

THEMATIC RESEARCH

APPENDIX

BACKGROUND

THE NETHERLANDS 2050

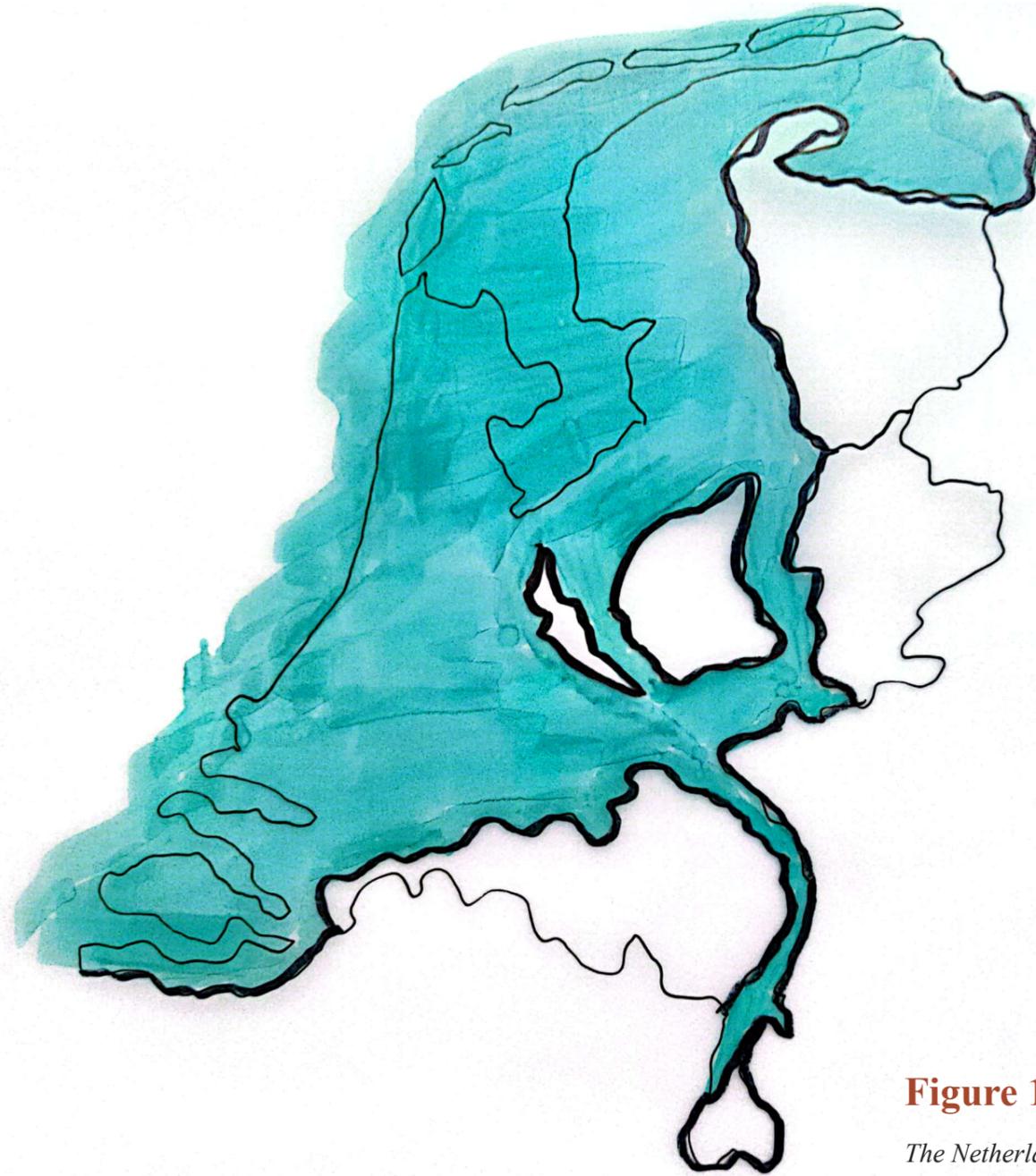


Figure 1

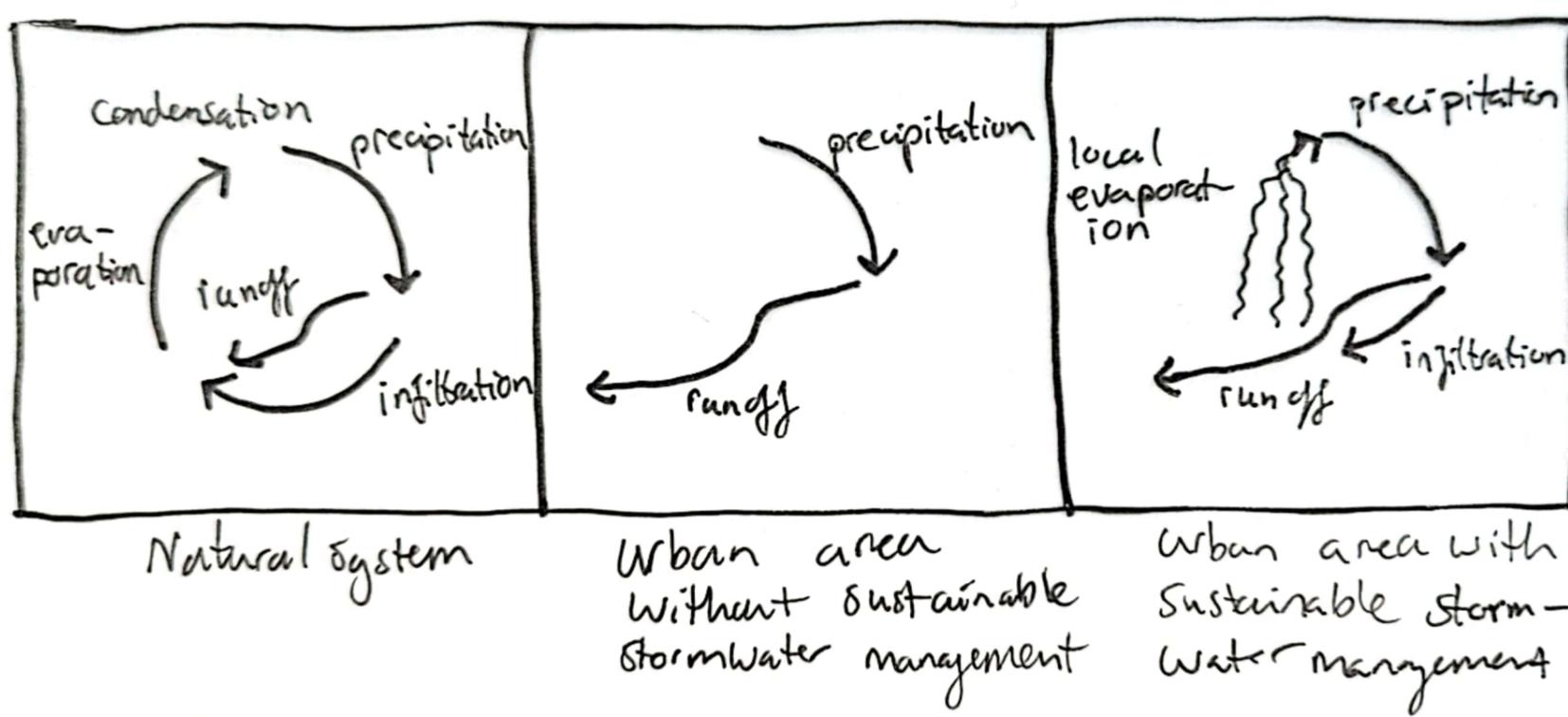
The Netherlands under water from 2050. Source: Author

HYDROLOGICAL SYSTEM

URBAN ANALYSIS

Figure 2

The Hydrological system. Source: Author

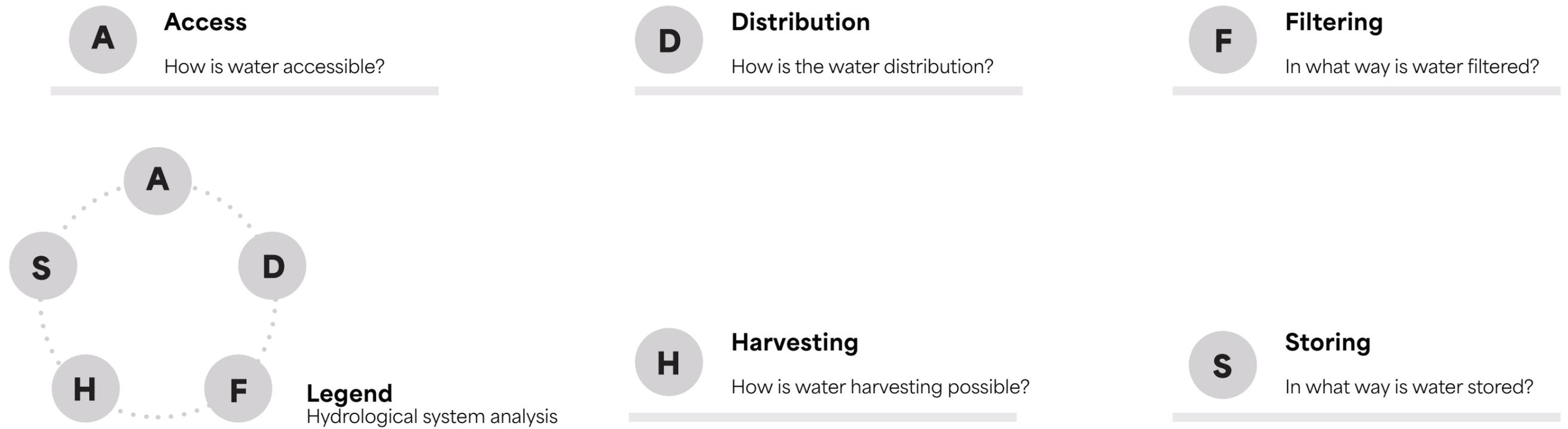


METHODOLOGY

HYDROLOGICAL SYSTEM

Figure 3

Case study analysis hydrological system. Source: Author



METHODOLOGY

SPIRITUAL ARCHITECTURE

Figure 4

Architectural stepwell analysis. Source: (Nejati, 2010) & (Charrin, 1992)

A

Architecture - (Nejati, 2010)

Form & Geometry

Light & Colour

Material

Sound/temperature/air

S

Spiritual elements - (Charrin, 1992)

One/Whole

Horizontal/Vertical

Openness/enclosure

Sculpture/composition

Materials (simple and sincere such
as wood or stone)

CONTEXT

MOHENJO-DARO - LOTHAL - DHOLVIRA

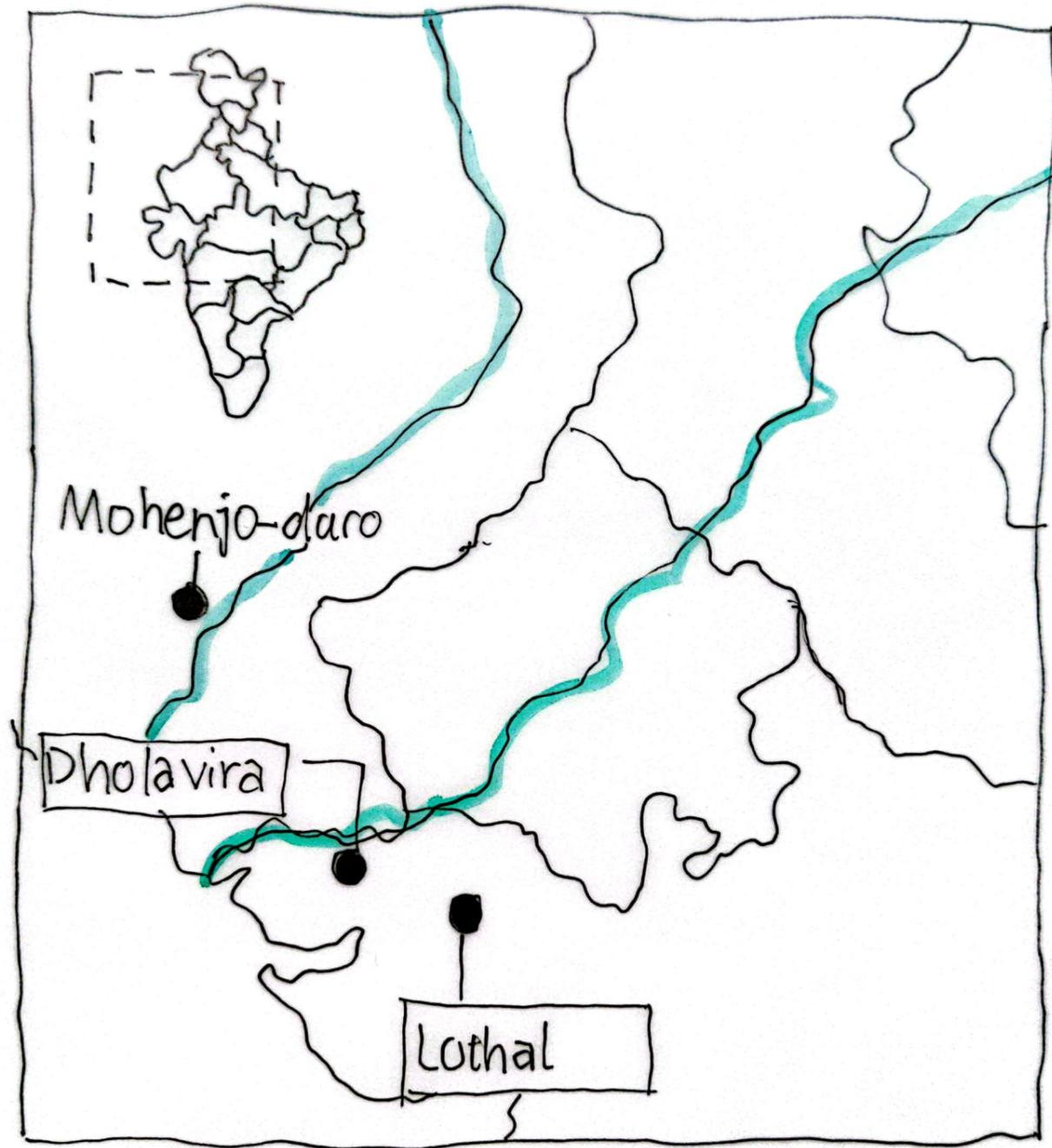


Figure 5

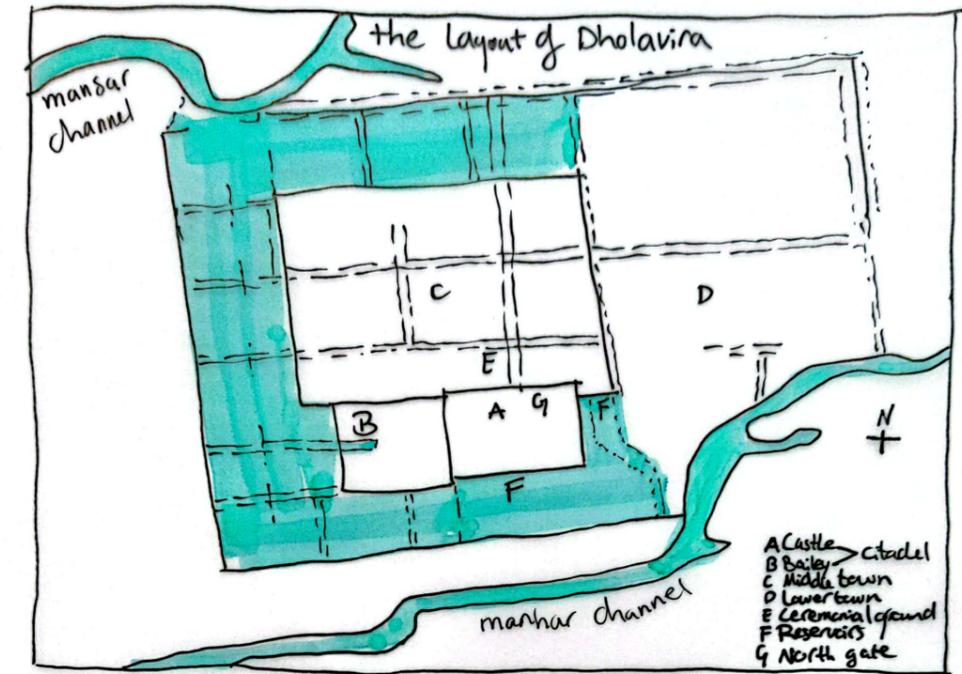
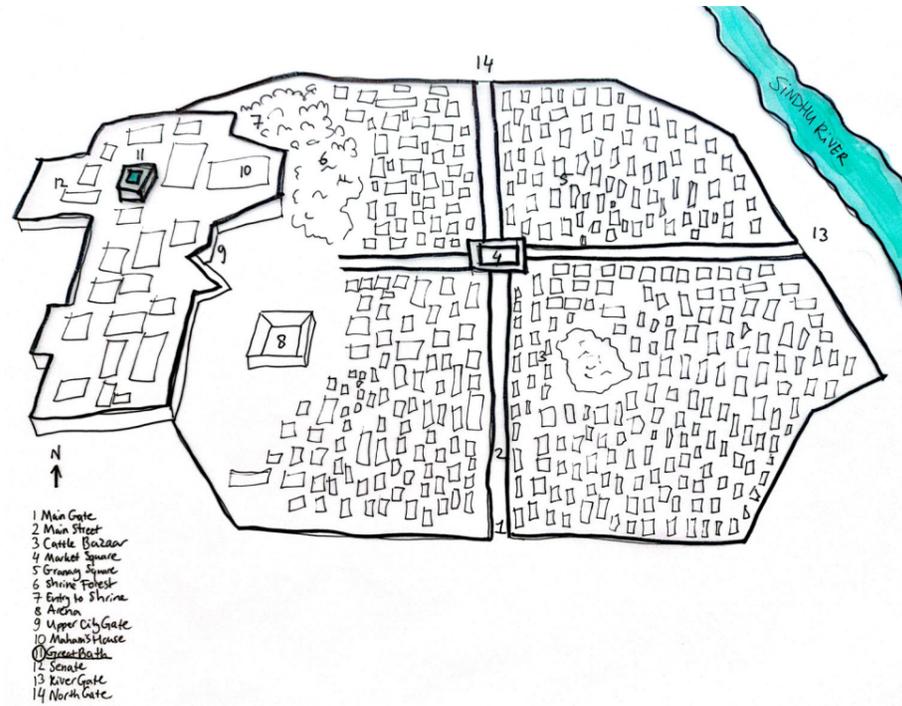
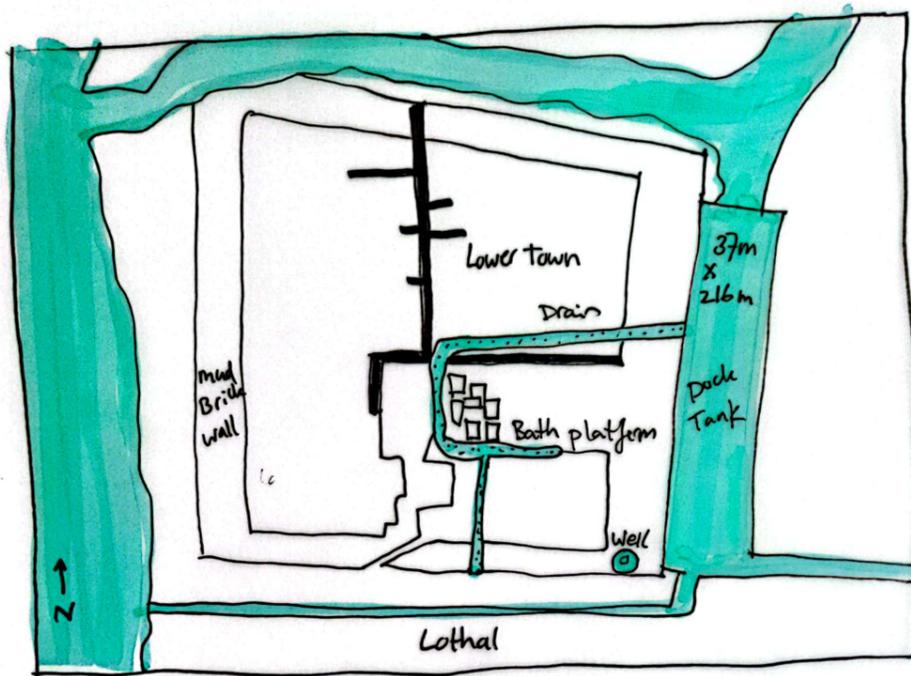
The Indus Civilization context. Source: Author

CONTEXT

MOHENJO-DARO - LOTHAL - DHOLVIRA

Figure 6

L-R; Lothal, Mohenjo-Daro, Dholavira. Source: Author



CONTEXT

DHOLVIRA

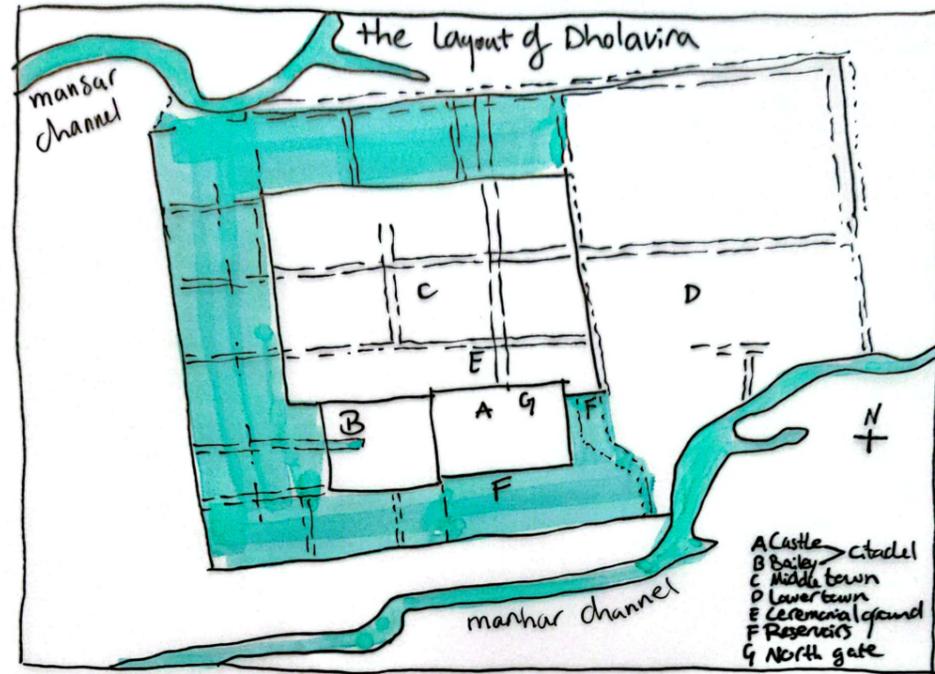
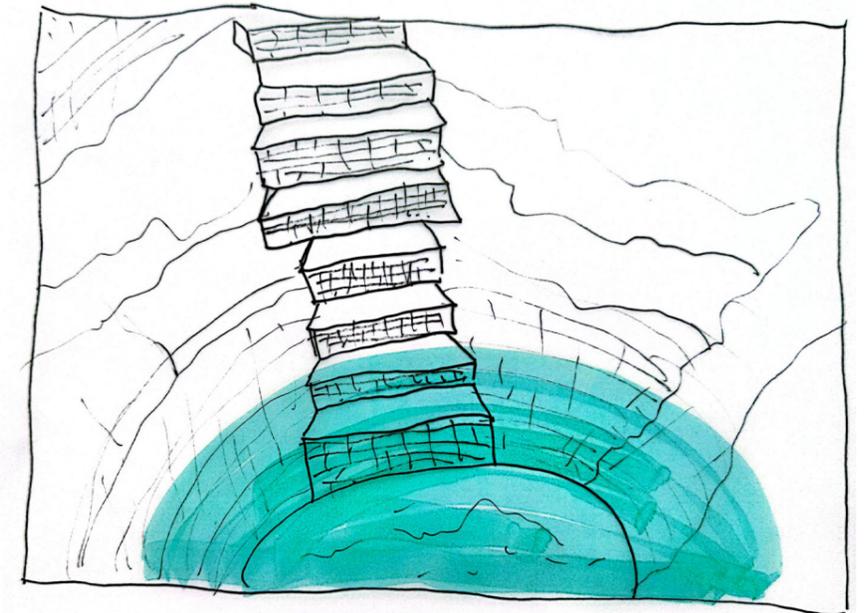
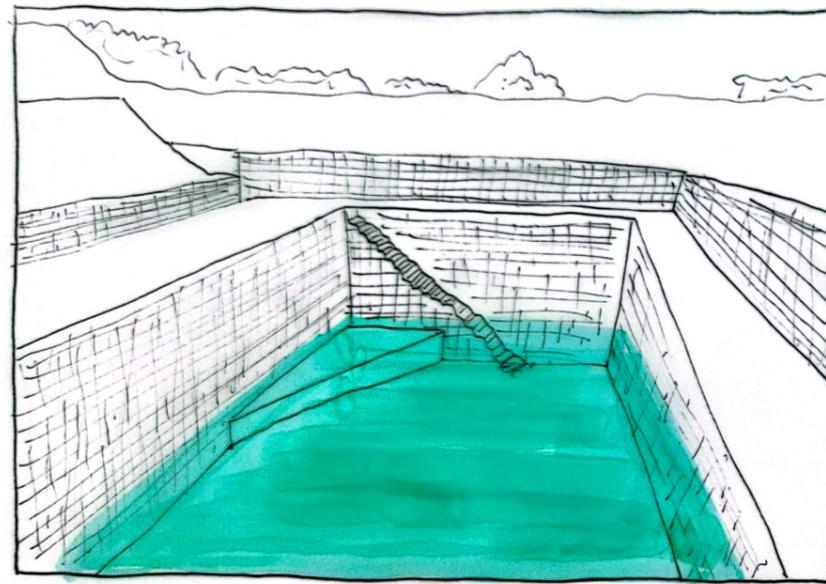
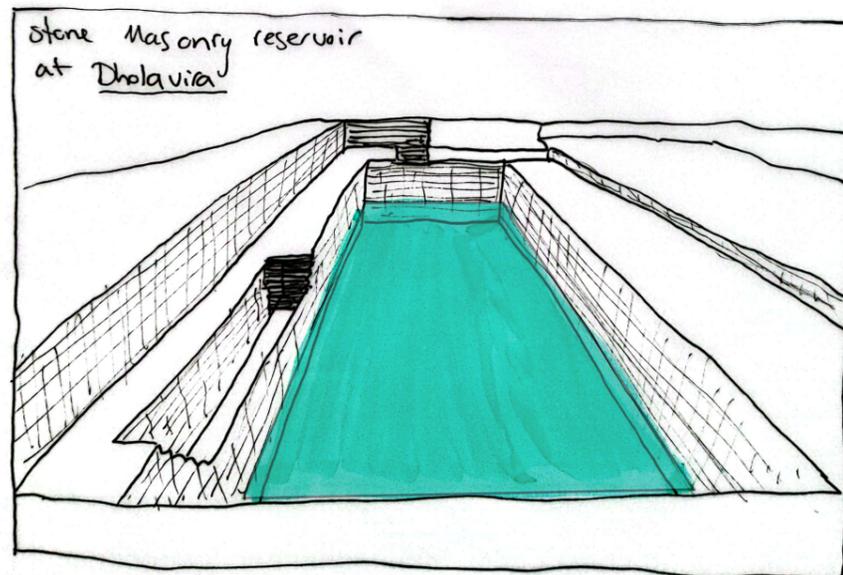


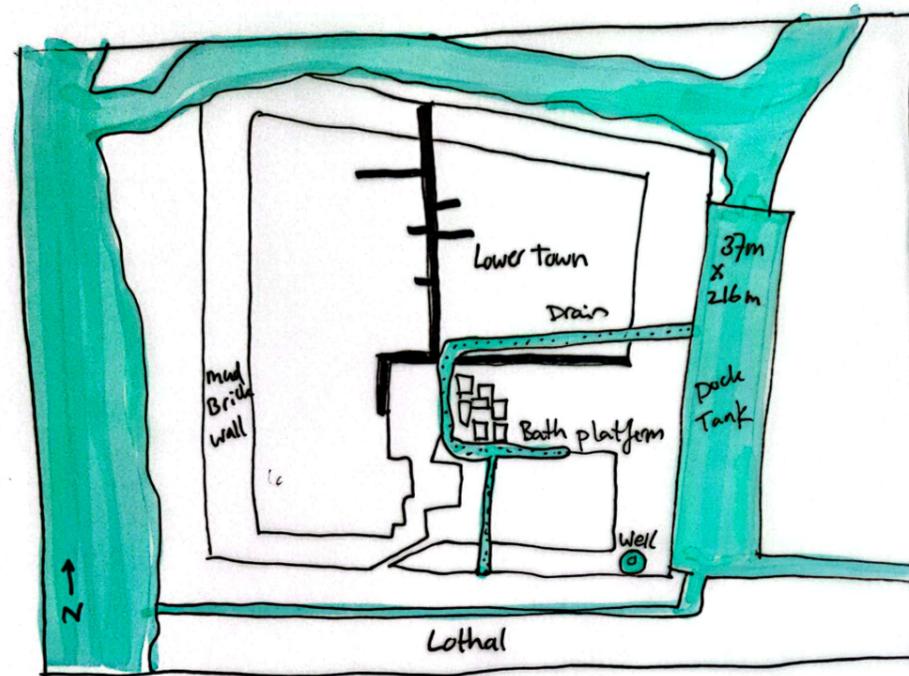
Figure 7

Dholavira hydrological analysis. Source: Author

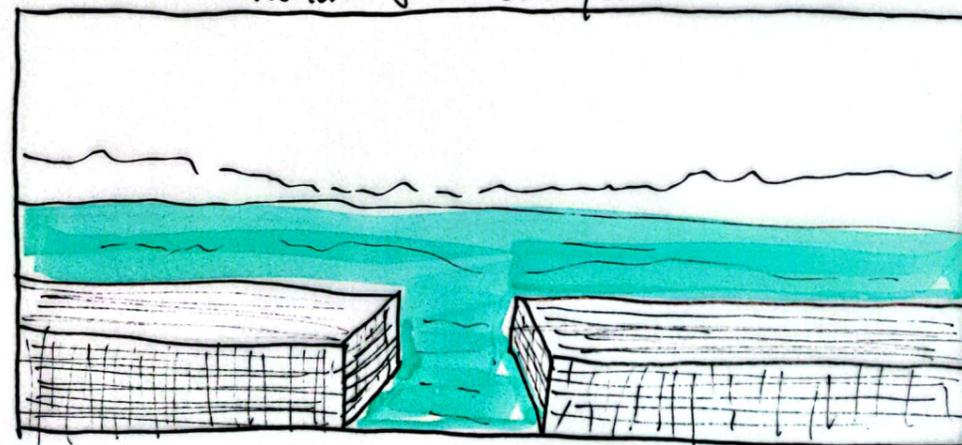


CONTEXT

LOTHAL



World's first dockyard



Artificial brick dockyard at Lothal

Figure 8

Lothal Hydrological analysis. Source: Author

CONTEXT

MOHENJO-DARO

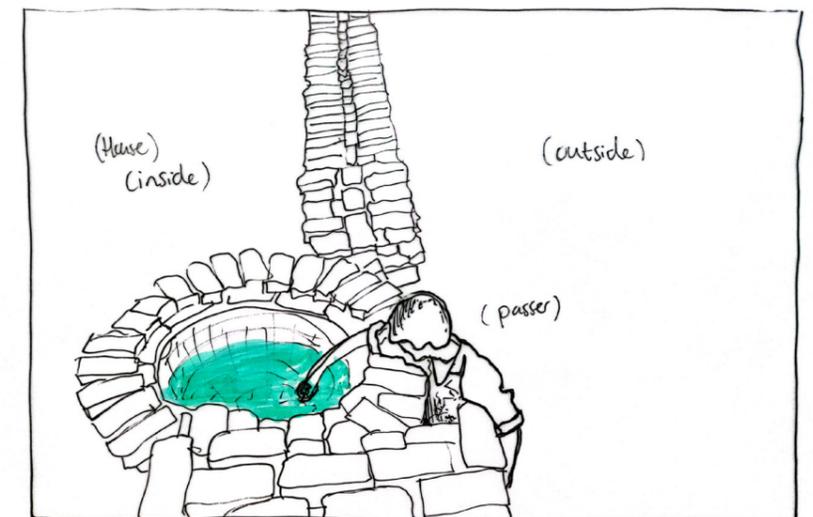
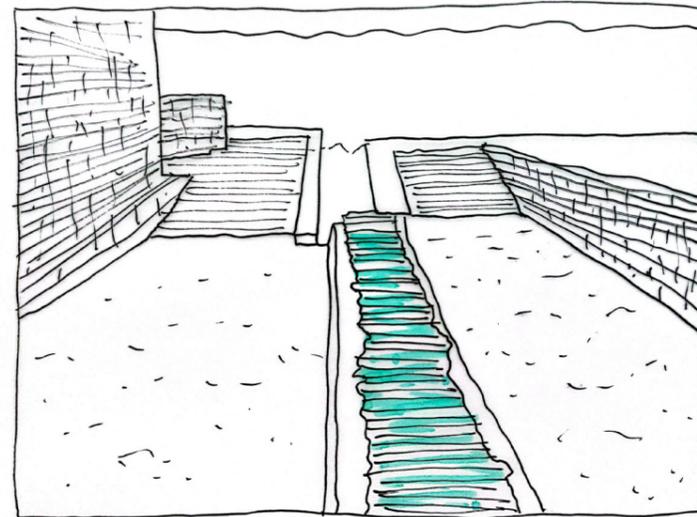
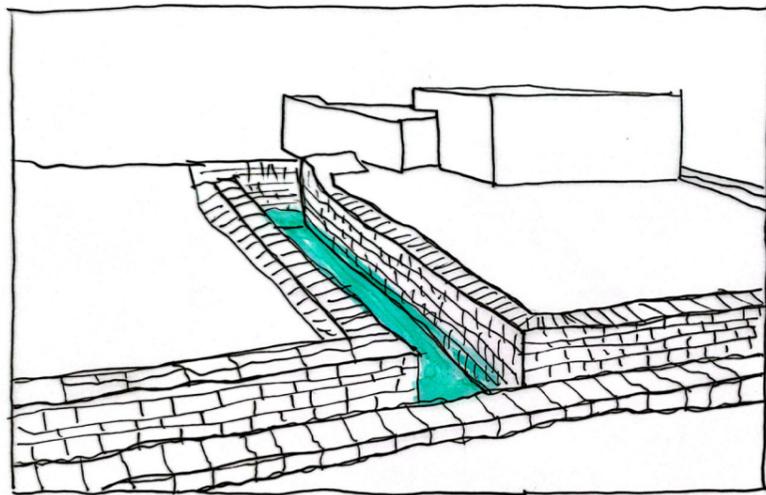
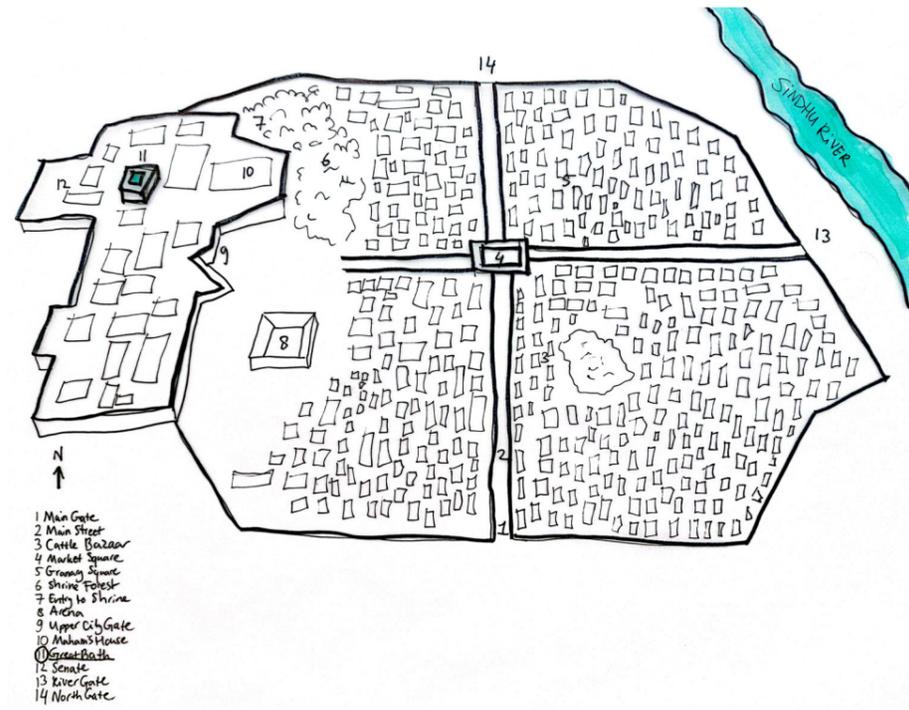


Figure 9

Mohenjo-Daro Hydrological analysis. Source: Author

CONTEXT

MOHENJO-DARO

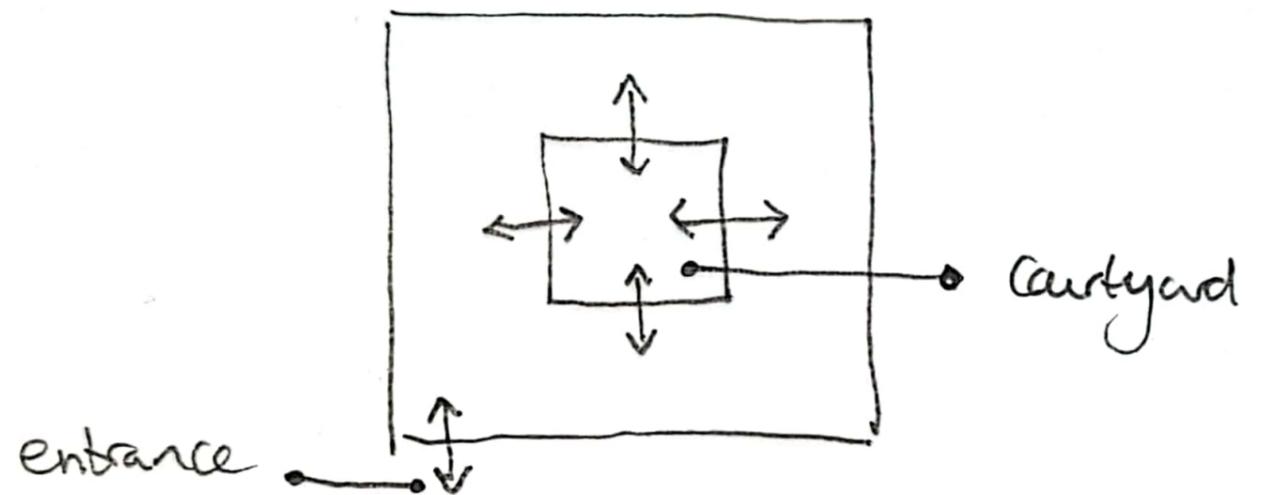
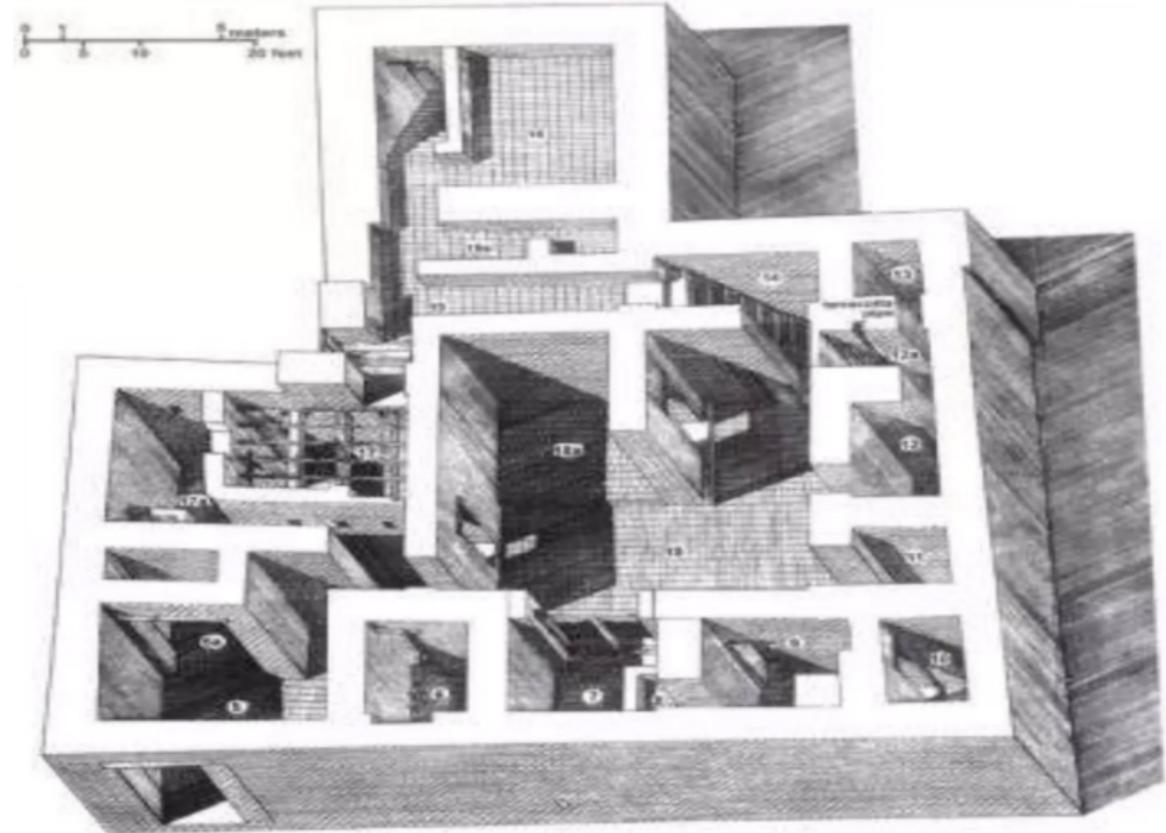
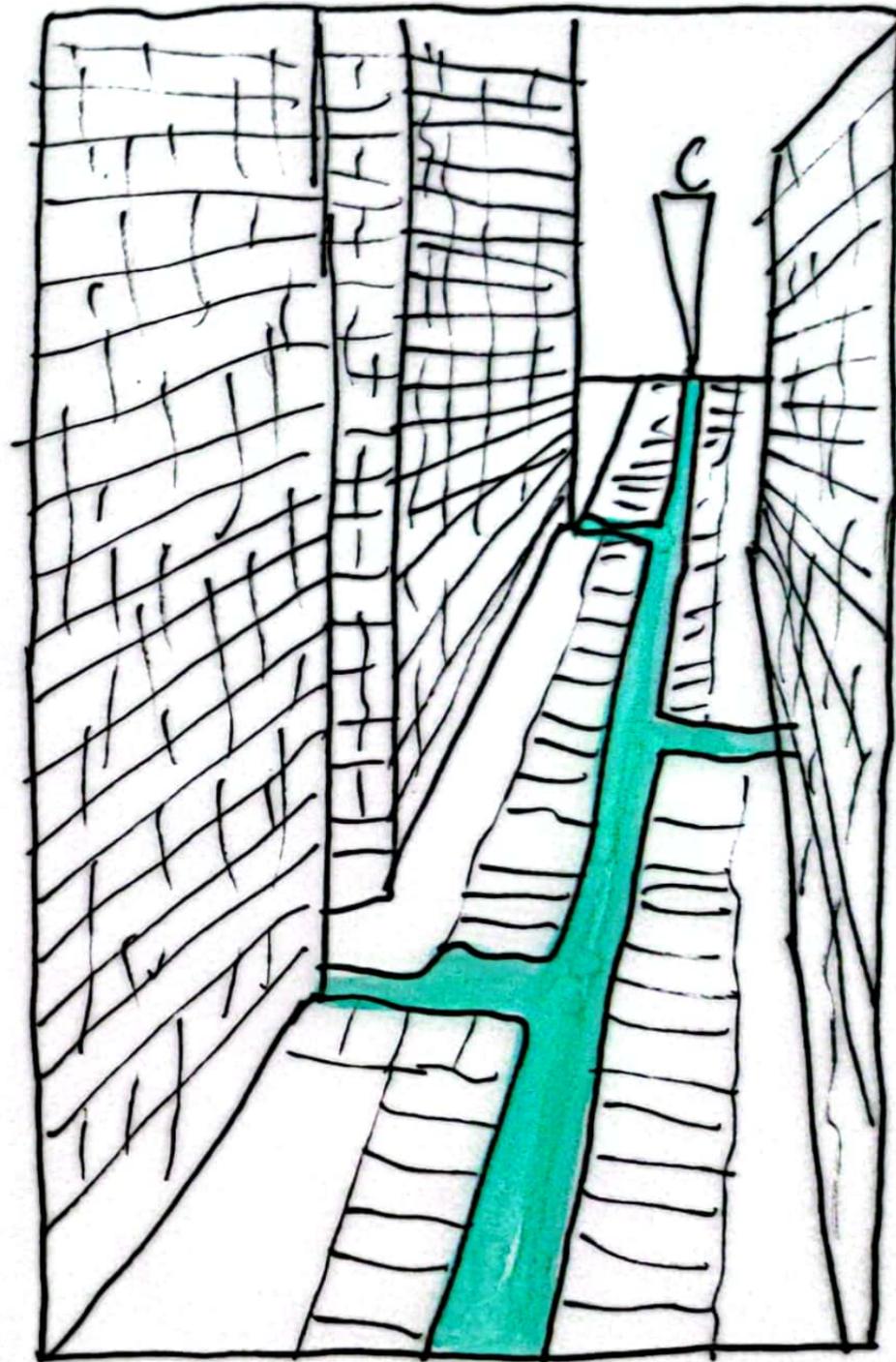


Figure 10

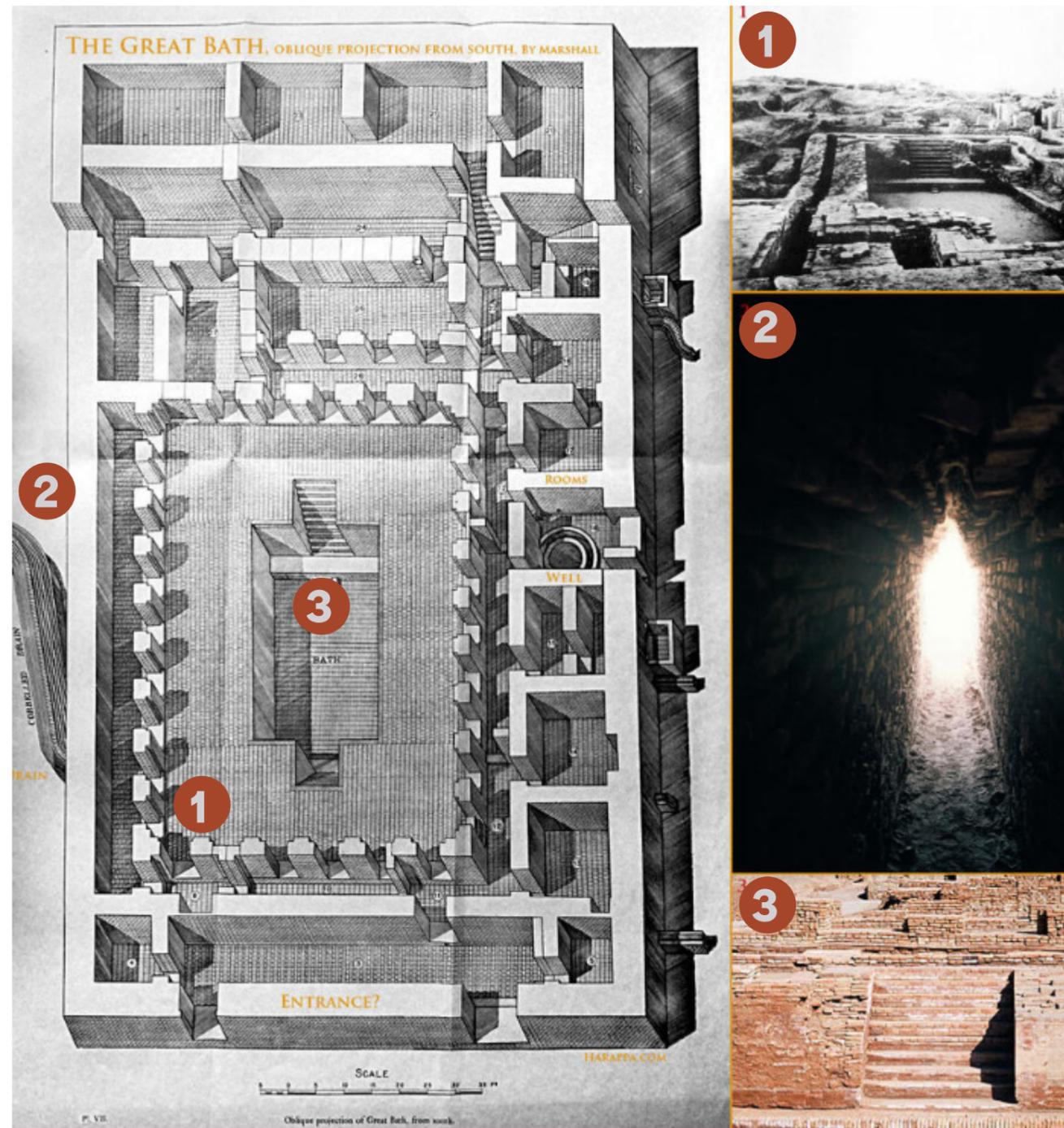
Domestic water distribution. Source: Author & <https://www.slideshare.net/PushprajPatil3/architectural-and-planning-aspect-of-ancient-civilization>

GREAT BATH

MOHENJO-DARO

Figure 11

The Great Bath. Source: (Marshall, 1996)

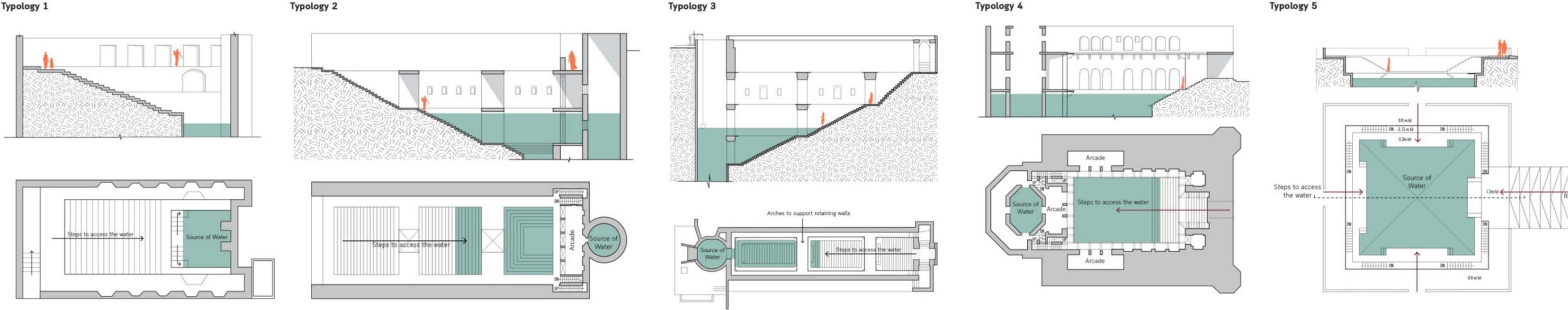


STEPWELL

TYPOLOGY

Figure 12

Stepwell Typology. Source: (Chanda, 2019)



CASES

ANALYSIS ARCHITECTURE & SPIRITUALITY (SERENITY)

1. Chand Baori

Figure 13

Information

9th Century
3500 Narrow steps
13 stories
30 m. deep
(deepest stepwell)

Architecture

When we examine its architectural form, we observe a unique inverse structure reminiscent of a Ziggurat, where the complex is excavated from the ground. Adding to its distinctive design, a subtle cantilever extends outward from the center of the complex.

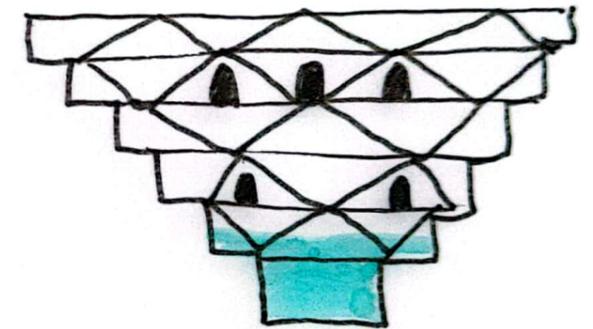
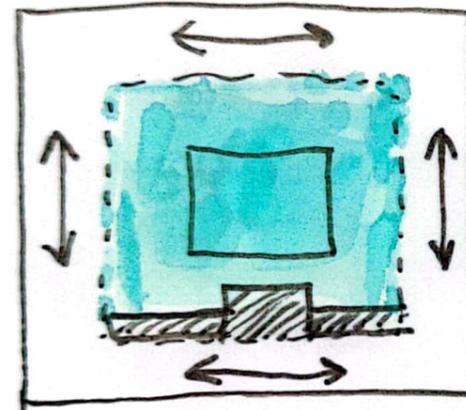
Shifting our focus to the internal environment, we discover that the presence of water creates a refreshing microclimate within. In fact, this microclimate can be remarkably cooler, with temperatures up to 9 degrees lower than the surrounding area. Moreover, this complex serves as a gathering place, particularly for women. The narrow steps, arranged meticulously in perfect symmetry, create a sense of a mystical labyrinth. The interplay of light and shadow further enhances its enigmatic ambiance.

Overall, this structure serves as a remarkable example of rock-cut architecture, showcasing its ingenuity and uniqueness (Perumal, 2022).

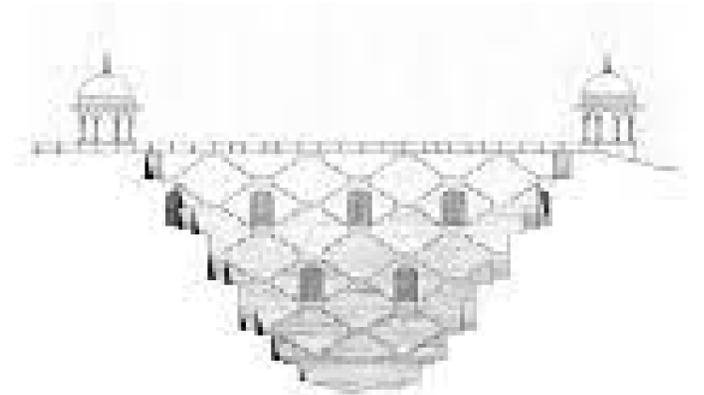
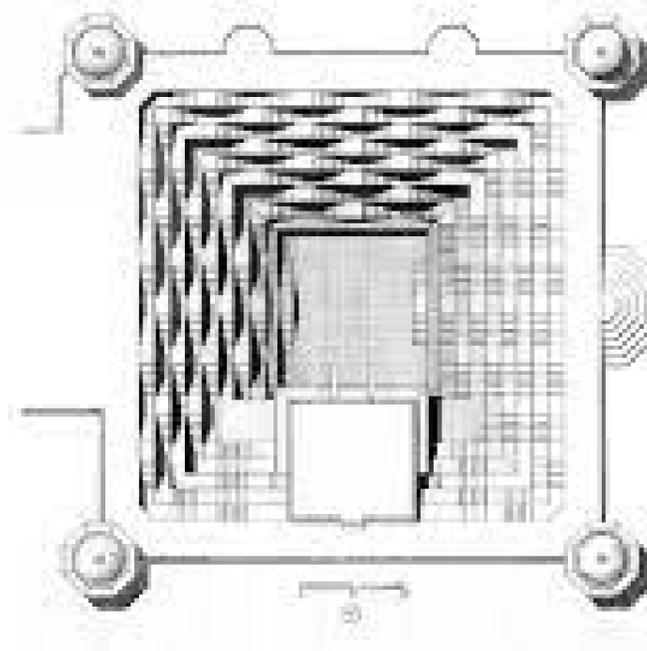
Spirituality/Serenity

This architectural structure exudes a strong sense of unity, harmoniously blending with its natural surroundings. Its design prominently incorporates horizontal elements, facilitating easy movement and navigation, while vertical elements beckon visitors to explore the depths of the well. The stepwell stands as an inclusive space, welcoming people from all walks of life. The choice of materials, particularly the combination of stone and wood, showcases an authentic and heartfelt approach to construction.

The meticulously symmetrical arrangement of the steps and the interplay of light and shadow create a captivating atmosphere that allows visitors to feel a deep connection with the water. It is an immersive experience that encourages a profound sense of oneness with the surroundings.



Analysis of Chand Baori. Source: the Author



Chand Baori plan. Source: Step well / Getrap waterreservoir. HKB Stedenbouwkundigen. <https://hkblabla.wordpress.com/2011/09/12/step-well-getrap-waterreservoir/>

2. Assi Khamba Ki Baori



Figure 14

Information
1500 CE

Assi Khamba Ki Baori. Source: <https://www.indiamike.com/india-images/pictures/assi-khamba-ki-baori>

Architecture

As we look into the Assi Khamba Baori we find this time a circular form with a promenade and colonnade on top. The amount of stairs used in here is very minimal. What we find is a temple on site attached to the complex. This complex was built for military purpose and was built in 5 days. It was used to store water but also for bathing.

Spirituality/Serenity

What we observe in this structure is a compelling circular arrangement, creating a sense of unity and coherence. The circular form enhances the overall harmony of the complex, symbolizing togetherness and interconnectedness. The presence of a long passage with a colonnade further enhances the visitor's experience, as it allows for the interplay of light and shadow, evoking a feeling of depth and intrigue.



Analysis of Assi Khamba Ki Baori. Source: the Author

3. Adi Kadi Vav



Adi Kadi Vav. Source: <https://www.outlookindia.com/outlooktraveller/explore/story/69059/ iconic-stepwells-of-gujarat>

Architecture

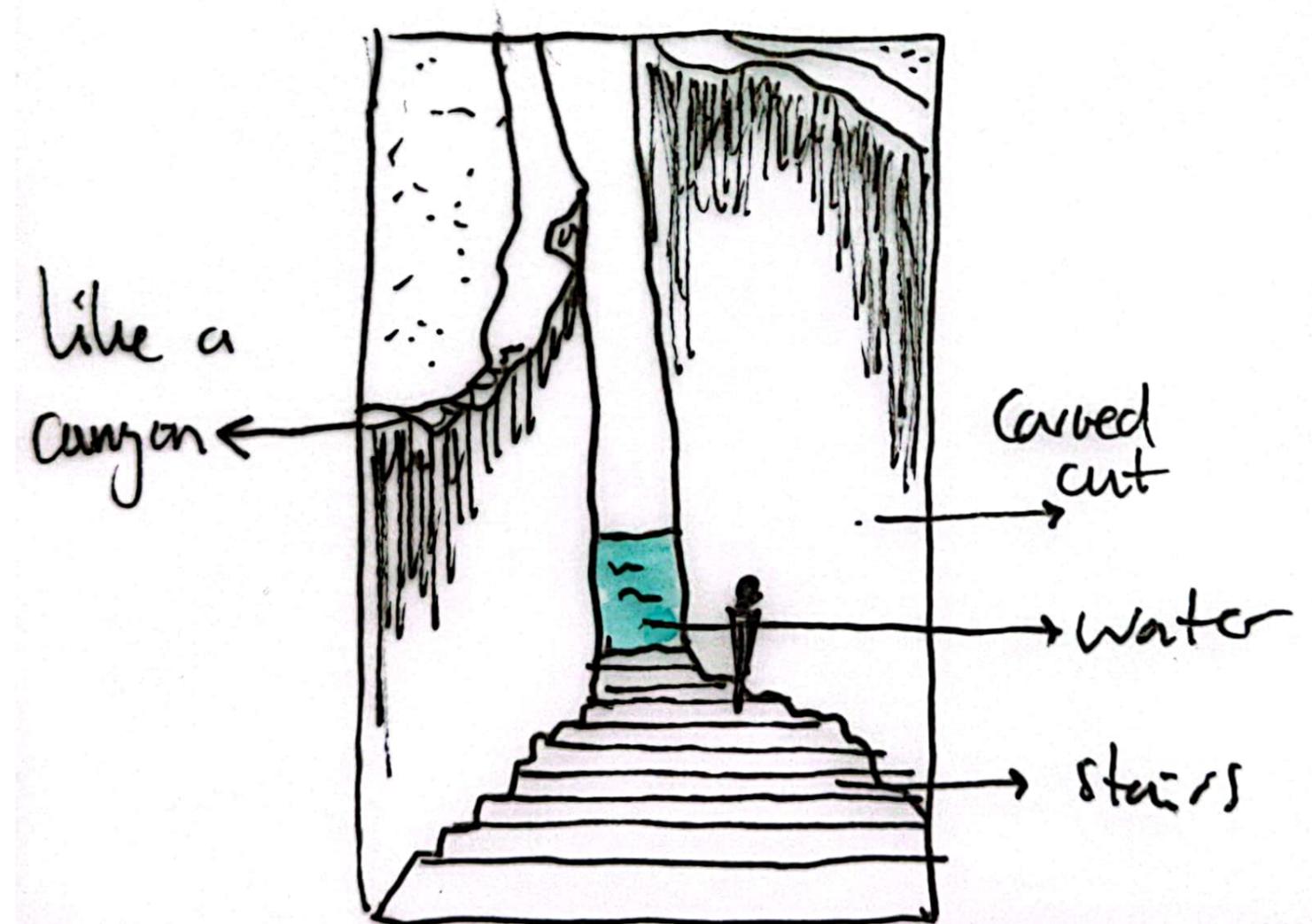
The well is strategically designed with five levels, adorned with intricately sculptured pillars and motifs. Stone ledges, open skies, and interconnected passageways at each level create a comfortable resting space, promote air circulation, and facilitate easy movement. The circular well shaft showcases captivating geometric designs, enhancing the visual appeal of the structure.

Spirituality/Serenity

The Adi Kadi Vav stands as one of the ancient stepwells, skillfully carved into the mountainside. This craftsmanship showcases the inherent beauty, simplicity, and authenticity of the rock material, creating a captivating interplay of light and shadows. The unique aspect lies in its resemblance to a natural fissure in the earth, from which water gracefully emerges, accessible to people through a series of stairs. The design emphasizes the significance of verticality while maintaining a harmonious integration with the surrounding natural environment.

Figure 15

Information
319 BCE



Analysis of Adi Kadi Vav. Source: the Author

4. Baoli Ghaus Ali Shah



Figure 16

Information
18th Century
Purpose: Layover

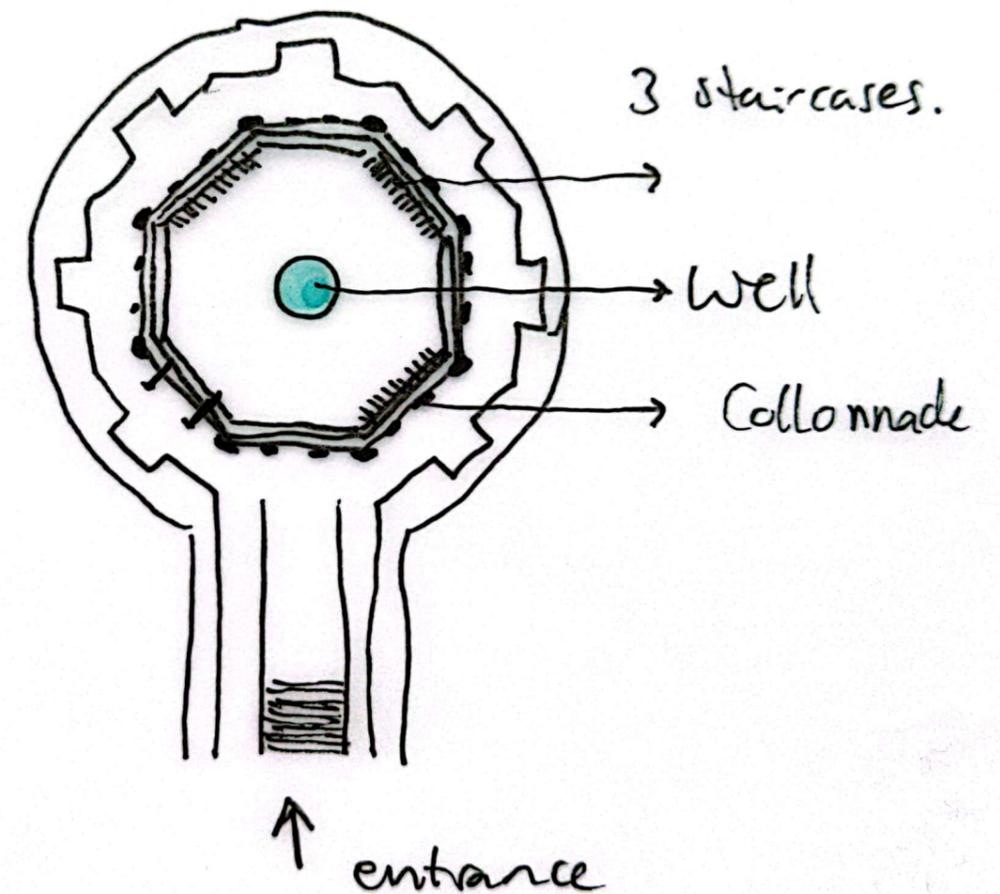
Baoli Ghaus Ali Shah. Source: <https://haryanatourism.gov.in/Destination/baoli-ghaus-ali-shah>

Architecture

The Baoli Ghaus exhibits a captivating lower courtyard that imparts a sense of serenity and proportion, with the well taking center stage. The presence of a promenade and two staircases leading to lower levels, accompanied by comfortable seating areas, invites visitors to pause and indulge in the peaceful ambiance. The design of this courtyard stepwell incorporates an octagonal shape, adding to its aesthetic appeal and architectural intrigue.

Spirituality/Serenity

The octagonal courtyard design of this stepwell provides a distinct courtyard typology, creating an open and inviting atmosphere. The central area, with its well, allows for unobstructed views and freedom of movement around the surrounding colonnade. The presence of only three staircases contributes to a sense of intimacy within the stepwell. Access to the stepwell is facilitated by a long hallway that leads to the octagonal courtyard, adding a gradual and intriguing entry experience. The use of light materials enhances the overall feeling of lightness and adds to the intimate ambiance of the space.



Analysis of Baoli Ghaus Ali Shah. Source: the Author

5. Hampi Stepwell



Figure 17

Information
13th century
Purpose: Worship

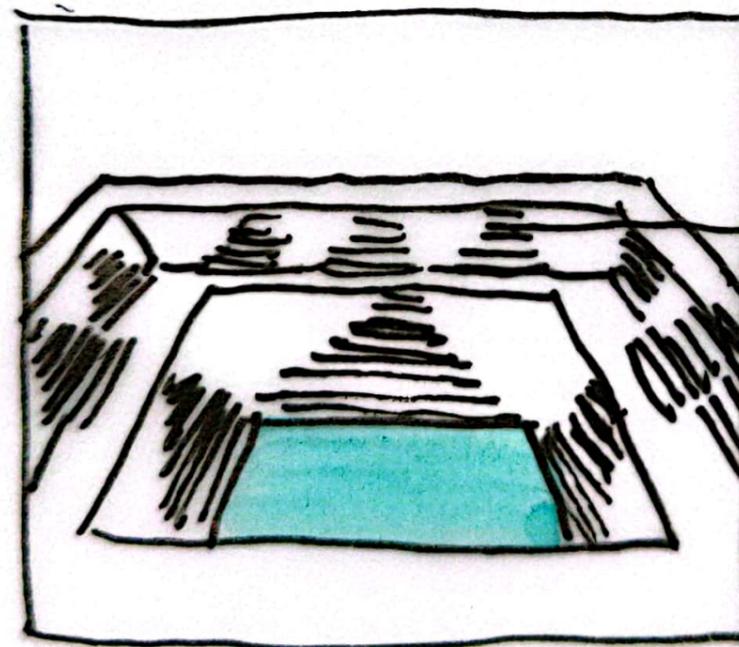
Hampi Stepwell. Source: <https://www.atlasobscura.com/places/stepped-tanks-pushkarani-hampi>

Architecture

The stepwell, with its square shape, was meticulously planned and constructed using a prefabricated method, a technique that was uncommon for its time in the early 13th century. This innovative approach, which gained popularity in the 19th century, allowed for faster construction compared to traditional methods. Interestingly, the sequential numbering of the stones during the dressing process was employed to ensure their precise placement within the stepwell. This efficient construction technique also enabled simultaneous construction of various sections of the stepwell, as evidenced by the removal of dressed stones from the site. The adaptation of this prefabricated approach during a time of war in the Vijayanagara empire highlights the remarkable engineering and planning skills of the builders.

Spirituality/Serenity

The Hampi stepwell presents a mesmerizing display of triangular staircases, forming an enchanting pattern that captures the eye. Located nearby is a square-shaped stepwell that invites visitors to approach it from any angle. This stepwell stands out for its artistic composition and playful orientation, creating a delightful atmosphere. The dynamic interplay of shapes and forms within the stepwell's design enhances its aesthetic allure, encouraging exploration and interaction from all directions. It is worth noting that this stepwell also serves as a place of worship, adding a spiritual dimension to its significance.



→ triangle form of stairs.

Analysis of Hampi Stepwell. Source: the Author

6. Rajon Ki Baoli



Rajon Ki Baoli. Source: <https://www.foodravel.com/2020/12/22/rajon-ki-baoli-mehrauli/>

Figure 18

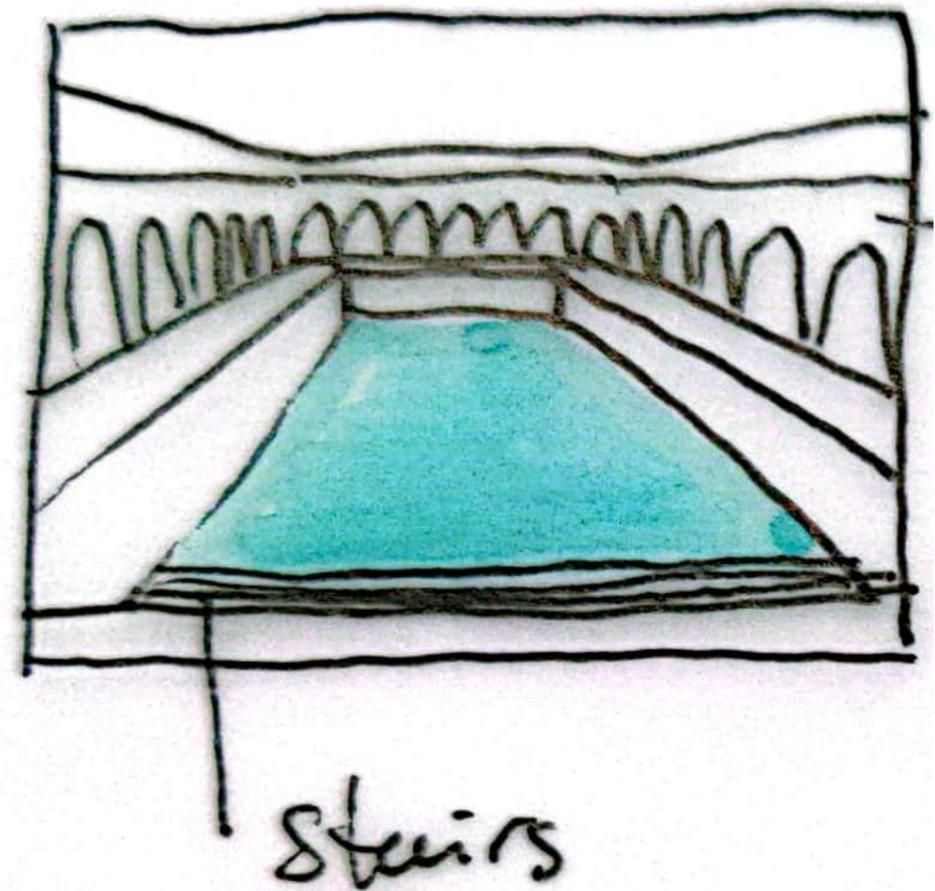
Information
1506 century

Architecture

The Rajon Ki Baoli showcases the use of a unique type of brick, where lime and brick powder were combined to serve as the binder. River sand was employed as the fine aggregate, while brick surkhi served as the coarse aggregate. This ingenious combination enabled the lime mortars to achieve a strength comparable to that of cement concrete, thanks to the enhanced pozzolanic reaction and the formation of additional Calcium silicate hydrate. The incorporation of brick powders as strength enhancers resulted in highly durable materials that could withstand environmental forces with resilience.

Spirituality/Serenity

The Rajon Ki Baoli features a rectangular shape with a lengthy colonnade at the ground level. When the stepwell is filled with water, it evokes a sense of a medieval courtyard, creating a charming ambiance. The colonnade extends even as one descends deeper into the stepwell, maintaining its continuity. The stepwell exhibits a pronounced verticality that encourages visitors to gaze into the distance, fostering a profound connection with nature. The materials used in its construction are humble and genuine, reflecting a simplicity that resonates with the surroundings. Access to the stepwell is granted through a long staircase on one side, guiding visitors on a gradual descent into its inviting depths.



Analysis of Rajon Ki Baoli. Source: the Author

7. Mata Bhavani Vav



Figure 19

Information
11th Century
Purpose: Temple/worship

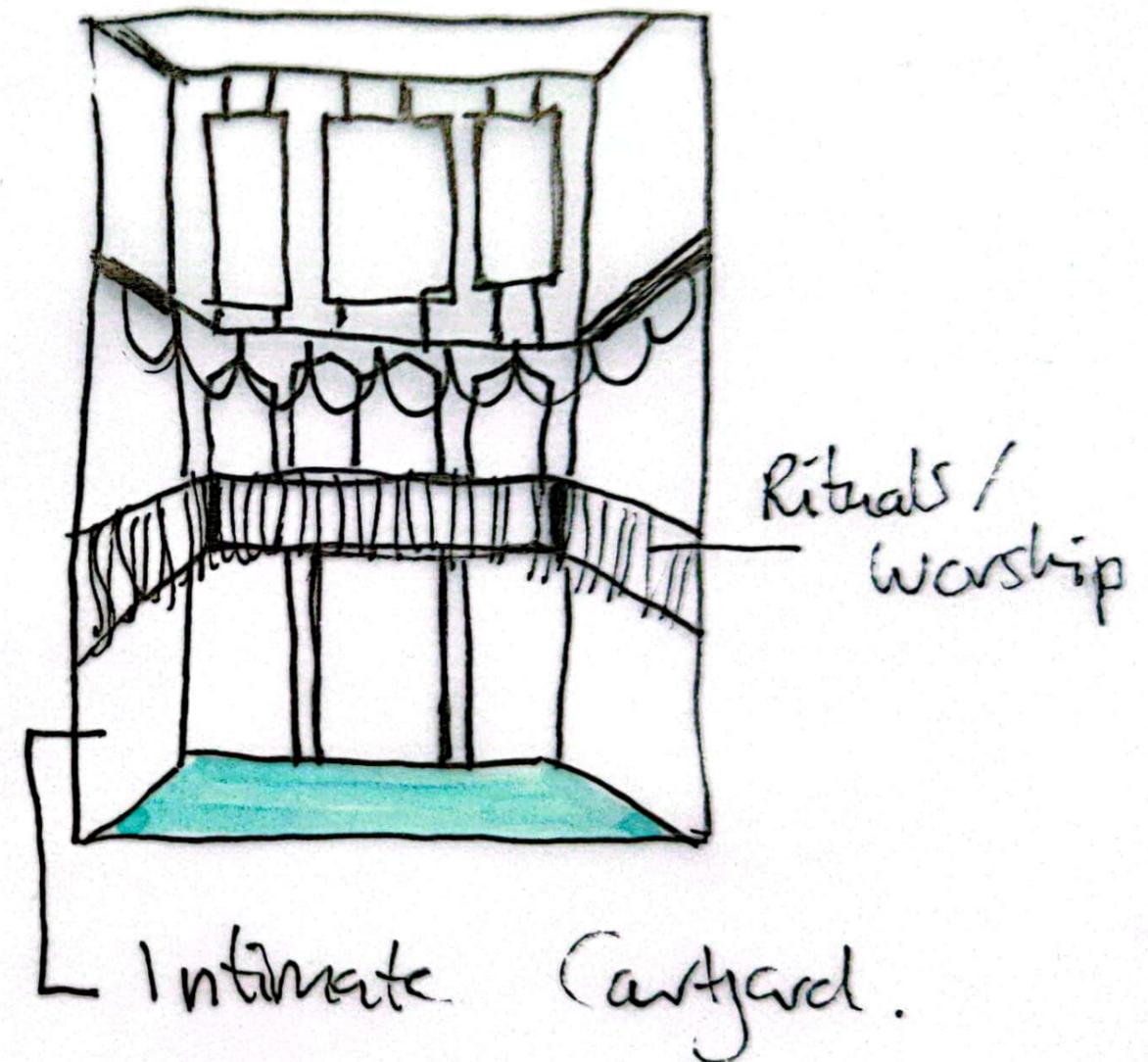
Mata Bhavani Vav. Source: <https://amdavadiheritage.wordpress.com/2018/12/02/mata-bhavani-stepwell-in-ahmedabad/>

Architecture

The Mata Bhavani Vav serves multiple functions, primarily as a place of worship, rituals, and communal gatherings. Visitors have personalized this space by adorning the balustrades with vibrant, colorful cloths, adding a touch of individuality and cultural expression. The colonnade of the building follows a grid pattern, with each module measuring 2m x 2m, creating a sense of rhythm and order within the architectural composition.

Spirituality/Serenity

This space is designed with spirituality in mind. It features a cozy courtyard surrounded by colonnades and open on both sides. What makes it truly special is the personal touch added by people through sculptures and vibrant colors, creating a unique and individualized atmosphere. Additionally, the walls are adorned with candle holders, harmoniously bringing together elements of light, natural stone, water, air, and the play of light. The interplay of these elements enhances the beauty and serenity of the sculpture, making it a truly enchanting space.



Analysis of Mata Bhavani Vav. Source: the Author

8. Ujala Baoli



Ujala Baoli. Source: <http://www.navrang-india.in/2019/09/ujala-baoli-near-mandu-madhya-pradesh.html>

Figure 20

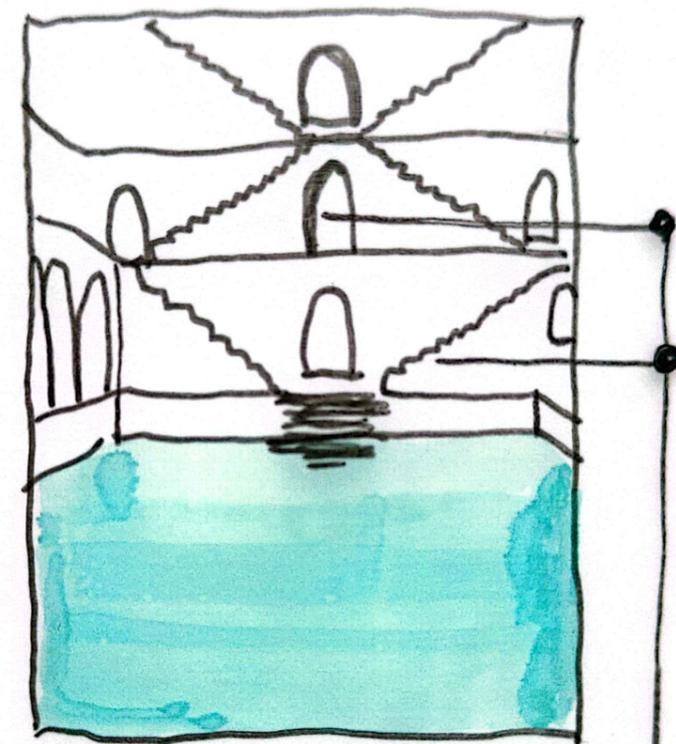
Information
15th Century

Architecture

The name Ujala signifies light, which perfectly contrasts with the conventional symmetry found in most stepwells. This baoli stands out with its eccentric design, featuring stairways that vary between direct and zigzagging paths. This unconventional arrangement adds a distinct and original touch to the structure.

Spirituality/Serenity

Although the approach may appear unconventional and the steps somewhat repetitive, when combined with the finely carved niches and arched chambers, the result is a truly sculptural experience. The shadowy arches, hint to some kind of mystery. The stairs lead the way towards the calm and inviting green water, inviting visitors to immerse themselves in its tranquility.



Semi openings + Symmetric Stairs

Analysis of Ujala Baoli. Source: the Author

9. Dada Harir Vav



Figure 21

Information
1498 CE

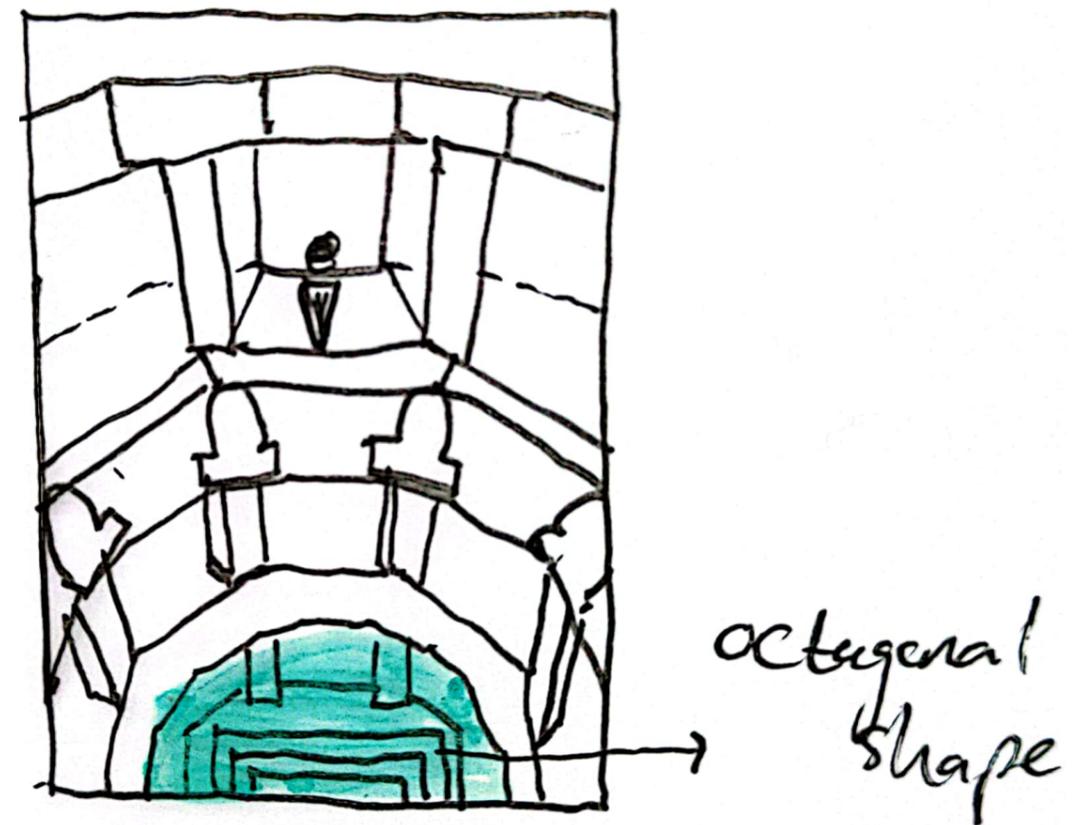
Dada Harir Vav. Source: <https://thirdeyetraveller.com/dada-harir-stepwell-ahmedabad-bai-harir-vav/>

Architecture

Constructed in sandstone, the Dada Harir stepwell is an impressive structure that delves five stories deep into the ground. Its octagonal shape at the top showcases intricate carvings and a multitude of pillars. Each floor offers ample space for gatherings and socializing. The stepwell was meticulously excavated to tap into groundwater at that particular level, taking into account the fluctuations in water levels throughout the year caused by seasonal rainfall. To ensure proper ventilation and illumination, the roofs of the various floors and the landing level feature large openings as air and light vents. One unique aspect is the presence of three staircases from the first-floor level that lead down to the water level, adding to the stepwell's distinctiveness.

Spirituality/Serenity

Within this hallowed and nurturing setting, we come across a splendid rest-house embraced by intricately carved and adorned walls. The serene atmosphere is further enriched by a flourishing grove of fruit trees, generously presenting their abundant fruits. Additionally, a well and a revitalizing pool of water are thoughtfully provided to cater to the needs of visitors. The architectural design, characterized by its octagonal layout, imparts a profound sense of intimacy, as if embracing and enveloping those within its space.



Analysis of Dada Harir Vav. Source: the Author

10. Rani Ki Vav



Rani Ki Vav. Source: <https://whc.unesco.org/en/list/922/>

Figure 22

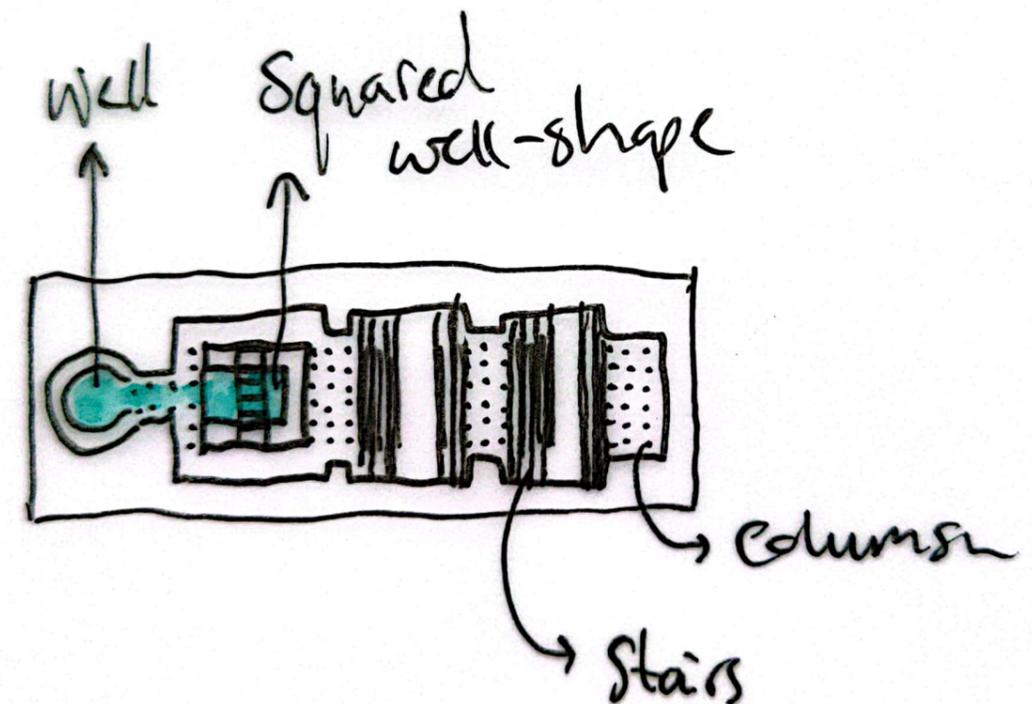
Information
1063 CE
Also known as the
Queens stepwell

Architecture

The Rani Ki Vaav, known for its intricate and well-planned architecture, was primarily constructed using sandstone. The sandstone employed in its construction exhibited a creamy hue and was of sedimentary nature, featuring a range of grain sizes from fine to coarse. To ensure structural integrity and prevent any potential collapse, pillars, niches, and slabs were crafted from coarse-grained stone capable of bearing heavy loads. Finer grains were utilized for finishing touches and ornamental embellishments. In addition, stone wooden dowels were employed as joints to provide adhesion and stability to the structure.

Spirituality/Serenity

A lengthy vertical pathway leads us to the well, accompanied by four sections of colonnades. The vertical nature of this route acts as a guiding force, directing our movement and drawing us closer to the water. As we journey along this path, our focus becomes wholly absorbed by the structure, forging a deep sense of unity with the natural surroundings. Upon reaching the plateau adorned with colonnades, we are provided with a serene space for rest and introspection before continuing onward to the next flight of stairs. This remarkable structure seamlessly integrates with its environment, creating a profound sense of enclosure and oneness.



Analysis of Rani Ki Vav. Source: the Author

11. Modhera Sun Temple



Figure 23

Information

1026

Purpose: Worship of Sun and water

Well is 54 x 37 meters

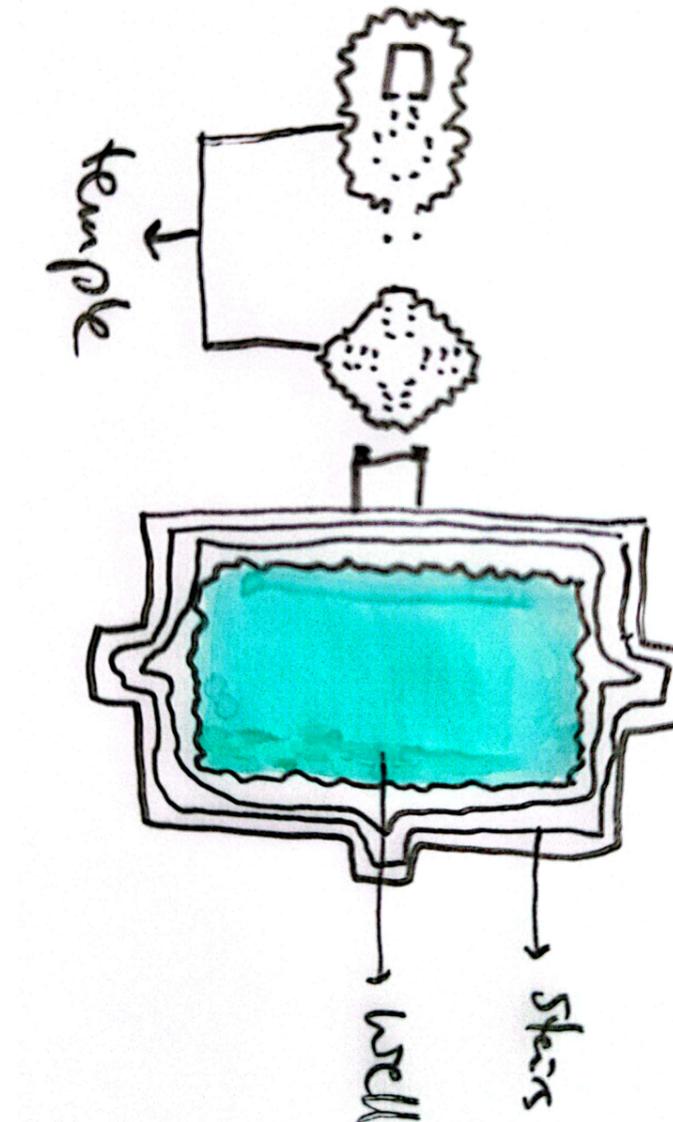
Modhera Sun Temple. Source: Sun Temple Modhera - History, Architecture & Interesting Facts | T2B (taleof2backpackers.com)

Architecture

A magnificent flight of steps provides access to this sacred pool, which holds significant importance for ritual ablutions. The pool is meticulously crafted with a rectangular layout, featuring a series of platforms and terraces adorned with shrines of diverse sizes and shapes. Skilfully constructed small pyramidal stairways connect the terraces in staggered rows, while the presence of low semicircular steps (ardhachandra) on their landings adds an elegant touch to the architectural design.

Spirituality/Serenity

A multitude of skilled artisans and sculptors poured their talent and craftsmanship into the creation of this magnificent structure. The significance of this site is exemplified by the presence of the king himself, who would visit to offer prayers to the sun. Not only did this complex serve as a stepwell, but it also functioned as a hub for music and dance performances. The harmonious rhythms, combined with the multiple layers of depth within the structure, including the temple at its center and the reflective waters, contribute to an atmosphere of profound spirituality. It truly is a place where various elements converge, creating a space that transcends the physical and reaches the realm of the divine.



Analysis of Modhera Sun Temple. Source: the Author

12. Adalaj Stepwell



Adalaj Stepwell. Source: <https://ahmedabadtourism.in/adalaj-stepwell-ahmedabad>

Architecture

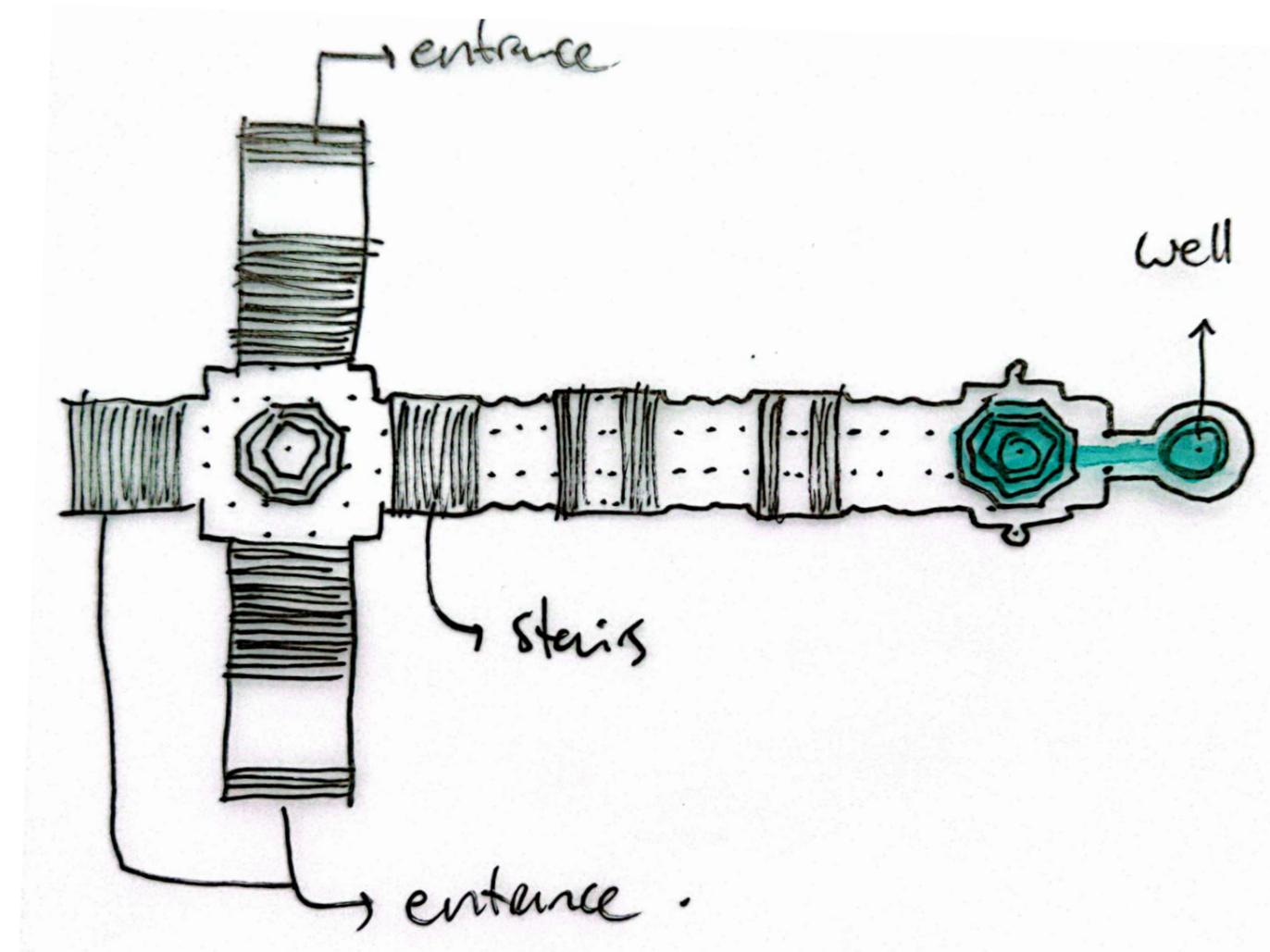
The remarkable structure was frequented by local residents for traditional rituals, adding to its cultural significance. Crafted from striking sandstone, the square stepped platform leads to a deep well below, symbolizing the vital role that stepwells played in providing water for drinking and household purposes in ancient times. Known as vav in Gujarati and baoli in Rajasthani, these architectural marvels are especially prevalent in the semi-arid regions of Gujarat. The water festival held at Adalaj drew numerous visitors, eager to witness captivating performances by renowned musicians, further adding to the allure of this remarkable site.

Spirituality/Serenity

As visitors descend the steps of this magnificent stepwell, they are transported back in time, surrounded by the awe-inspiring architecture and a serene ambiance. Exploring this historic monument is a captivating experience, especially for those who have a deep appreciation for the past. This remarkable five-storey stepwell holds great significance, not only for its architectural grandeur but also for the intricately engraved deities adorning its walls. It is believed that villagers flock to the stepwell to offer their prayers and seek blessings from these revered deities. At the entrance of the stepwell, a temple stands as a testament to the spiritual importance of this

Figure 24

Information
1498 CE



Analysis of Adalaj Stepwell. Source: the Author

13. Toorji Ka Jhalra



Figure 25

Information
1740 CE

Toorji Ka Jhalra. Source: <https://kevinstandagephotography.wordpress.com/2017/03/21/toorji-ka-jhalra-jodhpur-step-well/>

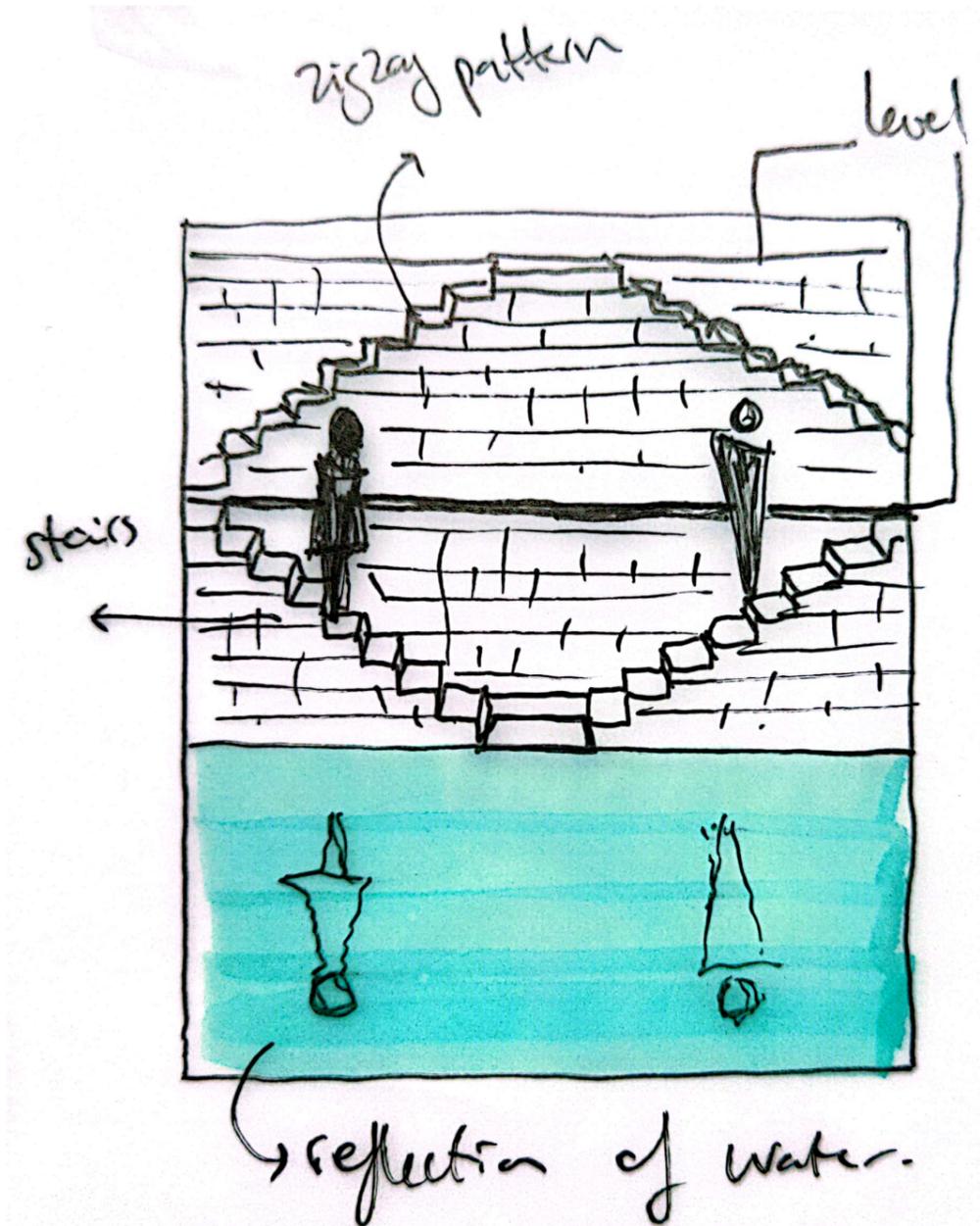
Architecture

During the excavation process, the depths of over two hundred feet revealed a hidden world of hand-carved wonders in Jodhpur's renowned rose-red sandstone. Among these treasures were exquisite carvings depicting dancing elephants, majestic medieval lions, and intricately designed cow water-spouts. The stepwell also featured niches that once housed long-forgotten deities, adding an air of mystery to the site.

Spirituality/Serenity

Within this complex, numerous square-carved openings adorn the staircases, offering a respite from the sunlight and providing a cool, shaded sanctuary for rest and prayer. These intricately crafted carvings not only serve a functional purpose but also contribute to the overall aesthetic appeal of the site.

The design of this complex fosters a sense of tranquility and togetherness, creating an enclosed space where people can gather and connect. It offers a serene environment for individuals to come together, reflect, and engage in communal activities. The combination of architectural elements, soothing surroundings, and the presence of water creates a harmonious atmosphere that encourages a sense of calm and unity among visitors.



Analysis of Toorji Ka Jhalra. Source: the Author

14. Geban Shah Vav



Geban Shah Vav. Source: <https://champaner-pavagadh.blogspot.com/2007/12/geb-anshahs-vav.html>

Figure 26

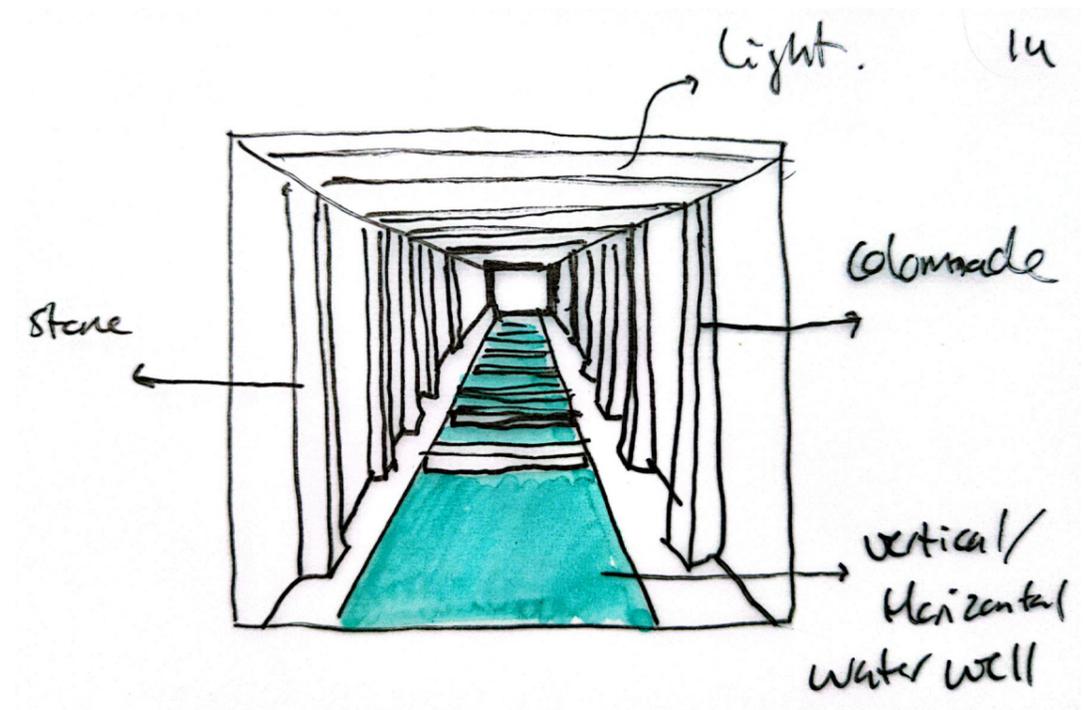
Information
16th Century
52 meters long

Architecture

Despite its imposing size, the stepwell's design embraces simplicity and elegance, with minimal decorative elements and made out of sandstone. Platforms encircle the well shaft at each landing, offering convenient resting spots for those navigating the stairs. The stepwell played a crucial role as communal resources, providing vital water supplies to the surrounding areas. The ingenuity of the design relied on subsoil flow, utilizing the natural filtration properties of the soil to maintain the water's purity. This sustainable approach to water management not only demonstrates the builders' resourcefulness but also underscores their deep concern for the welfare of the community.

Spirituality/Serenity

The stepwell's entrance emanates an aura of understated refinement. It evokes the sensation of traversing a water pathway, with stones appearing to hover above the surface. The architectural design of the stepwell is marked by a captivating interplay between light and shadow, creating an aesthetically captivating spectacle. Crafted predominantly from stone, the structure imparts a feeling of enclosure, further enhancing the intimate atmosphere within.



Analysis of Geban Shsh Vav. Source: the Author

CONCLUSION

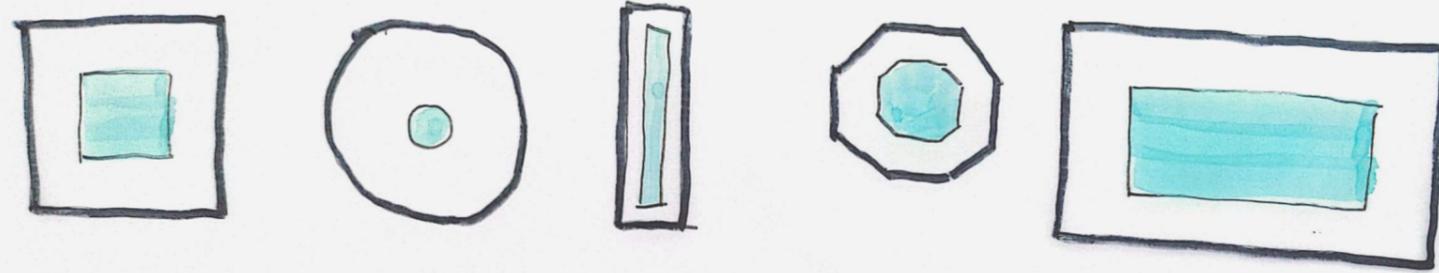
RESULT OF CASE ANALYSIS

Figure 27

Design guidelines. Source: Author.

Form

*The way people
will follow the
structure*



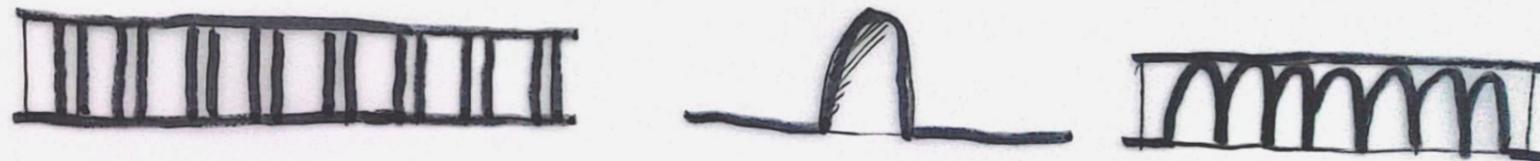
Routing

*(creating playful
shadows via
Stairs & setbacks)*



Collonade

*A sense of em-
bracement*



Enclosed by earth

*creating a cooler mi-
croclimate due to the
presence of water*

