Taxila.

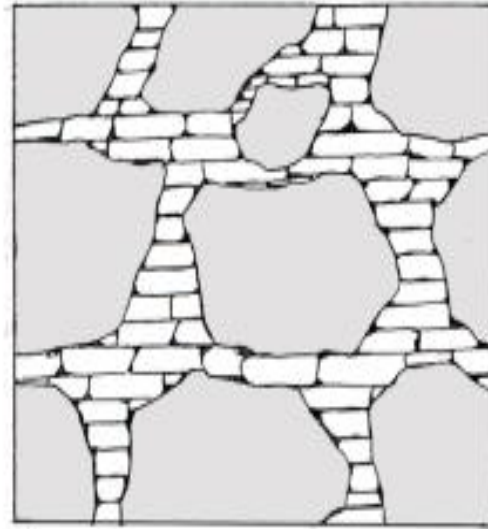


Figure 49: Levels of Construction in the cities and monuments of Taxila from oldest (at bottom) to latest (at top)

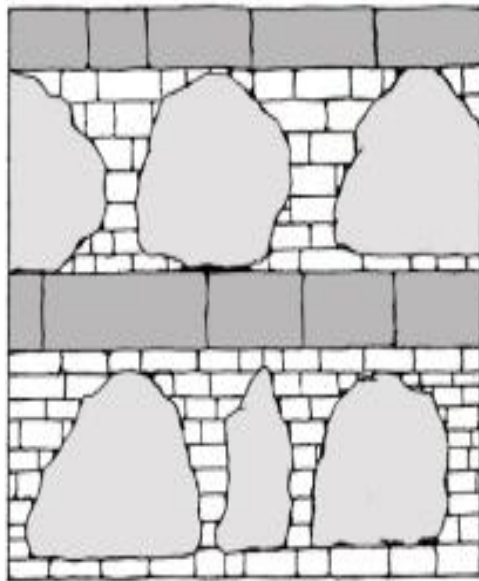
The various levels of construction in the **cities** and monuments of **Taxila** from the oldest (bottom) to the latest (top) as recreated at Taxila Museum. They represent various time periods - Early Rubble Masonry: 2nd century BCE and earlier (Bottommost)-Rubble Masonry: 2nd cent BCE to 1st century CE-Small Diaper Masonry: 1st century CE to 2nd cent CE-Large Diaper Masonry: 2nd century CE to 3rd cent CE and later-Semi Ashlar Diaper Masonry: 2nd century CE to 5th century CE (Topmost). These systems did not always replace each other but also were used side by side depending on the type of construction i.e. buildings of more importance and relevance were created with more care and the less important ones had less finesse involved.



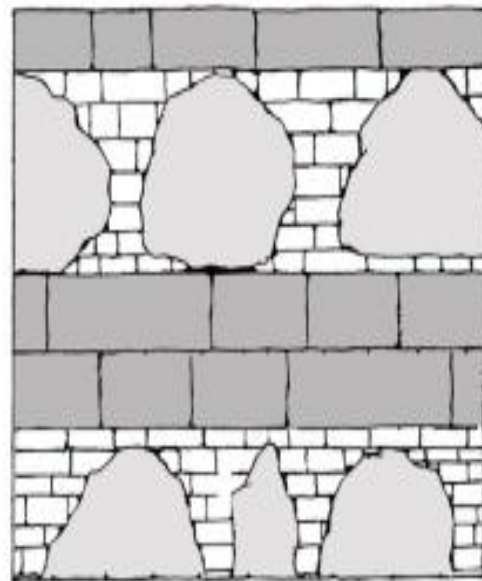
Rubble Masonry
Phase I



Diaper Masonry
Phase II



Semi-Ashlar Masonry
Phase III



Double-Semi-Ashlar Masonry
Late Phase III

Figure 50: Sketch showing main Taxila masonry types: Phase I rubble masonry, Phase II diaper masonry, Phase III semi-ashlar masonry and late Phase III double-course semi ashlar masonry
(Source: Kurt Behrendt, modified from Marshall 1916)

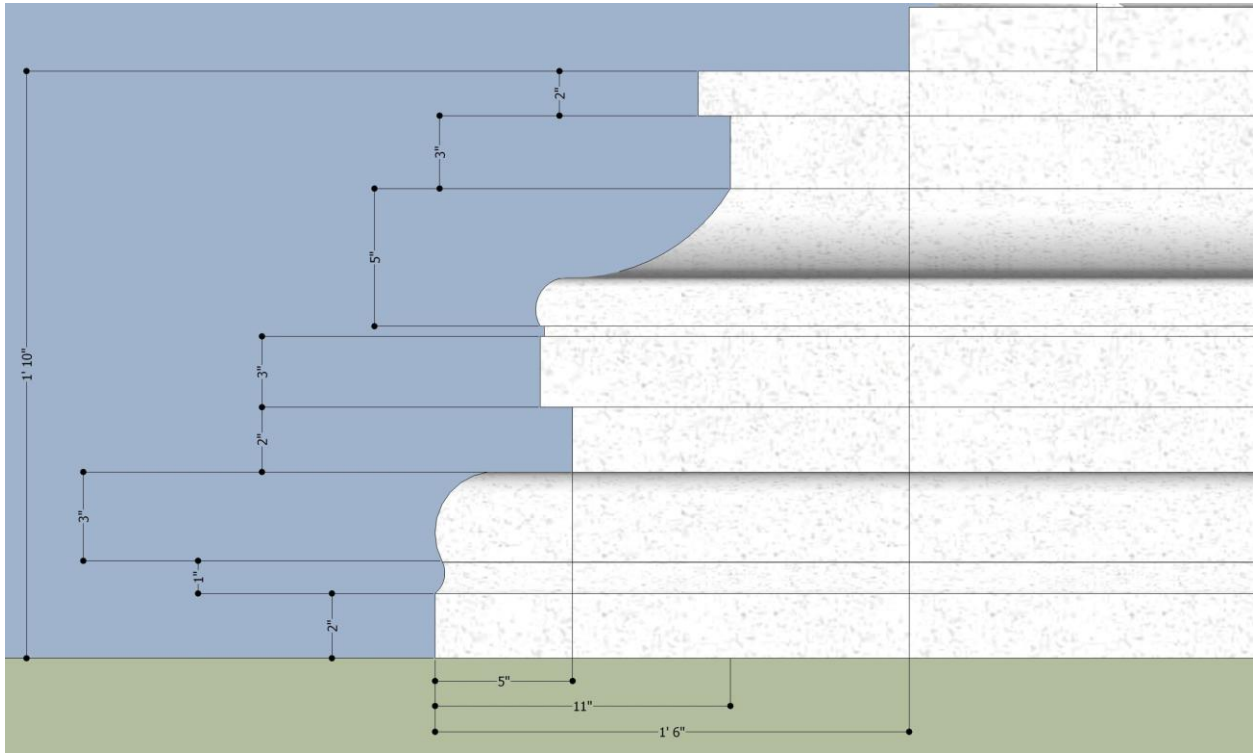


Figure 51: Base molding typically seen on most stupa bases in the Taxila region

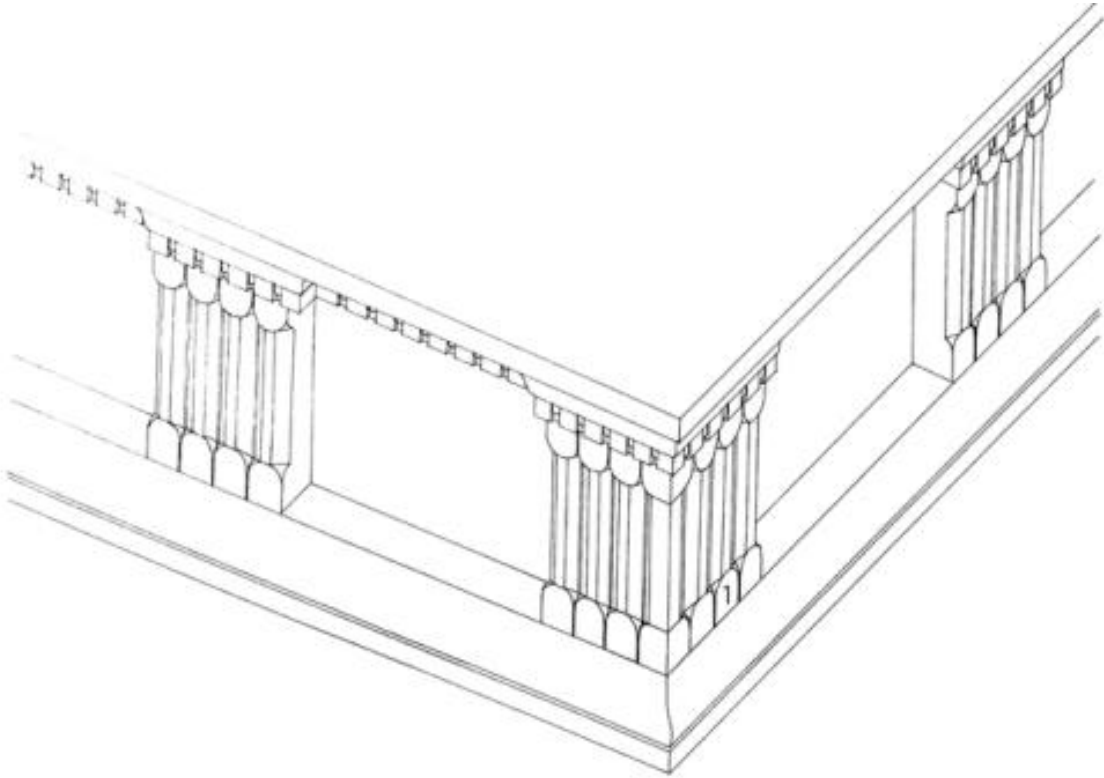


Figure 52: Portico detail typically seen on most stupa bases in Taxila region

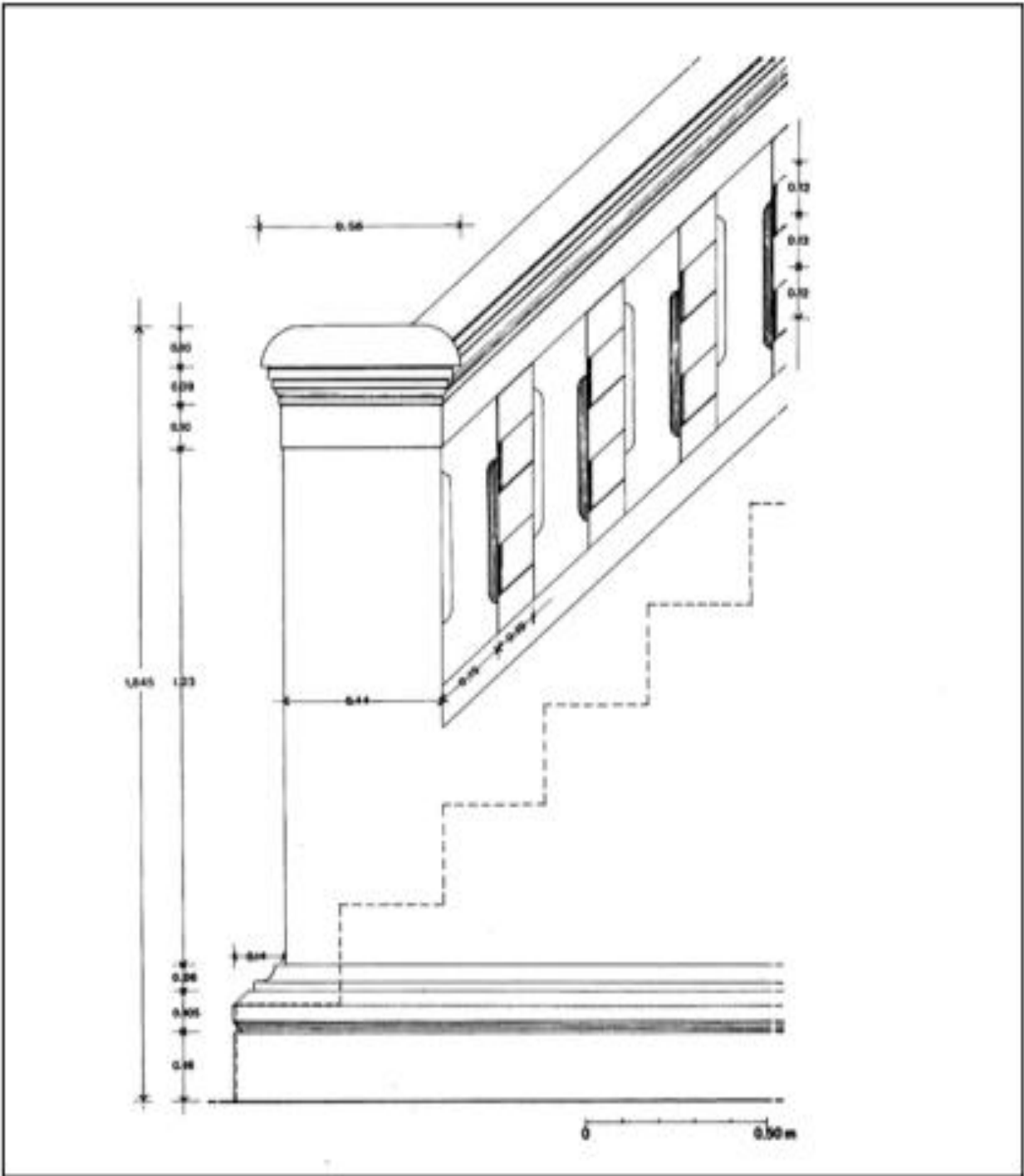


Figure 53: Stair Detail typically seen on most stupa bases in the Taxila region

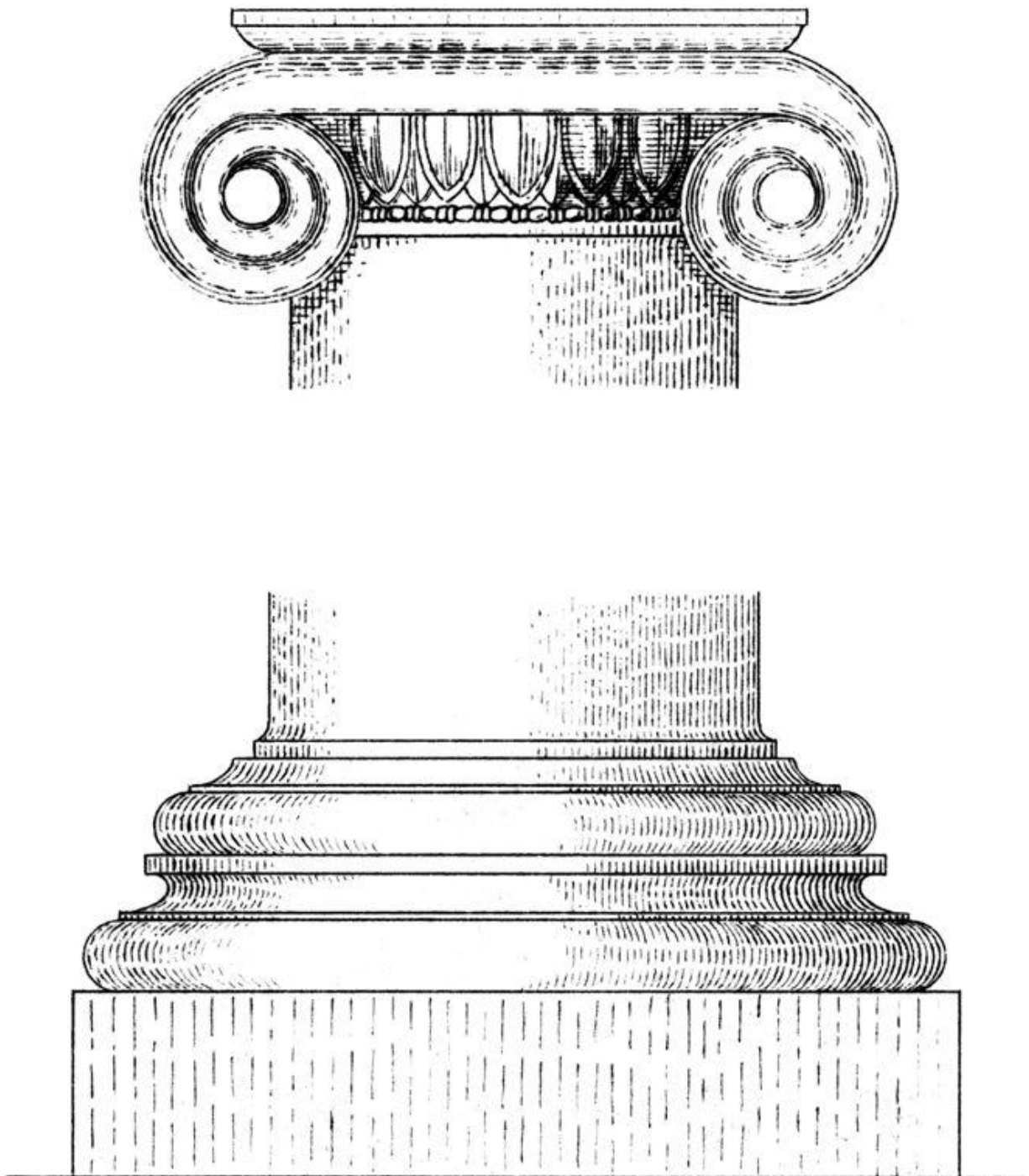


Figure 54: Ionic column capital and base from the Jandial Temple, Taxila. 1st century AD

4.17. Gandhara Tourist Trail

Tourist trail means a facility comprising an integrated tourists and recreational infrastructure equipped in situ with special trail signs for the purpose of recreational or tourist travel. Historic trail means a route located on or near the approximate alignment of a trail on which a person or group traveled while making a journey of regional or national historic significance.

Archaeological tourism is a type of cultural tourism which involves visiting archaeological sites, museums, and similar destinations with historical significance. This form of tourism enables you to engage with ancient cultures and civilizations, offering a unique journey through time.

WCLA created a such "Royal Trail (Shahi Guzargah) which is a heritage trail that leads from Delhi Gate to the Lahore Fort. This is the route once followed by Mughal Emperors when they came from Delhi to Lahore. The Royal Trail connects many of the heritage monuments like Shahi Hamam Turkish Bath), Wazir Khan Mosque, Sonehri (Golden) Mosque and tomb of Malik Ayaz, a Mughal governor of Lahore."



Figure 55: Royal Trail, Lahore

Similar to Royal trail Lahore, hundreds of historic tourist trails exist in historic urban areas around the world. Additionally, many archeological trails also do exist around the world which provide archeological tourist an ultimate tourist experience.

Archeology Trail at Zion National Park



Figure 56: Archeology Trail at Zion National Park

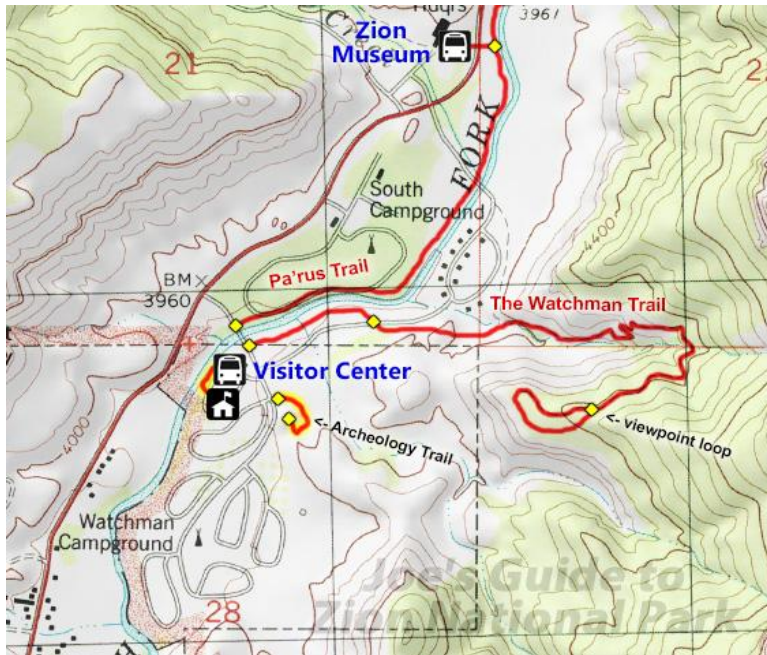


Figure 57: Map showing route of Archaeology Trail at Zion National Park

Gandhara Tourist Trail is being proposed to link all Major Gandharan Monuments through Electric Carts/ Vans or Bikes starting and ending at Taxila Museum presently in the given order and to be expanded in phase 2.

Another proposal is to find out original paths in between all three cities naming Bhir, Sirkup and Sirsukh with Stupa and Monasteries Complexes and they shall be revived and provided with tourist facilities and shall be named pilgrim routes for Buddhists and interested tourists.

Gandharan Touristic Trail Route

Phase-1	Phase-2
<ol style="list-style-type: none"> 1. Taxila Museum 2. Bhir Mound 3. Dharmarajika Complex 4. Sirkup Cluster 5. Mohra Moradu Complex 6. Gandhara Art Village 7. Gandhara Craft Street 	<ol style="list-style-type: none"> 1. Ghiri Monuments 2. Kalawan Complex 3. Kunala Complex 4. Bhallar Complex 5. Other monuments to be added

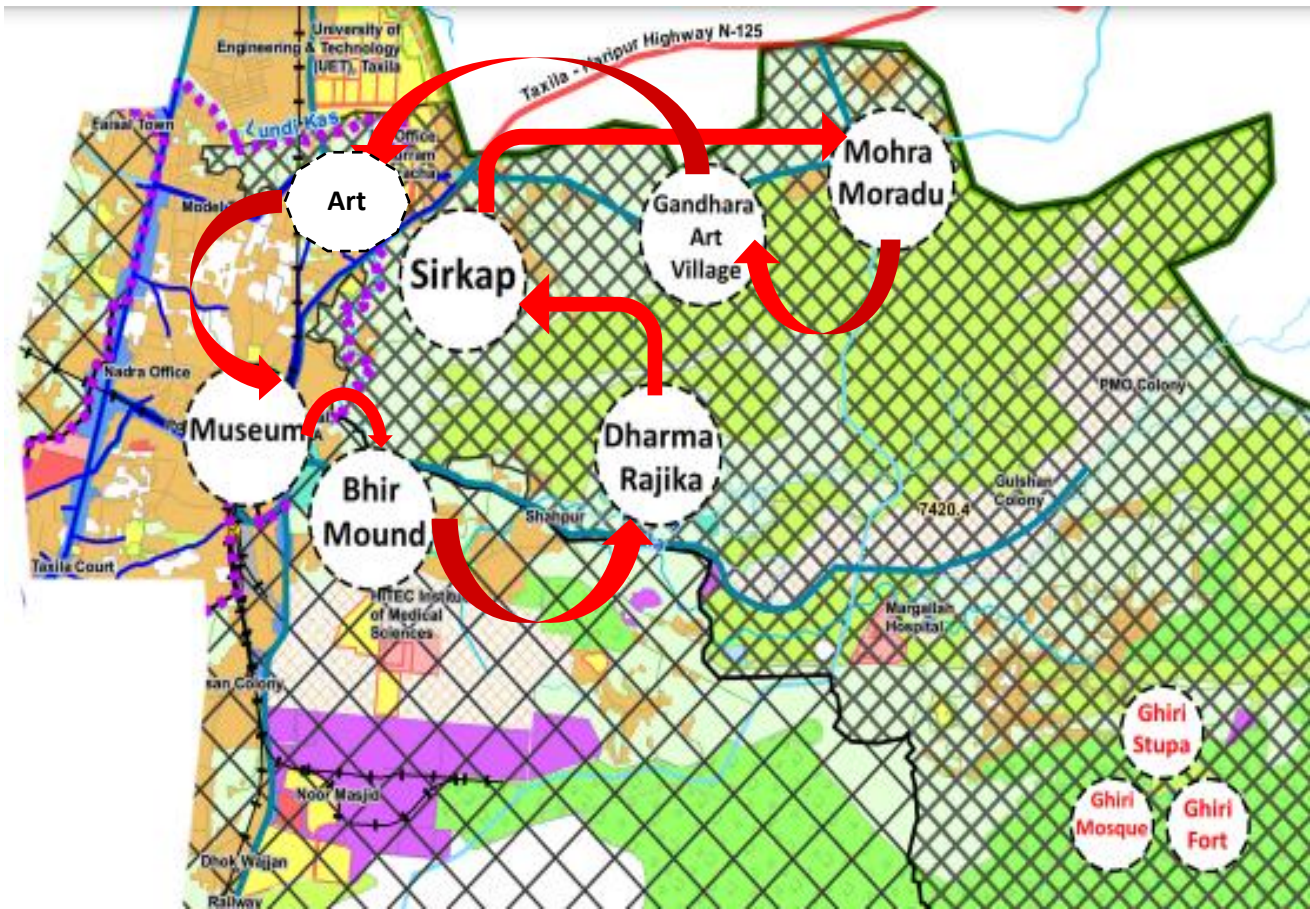


Figure 58: Proposed Gandharan Tourist Trail Route

4.18. Provision of Tourists Facilities

Archaeotourism or Archaeological tourism is a form of cultural tourism, which aims to promote public interest in archaeology while conserving historical sites.

Archaeological tourism encompasses a wide range of activities related to the public promotion of archaeology, including visits to archaeological sites, museums, and interpretation centers; historical reenactments; and the revival of indigenous products, festivals, and traditional performances such as theater.

Archaeological tourism promotes archaeological sites and an area's cultural heritage. The goal is to ensure that tourism remains non-invasive, preserving the integrity of archaeological sites while allowing for meaningful public engagement. Archaeologists have expressed concerns that tourism encourages particular ways of seeing and knowing the past. When archaeological sites are run by tourist boards, ticket fees and souvenir revenues can become a priority. The tradeoff between opening a site to the public or remaining closed and keeping the site out of harm's way should be assessed. Damage to irreplaceable archaeological materials is not only direct, as when remains are disordered, altered, destroyed, or looted, but often an indirect result of poorly planned development of tourism amenities.

Tourism facilities refer to the infrastructure, services, and amenities specifically designed to meet the needs of tourists and enhance their travel experience, such as **hotels, restaurants, transportation, roads, shops and recreational sites**. These can alter the environment producing flooding, landslides, or undermining ancient structures hence a very careful design is required when they are proposed in an area of archeological importance. Though most of these facilities do exist in Taxila though may not be adequate, hence, following tourist facilities are envisaged in Taxila.

1. Hotels
2. Lodging
3. Restaurants
4. Transportation
5. Roads
6. Shops
7. Parking Area
8. Medical Facilities
9. Recreational Sites



4.19. Gandhara Digital Archeology

Digital archaeology is the application of information technology and digital media to archaeology. This includes the use of tools such as databases, 3D models, digital photography, virtual reality, augmented reality, and geographic information systems. Computational archaeology, which covers computer-based analytical methods, can be considered a subfield of digital archaeology, as can virtual archaeology. Digital archaeology plays a key role in data collection, analysis, and public outreach, enhancing the study and preservation of archaeological sites and artifacts.

The use of digital technology to conduct archaeological research allows data to be collected without the invasion or destruction of archaeological sites and the cultural heritage they hold, aiding the preservation of archaeological data. This is how many early archaeological sites were discovered in-depth. Applications of this technology have aided the reconstruction of historical monuments and artefacts such as pottery, human fossils, and mummified remains.



Computational Archaeology

Computational archaeology is a subfield of digital archaeology that focuses on the analysis and interpretation of archaeological data using advanced computational techniques. This field employs data modeling, statistical analysis, and computer simulations to understand and reconstruct past human behaviors and societal developments.

Virtual Archaeology

Virtual archaeology is a subfield of digital archaeology that creates and use virtual models and simulations of archaeological sites, artifacts, and processes. It makes use of 3D modeling, virtual reality (VR), augmented reality (AR), and other technologies to recreate or visualize archaeological findings.



It has already been proposed that a Gandhara Digital Archeology Gallery be formed in Taxila Museum Extension and this cutting-edge technology be utilized to educate public about Gandhara civilization and importance of this area.

4.20. Institutional involvement – UET Taxila internship Program with Public sector

Social Aspects & UET Taxila Student Engagement in Taxila's Tourism Development – Heritage Awareness & Community Involvement

Heritage awareness and community involvement are essential for the protection and promotion of historical sites. The field assessment revealed a significant lack of heritage literacy among residents. One respondent, when asked about Bhir Mound, remarked, "*Ye koi bahar se aayi hui cheez lagti hai, banda kahe ke ye kisi insan ne nahi banaya*" (This looks like something that came from outside; one might say no human built it). This reflects a disconnect between the community and its rich historical legacy.

To address this issue, we can leverage the resources available, particularly the students of UET Taxila. Since community service is a mandatory non-credit course for undergraduates, these students can actively participate in heritage awareness campaigns, guided site tours, and educational workshops. Their involvement can foster a sense of ownership and responsibility among locals, ensuring that cultural preservation becomes a shared goal.



Figure 59: Consultation session with UET Taxila Students

University Community Service Programs (40-Hour Requirement)

Education & Youth

- **Heritage Education:** Students can **tutor local youth** about Taxila’s historical significance through workshops and storytelling.
- **Youth Leadership:** Establish a **heritage ambassadors’ program** where students train as tour guides and community educators.

Environmental Conservation

- **Historic Site Preservation:** Students can **assist in site cleanups** and help monitor environmental impacts like uncontrol vegetation growth on heritage structures.
- **Sustainable Tourism:** Engage students in **eco-friendly tourism initiatives**, such as green visitor management and tree plantations around heritage sites.

Community Development & Socioeconomic Growth

- **Revitalizing Public Spaces:** Architecture students can contribute to the **adaptive reuse of heritage structures**, making spaces more engaging.
- **Women Empowerment in Handicrafts:** Support local women artisans in **traditional crafts like pottery, textile weaving, and Gandhara art** by involving students in training workshops and marketing strategies.
- **Support for Local Artisans:** Facilitate **exhibitions, online platforms, and heritage bazaars** to promote Taxila’s craftsmanship.

Arts & Culture

- **Cultural Festivals & Exhibitions:** Organize **interactive heritage events** like reenactments, folk performances, and museum volunteering.
- **Murals & Public Art:** Encourage students to create **historically inspired murals** to visually narrate Taxila’s legacy.

Traditional Food Tourism & Gastronomy

- **Reviving Gandharan Cuisine:** Students can collaborate with culinary experts to **research and recreate historical dishes** from the Gandhara civilization.
- **Experiential Dining for Tourists:** Local vendors can be engaged to prepare **historical meals**, offering visitors a taste of Gandhara’s food culture.
- **Sustainable Food Practices:** Promote **eco-friendly food packaging and waste management** in tourist hubs.

Health & Wellness

- **Tourist Assistance Programs:** Train students for **first aid services at heritage sites**.
- **Hygiene & Sanitation Drives:** Engage students in **awareness campaigns to maintain cleanliness at tourist attractions**.

Disaster Preparedness & Response

- **Emergency Readiness at Heritage Sites:** Create student-led teams for **risk assessment and disaster response training** related to earthquakes and site preservation.

Mutual Benefits

- **For Students:** Hands-on experience, professional exposure, and fulfillment of social work hours.

For Taxila: Engaged youth contributing to **sustainable tourism, cultural preservation, and socioeconomic development.**



CSCE cabinet along with Prof Usman Rasheed, met Team from The Urban Unit, (P&D Board) Punjab Government along with Professor Muhammad Ali Tirmizi to discuss the details of upcoming event of HERITAGE GUARDIANS campaign on the archaeological sites of Taxila in collaboration with Taxila Museum.

Figure 60: Consultation session with CSCE cabinet & Prof Usman Rasheed

4.21. Induction & Training of Onsite Staff

Natural events and human activities can impact the integrity of archaeological sites. When archaeological sites are damaged, invaluable information about past ways of life is lost—information that can never be recovered, as the people of the past will not return to live their lives again

Armed conflict and war, earthquakes and other natural disasters, pollution, poaching, uncontrolled urbanization and unchecked tourist development pose major problems to World Heritage sites.

Taxila monuments are facing all these problems simultaneously and on-site staff remains unable to tackle these problems. It is ironic that on-site staff are often employed as part-time workers or daily wagers, with little to no specialized training—amounting to unskilled labor—yet they are expected to maintain and preserve the site. Furthermore, due to limited budgets, there is an inadequate supply of essential chemicals and herbicides, leading to uncontrolled vegetation growth within the monuments.

It is required that appropriate number of staff be inducted and trained to look after site as per international standards.



Figure 61: Consultation session

4.22. Seismic Vulnerability Studies and Implementation

Over the last decades, archaeological sites have experienced a sharp increase of damage, caused by multiple factors such as agricultural activities, urban sprawl, earthquakes, sea level rise, as well as the spread of conflicts. This trend has been amply documented globally. Amongst others, archaeological sites included in the UNESCO World Heritage Site (WHS) list faced an increasing number of hazards from the earliest systematic monitoring, started in 1979, until today. This trend has been recently confirmed by academic researches and grey literature reports tackling single or multiple WHS.

A perfect example reflecting these issues is the WHS of Taxila, Pakistan. The site has a long history spanning over 8000 millennia, from the Neolithic tumulus of Saraikala to the ramparts of Sirkap (2nd century BCE). It is situated on a branch of the Silk Road that linked China to the West and it currently comprises 18 heritage properties scattered over an area exceeding 100 ha. Taxila has been considered as a key Buddhist center of learning for centuries, while the Bihir mound is associated with the historic event of the entry of Alexander the Great into the city. After having been abandoned for a thousand years, the city was rediscovered during the 19th century CE by explorers, and then systematically investigated by John Marshall between 1910s and 1930s. The outstanding discoveries opened a new chapter in the history of the site, eventually leading to its declaration as UNESCO WHS in 1980.

Apart from human-made activities, cultural heritage sites are also vulnerable to extreme natural catastrophic events. For example, earthquakes have caused considerable destruction to heritage sites in South Asia and across the globe throughout the human history. Pakistan has a rich seismological environment documented by several historical earthquakes, for instance, "the great earthquake" destroyed the Taxila in the early first century CE and the 2005 Kashmir earthquake of magnitude 7.6 shook the whole region that highlights the high seismic risk at WH sites. However, no geophysical studies have been conducted at the World Heritage Site, despite the fact that such methods offer significant advantages over traditional archaeological surveys—particularly in terms of time efficiency, cost-effectiveness, and their non-invasive nature, which is essential to prevent any damage to the heritage site. The horizontal-to-vertical spectral ratio (HVSr) geophysical method has extensively been used in geo hazard related studies; however, it has rarely been employed in archaeological studies. Owing to the location of WHS in a seismically vulnerable Taxila city and their cultural importance, there is a strong need for the HVSr investigations to evaluate its seismic vulnerability.

Proposal is to employ seismic micro zonation (hereafter referred to as SM) study at heritage-scale aimed at targeted hazard mitigation actions at Taxila, Pakistan by an integrated cost-effective and a time-cutting approach based on space borne and ground-based remote sensing techniques.

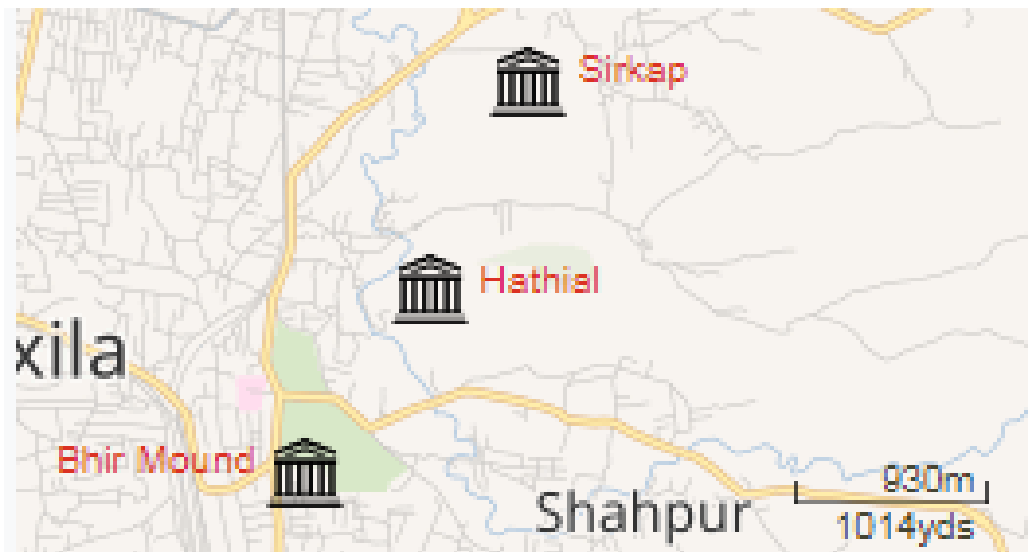
4.23. Purchase of Land Consisting Monuments or Access to Monuments

The first town in Taxila was situated in the Hathi mound in the southwest corner of the Sirkap site. It lasted from the late second millennium BC until the Achaemenid period, with the Achaemenid period remains

located in its Mound B. The Bhir Mound site represents actually the second city of Taxila, beginning in the pre-Achaemenid period and lasting till the early Hellenistic period. The earliest occupation on the Bhir mound begins around 800-525 BC, and what now appears to be the second phase might date to the late 6th and 5th centuries BC, as originally suggested by Marshall.

Hathial is quite a large site, in which red burnished ware and various materials were discovered similar to those of Charsadda. This suggest that the establishment of the Hathial site may go back as far as 1000 BCE. The adjoining settlement of Bhir Mound was only created later, probably around 500 BCE

The pottery found at the site has been dated to the period between 1000 BCE and 400 BCE, and thus constitutes an interesting intermediary, pre-Achaemenid period, between the Late Harappan of the Indus Valley and the Early Historic period.



Such an important city which predates Bhir mound has disappeared due to our negligence as government failed to acquire/ purchase its land from its private owners and a complete Hathial range disappeared and people flattened the range to make cultivation fields and today only 8 Canal and 15 Marla size of mound is existing in the hands of a private owners who very soon intends to flatten the mound to give way to cultivation land if not purchased from him sooner. **Purchase of this land and its security is urgently proposed.**

4.24. Pursue Foreign and Local Investment Using Thailand’s Model to Secure Funding and Expertise. (UNESCO GUIDELINES)

Sustainability is always to an extent about financial sustainability. Having enough income to sustain the heritage values of the site for future generations is a critical issue. Money ultimately determines whether all of the possibilities presented in the previous Guides are actually feasible. Resources are always finite. Very few sites have adequate investment to do everything they need/want to do, so all sites, to a greater or lesser

extent, need to think about attracting additional/new funding and investment to make the progressive changes necessary for a more sustainable destination.

The four ways to finance World Heritage

There are basically only four ways to finance and sustain your heritage site:

1. Taxation

The conventional model is based on the state, regional, or local government imposing taxation directly (through visitor taxes imposed at point of entry) or indirectly (through taxing tourism businesses) on the travelling public, which is then returned to the site as a subsidy for conservation works. For many people engaged in the conservation of World Heritage sites, this will be the preferred model.

2. Raising commercial revenue on-site

This is another common model in which site authorities raise revenue locally from increased or higher value ticket sales, retail, food and drink, accommodation, transport, and experiences, and re-invest this into the conservation of the site. For many site management organizations, this is often the solution, but it carries all the potential negative issues that can result from greater footfall or increased economic exploitation of the site. Raising commercial revenue on site is important, but it will cover only a fraction of the tourism spending in your destination, the majority of which is not spent at the site.

3. Raising commercial revenue beyond the site

Some sites can sell products, services, experiences, or intellectual property beyond the destination. A growing minority of World Heritage communities have developed business models that transcend the local resident and tourism demand for products and have developed revenue streams for products, services, experiences, or intellectual property from beyond the destination.

4. Fundraising or working with others to secure investment

A growing number of sites are developing new fundraising models. You need to be clear what your revenue-generating strategy is, as it will inform how you develop your destination.

Some of the following sources should be considered for funding (and others specific to your site):

1. Governments and statutory bodies

At many sites, a relatively sustainable funding model exists, with the State Party or relevant authorities assuming full responsibility for the costs of conservation, interpretation, and enhancement of the site and its surrounding area. However, this support is often insufficient to fully implement the broader strategic objectives, making it necessary to seek additional sources of funding and investment. World Heritage sites are global entities, so do not confine your analysis to local or national boundaries. At times, support may be available through transnational funding sources such as the European Union, the World Bank, or other State Parties with a particular interest in your type of site or conservation activities. For instance, much of the funding for the Valley of the Kings in Egypt has been provided by Japan. Therefore, it is important to think more broadly and consider which governments or international agencies might be potential partners in supporting your site.

2. Third sector charities, trusts, and foundations

In many societies around the world there are philanthropic trusts, charities, and organizations that have funds to invest in projects that meet their objectives. Having a basic understanding of these is important, as it may give you opportunities for investment. Again, think globally because many fundraising mechanisms are now global. Identify possible third sector donors and investors and think about what outcomes they will require for their investment – read their websites and funding guidance.

3. Corporate sponsorship

As a World Heritage site, you are of significance to the whole world, and many responsible and philanthropic companies will value association with your site. Some businesses may wish to secure the benefits of public relations (PR) of being seen as investors in the preservation of the site or be involved in a specific project. However, be cautious about donors' motivations and set clear ground rules and expectations about what is and is not appropriate. Start to make a list of companies with a link to the site, or which might be approached for other reasons to secure investment.

4. High net-worth individuals

Many people who have had the good fortune to become affluent are looking for ways to leave a lasting legacy, and there is no greater lasting legacy than to help preserve a World Heritage site for future generations. For this to happen, sites need to be able to present their needs, their projects, and the chance to invest in a structured manner. Think about where these individuals are, and how you can get their attention with a well-thought-out pitch that will appeal to their philanthropy. When selecting individuals, it is particularly important to be aware of their personal interests and values, and to craft individual-specific pitches.

5. Residents

Sometimes a great source of funding and investment lies right within the site – in the form of the local communities. Having a local community membership/donor scheme that encourages the involvement of local people in the preservation of the site can be a powerful tool. It becomes about more than the money. Sometimes people who have left the local community to go and work elsewhere are affluent and looking for ways to return benefit to the host community or the heritage of the site/destination. This can be made possible with new technologies and ideas like payroll giving or requests for donations for special initiatives. Think about how such a scheme might work and the ways that it could become a reality. For instance, would people enter a lottery each week in aid of the site? Is that appropriate to your society? If not, think of other ways to encourage them to contribute willingly.

6. Tourism organizations and businesses

The investment required will often be commercial investment in the tourism infrastructure rather than philanthropic contributions for conservation. However, this investment is also critical – remember, a crucial part of the discussion concerns what types of development and infrastructure are appropriate for the site and its values. It is essential to set the limits and constraints on growth so developers and businesses understand what is and is not appropriate at a World Heritage site. In some states, there are legal mechanisms to return a share of the gain from new developments to conservation and local socio-

economic development initiatives. Tourism businesses are often looking to establish schemes that let them achieve social, cultural, or environmental outcomes as a means to give something back, or raise their profile and perception they are a responsible business with good ethics. There is a temptation to overestimate tourism businesses as an easy source of funding. In reality, many tourism businesses are small and only marginally profitable. Think about how you can transform tourism businesses into fundraisers, donors, or champions of the site. Think about how you can reach out to the tourism businesses and encourage them to develop more sustainable infrastructure or raise funds for conservation. Many businesses are quite willing to do this because it makes them look good to consumers, and other businesses will quickly follow suit when they see that it works.

7. Visitors

A growing number of destinations around the world are developing systems to encourage direct financial contributions from visitors to sustain the heritage at the heart of the destination, or for local socio-economic development. In some societies and cultures, the preference is for a mandatory tax imposed on visitors at the entry point, on the ticket price, or on beds in the accommodation sector. In other cultures, the preference is for voluntary contributions from visitors through communicating the site's needs and making it easy to donate during the holiday experience.

8. Citizens of the world

The rise of internet-based crowd sourcing models means that sites can, and should, reach out to an interested and sympathetic audience around the world. You can establish a relationship with them that makes them participants in the life of the site, as well as potential donors for social initiatives. The platforms already exist to do this, but very few sites have developed suitable projects and projected them into the world for donations.

5. Proposed Project Interventions & Costing

Proposed Project interventions will be divided into three stages:

Taxila Archaeological Heritage				
Summary Of Rough Cost Estimate				
Sr No	Description of work	Amount in PKR	Amount in Millions	Remarks
Short Term Plan				
1	Harmful and Invasive Vegetation Control at Archaeological site of Taxila Gandhara Heritage City and Equipment to Spray Chemicals To Control Unwanted Flora at Taxila	6,605,000	6.61	
3	Construction of Ceremonial Gate	12,000,000	12.00	
4	Remodeling of roads	21,412,335	21.41	
5	Monument at GT Road	14,965,329	14.97	
5	Creation of Gandhara Crafts Street	36,898,270	36.90	
6	Creation of Open-Air Museum at Bhir	447,850,000	447.85	
7	Development of Gandharan Tourist Trail to link Museum, Bhir, Dharmarajika, Sirkup, Mohra Muradu and Gandhara Art Village through electric carts	239,797,120	239.80	
8	Upgrading of Gandhara Art Village (Committee Training Center)	20,100,000	20.10	
9	Museum Expansion	160,340,000	160.34	
10	Community Participation (Social awareness program)	65,100,000	65.10	
Total Amount of Short Term Plan		1,025,068,054	1,025.068	
Medium Term Plan				
1	Creation of Tourist Facility (3-star hotel, Restaurant, parking shopping medical facilities)	522,600,000	522.60	
2	Preservation of Sirkup Cluster with Kunala Complex	95,023,242	95.02	

3	Kalawan Complex and Ghiri Complex	69,800,188	69.80	
4	Excavation at Bhir	85,000,000	85.00	
5	Land Acquisition of Hathial Work of Gandhara (*Assumed) 175 Marla	61,250,000	61.25	
6	Digital Archeology	200,000,000	200.00	
7	Seismic Studies	45,000,000	45.00	
	Total Amount of Medium Term Plan	1,078,673,430	1,078.67	
Long Term Plan				
1	Expansion of Tourist Trail to Ghiri and Bhallar	133,669,120	133.67	
2	Restoration of Dharmarajika, Mohra Moradu, Mankiala and Bhallar Complexes	497,512,233	497.51	
	1- Total Amount of Short-, Medium-, and Long-Term Plan	2,734,922,836	2,735	
	a) Project Management & Implementation Unit @ 3 %	82,047,685	82.05	
	b) Detailed Engineering, Archaeological & Conservation Design along with Procurement and Cost Estimation carried out by a Specialized Architecture and Conservation National and International Consulting Firm @ 5 %	136,746,142	136.75	
	c) Third Party Validation (TPV) conducted by highly qualified experts to ensure the validation and quality assurance of the work @ 2 %	54,698,456.72	54.70	
	d) Design & Resident Supervision @ 1+2 %	82,047,685.09	82.05	
	e) Contingencies @ 2 %	54,698,456.72	54.70	
	f) Horticulture @ 1 %	27,349,228.36	27.35	
	g) PST @ 5 %	136,746,141.81	136.75	
	2- (a+b+c+d+e+f+g) Total Amount Rs.	574,333,795.61	574.33	
	(1+2) G-Total of Amount Rs.	3,309,256,631.85	3,309.26	

COST: -

The Total Cost of this Rough Cost Estimate has been worked out amounting to **Rs.3,309.26 Million** including Project Management & Implementation Unit @ 3 %, Detailed Engineering, Archaeological & Conservation Design along with Procurement and Cost Estimation carried out by a Specialized Architecture and Conservation National and International Consulting Firm @ 5 %, Third Party Validation (TPV) conducted by highly qualified experts to ensure the validation and quality assurance of the work @ 2 % Design & Resident Supervision 1+2 %, Contingencies 2%, Horticulture 1 % and PST 5%.

Rough Cost Estimation, (Taxila-Gandhara Heritage City) Harmful And Invasive Vegetation Control At Archaeological Site Areas-Punjab

Sr.	Site Name	Covering Area (KANAL)	Amount		Total Amount	Total Amount	Remarks
			1 st Application	2 nd Application	Rupees	In Millions	
1	Sirkap	327	600,000.00	600,000.00	1,200,000.00	1.20	
2	Bhir Mound	281	800,000.00	800,000.00	1,600,000.00	1.60	
3	Dharmarajika	100	800,000.00	800,000.00	1,600,000.00	1.60	
4	Giri Sites	46	100,000.00	100,000.00	200,000.00	0.20	
5	Mohra Muradu	11	50,000.00	50,000.00	100,000.00	0.10	
6	Bhallar	30	150,000.00	150,000.00	300,000.00	0.30	
7	Mankiala	12	200,000.00	200,000.00	400,000.00	0.40	
8	Taxila Museum	105	100,000.00	100,000.00	200,000.00	0.20	
			2,800,000.00	2,800,000.00	5,600,000.00	5.60	
Grand Total (Cost per year)					5,600,000.00	5.60	

Rough Cost Estimation, (Taxila-Gandhara Heritage City) Harmful And Invasive Vegetation Control At Archaeological Site Areas-Punjab

Sr.	Site Name	Covering Area (KANAL)	No. Of Sprayers & PPE		Total Amount	Total Amount	Remarks
			Electronic	Manual	Rupees	In Millions	
1	Sirkap	327	6.00	2.00	250,000.00	0.25	PPE are included
2	Bhir Mound	281	5.00	2.00	200,000.00	0.20	PPE are included
3	Dharmarajika	100	4.00	2.00	150,000.00	0.15	PPE are included
4	Giri Sites	46	2.00	1.00	75,000.00	0.08	PPE are included
5	Mohra Muradu	11	2.00	1.00	75,000.00	0.08	PPE are included
6	Bhallar	30	2.00	1.00	75,000.00	0.08	PPE are included
7	Mankiala	12	1.00	1.00	30,000.00	0.03	PPE are included

8	Taxila Museum	105	4.00	1.00	150,000.00	0.15	PPE are included
Grand Total (Cost per year)					1,005,000.00	1.005	

Abstract of Rough Cost Estimate of Construction of Ceremonial Gate

Sr No	Description of work	Unit	Qty	Rates	Amount
				(Rs)	(Rs)
1	Construction of Ceremonial Gate	LS	1.00	12,000,000.00	12,000,000.00
Total Amount R. s					12,000,000.00

Abstract of Cost of Rough Cost Estimate Construction of Monument at GT Road

MRS, 1st BI-ANNUAL-2025 (01.01.2025 to 30.06.2025) DISTRICT RAWALPINDI						
Item No.	Description	Chap. / Item No	Unit	Qty	Rate (Rs.)	Amount (Rs.)
I	MRS ITEMS					
1.0	Earthwork					
1.1	Excavation in foundation of building and other structures, including dagbelling, dressing, refilling around structure with excavated earth, watering and ramming lead upto one chain 100ft and lift up to 5					
	i) in ordinary soil.	3/21-2(b)	1000Cft	15,000.00	10,639.90	159,599
1.2	Re-handling of ordinary earth Up to a lead	3-13 (b),3-16(i)	1000Cft	12,000.00	5,400.65	64,808
1.3	Supplying and filling of local sand.					
	i) under floors	10/3	100Cft.	2,773.00	4,017.00	111,391
2.0	Plain and Reinforced Concrete					

2.1	Cement Concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate)					
	i) Ratio 1:4:8	6/5(i)	100Cft	2,024.08	34,595.40	700,239
2.2	Providing and laying reinforced cement concrete (including prestressed concrete), using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.)					
	i) Reinforced cement concrete type B nominal mix 1:1:2 (cylinder strength 4000 psi) in girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects: -	6/6.(a-i)(1)	Cft	2,259.00	952.85	2,152,488
3.0	Steel Reinforcement					
3.1	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labor charges for binding of steel					

	reinforcement (also includes removal of rust from bars).					
	i) Deform bars (Grade - 60)	6/13(c)	100Kg	5,647.50	30,357.05	1,714,414
4.0	Brick Work					
4.1	Pacca brick work of 9" and above thickness including removal of surplus debris, unused material and by product ratio 1:5 Cement, sand mortar etc. complete in all respect-					
	i) Foundation & Plinth	7/5.(i)	100Cft	4,442.46	30,357.05	1,348,599
4.2	Cement plaster 1:4 on internal walls up to 20' (6.00 m) height and ½" (13 mm) thick.	11/9(b)	100Sft	4,230.00	4,660.70	197,148
5.0	Earthwork					
5.1	Supply, filling select Sandy Soil material as specified in the drawings including all leads and lift, dressing, watering and compacting to produce in situ dry density not less than 95% modified		Cft	2,729.00	45.00	122,805
6.0	Flooring					
6.1	Granite slab pre polished of approved quality, size and pattern, jointed and grouted with white cement mixed with imported matching color pigment.					
	i) Granite Slab on flooring set in 3/4" (avg.) thick cement sand (1:3) mortar.		Sft	2,050.00	2,999.00	6,147,950
6.2	Providing and fixing handmade Ceramic tiles of approved shade, size and pattern jointed and grouted mixed with imported		Sft.	2,066.00	868.00	1,793,288

	matching color pigment.					
6.6	Providing and fixing brick guttka 1½"x2¼"x9" (straight or on edge) jointed in 1:3 cement: surkhi over 1" thick (avg.) 1:4 C/S base mortar on floor approved pattern, complete in all respect as shown on the drawings or as directed by the Engineer.	Sft	2,000.00	226.30	452,600	
Total Amount		14,965,329				

Rough Cost Estimate of Remodeling of Roads

MRS, 1st BI-ANNUAL-2025 (01.01.2025 to 30.06.2025) DISTRICT RAWALPINDI						
Sr No	Item No.	Description	Unit	Quantity	Rate (PKR)	Amount (PKR)
1	1	Site Preparation				
1.1	3/53	Clearing and Grubbing	Per Sqm	5,000.00	49.70	248,500.00
1.2	3/54	Compaction of natural ground	Per Sqm	5,000.00	32.55	162,750.00
1.3	3/30	Excavation	Cu. m	1,200.00	478.35	574,020.00
1.4	3/5-i	Earthwork and Embankment	Cu. m	1,000.00	342.90	342,900.00
		Subtotal for Site Preparation				1,328,170.00
2	2	Subgrade and Base Layer				
2.1	2.1	Subgrade Preparation	Sq. m	5,000.00	20.00	100,000.00
2.2	2.2	Compaction of Subgrade	Sq. m	5,000.00	15.00	75,000.00
2.3	18/3	Granular Sub-base Material	Cu. m	600.00	3,529.00	2,117,400.00
2.4	18/4	Base Course Material	Cu. m	450.00	4,728.70	2,127,915.00
		Subtotal for Subgrade and Base Layer				4,420,315.00
3	3	Pavement Works				
3.1	3.1	Surface Course (Hot Mix Asphalt)	Ton	500.00	14,000.00	7,000,000.00
3.2	3.2	Binder Course	Ton	300.00	12,000.00	3,600,000.00

		Subtotal for Pavement Works				10,600,000.00
4	4	Drainage Works				
4.1	4.1	Side Ditches	M	1,000.00	100.00	100,000.00
4.2	4.2	Culverts and Cross Drainage Structures	No.	20.00	50,000.00	1,000,000.00
4.3	4.3	Manholes and Catch Basins	No.	15.00	37,500.00	562,500.00
		Subtotal for Drainage Works				1,662,500.00
5	5	Road Markings and Signage				
5.1	18/36	Painting Traffic Lane Marking of specified width (1.5mmthick), with Thermoplastic (TP) Paint including Glass Beads, complete in all respect, as approved and directed by Engineer in charge. i) 5" wide	M	1,000.00	161.35	161,350.00
5.2	5.2	Installation of Traffic Signs and Signals	No.	30.00	30,000.00	900,000.00
		Subtotal for Road Markings and Signage				1,061,350.00
6	6	Shoulders and Footpaths				
6.1	6.1	Granular Shoulder	M	1,500.00	200.00	300,000.00
6.2	6.2	Concrete Footpaths	Sq. m	1,000.00	1,500.00	1,500,000.00
		Subtotal for Shoulders and Footpaths				1,800,000.00
7	7	Landscaping and Environmental Measures				
7.1	7.1	Grass Seeding or Planting	Sq. m	2,000.00	45.00	90,000.00
7.2	7.2	Erosion Control Measures	Sq. m	500.00	100.00	50,000.00
		Subtotal for Landscaping				140,000.00
8	8	Miscellaneous Works				
8.1	8.1	Utility Relocation	L.S	1.00	100,000.00	100,000.00
8.2	8.2	Street Lighting Installation	No.	20.00	15,000.00	300,000.00
		Subtotal for Miscellaneous Works				400,000.00
Total Estimated Cost						21,412,335.00

Rough Cost Estimated of Creation of Gandharan Crafts Street

MRS, 1st BI-ANNUAL-2025 (01.01.2025 to 30.06.2025) DISTRICT RAWALPINDI						
Sr No	Item No.	Description	Unit	Quantity	Rate (PKR)	Amount (PKR)
1	1	Site Preparation				
1.1	3/53	Clearing and Grubbing	Sq. m	1,000.00	49.70	49,700.00
1.2	3/54	Compaction of natural ground	Sq. m	1,000.00	32.55	32,550.00
1.3	3/30	Excavation	Cu. m	1,000.00	478.35	478,350.00
1.4	3/5-i	Earthwork and Embankment	Cu. m	60,000.00	342.90	20,574,000.00
		Subtotal for Site Preparation				21,134,600.00
2		Street Construction				
2.1		Subgrade Preparation	Sq. m	55,000.00	20.00	1,100,000.00
2.2		Compaction of Subgrade	Sq. m	55,000.00	15.00	825,000.00
2.3	18/3	Granular Sub-base Material	Cu. m	200.00	3,529.00	705,800.00
2.4	18/4	Base Course Material	Cu. m	100.00	4,728.70	472,870.00
2.5		Sidewalks (Concrete pavers)	Sq. m	2,500.00	2,500.00	6,250,000.00
2.6		Curbing and Edging	M	10,000.00	400.00	4,000,000.00
		Subtotal for Street Construction				13,353,670.00
3		Drainage and Utilities				
3.1		Stormwater Drainage Installation	M	300.00	400.00	120,000.00
3.2		Sewerage Installation	M	200.00	500.00	100,000.00
3.3		Water Supply Lines	M	200.00	400.00	80,000.00
3.4		Electric Cabling and Connections	L.S.	1.00	100,000.00	100,000.00
		Subtotal for Drainage and Utilities				400,000.00
4		Landscaping and Cultural Features				
4.1		Tree Planting and Green Areas	No.	20.00	5,000.00	100,000.00

4.2		Cultural Displays (Statues, Art)	L.S.	1.00	500,000.00	500,000.00
4.3		Lighting Installations (Cultural Theme)	No.	10.00	18,000.00	180,000.00
4.4		Benches and Seating Areas	No.	20.00	28,500.00	570,000.00
		Subtotal for Landscaping and Cultural Features				1,350,000.00
5		Miscellaneous Works				
5.1		Utility Relocation (if necessary)	L.S.	1.00	350,000.00	350,000.00
5.2		Signage (Directional/Informational)	No.	10.00	31,000.00	310,000.00
		Subtotal for Miscellaneous Works				660,000.00
					Total Estimated Cost	36,898,270.00

Abstract of Cost of Rough Cost Estimate Creation of Open-Air Museum at Bhir

Sr. No.	Description of Item	Unit	Quantity	Rate (PKR)	Amount (PKR)
1	Site Survey, Topographical Mapping, and Layout Planning	Job	1	500,000.00	500,000
2	Earthwork for Trail Formation (Clearing, Grubbing & Levelling)	Sft	250,000	300.00	75,000,000
3	Stone Pathways with Edging (Local stone, compacted base)	Sft	120,000	650.00	78,000,000
4	Construction of Resting Sheds (wooden structure with tiled roof)	No	10	6,000,000.00	60,000,000
5	Development of Entry Gate and Small Visitor Reception Center (including map boards, ticket counter)	Lump Sum	2	8,000,000.00	16,000,000
6	Installation of Interpretive Signboards (stone base with steel signage)	No	150	180,000.00	27,000,000
7	Reconstruction of Selected Walls and Structures (Historic Methods using Original Materials)	Rft	20,000	7,000.00	140,000,000
8	Drinking Water Stations (Solar-powered units)	No	3	650,000.00	1,950,000

9	Public Toilets (prefab unit with septic system)	No	3	1,800,000.00	5,400,000
10	QR Code-Based Interactive Points (coding, design, posts installation)	No	50	140,000.00	7,000,000
11	Supply & Installation of Benches (stone/wood hybrid)	No	50	150,000.00	7,500,000
12	Landscaping and Plantation (native species, soil improvement)	Acre	10	900,000.00	9,000,000
13	Solar Lighting for Trails and Rest Areas	No	50	180,000.00	9,000,000
14	Fire Extinguishers and Safety Equipment	Set	10	150,000.00	1,500,000
15	Miscellaneous (Signage Repair, Minor Construction, Visitor Maps Printing)	Lump Sum	2	5,000,000.00	10000000
Total Amount Rs.					447,850,000

Rough Cost Estimate of Development of Gandharan Tourist Trail to link Museum, Bhir, Dharmarajika, Sirkup, Mohra Muradu and Gandhara Art Village through electric carts

Sr No	Description of work	Unit	Qty	Rates	Amount
				(Rs)	(Rs)
3/53	Site Preparation (Clearing, Grubbing)	Sq. m	40,000.00	49.70	1,988,000.00
3/5i	Earthworks (Excavation and Embankment)	Cu. m	41,800.00	342.90	14,333,220.00
3/14	Gravel Surfacing	Cu. m	50,000.00	531.50	26,575,000.00
	Concrete Trail Edging	M	3,500.00	800.00	2,800,000.00
	Drainage Installation (Pipes, Ditches)	M	2,200.00	600.00	1,320,000.00
	Stone Masonry Retaining Walls	Cu. m	400.00	7,500.00	3,000,000.00
	Wooden Boardwalk Sections	Sq. m	3,400.00	6,000.00	20,400,000.00
	Signage (Information and Directional)	Each	50.00	30,000.00	1,500,000.00

	Landscaping (Planting, Mulching)	Sq. m	5,000.00	400.00	2,000,000.00
25/73	Safety Barriers (Railings, Fencing)	M	11,000.00	1,264.40	13,908,400.00
	Benches and Rest Areas	Each	30.00	28,750.00	862,500.00
	Lighting Installation	Each	50.00	22,200.00	1,110,000.00
1	Development of Gandharan Tourist Trail to link Museum, Bhir, Dharmarajika, Sirkup, Mohra Muradu and Gandhara Art Village through electric carts (Passenger Electric Carts)	Each	50.00	3,000,000.00	150,000,000.00
Total Amount R.s					239,797,120.00

Rough Cost Estimate of Gandhara Art Village (Committee Training Center)

Sr. No.	Description	Unit	Quantity	Rate (PKR)	Amount (PKR)
Committee Training Center					
1	Training Hall (100 Persons Capacity) with Audio- Visual Facilities	Sft	2,500	5,500.00	13,750,000
2	Audio-Visual Setup (Sound System, Projector, Digital Screens)	Job	1	2,000,000.00	2,000,000
3	Furniture (Tables, Chairs, Podium, Conference Setup)	Job	1	2,000,000.00	2,000,000
4	Parking Area (Stone paved with shaded structure)	Sft	3,000	450.00	1,350,000
5	Maintenance of Building	Ls	1	1,000,000.00	1,000,000
Total Amount					20,100,000

Rough Cost Estimate of Gandhara Art Village (Hostel, Committee Training Center, Showroom)

Sr. No.	Description	Unit	Quantity	Rate (PKR)	Amount (PKR)
1	Site Clearance, Earthwork, Levelling and Compaction	Sft	20,000	110	2,200,000

2	Foundation Works (RCC Strip Footings with Stone Masonry)	Sft	15,000	780	11,700,000
3	Main Structure RCC (Columns, Beams, Slabs)	Sft	15,000	2,500	37,500,000
4	Walls Construction (Stone masonry with lime plaster finish)	Sft	12,000	1,200	14,400,000
5	Roof Insulation and Waterproofing Treatment	Sft	15,000	350	5,250,000
Museum Galleries and Exhibition Spaces					
6	Gallery Interior Finishing (Heritage grade - stone+wood works)	Sft	12,000	2,000	24,000,000
7	Climate Control Systems (HVAC specialized for artifacts)	Job	1	12,000,000	12,000,000
8	Electrical and Lighting Works (Special artifact lighting)	Lump Sum	1	6,000,000	6,000,000
9	Museum Display Cases, Showcases, and Fixtures (Custom Design)	Lump Sum	1	15,000,000	15,000,000
10	Specialized Flooring for Galleries (Granite/Stone)	Sft	12,000	850	10,200,000
Visitor Facilities					
11	Visitor Lounge and Reception Area (Elegant Design)	Sft	2,000	2,000	4,000,000
12	Toilets and Washrooms (Public Standard)	Sft	1,500	1,500	2,250,000
13	Cafe and Gift Shop Construction	Sft	1,200	2,200	2,640,000
External Development Works					
14	External Pathways, Landscaping, Benches, Heritage Lighting	Lump Sum	1	8,000,000	8,000,000
15	Parking Area Expansion (Stone/Concrete Paved)	Sft	5,000	400	2,000,000
16	Boundary Wall Strengthening	Rft	800	4,000	3,200,000
Total Amount					160,340,000

Rough Cost Estimate of Community Participation (Social Awareness Program)

Sr. No.	Description	Unit	Quantity	Rate (PKR)	Amount (PKR)
1	Awareness Workshops for Locals (at villages/schools/university including halls, refreshments, basic stationery)	Session	15	3,300,000	49,500,000
2	Printing of Informational Materials (Brochures, Posters, Banners, Local Language Booklets)	Job	1	1,000,000	1,000,000
3	Community Mobilization Team (3 Field Officers + 1 Manager for 6 months)	Month	6	800,000	4,800,000
4	Radio and Local Media Campaign (Public announcements, Interviews, Programs)	Campaign	1	1,500,000	1,500,000
5	Educational Trips for Schoolchildren to Taxila Museum and Sites	Trip	10	150,000	1,500,000
6	Production of Short Documentary Video (heritage importance, local voices)	Job	1	1,200,000	1,200,000
7	Community Wall Painting (Murals on heritage protection themes in villages)	Mural	20	50,000	1,000,000
8	Social Media Campaign (Awareness videos, posts, Facebook, YouTube)	Month	6	350,000	2,100,000
9	Volunteer Training and Equipment (T-shirts, IDs, Kits for Heritage Guards)	Set	100	15,000	1,500,000
10	Launch and Closing Ceremonies (Venue, Press, Refreshments)	Event	2	500,000	1,000,000
				Total Amount R. s	65,100,000

Rough Cost Estimate of Creation of Tourist Facility (3 star hotel, Restaurant, parking shopping medical facilities)

Hotel Block (3-Star Level, Heritage Architecture)					
Sr. No.	Description	Unit	Quantity	Rate (PKR)	Amount (PKR)
1	Site Preparation, Levelling, Earthworks	Sft	50,000	110	5,500,000
2	Foundation Works (RCC + Stone Masonry)	Sft	40,000	750	30,000,000
3	Main Building Construction (RCC + Stone Facing)	Sft	40,000	4,500	180,000,000
4	Interior Finishes (Standard 3-Star with local touch)	Sft	40,000	2,000	80,000,000
5	MEP Works (Mechanical, Electrical, Plumbing)	Lump Sum	1	35,000,000	35,000,000
6	Furnishing and Fixtures (Rooms, Lobby, Dining)	Lump Sum	1	40,000,000	40,000,000
7	HVAC System (Complete centralized AC)	Lump Sum	1	25,000,000	25,000,000
Parking Facility					
8	Surface Parking (stone paved) for 150 vehicles	Sft	30,000	400	12,000,000
9	Parking Shade Structures	Bay	150	100,000	15,000,000
10	Lighting, Signage and Drainage for Parking	Lump Sum	1	5,000,000	5,000,000
Shopping Arcade (Retail Outlets for Handicrafts & Souvenirs)					
11	Shopping Arcade Construction (20 Shops + Walkways)	Sft	10,000	4,800	48,000,000
12	Shop Interior Fit-out (Lighting, Display Shelves, Signboards)	Shop	20	800,000	16,000,000
Medical/First Aid Center					
13	First Aid and Basic Medical Facility Building (small clinic)	Sft	2,000	4,000	8,000,000
14	Medical Equipment (First Aid Beds, Oxygen,	Job	1	5,000,000	5,000,000

	Minor Treatment Kits)				
External Works and Landscaping					0
15	Landscaping (Green belts, gardens, benches)	Acre	3	700,000	2,100,000
16	Boundary Wall with Stone Masonry (Security, Aesthetics)	Rft	2,000	4,000	8,000,000
17	Internal Roads and Walkways (Stone/Cobblestone paving)	Sft	20,000	400	8,000,000
				Total Amount	522,600,000

Rough Cost Estimate of Preservation of Sirkup Cluster with Kunala Complex

Item No.	Items of work	Quantities		Rates	Unit	Amount
				(Rs)		(Rs)
1	Providing and relaying Gandhara type stone masonry (un-coursed Rubble) laid in lime, cement & sand mortar 1:1:3 matching the original work with care considering special nature work, including scaffolding and curing etc. complete (50% old strewed Stones and 50 % new stones will be used approximately)	39047.71	Cft	71,229.62	%Cft	27,813,533.67
2	Providing and re-fixing of stone chips in the missing portions of stone masonry with care in stone wall of Gandhara type (un-coursed rubble masonry) laid in lime, cement & sand mortar 1:1:3 matching the original work with care considering special nature work including scaffolding and curing etc.	35322.75	Sft	35,631.04	%Sft	12,585,861.65

3	Relaying for water tightening and relaying of missing portions with care the stone masonry of Gandhara type (un coursed rubble masonry) up to 9" average height, laid in lime, cement & sand mortar 1:1:3 matching the original with care considering special nature work including scaffolding and curing etc. complete	30152.08	Sft	54,116.80	%Sft	16,317,342.18
4	Providing drainage system of 1st class solid burnt brick (9"x4½"x1-1/2") masonry, and 1st class tiles (12"x6"x2"), laid in cement & sand mortar 1:3 as per approved design (3" thick floor of bricks 3'-0"x1'-6", 2 No. side walls of drain 3'-0" avx4½"x0'-9" and top roof of drain with 2" thick brick tiles 3'-0"x1'-0") including curing etc.	200.00	Nos	5,800.53	Each	1,160,105.80
5	Supply and Erection of Car Parking Shed consisting of 3mm thick fiber glass sheet roof (3-layers) fixed/riveted on molded curved frame of M.S box pipe 1-1/2"x1-1/2"16-SWG supported on trusses of M.S. angleiron1-1/2"x1-1/2"x3/16"all around duly supported on M.S sheet 6"x6"x1/4" welded on GI pipe post (Medium Quality) of specified diameter embedded in P:C:C (1:2:4) i/c the cost of excavation, cutting straightening assembling, bending as per design, welding / grinding of joints and painting three coats complete in all respect as approved and directed by the Engineer in charge. (i) 4" dia GI Pipe Supports	11240.00	Sft	1,756.04	Sft	19,737,839.02
6	Providing & Fixing Fiber Glass Sheet 3 Layers, 3mm thick to cover the steel structure of the shed over M. S. Box Pipe 1-1/2"x1-1/2"16-SWG with frame of 2' x 2' including welding cutting, welding, riveting etc. complete	11453.00	Sft	1,520.00	%Sft	17,408,560.00
					Total:	95,023,242.32

Rough Cost Estimate of Kalawan Complex and Ghiri Complex

Item No.	Items of work	Quantities		Rates (Rs)	Unit	Amount (Rs)
1	Providing and relaying Gandhara type stone masonry (Coursed Rubble) laid in lime, cement & sand mortar 1:1:3 matching the original work with care considering special nature work, including scaffolding, chiseling and curing etc. complete (50% old strewed Stones and 50 % new stones will be used approximately)	29411.38	Cft	76369.20	%Cft	22,461,232.50
2	Relaying for water tightening and relaying of missing portions with care the stone masonry of Gandhara type (un coursed rubble masonry) up to 9" average height, laid in lime, cement & sand mortar 1:1:3 matching the original with care considering special nature work including scaffolding and curing etc. complete	15222.50	Sft	75112.62	%Sft	11,434,018.42
3	Providing and laying Kanjoor Stone masonry (Ashlar Fine) as per original design along with carvings and mounding's and floral designs laid into position in Lime Sand mortar 1:2 matching the original work with care including scaffolding & curing etc. complete. (25% old strewed stones and 75% new stones will be used approximately).	9281.00	Cft	349026.36	%Cft	32,393,136.47
4	Carriage of consignments job. ii)Carriage of consignments odd jobs') Up to 1000 feet.	92415.79	Cft	38.00	Consign ment	3,511,800.12
Total:						69,800,187.51

Rough Cost Estimate of Excavation at Bhir

Item No.	Description	Unit	Quantity	Rate (PKR)	Amount (PKR)
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1	Pre-excavation	lump sum	2	1,000,000.00	2,000,000.00
2	Excavation at Bhir Site	cu. m	6500	5,000.00	32,500,000.00
3	Excavation at Hathial Site	cu. m	9500	5,000.00	47,500,000.00
4	Artifact Documentation and Cataloging	lump sum	1	3,000,000.00	3,000,000.00
Total Estimated Cost					85,000,000.00

Rough Cost Estimate of Expansion of Tourist Trail to Ghiri and Bhallar

Sr.No	Item No.	Description of Work	Unit	Quantity	Rate	Total Cost
1	3/53	Site Preparation (Clearing, Grubbing)	Sq. m	10,000.00	49.70	497,000.00
2	3/5i	Earthworks (Excavation and Embankment)	Cu. m	1,800.00	342.90	617,220.00
3	3/14	Gravel Surfacing	Cu. m	4,000.00	531.50	2,126,000.00
4		Concrete Trail Edging	M	250.00	800.00	200,000.00
5		Drainage Installation (Pipes, Ditches)	M	120.00	600.00	72,000.00
6		Stone Masonry Retaining Walls	Cu. m	20.00	7,500.00	150,000.00
7		Wooden Boardwalk Sections	Sq. m	240.00	6,000.00	1,440,000.00
8		Signage (Information and Directional)	Each	10.00	30,000.00	300,000.00
9		Landscaping (Planting, Mulching)	Sq. m	400.00	400.00	160,000.00
10	25/73	Safety Barriers (Railings, Fencing)	M	1,000.00	1,264.40	1,264,400.00
11		Benches and Rest Areas	Each	10.00	28,750.00	287,500.00
12		Lighting Installation	Each	25.00	22,200.00	555,000.00
13		Passenger Electric Carts (4 to 6 Seaters)	Each	25.00	3,000,000.00	75,000,000.00
14		Passenger Electric Mini Cart (Passenger capacity 2)	Each	25.00	2,000,000.00	50,000,000.00

15	Miscellaneous Expenses	LS	1.00	1,000,000.00	1,000,000.00
				Total Amount	133,669,120.00

Rough Cost Estimate of Restoration of Dharmarajika, Mohra Moradu, Mankiala and Bhallar Complexes

Item No.	Items of work	Quantities	Rates	Unit	Amount
			(Rs)		(Rs)
1	Providing and laying Grey Sand Stone masonry (Ashlar Fine) as per original design laid into position in Lime Sand mortar 1:2 matching the original work with care including scaffolding & curing etc. complete.	192,081.80 Cft	98,969.25	%Cft	190,101,916.85
2	Extra labor for: - b) cornice & string course	80,560.00 Rft	38,710.40	% Rft	31,185,098.24
3	Providing and laying Kanjoor Stone masonry (Ashlar Fine) as per original design along with carvings and mounding and floral designs laid into position in Lime Sand mortar 1:2 matching the original work with care including scaffolding & curing etc. complete.	162,000.25Cft	161,048.00	%Cft	260,898,162.62
4	Removing cement or lime plaster.	1,400,362.00 Sft	475.00	%Sft	6,651,719.50
5	Cement plaster 1:4 up to 20' (6.00 m) height: - 1/2 " thick	140,036.00 Sft	4,278.45	%Sft	5,991,370.24
6	Painting old surfaces: - Painting guard bars, gates of iron bars, gratings, railing (including standards, braces etc.) and similar open work:- i) first coat. ii) each subsequent coat.	201,620.00 Sft	1,331.20	%Sft	2,683,965.44
Total:					497,512,232.89

Annexure – A

Assessment of Harmful & Invasive Flora and Removal/Control Strategy at Archeological Sites for Master Plan Development

Introduction

Taxila is situated near the capital city Islamabad about 32km away. It has topographical and tourism importance. The most important and famous monasteries and Buddhist sites of Gandhara heritage city especially around Taxila including, Bhir Mound, Dharmarajika, Mohra Muradu, Giri, Sirkap, Kunala complex and many other archeological sites as mentioned in the Master Plan. Taxila city and all archeological sites included in master plan (Punjab & KPK) are rich in natural environment and have very rich diversity of plants and vegetation. These plants have some varieties which have harmful impacts on natural ecosystems and infrastructure of archeological sites in the target areas. These plants may degrade the ecosystem and their presence have adverse impacts on biodiversity, tourism, and infrastructure within site areas. According to literature and survey, approximately 250 – 300 species of plants and trees are reported in Taxila and related archeological sites. (Mehmood 2013). Diversity of flora and natural ecosystems provide ideal environment to these harmful species for rapid growth and dispersal. Taxila contains many archeological sites and monasteries which are adversely affected by many kinds of plants and trees. Literature Review provides some details of plants and trees which are big hurdle in archeological site preservation and conservation. Mostly abundant plants are mentioned with their biological names *Bauhinia variegata*, *Ficus carioca*, *Pinus Roxburghe*, *Quercus leucotrichophora* (Mehmood A., 2013).

An Overview of Concerned Issues

Some species of plants, trees and grasses are involved in the degradation of archeological sites. Deep rooted plants and trees have severe impact on infrastructure and important archeological places. Deep roots penetrate into the infrastructure building materials and cause the broken process of infrastructure. These vegetation species show highly developed characteristics for dispersal and growth. Rapid increase and dispersal make these species more harmful. The presence of the vegetation described below poses challenges to the development of ecotourism and the revitalization of archaeological sites in Punjab and Khyber Pakhtunkhwa. While surface-feeding plants with shallow root systems are relatively less harmful to the structural integrity of archaeological remains, they should not be overlooked when aiming to enhance the site's tourism potential. Of particular concern are plants growing directly on the walls of the sites, as they are a major cause of structural damage, leading to severe cracks. Once established, wall vegetation becomes difficult to control and can significantly compromise the preservation efforts. Deep rooted plants grow inside the cracks and become a source of degradation. It is very crucial to mitigate the severe impacts of these harmful botanical species from the archeological ecosystems to enhance tourism in natural healthy

areas. It is imperative that we must have strong framework to tackle these harmful and invasive alien species in these areas.

Invasive species control, along with some harmful native plants and trees, is a critical endeavor for the preservation of natural heritage sites. These non-native species can pose a significant threat to native flora and fauna along with disrupting delicate ecosystems. Invasive alien species are those species which are introduced intentionally or unintentionally that can harm and compete the native biodiversity in the natural ecosystems. In case of heritage site preservation, some native trees and plants are a big hurdle in preservation and conservation of archeological sites. It is estimated that each year the unwanted plants, trees and invasive alien species are the cause of huge loss of revenue in the world. It is observed that some features like massive seed production and dispersal are the big threat in archeological sites of Punjab Pakistan. Many kinds of plants, trees and invasive plants have ability to grow rapidly with massive production of light weight seeds, which can fly with air currents and can easily disperse in surrounding areas to create many serious challenges. Mitigation and effective planning to control these harmful species may bring positive impact on archeological ecosystems and tourism enhancement.

Assessment & Identification of Target Flora

The team, concerned to the project, visited the archeological site on 15-21 February of 2025. The comprehensive survey for the assessment and identification of target plants and trees was conducted for the protection, preservation, conservation and management of archeological sites included in the master plan. Many kinds of plants and trees were observed in which some species are native and harmful in the way of archeological preservation and conservation. Some species are invasive and are the source of destruction of archeological infrastructure and ecosystems. Samples were collected from the site areas during visit and local community interviews shows the complete scenario. The plants and trees which were directly associated with archeological infrastructure are observed deeply, which shows that harmful plant and tree species have degraded the archeological infrastructure at critical level. The list of some plants is given below for the effective assessment and mitigation strategy to restore, preserve, and conserve the archeological important sites both in Punjab and KPK.

Sr.	Scientific Name	Common Name	Family
1	<i>Silybum marianum</i>	Dodho Type / Milk Thistle	Asteraceae
2	<i>Cannabis</i>	Bhang	Cannabaceae
3	<i>Euphorbia helioscopia</i>	Chatriwala dudhi	Euphorbiaceae
4	<i>Parthenium hysterophorus</i>	Parthenium	Asteraceae
5	<i>Dodonaea viscosa</i>	Snatha	Spindaceae
6	<i>Dalbergia sissoo</i>	Sheesham	Fabaceae
7	<i>Prosopis juliflora</i>	Mesquite	Fabaceae
8	<i>Oxalis corniculata</i>	unavailable	Tracheophyta
9	<i>Ficus carica</i>	unavailable	Moraceae
10	<i>Ajuga / Ajuga Bracteosa</i>	unavailable	Lamiaceae
11	<i>Ajuga parviflora</i>	unavailable	Lamiaceae
12	<i>Brassica</i>	Sarsoon	Brassicaceae

13	<i>Lactuca</i>	unavailable	Asteraceae
14	<i>Adiantum incism</i>	unavailable	Peteridaceae
15	<i>Desmostachy bipinnate</i>	unavailable	Poaceae
16	<i>Marchantia polymorpha</i>	unavailable	Marchantiaceae
17	<i>Mulberry Sp.</i>	Desi Toot/Shehtoot	Moraceae

1- *Silybum marianum* or *Dodho* Type:

This plant is present in archeological site areas in vast area. It can be observed abundantly in Bhir Mound, Giri, Kalawan, Dharmarajika, Sirkap, Mohra Muradu and common in other related areas in Punjab and KPK. It is a spiny leaf plant and has ability to disperse easily in vast areas. These plants are the source of degradation of archeological sites. These plant species may also be a hurdle in tourism strategies. Control strategies toward these species can be read in operational management section of this chapter.

2- *Cannabis* or *Bhang*:

Cannabis is very common in these areas even in Islamabad territory. This plant has ability to survive in harsh conditions as well. Seed dispersal ratio of this plant is very high and can reach at long distance in short periods. This plant roots also damage the archeological structures. It also has impacts on soil composition of archeological sites.

3- *Euphorbia helioscopia*:

It is also herb plant and have high penetration of roots. This ability makes it harmful for archeological sites in Taxila, Bhir Mound, Giri and other related sites. Control strategy is necessary for archeological conservation.

4- *Parthenium hysterophorus* or *Gajar Booti*:

Parthenium hysterophorus also known as Gajar Booti. This plant species is wide spread all across Asia. This plant has adverse impacts on ecosystems and archeological sites degradation. This plant has severe impacts on soil composition. It gradually changes the soil properties and is the cause of soil erosion. This continuous process eventually will lead the destruction of archeological structures. Effective conservation strategy must be adopted to mitigate the severe impacts of this invasive species in target areas. *Parthenium* have ability to survive in harsh conditions and it needs no maintenance to survive in natural ecosystems. Archeological sites have special type of soil composition and excessive root clusters of plants may penetrate in structures and remains may cause destruction in dry and rainy seasons. Further, it is observed that *Parthenium* have allergic impacts of humans and biodiversity. It may cause the problem in tourism practices. So, the eradication of this invasive and harmful species is necessary from these historic and important sites.

Dodonaea viscosa is growing in large archeological areas in Punjab and KPK. This abundant plant grows in the walls and long roots have damaging impacts on stones and walls. Abundantly growing roots into structures, break up the structures and leave some gaps after dry. These gaps provide space to the rainy water and humidity which become the cause of degradation of archeological sites. Some conservation strategies may be applied to mitigate the severe impacts of this plant. These conservation strategies can be analyzing in operational management section of this report.

5- *Dalbergia sissoo* or Sheesham:

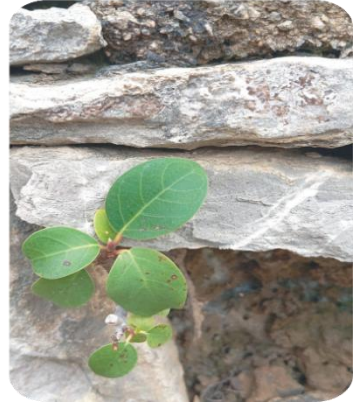
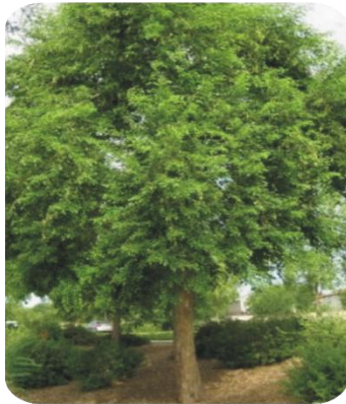
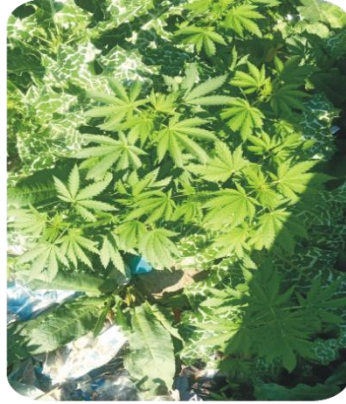
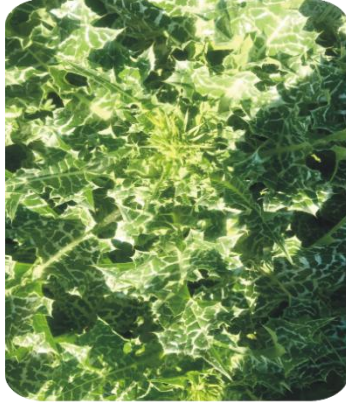
Sheesham is native to Pakistan. In case of archeological scenario, this tree has severe impacts and can damage the archeological structures by extra growth of roots in archeological areas. As we know, this plant can grow by spreading their seeds in surrounding areas. Sheesham is present in archeological natural areas near monasteries and stupas. Long roots growth under soil surface makes the archeological infrastructure weak which leads toward site degradation. Many conservation strategies can be applied to mitigate the Sheesham impacts on target areas. These strategies can be observed in operational management section of the report.

6- *Prosopis juliflora* or Keekar:

This plant in different varieties is present in Pakistan. Mostly archeological sites of Punjab and KPK are severely affected by these invasive and exotic species. These species harm the archeological structures and soil fertility. These also produce food completion with native species. Conservation strategy and planning is necessary to get rid from these plant species in target areas.

7- *Other Species:*

All other plant and tree species prevail harmful impacts on archeological habitat and structures. These species mostly destroy the site habitat and structures due to high root penetration and cracks formations at site areas. Abundant availability of these plants is also a major threat to tourism activities. Effective control and strategic measures may be initiated to control and remove these destructive species form all archeological sites as shown in the map of master plan.



Control & Removal Strategy of Harmful Flora

Harmful flora mitigation, removal and control planning is crucial for effective and sustainable conservation of archeological sites of Taxila heritage city and related areas in Punjab and KPK. Flora species which are keenly identified in above species table need some remedies and operational strategies in order to conserve the archeological structures, sustainable ecosystems and tourism potential. Many strategies can be followed to mitigate this serious issue including:

1. **Chemical Control**
2. **Manual Removal of Harmful Flora**
3. **Community Awareness Strategies**

1- Chemical Control:

Archeological sites have diverse range of flora which are destructing the ecosystems and sites sharply. Mostly the small herbs, shrubs and grasses can be control by applying some herbicides, fungicides, and round ups in the target site areas. These chemicals have minor impact on soil and archeological structures and all other herbs, shrubs and target plants can be controlled. Some chemicals which are most effective for this purpose are:


- Herbicide, Roundup (Acid Equivalent)

These herbicides are important to use because of mode of action. These herbicides reduce the enzymatic activity in the plant growth and eventually the plant goes to vanish. But the most important is timing of the use of this herbicide. Glyphosate is most effective when applied during the growing season when invasive and harmful flora are actively photosynthesizing and absorbing nutrients. Applying glyphosate at the right time, such as during the late spring or early summer, ensures that herbicide works quickly and efficiently, leading to rapid plant death.

Mostly, herbicides can be more effective only in early growth seasons and rapidly transfer the action. All herbs, shrubs, grasses and small growing plants can be destroyed by the use of round ups and related chemicals which have acid equivalent composition.

Chemical Strategy Framework Table:

CHEMICAL	FLORA NAME	PROPERTIES OF CHEMICAL	TIMING
1- Round Up 2- Paraquat 3- Sodium Carbonate peroxyhydrate	<i>Silybum marianum</i>	1- Selective Targeting 2- Quick Absorption & Translocation 3- More effective for invasive flora 4- Less impact on soil	All these chemicals will be effective if used in early growing season. These can be applied in growing seasons in specific concentrations.
	<i>Cannabis</i>		
	<i>Euphorbia helioscopia</i>		
	<i>Parthenium</i>		
	<i>hysterophorus</i>		
	<i>Dodonaea viscosa</i>		
	<i>Oxalis corniculata</i>		
	<i>Ficus carica</i>		

	<i>Ajuga / Ajuga Bracteosa</i>	
	<i>Ajuga parviflora</i>	
	<i>Lactuca</i>	
	<i>Adiantumincism</i>	
	<i>Desmostachybipinnate</i>	
	<i>Marchantia polymorpha</i>	
<p>Note: Paraquat can be used for excessive growth of Brassica. Sodium Carbonate Peryoxyhydrate can be used for <i>Marchantia polymorpha</i> excessive growth in archeological areas.</p>		

2- Manual Removal of Harmful Flora:

Manual strategy can be initiated in the field and site areas to remove harmful flora for archeological site degradation in each proposed area. A team may be engaged from concerned and line departments to carry on this effective campaign.

Manual removal may involve following activities:

2.1. Pulling (By Hand)

This method is simple and very clear to remove and manage unwanted flora from archeological sites. It requires effective team, training strategies, time and management. In this method we have need to pull the plants from grounds. But we have to make sure that roots of the plant are completely moved up from grounds. Small plants can be moved from grounds easily. This method has no side effects on soil and structures, and it takes long time to make sustainable ecosystems. Large and fast-track campaigns may reduce the time frame, and positive impacts may be achieved in short periods.

2.2. Digging Up Target Flora Species

In some archeological areas, large trees and pants are available which have to be removed from archeological sites. These trees and plants cannot be removed easily with local practices. It demands for heavy machinery like shovels, cranes or other heavy tools. Effective digging and complete root destruction will make the ecosystems sustainable to preserve archeological sites in Punjab and KPK.

2.3. Cutting Back

Large invasive flora species *Parthenium*, *Snatha*, and other large plants can be removed by cutting back the plants. It must make sure to cut near the base to reduce the regrowth ability of plants or invasive species from the archeological site areas.

3- Awareness Strategy & Community Engagement:

It is very important to engage the local communities of the areas to hold events and seminars to prevail importance of the archeological sites and conservation. Community can play an important role for protection, preservation, conservation and management of the areas. Land owners near the archeology

sites can remove these unwanted plants and trees from their lands and can reduce the process of dispersal at large scale. Continuous practice will take few years to mitigate the process of invasive species dispersal. Influential individuals of the areas, youth and students can enhance the awareness strategies if trained properly. Media can be used to enhance the importance of important sites; video documentaries and awareness stuff can create many fruitful inputs through awareness operational management. Community engagement practices can be effective by following methods:

- Community participation in ongoing projects
- Training Programs to educate about archeological preservation and importance
- Sustainable land management practices

Suggestions

1. Archeological sites are precious asset of the country and we must be careful while working on heavy machinery to remove unwanted flora from the sites. Heavy machines may disrupt archeological delicate structures.
2. We must prefer trusted herbicide brands to use in site areas. These herbicides must be used in specific ratio each time. Moreover, strong herbicides may damage the soil fertility.
3. Engineers and workers must use manual tools while working on archeological structures. This practice may preserve the archeological assets to attain SDGs (Sustainable Development Goals (SDGs)).
4. Regular monitoring and regular cleaning of archeological remains is important task to perform under trained archeologists, experts and decision makers.
5. Government must introduce effective rules in which community must be at priority. It is crucial to provide financial benefits to the community for sustainable preservation and conservation of archeological sites in Punjab.
6. Regular archeological staff training and awareness workshops may bring effective development in protection, preservation, conservation and management of archeological heritage.
7. Land owners along buffer zones must be strictly prohibited to grow exotic flora species which bring drastic negative impacts on archeological natural ecosystems. Exotic flora is the major cause of destruction.
8. Proper archeological site analysis and open joints of masonry must be sealed with lime. Proper maintenance is necessary after cleaning the archeological structures for sustainable protection, preservation, conservation and management.

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