ADAPTIVE REUSE OF SETH CHUHIMAL KI CHATTRI & TALAB

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DECLARATION

I Sejal Gupta, here by solemnly declare that the thesis work undertaken by me, titled “Adaptive Reuse of Seth Chuhimal ki Chattri & Talab” is my original work, and whatever information I have incorporated in the form of photographs, text, data, maps, drawings, etc., from different sources, has been duly acknowledged in my report.

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ABSTRACT

This thesis explores the adaptive reuse of heritage architecture, focusing on RaniChui Mal ka Mahal and Chui Mal ka Talab in Nuh, Haryana. These culturally and architecturally significant structures, once integral to the social and water-centric heritage of the region, now face neglect and deterioration. The project aims to revive these historic spaces by transforming them into a multifunctional complex that includes performance spaces, exhibition galleries, dining under chhatris, and interpretive storytelling elements—while preserving their architectural integrity. Through a contextual and conservation-sensitive design approach, the study investigates how adaptive reuse can bridge the past with contemporary needs, offering an immersive cultural experience rooted in history.

The design proposes a dynamic integration of space and function that respects the site's original character while introducing elements such as acoustically designed performance zones, modular exhibition layouts, and environmentally responsive dining settings. Research methodologies include site analysis, literature review, case studies of similar adaptive reuse projects, and compliance with ASI (Archaeological Survey of India) guidelines. The outcome reimagines Rani Chui Mal ka Mahal and Talab not just as preserved relics, but as active contributors to community identity, tourism, and cultural education.

Keywords: Adaptive reuse, heritage interiors, performance design, Rani Chui Mal Mahal, stepwell reuse, cultural preservation, chhatri architecture, Nuh Haryana, sustainable design, historical storytelling.

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CHAPTER-1

INTRODUCTION

1.1. Introduction

Architecture has always been a bridge between the past and the future — a silent storyteller of civilizations, memories, and traditions. In, India's architectural heritage has always been closely intertwined with nature, particularly with its historic water structures like stepwells, ponds, and reservoirs. These spaces not only served utilitarian purposes but were also deeply embedded in the cultural, social, and spiritual fabric of Indian communities. Among these, the chhatris and talabs (ponds) in the semi-urban and rural belts of North India have stood as quiet markers of architectural brilliance and community engagement.

However, over the decades, many such heritage structures have fallen into neglect. Urban expansion, modernization, lack of awareness, and inadequate preservation efforts have led to the deterioration and abandonment of these once-thriving community centers. The disconnect between local people and their heritage sites has grown, leaving these monumental sites underused and at risk.

Thus, this project proposes an adaptive reuse of the historic Seth Chuihi Mal ki Chhatri and Talab in Nuh, Haryana. Through thoughtful, context-sensitive interior interventions, the project aims to revive the cultural vibrancy of the site by transforming it into a nature-integrated performance and dining space, enriched with storytelling, art, and sensory engagement.

What is the Project About?

- The project focuses on the adaptive reuse of Seth Chuhi Mal ki Chhatri and Talab to create a multifunctional cultural destination that includes a performance stage, dining areas, a storytelling fountain, and a museum, all inspired by nature.

Why is the Project Important??

- To preserve cultural heritage and prevent further deterioration of a historically significant site.
- To reconnect people with water-centric traditional architecture.
- To celebrate history through modern experiences like performances, exhibitions, and leisure.
- To promote sustainable tourism and community pride in local heritage.

How will it be Done??

- By restoring and stabilizing the historic structures sensitively.
- By introducing new design interventions inspired by nature — lotus-shaped stages, swan sculptures, and organic pathways.
- By integrating water into storytelling features like a musical fountain that functions day and night.
- By seamlessly connecting the museum to the ponds through landscaping mimics natural formations.(Sri Sai Kripa Offset, n.d.)

1.2. Types of Adaptive Reuse:

1. Historical Preservation:

This involves reusing a historic building with effort to preserve or restore its original state, maintaining its historical significance and integrity. For example, transforming an old factory into an art museum while preserving elements of the original building [9][10].

2.Renovation:

In renovation, much of the building's interior is repaired, rebuilt, or refurbished while leaving the exterior unchanged. The goal is to repurpose the building for a new use, not just to refresh it for its current purpose. An example is the Detroit Foundation Hotel, which repurposed the original Detroit Fire Department headquarters [9][10].

3.Facades:

Facadism involves demolishing and rebuilding most of the structure while keeping the street-facing side intact. This approach is chosen for buildings in poor repair or with little historical significance. It allows for the preservation of the facade while creating a new structure behind it, maintaining a historic look while ensuring modern functionality [9][10].

4.Integration:

Integration entails building around the original structure in a way that the old building remains but is encompassed by a new structure. For instance, student apartments built into a historic water tower display this type of adaptive reuse, where the original structure is integrated into a new building design [9].

5.Infrastructure:

This type of adaptive reuse involves repurposing infrastructure elements, such as converting an elevated highway into a linear park. It focuses on transforming existing infrastructure into new, functional spaces that innovatively serve the community, promoting sustainability and urban revitalization

1.3. Advantages of Adaptive Reuse:

Conserving and preserving historic sites involves more than just their aesthetic and historical value; there are numerous additional benefits to consider in adaptive reuse. These include cultural, social, economic, and environmental advantages.

Cultural

Preserving historic buildings helps people appreciate cultural variety and increases awareness of heritage culture. When choosing locations, it's essential to prioritize the preservation of culture, as architectural design often serves as a tangible expression of cultural customs. Additionally, the influence of various cultures on tourism underscores the importance of locations that embody cultural values.

Social

The benefits of restoring old structures. When materials are reused adaptively, their identity is maintained, public awareness of cultural or historical places is raised, and the sites' importance may be restored. Future generations will gain from preserved and maintained sites in addition to their historical relevance.

Economics

Adaptive reuse is a very cost-effective method. In buildings that have already been built, the cost of new construction is just two thirds that of existing structures. When old buildings were constructed using materials that were easily available in the area, they may be used for restoration and adaptation, which will save costs and provide employment for locals.

1.4. Disadvantages of Adaptive Reuse:

1.Development could be expensive because of governmental procedures including planning, permitting, and historic permits.

2.Very expensive building due to major environmental problems.

3.Increased design costs to replace infrastructure, such as obsolete HVAC and electrical systems, and handle change-of-use.

4.Site limitations and the current building design layout.

5.A designation for historic preservation may restrict changes to the exterior or façade.

1.5. Factors Affecting Adaptive Reuse

Economics:

Economic considerations encompass various factors such as development costs, project expenses, investment returns, and market dynamics. These elements play crucial roles in shaping decisions regarding the utilization and redevelopment of spaces.

Capital Investments:

Economic factors involve development and construction expenses, alongside marketing and maintenance costs. The feasibility of most adaptive reuse projects hinges on assessing the building's current physical layout and condition to determine its economic viability.

Asset condition:

Considerations encompass both the immediate and long-term impacts of adaptive reuse, including potential issues such as the building's failure to fulfill user requirements, structural instability, and degradation of materials over time.

Regulations:

There are few guidelines in building codes regarding adaptive reuse, and state and local governments do not support the implementation of these solutions or the ability to award buildings that have undergone reuse with high energy star ratings.

Social consideration:

The foundation of society and the source of people's survival are its buildings. To prevent abandonment, a building needs to be properly maintained and used again.

Environmental consideration:

Buildings use a lot of energy when they are constructed. Building materials and other resources with high embodied energy are needed for new construction.

1.6. Barriers of adaptive re-use

1.Physical restrictions:

Existing floor plans, the number of walls and columns and layouts of structural systems.

2. Economic considerations:

Costs associated with conservation, both direct and indirect

3. Social considerations:

Beyond economic considerations, there are intangible and personal aspects to maintaining the day-to-day lives of individuals who have a strong emotional attachment to a place.

4. Building rules, laws, and other restrictions:

Adhering to present-day construction standards, regulations, principles of conservation, licensing prerequisites, and planning criteria.

5. Insufficiently skilled craftspeople and limited supplies.:

Difficulties with compatibility between new and old materials, in addition to an absence of locally accessible individuals with the requisite expertise for conservation work

6. Limited response to sustainability agenda:

Owners of buildings and the commercial property market have not provided much help for making buildings sustainable.

7. Complexity and technical difficulties:

Technical installations, innovative solutions, and refurbishment approaches are necessary.

1.7. Need for the Topic

India's architectural heritage serves as a profound repository of cultural, social, and ecological knowledge. Among its less explored yet significantly meaningful elements are traditional water structures—such as stepwells and associated pavilions like chhatris—which historically

functioned as ceremonial, social, and contemplative spaces. These structures embody a harmonious blend of engineering ingenuity, artistic expression, and community utility. However, in the face of rapid modernization, these heritage elements are increasingly overlooked, leading to physical deterioration, diminished relevance, and a growing disconnect between historical legacy and contemporary life.

The need for this study arises from the growing gap between historical legacy and modern functionality. Many such structures now face the threat of abandonment due to inadequate conservation efforts, urban encroachment, and limited public awareness. Chuihi Mal ki Chhatri and Talab, located in Nuh, Haryana, exemplify this crisis. Once active with cultural rituals and local gatherings, this architectural ensemble now remains underutilized and in a state of disrepair, despite its rich historical, spatial, and cultural significance. The chhatris—marked by their intricate domes and formal symmetry—stand overlooking the talab, a deep traditional pond that historically served both symbolic and utilitarian roles. Together, they form a spatially compelling composition that holds strong potential for adaptive reuse.

This project recognizes the opportunity to reimagine these declining heritage assets as a vibrant cultural destination. Through sensitive and context-driven interior design strategies, the project proposes to integrate spaces for performance, dining, exhibitions, and reflection—bringing renewed life and relevance to the site. The design intervention will be guided by nature-inspired concepts and a commitment to preserving the site's architectural identity while adapting it for modern use.

Yet, this vision must contend with significant challenges. These include the structural vulnerability of the existing ruins, the possibility of inappropriate or insensitive interventions, and the difficulty of fostering sustained community involvement. Addressing these threats through holistic conservation, participatory design, and cultural programming can not only safeguard the site’s legacy but also inspire broader efforts in heritage preservation and regional cultural development.

1.8. Aim:

To preserve, restore, and adaptively reuse Chuihi Mal ki Chhatri and Talab by transforming them into a dynamic cultural and performance space through nature-integrated interior design strategies that enhance heritage value, promote cultural engagement, and support sustainable community development.

1.9. Objectives:

- To study the historical, architectural, and cultural significance of Chuhi Mal ki Chhatri and Talab.
- To explore nature-inspired and context-sensitive interior design interventions for adaptive reuse.
- To integrate modern functions such as dining, performances, exhibitions, and public gatherings into the heritage setting.
- To ensure the preservation of the site's architectural identity while enhancing usability.
- To enhance visitor engagement through innovative spatial storytelling.
- To ensure accessibility, ambiance, and seamless transition between historical and modern element

1.10. Methodology:

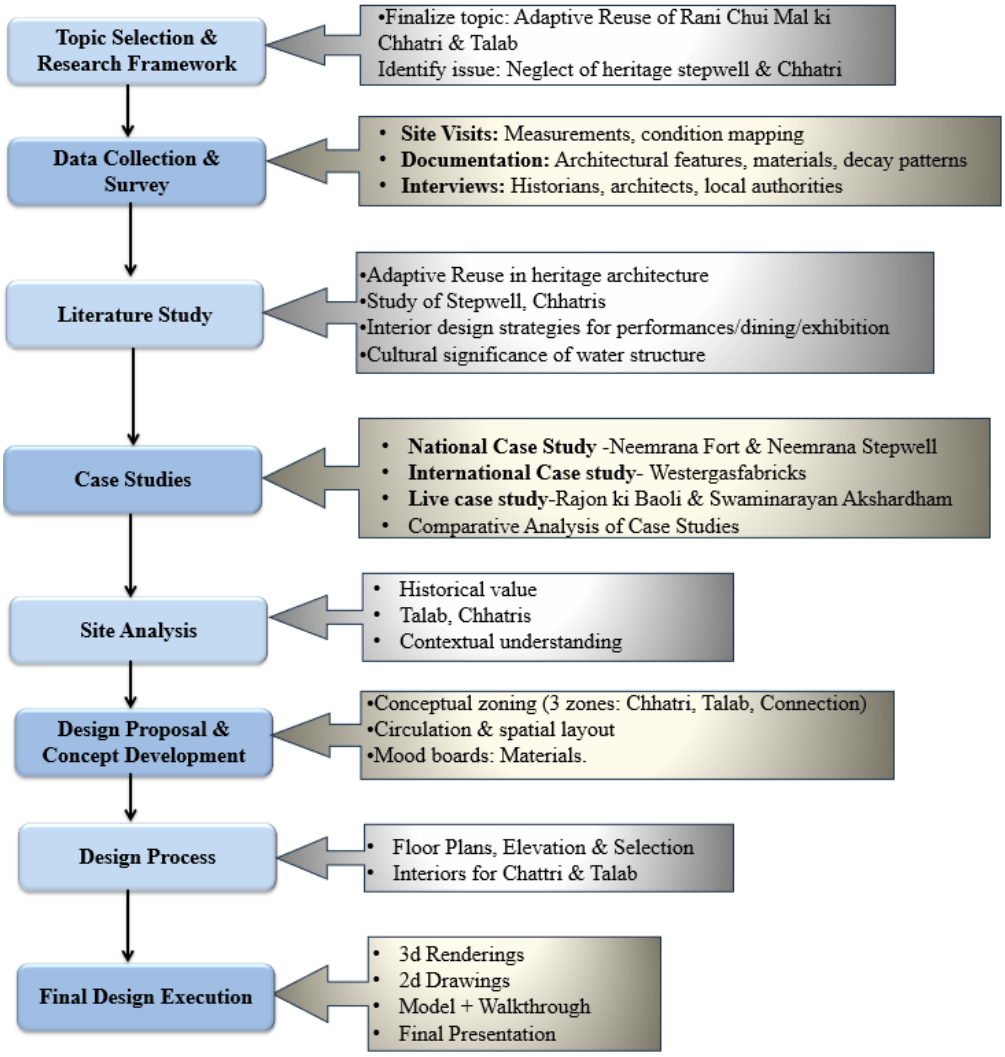


Table-1: Methodology

Source: Author

1.11. Scope:

- Adaptive reuse of heritage spaces while preserving the original fabric of the monument.
- Designing performance and exhibition interiors with culturally themed lighting, seating, and spatial flow, while integrating dining spaces under Chhatris that harmonize heritage aesthetics with modern functionality.
- Developing a souvenir shop with local art and traditional design elements.
- Enhancing visitor flow and ambiance through interior-led landscape planning.

1.12. Limitation:

- Restricted structural changes due to ASI heritage guidelines.
- Funding and government approvals may impact the feasibility of certain design solutions.
- Balancing modern interventions without overpowering the historical essence.
- Environmental factors like water damage affect material choices.
- Must ensure all designs are reversible and non-damaging to heritage fabric.

1.13. Research Question:

- How can adaptive reuse transform Seth ChuhiMal ka Mahal and Talab into a cultural and performance hub while preserving its heritage?
- What architectural strategies and design interventions can be applied to integrate the stepwell and chhatris into a functional space?
- How can sustainability and minimal intervention be balanced to ensure long-term conservation?

1.14. Thesis Statement

This thesis proposes the adaptive reuse of Seth Chuhi Mal ki Chhatri and Talab through interior design strategies that revive its cultural, social, and ecological value. By integrating performance, exhibition, dining, and contemplative spaces within a heritage context, the project seeks to create a nature-inspired cultural destination that connects the past to the present while engaging the local community.

1.15. Impact of Adaptive Reuse on Surrounding

Reusable and adoptable structures ought to have a bigger effect on the environment. Rather from being considered greenfield, these locations are referred to as brownfields because the structures must be cleared of any potential chemical pollution before they may be demolished or used for typical residential or commercial purposes. A well-executed adaptive reuse project can revitalize a neighborhood, promote growth, and attract historical tourists to the city.

1.16. What is ASI?

The Archaeological Survey of India (ASI), under the Ministry of Culture, is the premier organization for the archaeological research and protection of the cultural heritage of the nation. Maintenance of ancient monuments and archaeological sites and remains of national importance is the prime concern of the ASI. Besides, it regulates all archaeological activities in the country as per the provisions of the Ancient Monuments and Archaeological Sites and Remains Act, 1958. It also regulates the Antiquities and Art Treasure Act, 1972. For the maintenance of ancient monuments and archaeological sites and remains of national importance the entire country is divided into 24 Circles. The organization has a large work force of trained archaeologists,

conservators, epigraphist, architects and scientists for conducting archaeological research projects through its Circles, Museums, Excavation Branches, Prehistory Branch, Epigraphy Branches, Science Branch, Horticulture Branch, Building Survey Project, Temple Survey Projects and Underwater Archaeology Wing.

1.16.1. Grading for Heritage Buildings

Table 1: Grading for Heritage Buildings

S.NO		GRADE 1	GRADE 2	GRADE 3
1.	Definition	Heritage Grade-I comprises buildings and precincts of national or historic importance, embodying excellence in architectural style, design, technology and material usage and/or aesthetics they may be associated with a great historical event, personality, movement or institution. They have been and are the prime landmarks of the natural sites that shall fall within Grade-I	Heritage Grade-II (A&B) comprises of buildings and precincts of regional or local importance possessing special architectural or aesthetic merit, or cultural or historical significance though of a lower scale than Heritage Grade-I. They are local landmarks, which contribute to the image and identity of the region.	Heritage Grade-III comprises building and precincts of importance for townscape. These contribute to determining character of the locality and can be representative of lifestyle of a particular community or region
2.	Objective	Deserves careful preservation	Deserves intelligent conservation.	Deserves intelligent conservation
3.	Scope of change	No interventions be permitted either on exterior or interior of the heritage building or natural features unless it is necessary in the interest of strengthening and prolonging the life of the buildings/or precincts or any part or features thereof. For this purpose, absolutely essential and minimum changes would	Grade-II(A): Internal changes and adaptive re-use may by and large be allowed but subject to strict scrutiny. Care would be taken to ensure the conservation of all special aspects for which it is included in Heritage GradeII. Grade-II(B): In addition to above, extension or additional building in	Internal changes and adaptive reuse may by and large be allowed. Changes can include extensions and additional buildings in the same plot or compound. However, any changes should be such that they are

		be allowed, and they must be in conformity with the original.	the same plot or compound could in certain circumstances, be allowed provided that the extension /additional building is in harmony with the existing heritage building(s) or precincts especially in terms of height and façade.	in harmony with and should be such that they do not detract from

Source: (mohua.gov.in)

CHAPTER 2

LITERATURE STUDY

2.1. Architectural Features of Ponds & Chattri

Indian architecture reflects a deep connection with nature, spirituality, and societal needs. Among its many features, ponds and chhatris hold unique historical, cultural, and symbolic significance. Below is a detailed exploration of their history, cultural importance, evolution, and symbolism.

Historical Background of Ponds

Ponds have been a cornerstone of Indian civilization since ancient times, serving both functional and spiritual purposes. The earliest evidence of water structures like ponds can be traced back to the Indus Valley Civilization (c. 2500–1900 BCE), where advanced water management systems like reservoirs and the Great Bath of Mohenjo-Daro were constructed. These served as both utilitarian water sources and ritualistic spaces2.

During the Mauryan period (c. 321–185 BCE), Emperor Ashoka emphasized the construction of ponds, wells, and stepwells along major roads for travelers' convenience. His inscriptions highlight the integration of these water bodies into daily life and moral governance2. Over time, ponds evolved into temple tanks (kunds) and stepwells (vavs or baoris), particularly in arid regions like Gujarat and Rajasthan, where they became vital for water storage and community gatherings.

Cultural Significance of Ponds

Ponds in Indian culture are more than utilitarian structures; they are imbued with spiritual meaning:

- **Ritualistic Importance**: Many ponds are associated with temples and serve as venues for religious rituals such as ablutions before prayers or festivals like Chhath Puja. They symbolize purity and renewal3
- **Social Hubs**: Historically, ponds were central to village life, acting as gathering spaces for women to fetch water, wash clothes, or perform daily rituals. They fostered community bonding.
- **Sacred Symbolism**: Water bodies like rivers and ponds are considered sacred in Hinduism, often personified as deities. Ponds near temples were believed to connect devotees to the divine through the element of water.
- **Architectural Integration**: Ponds were often designed with ghats (stepped platforms) for easy access to water. These ghats became architectural marvels that harmonized with their surroundings while serving practical needs.

pavilions that originated in Rajasthani architecture and later became a hallmark of Indian architectural styles under Rajput, Maratha, and Mughal influences.

Evolution

- **Rajput Origins**: Initially built as memorials for kings or warriors in Rajasthan, chhatris symbolized honor and pride. These structures were erected at cremation sites as cenotaphs to commemorate the deceased.

- **Maratha Adaptation**: The Marathas adopted chhatris as decorative elements in forts and palaces, blending them into their architectural identity.
- **Mughal Influence**: Under Mughal rule, chhatris evolved into ornamental features in tombs like Humayun's Tomb in Delhi and the Taj Mahal in Agra. They added grandeur while maintaining a connection to traditional Hindu architecture.

Symbolism

- **Umbrella of Protection**: The term *chhatri* literally means "umbrella" in Hindi, symbolizing protection or shelter. This aligns with their use as memorials or decorative elements over significant structures.
- **Spiritual Connection**: In cremation sites, chhatris represent the soul's journey toward liberation (moksha). Their elevated domes signify ascension to the heavens.
- **Architectural Harmony**: Chhatris blend aesthetic beauty with functionality. In Shekhawati's havelis (mansions), they are often intricately painted, showcasing artistic excellence while serving as cooling pavilions.

2.2. Importance of Water Structures in Indian Architecture

Water structures have played a pivotal role in shaping Indian architecture, reflecting the country's cultural, religious, and practical needs. These structures are not only functional but also serve as aesthetic and spiritual landmarks, showcasing the ingenuity of ancient Indian engineering and artistry.

Historical Significance

1. **Foundation of Settlements**:
   - Water bodies were central to the establishment of early Indian civilizations, such as the Indus Valley Civilization, where cities like Mohenjodaro and Dholavira featured advanced water management systems, including reservoirs, aquifers, and drainage systems.
   - Rivers like the Ganges were considered sacred, influencing the development of cities like Varanasi with ghats designed for ritualistic purposes.
2. **Evolution of Stepwells**:
   - Stepwells (baolis or vavs) originated around the 3rd century CE in arid regions like Gujarat and Rajasthan to address water scarcity. These subterranean structures stored rainwater and provided reliable access during dry seasons.
   - They evolved into complex architectural marvels by the 11th century under Hindu and Islamic rulers, combining functionality with intricate carvings and sculptures.

Architectural Features

1. **Stepwells**:

- Characterized by descending steps leading to water levels, stepwells often included pavilions, galleries, and ornate carvings depicting deities and daily life scenes.
- Notable examples include Rani ki Vav in Gujarat (UNESCO World Heritage Site) and Chand Baori in Rajasthan.

2. **Ghats**:
    - Cities like Varanasi, Ujjain, and Nasik developed ghats along riverbanks for religious activities. These structures allowed physical access to water while serving as social and cultural hubs.
3. **Palaces and Forts**:
    - Water was integrated into palace architecture through decorative elements like fountains, channels, and textured marble chutes for aesthetic appeal and passive cooling. Examples include Mughal gardens and the Red Fort in Delhi.

Cultural and Religious Importance

1. **Sacred Water**:
    - Rivers were worshipped as divine entities, with rituals performed at lakes, kunds (small reservoirs), and stepwells. These practices highlight water's spiritual significance in Indian culture.
2. **Social Gathering Places**:
    - Stepwells served as community centers where people gathered for socializing, rituals, and festivals. They provided shaded spaces for travelers to rest during long journeys.

2.3. Design Principles for Performance Spaces

Designing performance spaces, such as theaters, auditoriums, and concert halls, requires careful consideration of architectural, acoustic, and functional elements to create environments that enhance the experience for both performers and audiences. The following principles outline the key aspects of designing effective performance spaces.

1. Acoustic Excellence

Acoustics are one of the most critical aspects of performance space design. The shape, dimensions, and materials used in space must ensure optimal sound quality. Key considerations include:

- **Sound Diffusion**: Walls and ceilings should be designed to evenly distribute sound throughout the space3.
- **Minimizing Echoes**: Use of sound-absorbing materials to reduce reverberation and ensure clarity.
- **Adaptability**: Incorporating adjustable acoustic panels to cater to different types of performances, such as orchestral concerts or spoken-word events3.

Fig.1: Acoustic
https://blog.burtonacoustix.com/acoustic-treatments/acoustic-panels-in-home-theater

2. Visibility and Sightlines

Ensuring every audience member has a clear view of the stage is essential. This can be achieved through:

- **Seating Layouts**: Tiered or semi-circular seating arrangements to maximize visibility2.
- **Stage Placement**: Proscenium stages, thrust stages, or arena configurations should be chosen based on the intended use of the space.
- **Lighting Design**: Proper stage lighting enhances visibility while creating an immersive atmosphere for performances.

3. Flexibility and Multi-Use Design

Modern performance spaces are often designed to accommodate various events. Flexibility can be achieved by:

- **Movable Seating**: Allowing reconfiguration for different audience sizes or event types2.
- **Versatile Stages**: Stages with adaptable rigging systems and platforms for diverse performances, from plays to concerts.
- **Multi-Purpose Infrastructure**: Spaces that can support theatrical productions, lectures, and community events increase functionality.

4. Audience Comfort

Comfort is a key factor in enhancing the audience's experience. This includes:

- **Seating Ergonomics**: Comfortable seats with appropriate spacing for legroom.
- **Climate Control**: Effective heating, ventilation, and air conditioning systems.
- **Accessibility**: Ensuring facilities are inclusive for people with disabilities through ramps, elevators, and designated seating areas.

5. Performer-Centric Design

The needs of performers must also be prioritized to ensure seamless production. This involves:

- **Backstage Facilities**: Adequate dressing rooms, green rooms, and rehearsal spaces.

- **Stage Equipment**: Advanced lighting rigs, audio systems, and fly systems for set changes3.
- **Ease of Movement**: Efficient pathways for performers and crew to move between backstage areas and the stage.

6. Safety and Security

Performance spaces must adhere to strict safety standards to protect both users and visitors:

- **Emergency Exits**: Clearly marked exits that are easily accessible from all areas.
- **Non-Slip Surfaces**: Flooring materials that reduce the risk of slips or falls.
- **Fire Safety Measures**: Installation of fire alarms, sprinklers, and fire-resistant materials.

7. Aesthetic Appeal

The visual design of performance spaces contributes to their overall impact:

- **Architectural Design**: Unique designs that reflect cultural or artistic themes can make a venue iconic (e.g., Sydney Opera House).
- **Interior Ambiance**: Use of colors, textures, and lighting to create an inviting atmosphere.

8. Sustainability

Incorporating eco-friendly practices is increasingly important in modern design:

- **Energy Efficiency**: Use of LED lighting and efficient HVAC systems.
- **Sustainable Materials**: Choosing renewable or recycled construction materials.
- **Water Management**: Facilities designed to minimize water usage wherever possible3.

9. Universal Design Principles

Performance spaces should cater to diverse user groups by adopting universal design principles:

- **Inclusivity**: Spaces should accommodate individuals with disabilities without compromising functionality.
- **Cultural Sensitivity**: Designs should reflect local traditions while being adaptable for global performance.

2.4. Exhibition and Gallery Design in Heritage Sites

- **Narrative Flow and Visitor Journey**: Designing exhibitions within heritage structures requires a thoughtful approach to storytelling and spatial navigation. The layout should guide visitors through a coherent narrative, respecting the building's original circulation patterns.

- **Display Techniques**: Exhibit installations must avoid permanent attachments to historical surfaces. Utilizing freestanding display cases, modular panels, and non-invasive mounting systems preserves the integrity of the heritage fabric.

- **Environmental Controls**: Maintaining appropriate environmental conditions is crucial for both artifact preservation and visitor comfort. Implementing climate control solutions that are sensitive to the building's historical features is essential.

- **Visual Documentation**: Include images of exhibitions within heritage buildings, highlighting the use of reversible display systems and the preservation of original architectural elements (Vafaie et al., 2023).

2.5. Dining Spaces in Historic Chhatris

- **Furniture Integration**: Dining furniture should be designed to complement the historical aesthetics of chhatris, using materials and styles that resonate with the original architecture. Furniture should be freestanding to prevent any damage to the flooring or structure.

- **Lighting and Ambiance**: Ambient lighting can be achieved using portable fixtures that do not require permanent installation. Emphasizing natural light during daytime operations and utilizing battery-operated or low-impact lighting solutions in the evening maintains the site's integrity.

- **Ventilation and Comfort**: Ensuring adequate ventilation while preserving the chhatri's open design is vital. Incorporating subtle, non-invasive climate control measures can enhance comfort without altering the structure.

- **Visual Documentation**: Provide photographs of dining setups within heritage pavilions, illustrating the balance between functionality and preservation.

2.6. Souvenir Shops in Adaptive Interiors

- **Retail Display Design**: Display units should be modular and adaptable, allowing for flexibility in product presentation while ensuring they do not impact on the heritage structure. Materials and finishes should be chosen to complement the historical context.

- **Circulation and Accessibility**: The layout must facilitate smooth visitor movement, avoiding congestion and ensuring accessibility for all users. Clear signage and logical product placement enhance the shopping experience.

- **Cultural Integration**: Incorporating local motifs and traditional design elements into the shop's interior can create a cohesive aesthetic that honors the site's heritage.

- **Visual Documentation**: Include images of souvenir shops within heritage settings, showcasing design strategies that respect and reflect the historical environment (Vafaie et al., 2023).

2.7. Storytelling and Interpretive Elements

- **Interpretive Signage**: Employing non-invasive signage methods, such as freestanding panels or digital displays, can convey historical narratives without impacting the building's fabric.

- **Interactive Technologies**: Utilizing augmented reality (AR) and mobile applications can enhance visitor engagement, providing immersive storytelling experiences that bring the site's history to life.

- **Community Engagement**: Involving local communities in the storytelling process ensures authenticity and fosters a deeper connection between visitors and the heritage site.

- **Visual Documentation**: Present examples of interpretive installations within heritage contexts, highlighting the use of technology and community narratives in storytelling (Vafaie et al., 2023).

2.8. Applicable Design Standards and Guidelines:

When designing performance spaces, adherence to specific standards and guidelines ensures structural integrity, functionality, accessibility, and sustainability. Below is a detailed explanation of the relevant standards and their application in performance space design.

1. National Building Code (NBC) of India 2016

The National Building Code (NBC), formulated by the Bureau of Indian Standards (BIS), provides comprehensive guidelines for building construction across various categories, including public spaces like performance venues.

Key Provisions:

- **Outdoor Public Spaces**: NBC mandates adequate open spaces around buildings for ventilation, safety, and accessibility. For assembly buildings like auditoriums, a minimum front open space of 12 meters and side spaces of 6 meters are required.
- **Ramps and Exits**: Performance spaces must include ramps with appropriate slopes for accessibility and multiple exits to ensure safe evacuation during emergencies.
- **Fire Safety**: NBC emphasizes fire-resistant materials, fire alarms, sprinklers, and evacuation protocols tailored for high-occupancy assembly buildings(*NBC 2016 Volume-1* , n.d.).

Application:

- Ensures compliance with safety standards for large gatherings.
- Facilitates smooth movement of audiences through well-designed exits and ramps.

2. Universal Accessibility Guidelines

Universal Accessibility Guidelines prioritize inclusivity by ensuring that buildings are accessible to differently abled individuals.

Key Provisions:

- **Differently Abled Access**: Ramps with non-slip surfaces, elevators with braille buttons, and designated seating areas are mandatory.
- **Signage**: Clear signage in multiple formats (visual, tactile) to guide users effectively.
- **Restrooms**: Accessible restrooms designed with grab bars and adequate turning space.

Application:

- Promotes inclusivity by accommodating diverse audience needs.
- Enhances usability for performers and crew members with disabilities.

3. Performance Space Standards

Performance spaces require specific design standards to optimize functionality and audience experience.

Key Provisions:

- **Minimum Dimensions**: Defined dimensions for stages, backstage areas, seating arrangements, and aisles ensure comfort and efficiency.
- **Sightlines**: Tiered seating layouts minimize obstructions and provide clear views of the stage.
- **Acoustic Treatments**: Use of sound-diffusing panels, absorptive materials, and adaptable acoustics tailored to different types of performances.

Application in Performance Spaces:

- Enhances audience engagement through superior visibility and sound quality.
- Supports diverse performance types by providing adaptable infrastructure.

4. Landscape Guidelines

Landscape design complements performance spaces by creating aesthetically pleasing environments while addressing ecological concerns.

Key Provisions:

- **Pond Restoration**: Incorporating water features like ponds or fountains enhances visual appeal while promoting rainwater harvesting.
- **Softscape Elements**: Use of trees, shrubs, and grass improves microclimate conditions around the venue.

- **Hardscape Elements**: Paved pathways and outdoor seating areas ensure ease of movement13.

Application in Performance Spaces:

- Elevates the aesthetic value of outdoor areas surrounding performance venues.
- Contributes to sustainability through eco-friendly landscaping practices.

5. Heritage Guidelines (ASI/UNESCO)

For performance spaces located in heritage sites or historical buildings, adherence to conservation norms is critical.

Key Provisions:

- **Structural Conservation**: Preservation of architectural integrity while integrating modern facilities.
- **Material Usage**: Use of materials compatible with the original structure to maintain authenticity.
- **Cultural Sensitivity**: Designs should respect the historical significance of the site12.

Application in Performance Spaces:

- Ensures harmonious integration of modern performance facilities within heritage contexts.
- Protects cultural heritage while enabling contemporary use.

Table-3 : Standards for Area Requirements:

S.No.	Space	Recommended Area / Dimension	Sources / References
1.	Entrance Lobby / Foyer	Area: 6–10 m² Min width: 1.5 m	NBC 2016 Part 3 (Section 4.1.2) Universal Accessibility Guidelines – CPWD 2016
2.	Reception Area	Area: 6–12 m² Counter height: Max 800 mm Turning radius: 1500 mm	NBC 2016 Part 9, Section 2.2 CPWD Guidelines 2016 – Accessible Counter Design
3.	Waiting Area	1.5–2 m² per person Total: 9–12 m² for 6 people	Neufert, Building Design Data 39th Ed. (Page 216) NBC 2016 Part 9

4.	Exhibition Area	3–5 m² per visitor Ceiling Height: Min 3 m Circulation: Min 1.5 m	Neufert (Page 226) NBC 2016 Part 3 & Part 4 – Museums/Assembly Buildings
5.	Art Gallery	30–100 m² Wall Display Height: 1000–1500 mm Wall length: 8–15 m	Neufert (Pages 222–226), NBC 2016 Part 4
6.	Storeroom (General)	10–20 m² Height: 2.4–3 m	NBC 2016 Part 4 – Storage & Services Neufert (Page 190–192)
7.	Photo Booth (Chhatri)	4–6 m² per booth Front clearance: 1.2 m	Neufert – Kiosk standards Universal Accessibility Guidelines – CPWD 2016
8.	Souvenir Shop	20–40 m² Aisle width: 1.2–1.5 m Display height: 400–1200 mm	Neufert (Page 243) – Retail Shops NBC 2016 Part 9 CPWD Accessibility Guidelines
9.	Dining Area (Chhatri Café)	1.4–1.8 m² per person incl. circulation 8–12 m² per Chhatri (4–6 people) Table clearance: 900 mm	Neufert – Restaurants (Page 236) NBC 2016 Part 9 Accessibility Guidelines – Dining Standards
10.	Performance Stage	Stage: 60–100 m² Width: 10–12 m Depth: 6–10 m Ramp: 1:12 slope, 900 mm width	NBC 2016 Part 4 – Assembly Buildings Neufert (Page 254) – Auditorium Stage Standards CPWD Accessibility Guidelines
11.	Kitchen + Cold/Hot Storage	Kitchen: 15–25 m² Cold storage: 8–12 m² Hot holding: 4–6 m²	NBC 2016 Part 8, Section 3 Neufert (Page 238) – Commercial Kitchen Standards
12.	Mechanical/Plant Room	10–15 m² Height: 2.8–3 m Ventilation required	NBC 2016 Part 4 – Mechanical Services
13.	Public Toilets (Universal)	Male/Female: 12–15 m² combined Accessible WC: 4.5–6 m² Door width: 900 mm Turning radius: 1500 mm	NBC 2016 Part 3 & Part 9 CPWD Universal Accessibility Guidelines 2016 (Govt of India)
14.	ASI Considerations	No anchoring or drilling in heritage walls No plumbing inside protected monument Only reversible structures allowed within 100 m radius	ASI (Archaeological Survey of India) Guidelines for Protected Monuments & Sites

CHAPTER- 3

CASE STUDY

3.1. NATIONAL CASE STUDY

3.1.1. NEEMRANA FORT & STEPWELL

- **Location:** 27°59'38"N 76°23'17"E
- 15th Century, Delhi-Jaipur Highway, 122nd Milestone, Delhi - Jaipur Expy, Neemrana, Rajasthan 301705
- **Founder:** Prithiviraj Chauhan III
- **Built in:** 1464 AD
- Reopened: (Restored and converted into a heritage hotel by Aman Nath & **Francis Wacziarg).**
- **Site Area:** 10 hectares (approximately 25 acres).

Fig. 2: Neemrana Fort

Source: https://www.neemranahotels.com/fort-palace-neemrana/gallery.html

Introduction:

Neemrana Fort Palace, located in the Alwar district of Rajasthan, is a 15th-century fort that has been transformed into a heritage hotel. Originally built in 1464 AD by Raja Dup Raj, a descendant of Prithviraj Chauhan III, the fort served as a royal residence for centuries. After being abandoned in 1947, the fort fell into disrepair until restoration began in the late 20th century.

Historical Timeline:

- **1464 AD:** Neemrana Fort was established by Rao Rajdeo , a descendant of Prithviraj Chauhan III, as a strategic hilltop stronghold for the Chauhan rulers after their displacement from Delhi (*Neemrana Hotels*, n.d.)
- **16th–18th Century:** Successive rulers expanded the fort, adding multiple terraces, palaces, courtyards, and stepwells, shaping it into a sprawling complex with commanding views of the plains (*Exzept*, n.d.)
- **19th Century:** With the decline of princely power during British rule, the fort lost its administrative and military significance and gradually fell into neglect.
- **1947:** Following India's independence, the Neemrana royal family left the fort, which remained abandoned and in ruins for nearly four decades.
- **1986:** Aman Nath and Francis Wacziarg leased the dilapidated fort and began its restoration, employing traditional techniques and local craftsmen.

- **1991:** Neemrana Fort Palace opened as a heritage hotel, becoming a pioneering example of adaptive reuse of a historic property in India.
- **1990s–Present:** The hotel has expanded with more rooms and amenities, while preserving (*Neemrana Hotels*, n.d.)its architectural integrity, and is now recognized as a leading heritage destination (*Neemrana Hotels*, n.d.)

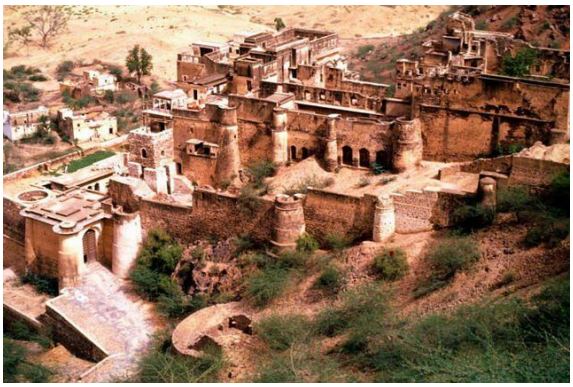


Fig.3- Condition before restoration of Neemrana Fort in 18th century

Source: https://www.archnet.org/sites/5050

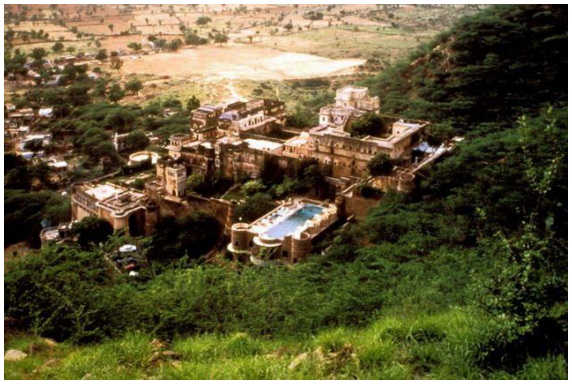


Fig.4- Condition after restoration of Neemrana Fort in present

Source:https://www.archnet.org/sites/5050

Restoration Process and Adaptive reuse:

In 1986, the dilapidated fort was acquired by Aman Nath and Francis Wacziarg, who envisioned reviving the structure through adaptive reuse. Their approach was rooted in heritage conservation, using traditional building techniques, local craftsmen, and sustainable materials to restore the fort's original character while making it suitable for contemporary use as a heritage hotel

Restoration Phases and Strategies

The restoration was executed in two main phases:

- **Phase 1 (1990):** Restoration began with key areas such as Suraj Paul, Tea Terraces, and Tulsi Chowk, focusing on stabilizing structures and reviving the aesthetic integrity of the original design.
- **Phase 2 (1991):** Work continued on Holi Kund, Aam Khas, and Panch Mahal, further expanding the number of usable spaces and integrating modern amenities discreetly(*Exzept*, n.d.)

Throughout the process, the team prioritized:

- **Minimal Intervention:** Preserving as much of the original fabric as possible and ensuring new additions were reversible.
- **Traditional Techniques:** Employing lime mortar, local stone, and traditional craftsmanship.

- **Adaptive Reuse:** Repurposing royal suites, courtyards, and terraces into guest rooms, restaurants, and event spaces, while maintaining the fort's historic ambiance(*Rajasthan Tour Planner*, n.d.)

Adaptive Reuse as a Heritage Hotel

Neemrana Fort Palace opened to the public in 1991 with just 15 rooms. Over the years, it has expanded to offer more than 65 rooms and suites, along with gardens, swimming pools, an amphitheater, and event spaces. The adaptive reuse model preserved the fort's architectural integrity while introducing modern comforts, transforming it into a leading heritage destination(*Exzept*, n.d.)

Architectural Style & Features:

- **Rajput Architecture (Primary Style):**
  The fort predominantly follows Rajputana architectural principles, known for their robust construction, elevated positions, and emphasis on symmetry and hierarchy.
- **Influence of Indo-Islamic Elements:**
  While primarily Rajput, certain features like arched openings, jharokhas (overhanging balconies), and ornamental jaali (lattice) work show the impact of Indo-Islamic styles that evolved through Mughal interactions.
- **Organic & Terraced Planning:**
  The structure was built over a steep hillside in an organic layout, adapting naturally to the contours of the terrain. Multi-leveled terraces and courtyards are a distinctive feature, providing views and climatic advantages(*Exzept*, n.d.)

Key Architectural Features:

- **Sprawling Multi-Level Layout:**
  The fort is built into the hillside, spreading across several acres and rising over 10 levels. This stepped design not only provided defense but also allows for panoramic views of the surrounding plains and Aravalli landscape(*Neemrana Hotels*, n.d.)
- **Seven Palace Wings:**
  Neemrana Fort comprises seven distinct palace wings, each reflecting architectural trends from the 15th to the 19th centuries. These wings are interconnected through labyrinthine corridors, staircases, and terraces, creating a sense of discovery as one moves through the complex (*India Walk*, n.d.)
- **Expansive Courtyards and Terraces:**
  Multiple courtyards serve as focal points for gatherings and events, while terraced gardens cascade down the slopes, offering tranquil green spaces and breathtaking vistas(*Incredible India* , n.d.-a)
- **Ornate Jharokhas :**
  The fort is adorned with intricately carved jharokhas—an iconic feature of Rajasthani

architecture—that provide shade, privacy, and dramatic views. These balconies are supported by decorative brackets and embellished with latticework(*India Walk*, n.d.)

- **Arches and Domes:**
  Mughal-style arches and domes lend a sense of grandeur to the palaces and halls, enhancing both structural integrity and visual appeal(*Rajasthan Tour Planner*, n.d.)
- **Intricate Frescoes and Wall Paintings:**
  Many interiors feature elaborate frescoes depicting mythological stories, royal processions, and floral motifs, showcasing the artistic legacy of the region(*Incredible India* , n.d.-a)
- **Stepwells (Baolis):**
  The fort has three historic stepwells, or baolis, which were essential for water storage in the arid climate. These stepwells are not only functional but also serve as architectural highlights with their geometric patterns and stonework(*Incredible India* , n.d.-a)
- **Hanging Gardens:**
  Lush hanging gardens are integrated into the terraced design, providing cool retreats and enhancing the fort's aesthetic appeal(*Incredible India* , n.d.-a)
- **Grand Entrance and Gateways:**
- The main entrance features massive gates with intricate carvings and motifs, setting the tone for the opulence found within the fort's walls (*Incredible India* , n.d.-a)
- **Vintage Car Museum:**
  A unique addition within the fort is a vintage car museum, reflecting the later history and the royal family's interests (*India Walk*, n.d.)

Fig.5: Restored Hawa Mahal terrace stone stairs railing reopened niches now used for candles and lanterns
Source: https://www.archnet.org/sites/5050

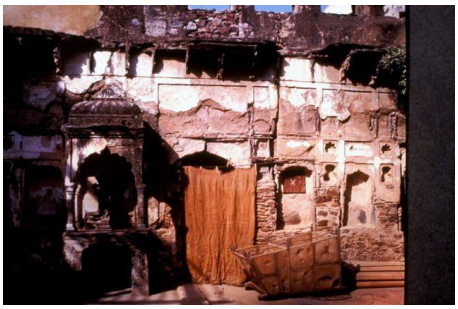


Fig.6: Delhi Sultanate Islamic arches temple with foliated arch before restoration
Source: https://www.archnet.org/sites/5050

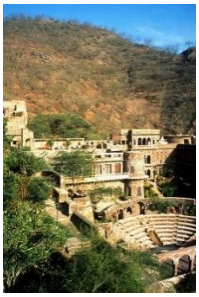


Fig.7 -Southern extension, added during 2002-03as a pool, spa, amphitheatre, hanging gardens, conference rooms

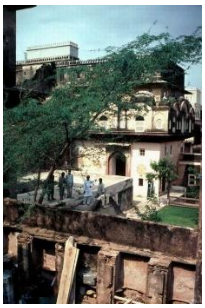


Fig.8 -Wall covering the 18th century ruins of kitchens and toilets before it was knocked out

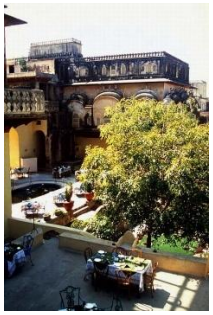


Fig.9-Aranya Mahal terrace replaces the ruins offering splendid views on to Holi Kund and the fields

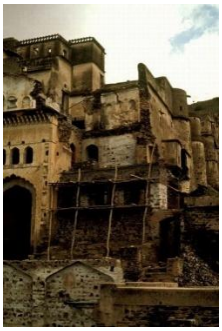


Fig.10 - Western façade,before restoration

Source: Archnet > Site > Neemrana Fort-Palace Revitalisation

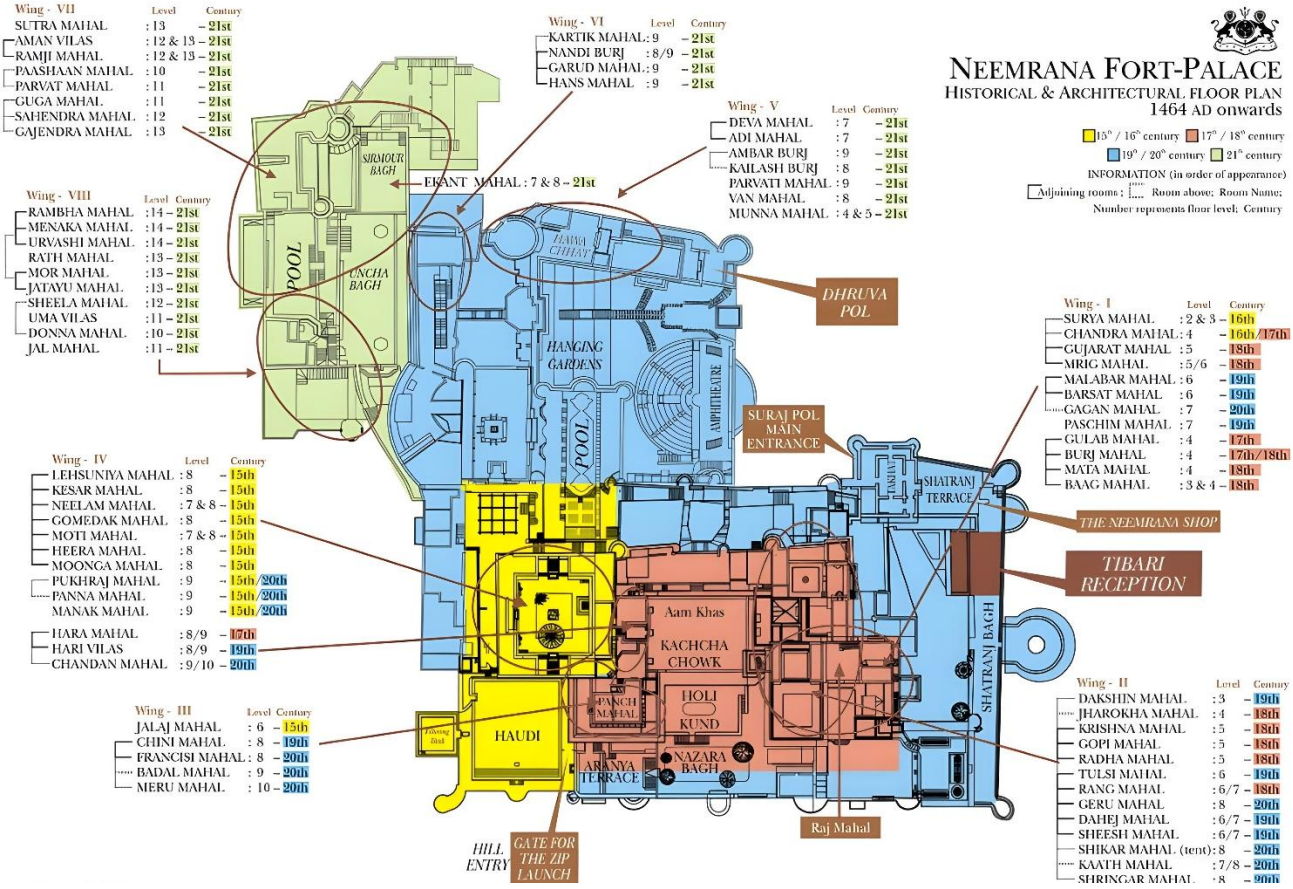


Fig.11- Plan of Neemrana fort

Source- https://www.archnet.org/sites/5050

Key Features of the Restaurant Restoration:

Adaptive Reuse of Historic Spaces:

Original areas such as the Hawa Mahal (formerly a tea terrace and meeting area), Aam Khas (the king's public audience space), and various courtyards were repurposed as open-air restaurants,

bars, and communal dining spaces. This allowed the fort's historic layout and atmosphere to remain central to the dining experience.

Preservation of Original Architecture:

The restoration team maintained the original stone walls, arches, and columns, ensuring that the medieval ambience was preserved. Repairs were made only where necessary, using traditional materials and techniques to retain the fort's patina and character.

Integration of Modern Amenities:

Essential modern comforts such as plumbing and air-conditioning were discreetly integrated, often hidden from view, so as not to detract from the historic interiors. This approach ensured guest comfort without compromising the authenticity of the setting.

Historic Furnishings and Decor:

Restaurant interiors were furnished with antiques and period-appropriate decor, inspired by Indian antiquity and colonial styles. This reinforced the sense of history and avoided the artificiality of modern hotel design.

Atmospheric Dining Experience:

The restaurants, such as Aatamsukh (with a terrace overlooking Neemrana town) and the Hawa Mahal (serving high tea in the oldest part of the fort), offer guests panoramic views and an immersive heritage experience. The ambience is frequently praised for its blend of historic charm and comfort.

Simplicity and Authenticity:

The restoration philosophy favored simplicity over ostentatious luxury, allowing the fort's architecture and history to define the dining atmosphere. This approach creates a unique, non-standardized restaurant experience that feels true to the site's origins. write in small points of all pointers.

Fig.12:Used the vibrant color in restaurant

Fig.13:Interior of Restaurant

Source: https://www.neemranahotels.com/fort-palace-neemrana/gallery.html

3.1.1.NEEMRANA STEPWELL

- **Location**-X9XM+W4J, Road, near Vrindavan International Public School, Neemrana, Naghori, Rajasthan 301705
- **Founder-** Thakur Janak Singh
- **Built in-** 17th century
- **Site area-**Approximately 0.6 acres
- **No. of Floors-**9th Floors

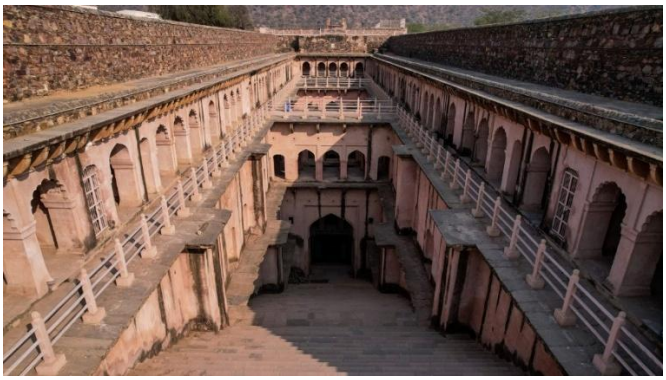


Fig.14 – Neemrana Stepwell

Source- https://www.incredibleindia.gov.in/en/rajasthan/alwar/neemrana-baori

Introduction

Neemrana Baoli, located in the historic town of Neemrana in Rajasthan's Alwar district, stands as one of India's most impressive and monumental stepwells. Known locally as a *baori* or *baoli*, this subterranean water-harvesting structure was ingeniously designed to provide year-round access to water in the region's arid climate. Built likely in the early 18th century by local kings—descendants of Prithviraj Chauhan—the Neemrana Baoli is remarkable for its sheer scale and architectural ambition, featuring approximately 86 colonnaded openings at ground level and a dramatic descent of nearly 200 steps to reach the water table during the driest months.

The stepwell's design not only ensured a reliable water supply but also created a cool, shaded refuge for villagers, travelers, and caravans journeying along the Delhi-Jaipur trade route. With its fortress-like appearance, deep vertical shaft, and multi-level galleries, Neemrana Baoli exemplifies the ingenuity and artistry of traditional Indian water architecture.

Historical Background & Timeline:

Neemrana Baoli is a magnificent stepwell built in the 18th century by Thakur Janak Singh, a local chieftain under the rule of the princely state of Alwar. It served both utilitarian and cultural purposes — providing water, shelter, and a community space for travelers, traders, and villagers.

This stepwell represents the Rajputana style of architecture, with intricate arches, vaulted chambers, and deep vertical spatial organization. The baoli reflects the social, environmental, and spiritual importance of water in pre-modern Indian society.

Neemrana, at that time, was a strategic stopover between Delhi and Rajasthan. The baoli thus became a hub of human interaction—merging architecture, ecology, and community.

Timeline-

Early 1700s-Neemrana becomes a settlement on a key trade route between Delhi and Rajputana regions.

1760 CE- Construction of Neemrana Baoli commissioned by Thakur Janak Singh, known for his civic works and architectural patronage.

Late 1800s-The baoli is actively used for water collection, as a resting place for travelers, and for local religious & cultural gatherings.

1900s (Early Mid)-With the decline of traditional water systems and the rise of modern pipelines, the baoli falls into gradual disuse.

Post-1950s- Urban migration and neglect cause the structure to be abandoned and partially buried.

2000s-Renewed interest in Neemrana Fort tourism revives curiosity about the stepwell. Some cleaning and conservation efforts were initiated by local authorities.

Present day- The baoli remains structurally intact but underutilized, a potential site for heritage tourism, performance, and adaptive reuse. Gaining attention from conservationists, heritage architects, and design students.

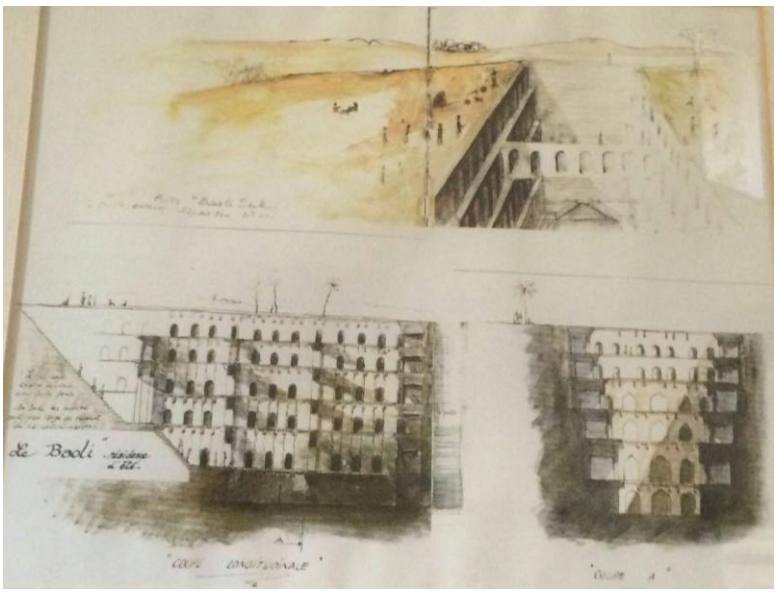


Fig.15 – Plan & Sections of Neemrana Stepwell

Source- https://www.navrangindia.in/2019/01/neemrana-step-well-rajasthan-great.html

Architectural Features of Neemrana Baori

Neemrana Baori, situated in Alwar district of Rajasthan, is an impressive example of traditional Indian stepwell architecture that combines practical water management with striking design elements.

1. Multi-Storeyed Subterranean Structure

- The baoli descends 9 stories underground, making it one of the deepest stepwells in India. Only seven levels are visible today, as the lowest tiers are often submerged or silted up (Jatin Chhabra, n.d.).
- Nearly 200 steep steps lead down to the water table, arranged in a near-vertical descent that emphasizes the dramatic depth and scale of the structure (*Atlas Obscura*, n.d.)

2. Symmetrical and Geometric Design

- The stepwell is carved with symmetrical patterns and a strong geometric logic, typical of Rajasthani stepwell architecture (Incredible India, n.d.-b).
- The plan is rectilinear, with the steps and landings organized in a linear fashion, guiding visitors downwards in a rhythmic sequence(*Incredible India,* n.d.-a)

3. Arched Galleries and Colonnades

- At ground level, the baoli features a series of arched galleries and colonnaded verandas, providing shaded spaces for rest and social interaction.
- These galleries not only add to the visual grandeur but also serve as communal spaces, reinforcing the baoli's role as a gathering point for villagers and travelers (Outlook Traveller, n.d.).

4. Ornate Carvings and Minimal Ornamentation

- While Neemrana Baoli is less ornate than Gujarat's famous stepwells, it still features intricate carvings and stonework along the steps, walls, and arches.
- The ornamentation is more functional and restrained, focusing on structural stability and durability rather than elaborate decoration (Neemrana Baori, n.d.).

5. Water Management and Environmental Adaptation

- The baoli's depth was engineered to ensure access to water even during the driest months, with the water level rising and falling dramatically between seasons(Atlas Obscura, n.d.).
- The subterranean chambers provide a cool, shaded environment, offering respite from Rajasthan's intense heat and creating a tranquil oasis for users(Incredible India, n.d.-a).

6. Scale and Ambience

- The sheer size of the stepwell—a vast, manmade chasm with a near-vertical descent—creates a powerful sense of awe and mystery.
- The ambiance is heightened by the interplay of light and shadow in the deep galleries, the echo of footsteps on stone, and the serene quietude that envelops the structure(Incredible India , n.d.-a).

7. Materials and Construction

- Constructed primarily from local sandstone and lime mortar, the baoli is built for longevity and resilience against the harsh climate(*Jatin Chhabra*, n.d.)
- The robust masonry and interlocking stonework contribute to its structural integrity, allowing it to withstand centuries of use and neglect(Neemrana Baori, n.d.).

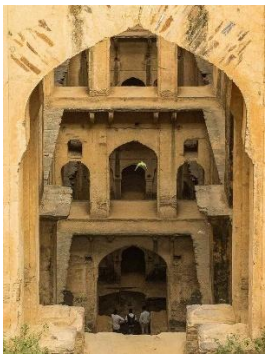


Fig.16 – Pointed arches are used.

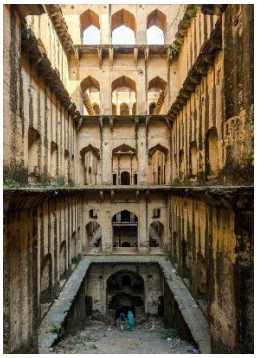


Fig.17- Arches Galleries of Neemrana Stepwell.

Fig.18- Puttio of Neemrana Stepwell.

Source- https://www.atlasobscura.com/places/neemrana-baori
Source- https://www.incredibleindia.gov.in/en/rajasthan/alwar/neemrana-baori

Functional Zones of Neemrana Baori

Neemrana Baori, a historic stepwell in Rajasthan, is organized into distinct functional zones that highlight its dual role as a water source and social hub. Here's a structured breakdown of its key areas and their purposes:

1. Upper Levels: Entry and Social Spaces

- **Colonnaded Galleries**: The ground-level arched verandas and pillared corridors served as shaded resting areas for travelers and locals. These spaces facilitated social interaction and provided respite from the heat. There used to be 86 colonnaded openings from where the visitors have to descend 170 steps to the deepest water source. More than 20 stairs from the eighth floor downwards were in water (*Steeping into History- Neemrana Bawadi*, n.d.).
- **Sarai (Rest House)**: Functioned as a shelter for caravans and pilgrims on the Delhi-Jaipur trade route, emphasizing the baori's role as a community gathering spot(*Jatin Chhabra*, n.d.).

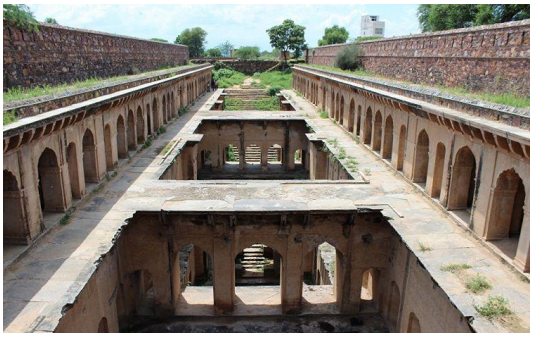


Fig.19-Ground Floor of Neemrana Stepwell

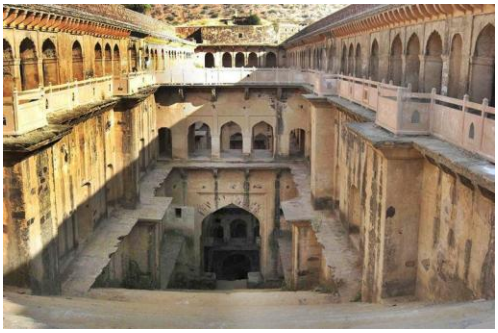


Fig.20-First Floor of Neemrana Stepwell

Source- https://jatinchhabra.com/a-rainy-road-trip-to-see-neemrana-and-narnaul-baolis/

2. Middle Levels: Community and Ritual Areas

- **Alcoves and Niches**: Small recesses along the walls held oil lamps for nighttime use and provided seating for women to socialize or perform rituals while collecting water (Neemrana Ki Baori, n.d.).
- **Multi-Tiered Corridors**: These interconnected passageways allowed villagers to congregate, exchange news, and engage in communal activities, reinforcing the baori's social significance(*Jatin Chhabra*, n.d.).

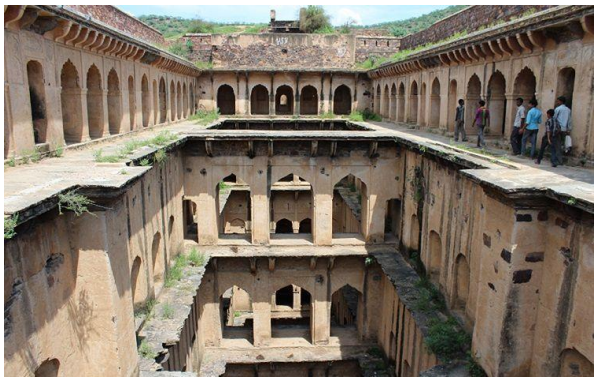


Fig.21- 2nd to 6th Floors of Neemrana Stepwell

Source-https://jatinchhabra.com/a-rainy-road-trip-to-see-neemrana-and-narnaul-baolis/

3. Lower Levels: Water Access and Storage

- **Stepped Descent**: Nearly **200 steep steps** led to the water table, ensuring access during dry seasons. The steps' vertical design accommodated fluctuating water levels, submerging partially during monsoons.
- **Groundwater Harvesting**: Engineered to collect and store rainwater, replenishing local aquifers and providing a year-round water supply(The Mysterious Stepwell of Neemrana, n.d.).

Fig.22 - Last Floor of Neemrana Stepwell

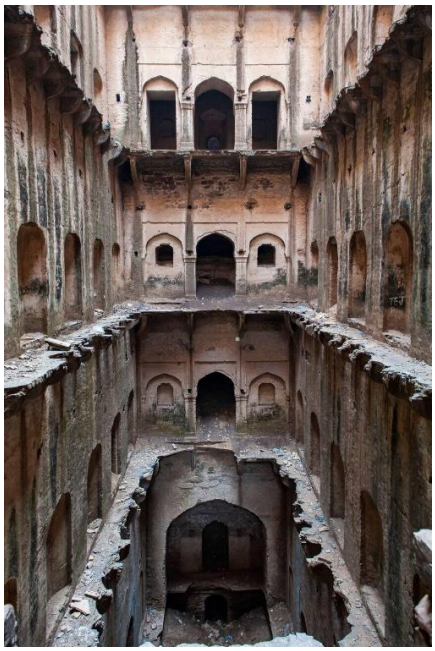


Fig.23- 7th & 8th Floor of Neemrana Stepwell

Source- https://jatinchhabra.com/a-rainy-road-trip-to-see-neemrana-and-narnaul-baolis/

Source- https://tickereatstheworld.com/the-mysterious-stepwell-of-neemrana-a-photo-essay/

Present Condition of Neemrana Baoli:

1. Structural Deterioration

- **Collapsed Ledges and Steps**: The lower tiers of the stepwell suffer from **cracked steps**, broken ledges, and eroded masonry, with some sections partially submerged or silted.
- **Submerged Levels**: Two of its original nine stories remain underwater or buried due to sedimentation and waterlogging(*Atlas Obscura*, n.d.)

2. Environmental and Human Impact

- **Vandalism**: Graffiti covers walls and pillars, while garbage accumulates in the lower chambers, detracting from its historical ambiance.
- **Natural Decay**: Beehives, bats, and vegetation (e.g., algae) occupy niches and corridors, further accelerating erosion.
- **Water Quality**: Stagnant water in lower levels poses health risks and contributes to structural weakening(*The Mysterious Stepwell of Neemrana*, n.d.).

3. Conservation Status

- **Lack of Restoration**: Unlike Neemrana Fort (converted into a heritage hotel), the baori has seen **no major restoration efforts**, despite its proximity to the fort.
- **Documentation Gaps**: Conflicting historical records and the absence of original blueprints complicate preservation plans(*Atlas Obscura*, n.d.).

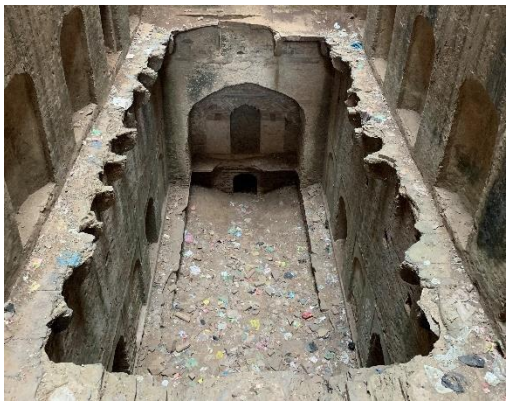


Fig.24- The seven floors (2 more levels lie filled been with mud and are often underwater)

Source- https://tickereatstheworld.com/the-mysterious-stepwell-of-neemrana-a-photo-essay/

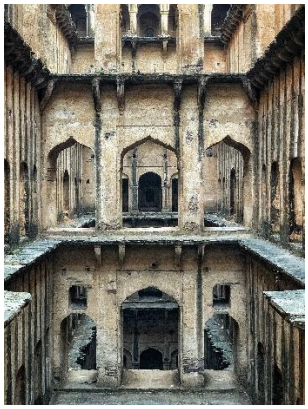


Fig.25- Some of the passageways have sealed, possibly for safety reasons.

Source- https://tickereatstheworld.com/the-mysterious-stepwell-of-neemrana-a-photo-essay/

3.2. INTERNATIONAL CASE STUDY

3.2.1. WESTERGASFABRIEK, AMSTERDAM, NETHERLANDS

Location:Klönneplein 1, 1014 DD Amsterdam, Netherlands
Architects: Gustafson Porter + Bowman
Area: 135000 m²
Year: 2006

Fig.26– Westergasfabrick, Amsterdam
Source- VvE Beurs Amsterdam Westergasfabriek - deurautomaat.info

Introduction

Westergasfabriek is a landmark example of industrial heritage reuse in Amsterdam. Originally built as a coal gasworks in the late 19th century, the site has been transformed into a vibrant cultural and recreational park, blending historic preservation with contemporary urban life(*Fabrique.Lumieries*, n.d.).

Historical Background

The Westergasfabriek was constructed between 1883 and 1885 to supply coal gas for Amsterdam's public lighting and household use. Designed by Dutch architect Isaac Gosschalk, the complex features Neo-Renaissance industrial architecture, with red brick façades and iron structures.

By the 1960s, gas production was phased out due to the introduction of natural gas. The site was abandoned and became environmentally contaminated. In the 1990s, the city of Amsterdam began an urban regeneration program, leading to the site's transformation into a creative, recreational, and cultural district (*Fabrique.Lumieries*, n.d.).

Timeline:

1883 -The Westergasfabriek was built in 1883 by the English Imperial Continental Gas Association, as the largest coal-natural gas conversion plant in Amsterdam(*M For Amsterdam*, n.d.).

1901 -A later expansion kept the design intentions of Gosschalk.

1963 -They started using the od gasholder building as a storage space.

1991 -artists and other groups started to use the site for gatherings and studio space, creating an "underground" second life for the site.

1996 -The new development plan called for restoration of the old buildings. The approach placed Historical value as the primary concern and the approach was conservative.

1998 -It was decided in the late 1990's that the site should be turned into a park with rental event space in some buildings, and offices in other buildings.

2000 -Kathryn Gustofson won a competition to design the site

2005 -The work was completed(Varro et al., n.d.).

Architectural Features of Westergasfabriek, Amsterdam:

Westergasfabriek is a masterclass in adaptive reuse, blending 19th-century industrial heritage with contemporary design. Below is a detailed breakdown of its architectural elements:

1. Dutch Neo-Renaissance Design

- **Architect**: Isaac Goss chalk (1883–1885), with later expansions adhering to his style.
- **Materials**: Red and yellow brick with light stone accents, featuring ornamental eaves, step gables, and symmetrical facades.
- **Structural Elements**:
  - **Gasholders**: Cylindrical structures with iron frames, including the iconic 1902 gasholder (now an event space).
  - **Purifier Building**: Rectangular hall with exposed steel trusses and arched windows, repurposed for events and cafes.
  - **Boiler House**: Distinctive brick chimneys and vaulted ceilings, now housing creative offices(Varro et al., n.d.).

2. Adaptive Reuse of Industrial Structures

- **Gasholder**: Converted into a theater/event space with a 1,500-person capacity, retaining its circular iron skeleton.
- **Transformer Building**: Hosts exhibitions, retaining original brickwork and industrial fixtures[2].
- **Metering Buildings**: Repurposed as public kiosks and studios, preserving arched doorways and stone lintels.
- **Machine Building**: Flexible event space with exposed steel beams and brick walls(Varro et al., n.d.).

3.Landscape Design by Gustafson Porter + Bowman

- **Master Plan**: Divides the park into **four thematic zones**, reflecting humanity's evolving relationship with nature:
  - **East (Formal)**: Geometric lawns and orchards near the Stadsdeelraad (town hall), eferencing 19th-century city parks.
  - **Central (Recreational)**: Open fields for festivals, framed by the **Haarlemmervaart Canal** and Market Square.

- **Northwest (Ecological)**: Native wetlands and meandering paths, emphasizing biodiversity.
- **West (Cultural)**: Cité des Artistes complex with offices and studios in repurposed industrial buildings(Varro et al., n.d.).

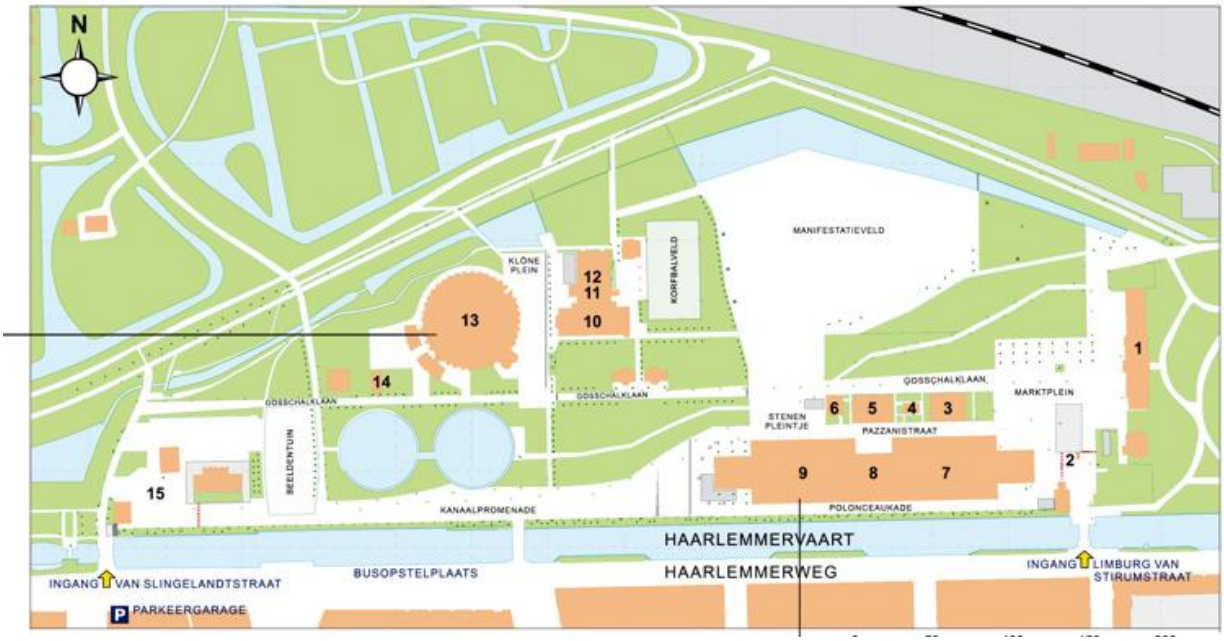


Fig.27 - Master Plan of Westergasfabrick,Amsterdam

1- District office 2- Doorman 3- The Boiler House 4- Eastern Meter House 5- Machine building

6- Western Meter House 7- Purification Hall East 8- Public Lighting 9- Purification Hall West

10-Transformatorhuis 11 Westerunie 12 Western Love 13- Gas holder 14 - Trial 15 City of Arts

Source-(Varro et al., n.d.)

Master Plan of Westergasbrick

1.Gasholder (Gasometer)

- **Original Use (1902):** Stored coal gas in a cylindrical iron-framed structure with a capacity of 100,000 m^3[12].
- **Current Function:** A multi-purpose event space hosting concerts, theater performances, and large-scale events (e.g., Amsterdam Light Festival)[34].
- **Design Features:**

- Retains the original iron skeleton, now enclosed within a modern circular structure with glass and steel elements[31].
- Interior includes a retractable stage and seating for 1,500 guests, blending industrial heritage with contemporary acoustics[32].
- Exterior lighting highlights the historic iron framework at night[1].

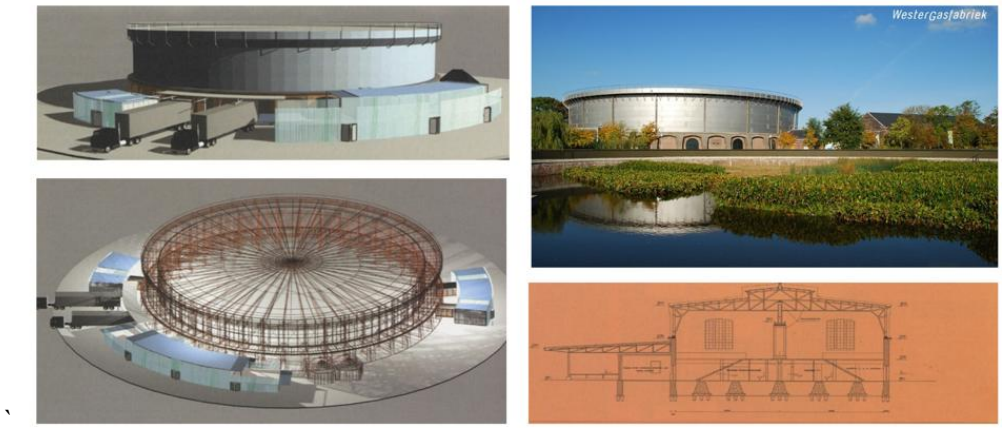


Fig.28: Westerfabrick- Gasholder
Source-(Varro et al., n.d.)

2. Purifier Building

- **Original Use:** Purified coal gas using chemical processes (scrubbing impurities like ammonia and sulfur).
- **Current Function:** Houses cafés, creative studios, and event spaces (e.g., WesterUnie for markets and exhibitions).
- **Design Features:**
    - Arched windows and exposed steel trusses preserved to maintain industrial character.
    - Open-plan interiors adapted for flexible use, including pop-up markets and workshops.

Fig.29: Westerfabrick- Purifier Building present used as Event space
Source-https://cls-led.com/projects/transformatorhuis-westergasfabriek/

3. Boiler House (Ketelhuis)

- **Original Use (1903):** Generated steam for gas production using coal-fired boilers[1].
- **Current Function:** Creative offices for design firms and cultural organizations (e.g., The Think Tank).
- **Design Features:**
    - Brick chimneys and vaulted ceilings retained as focal points[5].

- Modern glass partitions inserted to create office spaces without altering historic fabric[2].

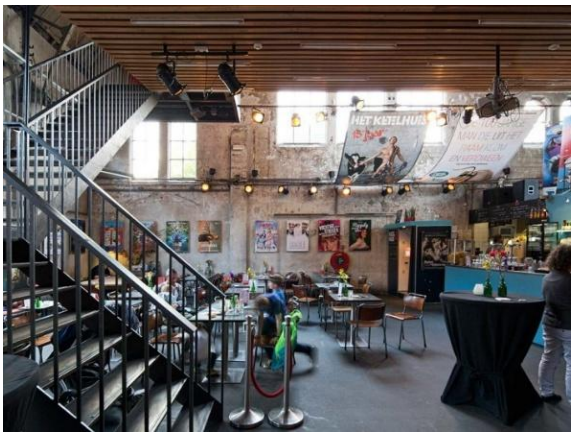


Fig.30: Westerfabrick- Boilher House present used as Office.

Source-https://cls-led.com/projects/transformatorhuis-westergasfabriek/

4. Transformer Building

- **Original Use:** Converted electricity for plant operations.
- **Current Function:** Art galleries (e.g., Kunstmatig) and exhibition spaces.
- **Design Features:**
  - Original brickwork and steel lintels preserved.
  - Industrial fixtures, such as crane tracks, repurposed as decorative elements.

Fig.31: Westerfabrick- Transformer Building present used as a Art Gallery

Source : https://cls-led.com/projects/transformatorhuis-westergasfabriek/

5. Metering Buildings (Meetgebouwen)

- **Original Use:** Measured gas output and quality.
- **Current Function:** Public kiosks (e.g., coffee shops) and small creative studios.
- **Design Features:**

- Arched doorways and stone lintels retained.
- Compact interiors adapted for retail and co-working spaces.

Fig.32: Westerfabrick- Metering Buildings present used as a Public kiosks

Source: https://www.meininger-hotels.com/blog/en/westergasfabriek-amsterdams-cultural-quarter/

6. Machine Building (Machinegebouw)

- **Original Use:** Housed compressors and machinery for gas production.
- **Current Function:** Flexible event space for markets, fairs, and performances (e.g., Rolling Kitchens food festival).
- **Design Features:**
  - Steel beams and brick walls left exposed.
  - Large sliding doors allow seamless indoor-outdoor events.

7. Regulator House (Regulateurhuis)

- **Original Use:** Controlled gas pressure and distribution across the site.
- **Current Function:** Offices for Westergasfabriek's management and event organizers.
- **Design Features:**
  - Brick façade and steel-framed windows preserved.
  - Modern HVAC systems discreetly integrated.

8. Cité des Artistes

- **Original Use:** Workshops and storage.
- **Current Function:** Creative studios and offices for artists, architects, and cultural NGOs.
- **Design Features:**
  - New construction harmonizes with historic architecture using red brick and steel.

- Glass façades maximize natural light for workspaces[4].

9. Conscious Hotel

- **Location:** Former administrative offices.
- **Current Function**: Eco-friendly hotel with 89 rooms, emphasizing sustainability.
- **Design Features:**
  - Solar panels and rainwater harvesting systems.
  - Interiors use recycled materials (e.g., upcycled wood, LED lighting).

Landscape Features of Westergasfabriek Park

Fig.33: Landscape Features

Ecological Remediation and Terrain Design

- The landscape transformation of Westergasfabriek Park was fundamentally shaped by the need to address severe soil contamination inherited from its industrial past. Instead of exporting polluted soil-which would have shifted the problem elsewhere-a cut-and-fill strategy was employed. Clean soil was brought in to cap and displace the contaminated ground, while the original ground levels around historic buildings were retained. This process resulted in a new, undulating terrain that both resolved environmental concerns and introduced dynamic topography to the park(Varro et al., n.d.).

Spatial Structure and Zoning

- The park's layout is organized around a strong central axis, known as "The Axis," which links the town hall with the Cité des Artistes and various other spaces. This axis provides a clear orientation and a sense of order, while the adjacent areas offer a diversity of ambiences and functions(Varro et al., n.d.).
- The design deliberately interweaves civic, social, commercial, cultural, recreational, and ecological zones, making the park a microcosm of the city rather than a traditional, uniform green space.

Planting Strategy and Ecological Gradients

- Planting schemes reflect a gradient from formal to wild as one moves from east to west through the park. The eastern end features more structured, garden-like plantings, while the central area supports sports, leisure, and recreation with open lawns and meadows.

- The northwest corner, adjacent to an active agricultural polder, is dedicated to pure ecology, with native species and an explicitly ecological circulation scheme. This area emphasizes biodiversity and natural processes, integrating water features and native plantings to support local wildlife(Varro et al., n.d.).

Water Features and Hydrology

- Water is a unifying element throughout the park, serving both ecological and aesthetic purposes. Multiple ponds, some framed by historic gas holding structures, display aquatic plants, fish, and reflective surfaces. These water bodies are isolated from the contaminated ground by clay or concrete liners to prevent pollution.
- A closed water circulation system was created, with reservoirs and pumps (such as beneath the korfball field) providing irrigation during droughts. Reed bed ponds act as natural purifiers, further supporting the park's ecological ambitions(Varro et al., n.d.).

Paths, Circulation, and Event Spaces

- The park features a network of straight axes and winding paths, such as the "Path of Dreams," guiding visitors through a sequence of varied landscapes: orchards, meadows, flower fields, forests, event lawns, and wild gardens.
- Open-air event fields, including the island stage area, are integrated into the landscape, providing flexible spaces for concerts, festivals, and community gatherings. Sloped lawns around performance areas offer natural seating and enhance the visitor experience.

Fig.34: Park of Westergasfabreick

Source- https://www.archdaily.com/803228/cultuurpark-westergasfabriek-gustafson-porter-plus-bowman/587556a9e58ecea37600020f-cultuurpark-westergasfabriek-gustafson-porter-plus-bowman-photo?next_project=no

Integration of Industrial Heritage

- The design preserves and highlights the site's industrial legacy. Historic buildings and structures are interwoven with new landscape elements, and materials such as stelcon paving, steel, and concrete reference the site's past.
- Solar panels have been installed on the former steel frames of the gas plant, symbolically replacing gas with solar energy and reinforcing the park's sustainable ethos.

Fig.35- Market of Westergasfabrick

Source-https://www.archdaily.com/803228/cultuurpark-westergasfabriek-gustafson-porter-plus-bowman/587556a9e58ecea37600020f-cultuurpark-westergasfabriek-gustafson-porter-plus-bowman-photo?next_project=no

Lighting and Sensory Experience

- Innovative lighting systems, including photoelectric sensors along main paths and lighting masts on the central axis, enhance safety and atmosphere, responding to pedestrian movement and emphasizing key spatial features.

3.3.LIVE CASE STUDY

3.3.1.RAJON KI BAOLI

Location-Mehrauli Archaeological Park Trail, Mehrauli, New Delhi, Delhi 110030
ASI
Status- Protected
Built in- 1506 AD

Fig.36- Rajon ki Baoli
Source- Author

Introduction

Rajon ki Baoli has stood along a complex stepwell, and a masjid with chattri since 1506. The chattri features a dome that springs from 16-sided drum and was the earliest of 3 structures. An amir of the court of Sikander Lodhi- Daulat Khan, in the year 1516 built the detailed,elaborate and extensive baoli which was Rajaon ki Baoli.The baoli for mason was used by those for their daily chores. The U-shaped baoli with its natural spring as source of water is an Indo-Islamic design. It is located in the Mehrauli Archaeological Park, around 400m south of Adham Khan's Tomb. The stepwell consists of four levels and has arched colonnades on the east and west walls and steps on the southern side which lead to the water.

Historical Background

Rajon ki Baoli, located in Delhi near Connaught Place, is one of the prominent stepwells constructed during the Lodi Dynasty period in India. Stepwells, known locally as *baolis* or *bawdis*, served as vital water harvesting and storage structures in arid and semi-arid regions. They were not only functional infrastructures to secure water supply but also social hubs where people gathered for respite, rituals, and community interaction.(*IJRESM_V2_I10_173*, n.d.)

The name "Rajon ki Baoli" translates to "Stepwell of the People," reflecting its public nature, in contrast to royal or private wells reserved for elite use. This stepwell was commissioned during the early 16th century under Sultan Sikandar Lodi, who ruled Delhi from 1489 to 1517 AD. Unlike the more ornate Mughal-era stepwells, Rajon ki Baoli exemplifies the Lodi architectural style characterized by simplicity, sturdy construction, and a strong focus on utilitarian function.(*Islamic Heritage India*, n.d.)

Timeline:

- **1506 CE:**
  Rajon Ki Baoli is commissioned and constructed by Daulat Khan Lodi during the reign of Sikandar Lodi (Lodi dynasty, Delhi Sultanate).
- **16th–19th Century:**
  The baoli functions as a water source and social retreat for the local community. Over

time, the name "Rajon Ki Baoli" becomes associated with the masons who inhabited the area1.

- **Early 20th Century:**
  The stepwell becomes known as "Rajon Ki Baoli" due to the permanent settlement of masons in the vicinity.
- **Late 20th Century:**
  The baoli, along with other historical structures in Mehrauli, comes under the protection of the Archaeological Survey of India.
- **2004–2005:**
  The ASI undertakes desilting operations, removing 20 feet (6.1 meters) of silt and restoring the water level in the well. Sixty steps leading to the water surface are made accessible again.
- **Present Day:**
  Rajon Ki Baoli stands as a well-preserved example of Lodi-era stepwell architecture and is open to the public as part of the Mehrauli Archaeological Park.

Architectural Features:

A. Stepwell Structure

Plan and Layout

Rajon ki Baoli follows a **rectangular plan** typical of Lodi-era stepwells, with its main axis running north to south. The entrance is located at the **northern end**, and the primary water reservoir lies at the **southernmost point**, aligning with the natural slope for effective drainage and water collection. The plan is centered around a rectangular tank measuring **23 x 10 meters**, with descending steps on three sides and a closed southern wall at the well end(ASI, 2015, n.d.).

The layout incorporates a **progressive narrowing of platforms** as one descends. This technique not only optimizes structural stability but also adds a dramatic visual depth to the interior, reinforcing the symbolism of descending into the earth for water—a sacred act in Indian cosmology (Guha-Thakurta, n.d.).

Dimensions

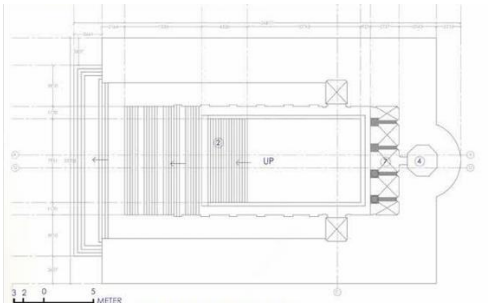
- **Total area**: approximately 1,610 square meters.
- **Maximum depth**: 13.4 meters from surface level to the bottom of the tank (*ASI, 2015*, n.d.)
- **Original number of steps**: 66, although only 41 are visible today due to silting (Guha-Thakurta, n.d.)

Sections and Levels:

Rajon ki Baoli is organized across **four architectural levels**, each serving both **functional and climatic purposes**.

1st Level: Entry Point:

The first level introduces visitors to the stepwell with **wide, open sandstone stairs** flanked by masonry ledges. The openness of this level facilitates orientation, ventilation, and panoramic views of the lower structure.



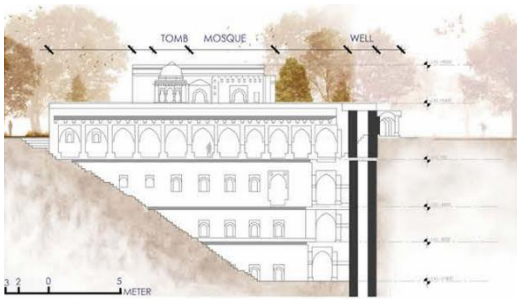
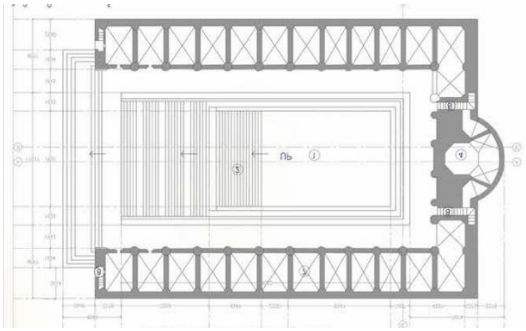


Fig.37 – Ground Floor Plan Fig.38 – Section-AA'

Source- https://www.jmi.ac.in/upload/menuupload/fae_RajaonKiBaoli_2022august18.pdf

2nd and 3rd Levels: Intermediate Arched Passageways:

These mid-levels contain **pointed arches resting on octagonal stone pillars**, forming **shaded arcaded galleries**. These arched corridors offered **cooling rest stops**, social interaction spaces, and protection from direct sunlight. Their **ogival arches**, a hallmark of Lodi architecture, reveal a minimalist yet enduring aesthetic.



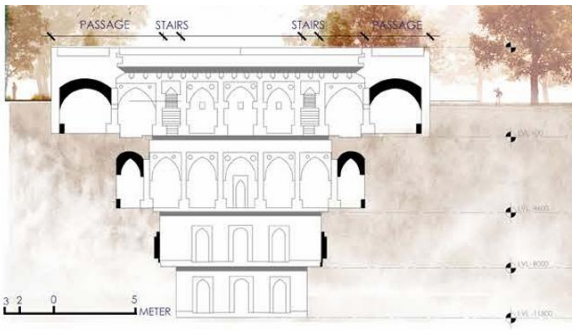


Fig.39 – 2nd Floor Plan Fig.40 – Section- BB'

Source- https://www.jmi.ac.in/upload/menuupload/fae_RajaonKiBaoli_2022august18.pdf

4th Level: Reservoir Chamber

The final level houses the water tank, enclosed within massive stone walls. It remains cool and dark, protected from evaporation and debris. The **subterranean architecture** ensures water retention even during dry months (Asher, 1992).

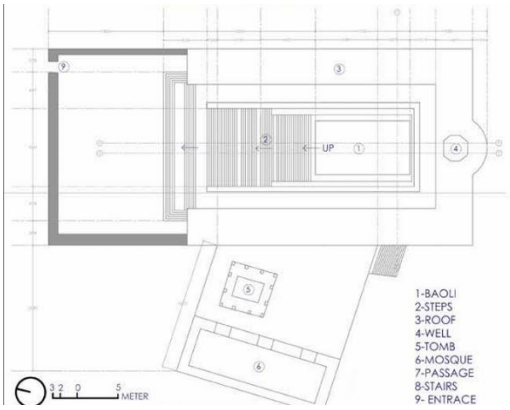


Fig.41- Roof Plan

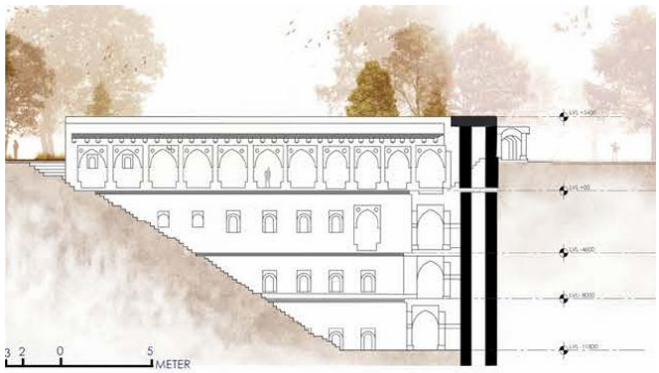


Fig.42- Section- DD'

Source- https://www.jmi.ac.in/upload/menuupload/fae_RajaonKiBaoli_2022august18.pdf

Cooling Effect and Environmental Strategy

The baoli's form is a **natural climate moderator**, leveraging **passive cooling principles**. As users descend, the **ambient temperature drops** by several degrees due to earth insulation and evaporative cooling from the water body (Chattopadhyay, 2017). The **porosity of stone**, combined with limited sunlight penetration and architectural massing, creates a comfortable microclimate even in Delhi's scorching summer months.

Such traditional stepwell structures demonstrate remarkable **sustainability and resilience** by reducing dependence on external water sources and air-conditioning—an ecological design principle increasingly relevant in contemporary architecture.

Architectural Elements of Rajon ki Baoli

Rajon ki Baoli, constructed during the reign of Sikandar Lodi in the early 16th century (circa 1516 CE), is a seminal example of late medieval Indo-Islamic stepwell architecture in northern India. The baoli is remarkable not only for its functional role as a water-harvesting structure but also for the finesse of its **masonry, ornamentation, and spatial composition**. The following architectural elements characterize their unique identity:

1. Arches (Ogival/Pointed Arches)

The predominant structural feature in Rajon ki Baoli is the **pointed or ogival arch**, used throughout the second and third levels. These arches are key to **load transfer**, allowing for wide spans while minimizing material usage. They are formed using dressed sandstone voussoirs and exhibit the Lodi dynasty's affinity for simple but structurally expressive Islamic motifs (Asher, n.d.)

- **From and Function**: The arches are not merely decorative; they facilitate the creation of recessed resting spaces and passageways that provide shaded zones across levels.
- **Stylistic Identity**: The pointed arch reflects the broader Indo-Islamic aesthetic that emphasizes verticality and modular geometry (Nath, n.d.)

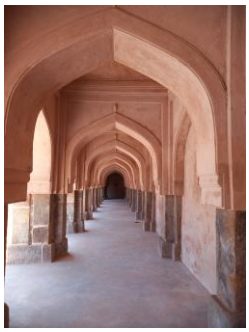


Fig.43 – Pointed arch
Source- Author

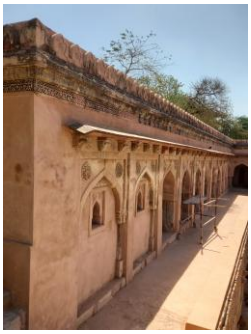


Fig.44 – Indo-Islamic Architecture
Source- Author

2.Pillars and Columns:

The arches are supported by **octagonal and square stone pillars**, carved from locally available quartzite. These columns are unornamented but proportionally elegant, reinforcing the structural grid and adding rhythm to the interior elevation.

- **Material**: Rough-dressed or ashlar stone, mortared with lime plaster.
- **Detailing**: The capitals are understated; their design highlights the utilitarian nature of the baoli, avoiding excessive embellishment typical in post-Mughal works (ASI, 2015, n.d.).

Fig.45 – Octagonal Stone Pillars are used.
Source-Author

3.Stepwell Shaft and Tank

At the southern end lies the **main water reservoir**, encased in high load-bearing stone walls. The tank, approximately 23 x 10 meters in size, is built using tightly fitted stone blocks with minimal mortar to reduce permeability.

- **Engineering Detail**: The step access ensures water can be reached at all seasonal levels, and the tank's depth of over 13 meters reflects a keen understanding of water table dynamics.
- **Substructure**: A deep shaft lies beneath the base, allowing water percolation and replenishment(*ASI, 2015*, n.d.).

Fig.46- Stepwell
Source- Author

4.Staircases:

The baoli's primary descent is marked by **broad staircases** extending from the north to the south, aligned along the longitudinal axis. The stairs are slightly inclined and interspersed with landings at each level, providing physical and visual relief.

- **Design Logic**: Each stair landing corresponds to a platform on the adjacent side walls, integrating circulation with spatial zones for rest or ritual(*ASI, 2015*, n.d.) .

Fig.47 – Steps of Baoli
Source- Author

5.Parapets and Balustrades

The upper level of the baoli features **low masonry parapets**, which enclose the terrace and provide safety without obstructing views into the stepped structure.

- **Design Language**: The parapets are modest in height and devoid of ornate jali work, suggesting utilitarian intent rather than ornamental focus.

6. Plinth and Foundation

Rajon ki Baoli rests on a **stepped stone plinth**, which stabilizes the structure against soil erosion and hydrostatic pressure.

- **Plinth Architecture**: The plinth incorporates horizontal layers of dressed stone masonry, which absorbs and distribute vertical and lateral loads.

7. Roof Structures and Pavilion Elements
Although primarily a subterranean structure, the upper levels incorporate small, roofed **pavilions** and **flat roofs** with slab-stone construction.

- These elements once sheltered key functions, including **resting areas** and **storage rooms**, now largely lost due to structural erosion.
- The flat roofs would have originally supported tiled or thatch coverings to reduce heat gain (*Restoration of Rajon Ki Baoli*, n.d.)

8. Material Palette
The entire structure is constructed using **Delhi quartzite (locally sourced)** and **lime mortar**, materials chosen for their durability, water resistance, and thermal mass.

- **Stone Blocks**: Rough-dressed and laid in irregular courses with interstitial mortar filling.
- **Mortar Composition**: A mixture of lime, surkhi (brick dust), and organic additives, which enhanced its waterproofing capabilities(*ASI, 2015*, n.d.)

9. Ornamentation and Inscriptional Panels
Unlike many later Mughal-era stepwells, Rajon ki Baoli exhibits **minimal ornamentation**, aligning with the Lodi tradition's functional aesthetic. However, traces of **calligraphic inscriptions** and **stone-carved floral motifs** are present near the entry and along pillar bases.

- These elements are symbolic rather than decorative, often invoking religious or poetic phrases tied to water as life-giver(Islamic Heritage India, n.d.).

Mosque:

Location and Orientation
The mosque is situated immediately **north-east of the baoli's entrance** and is oriented towards the west, following the qibla direction, aligning worshippers towards Mecca.

Architectural Composition

- **Plan**: A small, single-bay prayer hall rectangular in layout.
- **Mihrabs**: Three recessed mihrabs in the western wall, with the central one being slightly larger, all in the **pointed arch** style common during the Lodi dynasty.
- **Roofing**: The flat roof is supported by **stone columns**, with brackets and minimal corbelling.
- **Openings**: Arched entrances on the northern and eastern façades promote cross-ventilation and visual access (Nath, n.d.)

Materiality and Style

- Built using **Delhi quartzite rubble masonry**, joined with **lime mortar**, typical of 16th-century Lodi architecture.
- The walls are unplastered, exhibiting a **raw, austere aesthetic**.
- Features minimal ornamentation, emphasizing **structural clarity over decoration**, as per Lodi sensibilities (*ASI, 2015*, n.d.)

Fig.48- Mosque of Rajon ki Baoli
Source-Author

Tomb:

Location and Typology:

The tomb is located slightly northeast of the baoli. It is a **square domed tomb**, likely constructed for a noble or religious figure closely associated with the site, possibly the baoli's patron or caretaker.

Architectural Features:

- **Plan and Form**: A square plan tomb raised on a plinth. The dome sits atop an **octagonal drum**, facilitating the transition from square base to circular dome — a classic Lodi-era design.
- **Entrances**: Recessed arched entrances on at least three sides; central chamber likely housed a **cenotaph**.
- **Interior**: Sparse remains of decorative plaster and incised stonework.

Material and Craftsmanship

- Constructed using the same **quartzite stone and lime mortar** as the baoli and mosque, suggesting simultaneous construction or a single patronage cycle.
- Minimal decoration, with occasional plaster fragments, reinforcing the Lodi dynasty's preference for **restraint and proportion**.

Symbolism

- The tomb completes the spiritual triad (life through water, prayer through mosque, and death through tomb), reflecting the **Indo-Islamic cosmology of life cycles**.

- Placement near water and a mosque aligns with the Islamic belief in barakah (blessing), signifying a **spiritually potent resting place**.

Fig.49- Tomb- Rajon ki Baoli
Source- Author

3.3.2.SWAMINARAYAN AKSHARDHAM

Location :NH 24, Pramukh Swami Maharaj Marg, Pandav Nagar, New Delhi, Delhi, 110092
Site area : 40 heacters
Built up area : 32,300 sq.m.
Architectural Style: Hindu temple architecture (Nagar style)
Designed By: BAPS Swaminarayan Sanstha
Inauguration: 6 November 2005
Built By: Over 8,000 volunteers and artisans
Inspired by HH Yogiji Maharaj (1892-1971 CE)

Fig.50 – Swaminarayan Akshardham
Source- https://akshardham.com/

Introduction

Swaminarayan Akshardham, located in East Delhi on the banks of the Yamuna River, is a monumental Hindu temple complex and cultural campus. Inaugurated on 6 November 2005, it is dedicated to Bhagwan Swaminarayan and showcases India's ancient art, architecture, and spiritual heritage. The complex is managed by the Bochasanwasi Akshar Purushottam Swaminarayan Sanstha (BAPS) and is recognized by the Guinness World Records as the world's largest comprehensive Hindu temple(*Swaminaryan Akshardham*, n.d.)

Design Philosophy and Planning

Architectural Style: Nagara Tradition

The temple is designed in the **Nagara style** of Hindu temple architecture, which is one of the three principal styles defined by ancient Indian architecture. Originating in northern India, the Nagara style is renowned for its **distinct beehive-shaped towers (shikharas)** that rise vertically above the sanctum sanctorum (garbhagriha). These shikharas represent Mount Meru — the sacred mountain in Hindu cosmology — symbolizing a spiritual axis that connects the earthly realm with the divine (Old Quarter Heritage Nexus, n.d.).The temple's vertical emphasis, symmetrical layout, and intricately carved surfaces showcase the grandeur and sanctity typical of this architectural tradition. Every element, from the base platform (jagati) to the topmost finial (kalasha), is thoughtfully planned to guide the devotee's spiritual journey from the physical to the metaphysical(Swaminarayan Akshardham (Delhi), n.d.).

Shilpa Shastras Compliance: Ancient Principles in Modern Construction:

The entire temple complex was constructed in strict accordance with the *Shilpa Shastras*, the ancient Indian architectural treatises that prescribe guidelines for sacred structures. In keeping with these texts, the Akshardham Mandir was built **without the use of any steel or concrete**-a rarity in

contemporary architecture. Instead, the structure relies on traditional stone masonry, with interlocking blocks and gravity-based stacking, ensuring both longevity and spiritual authenticity. This approach not only aligns with the ancient scriptures but also maximizes the temple's lifespan, as the Shilpa Shastras emphasize durability and harmony with nature(*Swaminaryan Akshardham*, n.d.)

Spatial Organisation
1 - Parking for cars and buses
2- Cloak Room and Queue area
3 Security check
4- Complex entry
5- Ten Gates
6- Visitor Centre
7 Bharat Upvan
8- Mandir
9-Ticketing area
10-Office/Conference Hall
11-Queues
12 Sahajanand Darshanı
13-Neelkanth Yatra
14- Sanskruti Darshan
15-Yagnapurush Kund
16-Abhishek Mandap
17- Premvati Food Court
18 Akshardham Books and gift shop
19- Exit

Fig.51 - Plan of Swaminarayan Akshardham
Source-https://akshardham.com/

Materials Used:

Rajasthani Pink Sandstone and Italian Carrara Marble

The selection of building materials for Akshardham was both symbolic and practical:

- **Rajasthani Pink Sandstone:**
  Used for the exterior, this stone was chosen for its strength, weather resistance, and traditional association with sacred architecture in North India. The pink hue adds warmth and grandeur, while its durability ensures the temple's preservation for centuries(*Akshardham Temple- Architectural Wonders Explained*, n.d.)

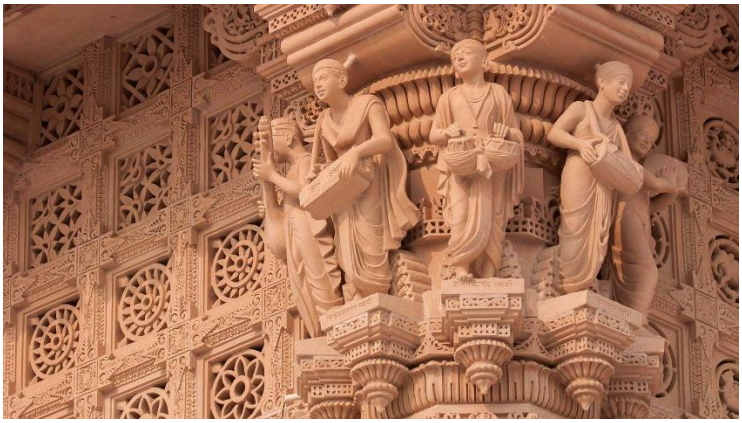


Fig.52 - Rajasthani Pink Sandstone
Source- https://akshardham.com/

- **Italian Carrara Marble:**
  The interior is lined with pristine white Carrara marble, symbolizing purity and peace. This marble is renowned for its fine grain and luminous quality, enhancing the spiritual ambiance inside the temple(*Akshardham Temple- Architectural Wonders Explained*, n.d.). Both materials were meticulously hand-carved by thousands of artisans, resulting in over 20,000 statues and countless decorative motifs that adorn the temple's pillars, domes, and walls(Swaminarayan Akshardham (Delhi), n.d.).

Fig.53 - Italian Carrara Marble

Source- https://www.indianeagle.com/travelbeats/baps-swaminarayan-akshardham-temple-in-new-jersey-robbinsville/

Main Temple (Akshardham Mandir) – Architectural Features (Detailed)

Dimensions and Scale:

- **Height:** 43 meters (141 feet)
- **Width:** 96 meters (316 feet)
- **Length:** 109 meters (356 feet)

- **Site Area:** 8,021.4 sq. meters (86,342 sq. ft)
- The temple rises prominently along the banks of the Yamuna River, forming the heart of the Akshardham complex(*Wander in India: Swaminarayan Akshardham*, n.d.)

Fig.54 – Akshardham Mandir
Source- https://akshardham.com/

Materials and Construction:

- **Exterior:** Constructed from Rajasthani pink sandstone, chosen for its durability and traditional significance in North Indian temple architecture(*Swaminarayan Akshardham (Delhi)*, n.d.)
- **Interior:** Clad in Italian Carrara marble, symbolizing purity and peace(*Swaminaryan Akshardham*, n.d.)
- **No Steel or Concrete:** The main structure is built entirely without steel or concrete, following the Shilpa Shastras (ancient Indian architectural treatises) to ensure longevity and spiritual purity. Stones are interlocked and stacked using traditional dry masonry techniques(*Swaminaryan Akshardham*, n.d.)

Fig.55 – Gajendra Pith
Source-https://akshardham.com/

Thematic Gardens and Cultural Features at Swaminarayan Akshardham, Delhi:

1. Yagnapurush Kund

- **Description:**
  Yagnapurush Kund is India's largest stepwell and serves as the setting for the spectacular Sahaj Anand Water Show. The kund is designed in a geometric pattern and features a grand yagna kund (sacrificial fire pit) at its center.

Fig.56- Yagnapurush Kund
Source- https://akshardham.com/

- **Musical Fountain (Sahaj Anand Water Show):**
  This multimedia show is inspired by the Upanishads and combines water, fire, lasers, projections, and music to narrate spiritual stories. The amphitheater can seat thousands, and the show is a major attraction, especially in the evenings(Swaminaryan Akshardham, n.d.).

Fig.57– Musical Fountain
Source- https://akshardham.com/

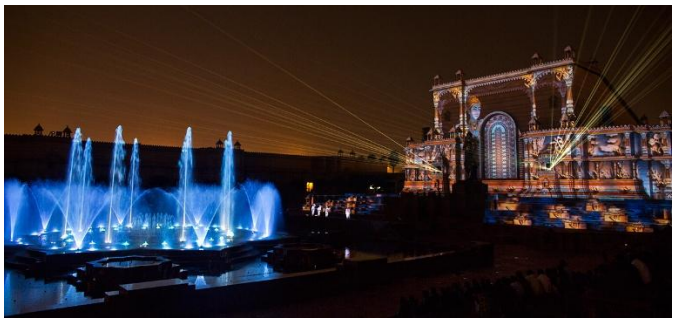


Fig.58- Musical Fountain (At night show)
Source- https://akshardham.com/

2. Bharat Upavan

- **Description:**
  Also known as the Garden of India, Bharat Upavan is a sprawling, manicured garden lined with bronze statues of Indian heroes, freedom fighters, cultural icons, and great women. The garden's design and statuary inspire values and national pride, reflecting India's spiritual and cultural heritage(*Swaminarayan Akshardham (Delhi)*, n.d.)

Features:
Statues include figures like Mahatma Gandhi, valorous warriors, and child prodigies, all set amid lush greenery and floral displays(*Swaminaryan Akshardham*, n.d.)

Fig.59- Bharat Upavan
Source- https://akshardham.com/

3.Yogi Hriday Kamal

- **Description:**
  This is a lotus-shaped sunken garden, named in honor of Yogiji Maharaj, whose vision inspired Akshardham. Each petal is engraved with inspiring quotes from world leaders, saints, philosophers, and visionaries, including Swami Vivekananda and Martin Luther King Jr (*Swaminarayan Akshardham (Delhi)*, n.d.)

- **Significance:**
  The garden symbolizes wisdom and the universality of good thoughts, encouraging visitors to reflect and find inspiration in the words of great personalities.(*Fae_RajaonKiBaoli_2022august18*, n.d.)

Fig.60– Yogi Hriday Kamal
Source- https://akshardham.com/

4.Exhibition Halls

- **Sahajanand Darshan (Hall of Values):**
  Features animatronic displays, dioramas, and multimedia presentations illustrating the

teachings and life of Swaminarayan. It emphasizes universal values such as non-violence, honesty, and harmony (Swaminaryan Akshardham, n.d.).

Fig.61 - Sahajanand Darshan
Source- https://akshardham.com/

- **Neelkanth Darshan:**
  An IMAX theater screening a film on the early life and spiritual journey of Swaminarayan as the teenage yogi, Neelkanth Varni. The film is immersive and educational, providing insight into India's spiritual traditions.

Fig.62 – Neelkanth Darshan
Source- https://akshardham.com/

- **Sanskruti Vihar:**
  A 12-minute cultural boat ride that takes visitors through 10,000 years of Indian history, showcasing ancient universities, scientific discoveries, and the country's rich heritage with life-sized dioramas and animatronics (Swaminaryan Akshardham, n.d.).

Fig.63 – Sanskruti Vihar
Source- https://akshardham.com/

➢ **Premvati Food Court**

- **Description:**
  Themed after the Ajanta and Ellora caves, this vegetarian food court offers a wide variety of traditional Indian dishes in a clean, comfortable setting. It is designed to accommodate large numbers of visitors and maintain a spiritual ambiance.

Fig.64- Premvati Food Court
Source- https://akshardham.com/

➢ **Book & Gift Shops**

- **Description:**
  The Akshardham Books and Gifts Center provides spiritual literature, souvenirs, mementos, and gift items, allowing visitors to take home a piece of their experience (Sri Sai Kripa Offset, n.d.)

Fig.65- Book & Gift Shops
Source- https://akshardham.com/

3.4.Compartive Analysis of Case Studies

Table of Compartive analysis

Parameter	Case Study 1: Neemrana Fort Palace	Case Study 2: Neemrana Stepwell	Case Study 3: Westergasfabriek, Amsterdam	Case Study 4: Rajon ki Baoli, Delhi	Case Study 5: Swaminarayan Akshardham Temple, Delhi
Location	Alwar, Rajasthan	Neemrana, Rajasthan	Amsterdam, Netherlands	Mehrauli, Delhi	Delhi, India
Year of Construction	1464 AD	1760 AD	1885 AD (converted post-1990s)	1506 AD	2005 (completed)
Architectural Style	Rajputana style	Rajputana stepwell	Industrial heritage + modern reuse	Indo-Islamic architecture	Traditional Hindu temple architecture (Nagara style)
Original Function	Fort + residence	Stepwell for water harvesting	Gasworks industrial complex	Stepwell + resthouse for travelers	Religious temple complex

Adaptive Reuse Function	Heritage hotel (Neemrana Group)	Tourism + heritage exploration	Cultural complex + performance space	Cultural heritage site	Spiritual, cultural, and educational center
Materials Used	Stone masonry, lime plaster	Sandstone	Brick, steel, glass	Stone (ashlar masonry)	Rajasthani pink sandstone + Italian marble
Design Features	Terraces, multi-level courtyards	Arched colonnades, deep steps	Brick vaults, steel trusses, open halls	Multi-level arched corridors	Domes, shikhars, carvings, exhibition halls
Spatial Configuration	Stepped profile along hill	Vertical shaft + horizontal entry	Modular halls, open-air zones, green parks	Symmetrical descending steps	Vast axial layout with water body, mandirs, exhibitions
Lighting & Ventilation	Natural ventilation & open terraces	Open-top, natural lighting	Skylights, reused industrial windows	Sunlight from above, airy	Natural light + artificial lighting in exhibition spaces
Cultural Significance	Historical monument & tourism hub	Water heritage + local history	Reviving industrial heritage with new use	Ancient water system + Indo-Islamic art	Reflection of Indian culture, spirituality, and art
Public Interaction	Boutique stay with cultural events	Tourism and local engagement	Concerts, exhibitions, outdoor events	Visitors, tourists, heritage walks	Devotees, tourists, cultural learners
Relevance to Thesis	Adaptive reuse into cultural space	Stepwell reuse and integration	Performance + cultural reuse model	Stepwell scale and space inspiration	Integrating tradition, water, and cultural storytelling

Source- Author

CHAPTER- 4

SITE ANALYSIS

Seth Chuhimal Ki Chhatri and Talab

Location-Old Nallah Road, Hamid Colony, Nuh, Haryana – 122107, India

Historical Period-Late 18th to 19th Century

Ownership and Jurisdiction-Owned and maintained by the Department of Archaeology and Museum, Government of Haryana

Site Category-Heritage Monument (Water Architecture and Residential Complex)

Total Site Area-Approximately 10 Acres

Fig.66- Seth Chuhimal ka Talab
Source- Author

Fig.67- Location of the site
Source- Author

Fig.68- Site Area
Source-Author

Accessibility

Bus Station- Nuh Bus Station (2.4 km) – Direct access to Sohna, Palwal, and Gurgaon

RailwayStation- Palwal Railway Station (36.3 km) – Nearest mainline connectivity

Metro Station- Millennium City Centre, Gurgaon (49.6 km) – Via SH-13A

Airport- Indira Gandhi International Airport, Delhi (61.7 km) – 2-hour drive

Fig.69- Accessibility of Site
Source- Google map

Nearby Landmarks and Institutions:

- Modern Mothers Pride School – 350 meters
- Pandurang Dham Temple – 400 meters
- Government Senior Secondary Girls School – 420 meters
- Yasin Meo Degree College – 700 meters

Historical and Cultural Background

The Seth Chuhimal ki Chattri & Talab was commissioned in the late 18th century by Seth Chuhimal, a wealthy trader and philanthropist from the region. The design reflects a refined understanding of Rajputana and Mughal architectural traditions, integrating aesthetic elegance with functional ingenuity. The complex includes:

- A stepwell-inspired talab (pond), acting as a rainwater harvesting system.
- Eight symmetrical chhatris surrounding the talab for rest, prayer, and gatherings.
- A grand two-storied haveli, signifying wealth and stature.

The chhatris are strategically aligned, potentially in accordance with Vastu principles, ensuring harmony with cardinal directions. The waterbody acted as both a functional water storage tank and a visual anchor, providing scenic beauty and climatic comfort.

The site was not only a residence but also a social and cultural hub for hosting:

- Religious rituals and spiritual gatherings
- Musical performances and poetry recitals
- Seasonal fairs, including Holi, Basant Panchami, and other local festivities

The water-centric design symbolizes purity, regeneration, and the deep connection between nature and built form in Indian heritage.

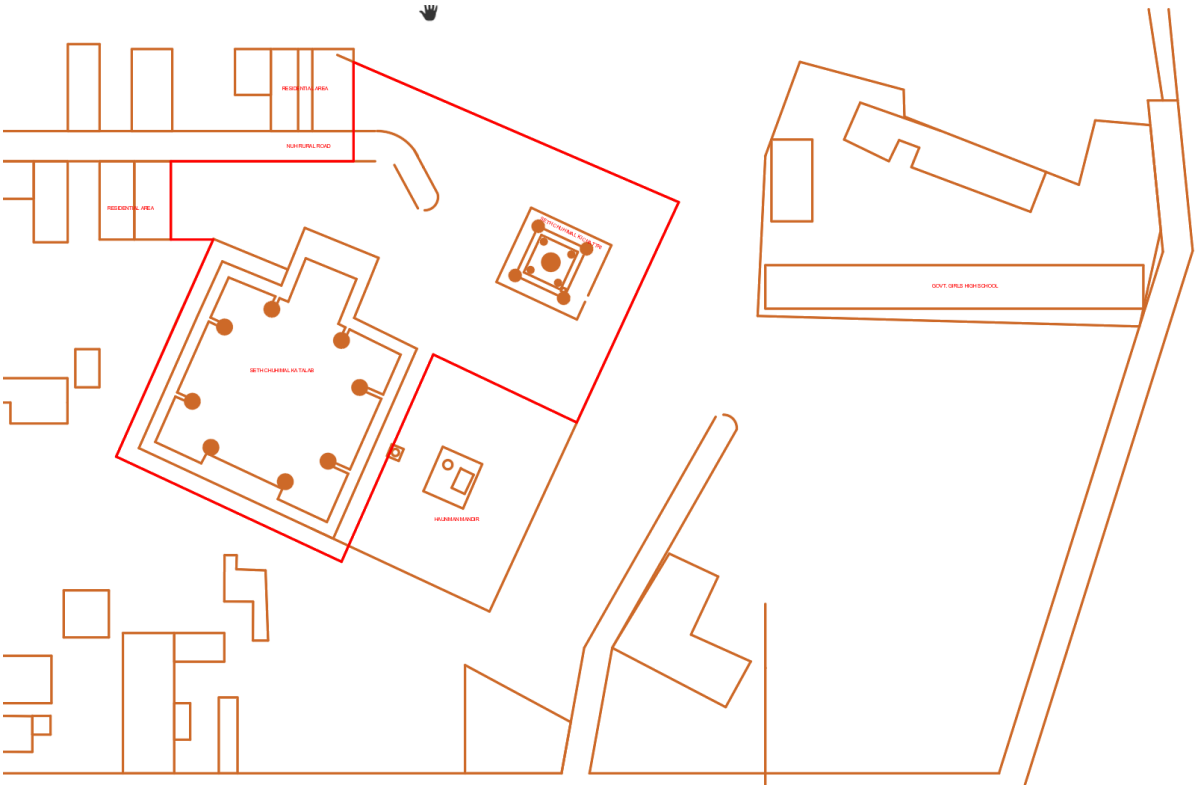


Fig.70- Site of Seth Chuhimal ki Chattri

Total Site Area: 12,421.79 m² (or approximately 1.24 hectares)

Source- Author

Timeline-

Late 18th & 19th Century- Seth Chuhimal built a private complex in Nuh, featuring a stepped water tank, eight octagonal chhatris, a grand two-storied red sandstone chhatri with floral designs, and two historic temples.

20th Century- The complex remained under the care of Seth Chuhimal's descendants, who maintained its structures and surroundings.
The talaab was kept clean and was fed by a perennial canal,preserving its historical water management system.

21st Century- The talab is surrounded by dense vegetation, while the chhatri is locked to prevent misuse. Some repairs have been made, preserving the Chuhimal Talab and Chhatri Complex as a testament to Nuh's historical and architectural legacy.

Climatic and Environmental Context:

- **Climate Zone**: Composite (extreme summers, moderate monsoon, cold winters)
- **Average Summer Temperature**: 40–45°C
- **Average Winter Temperature**: 6–15°C
- **Rainfall**: ~450 mm annually (mostly July–September)

Fig.71- Climatic Zone of Seth Chuhimal ka Talab & Chattri

Source-Author

Architectural Elements:

A. Seth Chuhimal ki Chhatris

- **Architectural Style**: Indo-Islamic (Rajput-Mughal synthesis)
- **Material**: Red and buff sandstone, with intricate floral carvings

Fig.72- Seth ChuhiMal ki Chattri
Source-Author

- **Features**:
    - Carved brackets and overhanging eaves (chhajjas)

- Cusped arches and stone latticework (jali)
- Elevated plinths to withstand monsoon water

➢ **Function**:

- Acted as shaded resting places for travelers
- Hosted ceremonial and contemplative activities
- Aesthetic elements adding verticality and rhythm to the landscape

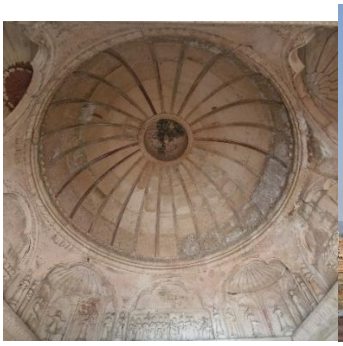


Fig.73-Domes supported by finely carved stone columns
Source- Author

Fig.74- Cusped arches and intricate basket
Source- Author

Fig.75- Perforated jali screens screens enabling cross-ventilation
Source- Author

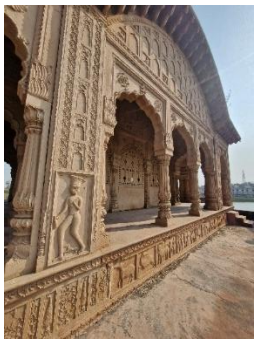


Fig.76- The Façade detailed stone cravings and pattern brickeorks,reflecting craftsmanship

Source-Author

B. Seth Chuhimal ka Talab

- **Design**: Rectangular stepped tank with descending stairs on all sides
- **Construction Technique**: Lime plaster, dressed sandstone, interlocking masonry

Fig.77- Seth Chuhi Mal ka Talab
Source-Author

- **Ecological Role**:
  - Harvested rainwater from the surrounding catchment
  - Supported microclimate regulation in arid summers
  - Facilitated water-based religious rituals and ablutions
- **Condition**:
  - Currently overgrown with vegetation and algae
  - Entry points blocked due to safety concerns

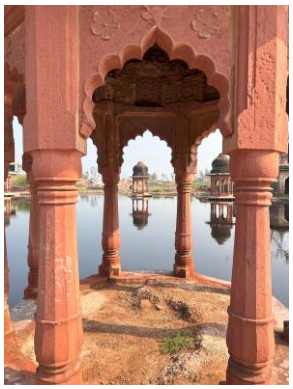


Fig.78- Balanced layout for aesthetics and functions
Source-Author

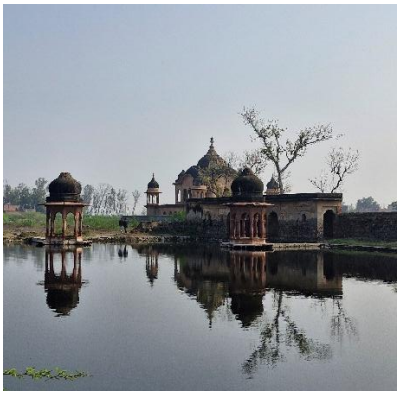


Fig.79 – Designed for rain harvesting and storage
Source-Author

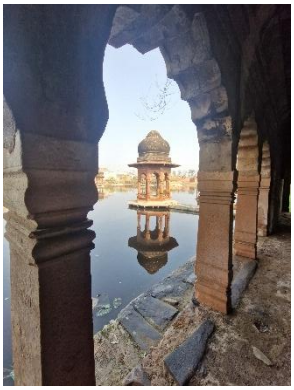


Fig80-.Stepwell-style reserved with descending stone step.
Source-Author

Past and Present Use

Historical Usage

- Functioned as a **private estate and water retreat**
- Served as a venue for **cultural events**, **festivals**, and **ritual gatherings**
- Supported **religious practices** and **communal socialization**

Present Condition

- Structures show visible **damage from water seepage**, **blocked access points**, **vegetation overgrowth**, and **fading ornamentation**
- **No systematic conservation** is currently implemented
- Site remains **closed to the public**, diminishing its tourism and educational value

Fig.81- Structural Deterioration
Source-Author

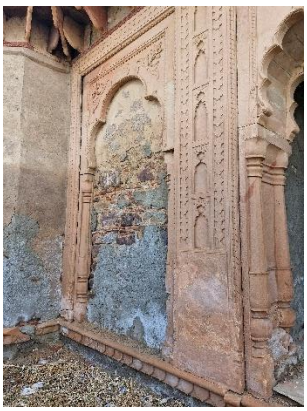


Fig.82- Blocked Entrances
Source-Author

Fig.83 Blocked Wall
Source-Author

Fig.84-Water Damage & stagnation
Source-Author

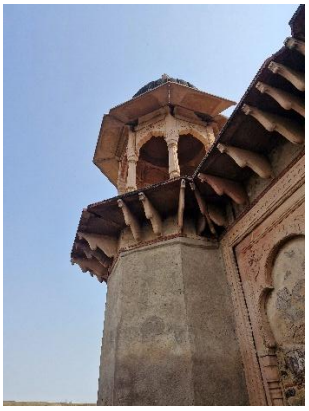


Fig.85- Structural Damage
Source-Author

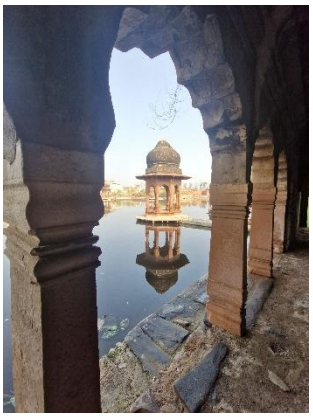


Fig.86- Fading Ornamentation
Source-Author

Socio-Economic Context and Community Impact

- The site has strong ties with the local **Meo Muslim community** and **trading class heritage**.
- Served as a **symbol of prosperity and communal harmony**, reflecting coexistence through its Indo-Islamic design.
- Nearby schools and religious sites make it a potential **heritage education and outreach center**.
- Revival of the site could generate **local employment**, **cultural pride**, and **tourism-driven microeconomy**.

SWOT ANALYSIS

STRENGTHS	WEAKNESS	OPPORTUNITIES	THREATS
Rich architectural language reflecting Rajput-Mughal fusion	Structural deterioration due to lack of regular maintenance	Adaptive reuse for performance, exhibition, dining, and community engagement	Pollution, deforestation, and ecological damage to the green zone surrounding the site
High cultural and historical significance	Lack of public awareness and limited tourism promotion	Integration into regional cultural tourism circuits	Climate change effects such as reduced water levels and increased thermal stress
Unique landscape-integrated design with a functional Talab	Inadequate infrastructure and poor accessibility	Scope for educational programs, art residencies, and storytelling events	Risk of irreversible architectural damage due to long-term neglect
Large site area (12,421.79 m²) enabling flexible adaptive reuse	No dedicated conservation authority managing upkeep	Community-based preservation models involving local stakeholders	Bureaucratic hurdles and delays in accessing heritage restoration funds

CHAPTER 5

DESIGN CONCEPT & PROPOSAL

Design Concept-

"Fluid Grace: Reimagining Heritage through Water and Lotus"

Core Design Concept Statement

The core concept of the project draws inspiration from the natural elements of water and the lotus leaf, symbolizing purity, fluidity, renewal, and cultural depth. These metaphors are woven into architectural expressions to enhance the storytelling of space. The design honors the site's spiritual, communal, and historic character by using water-inspired forms and flows to connect key spatial functions such as performance, dining, and exhibitions. The lotus, deeply rooted in Indian iconography, serves as a symbolic and structural motif—appearing in the design of entryways, furniture, spatial zoning, and display elements. This concept fosters a dynamic dialogue between nature, cultural memory, and contemporary use, offering an immersive and respectful experience within a historically sacred setting.

Project USP (Unique Selling Proposition)

- **Culturally Immersive Design**: Seamlessly blends heritage architecture with modern-day functions like performances, exhibitions, and curated dining under traditional chhatris.
- **Symbolic Integration**: Employs regional symbols—lotus and water elements—to evoke cultural identity and collective memory through spatial narratives.
- **Heritage-**Sensitive Adaptive Reuse: Preserves and highlights architectural integrity, while subtly introducing modern infrastructure and interventions.
- **Community-Centric Approach**: Engages local artisans, storytelling traditions, and interactive visitor experiences to foster a strong sense of place and pride.
- **Multifunctional Space Programming**: Integrates cultural, educational, and recreational components within a cohesive and historically respectful framework.

Interior Style Selection

The selected interior style is Contextual Contemporary Heritage Fusion, combining regional vernacular aesthetics with contemporary minimalism. This ensures that new interventions are harmonious and do not compete with the original heritage fabric.

Key features include:

- Use of natural and locally sourced materials such as red sandstone, lime plaster, and terracotta.
- A muted, earthy color palette that complements the patina and age of the heritage structure.
- Subtle incorporation of traditional features—like jaali work, arches, and brackets—enhanced with modern lighting, display systems, and acoustics.

- Flexible, modular design in performance and gallery zones to support user adaptability while maintaining spatial integrity.
- Custom-designed furniture and fittings inspired by lotus geometry and the fluid movement of water, reinforcing the symbolic core of the project.

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