Cover Sheet

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1. **Amphibious Housing**: Mekong Delta, Vietnam: Vernacular typology 4th century BC
2. **Mont Saint Michele**: Normandy, France: Bishop of Avranches, 8th century CE
3. ***Acqua Vergine***, **Roman Aqueduct**: Rome, Italy: Agrippa: 19 BCE
4. **The Blue Lagoon Geothermal Baths**: Reykjanes Peninsula, Iceland: Sigríður Sigþórsdóttir and Basalt Architects: 1999

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Biographical Sketch

Sarah Kenney is Chancellor's Fellow at the University of Tennessee, where she is receiving two Master's Degrees in Architecture and Landscape Architecture. Sarah has received grants to study conflict, reciprocity, and water in the architecture of Kenya, China, Italy, Vietnam, France, and Iceland. She plans to work for the United Nations Human Settlement Program, focusing on justice oriented architectural practices in cut-flower production enclaves.

My Fun Fact: I used to work as a celebrity florist in New York City.

Liquid Architecture: Fluid Reciprocity Between Design Disciplines

Fig. 1. View of a contemporary Vietnamese stilted house in a storm, (view facing west), Cat Ba Island, Ha Long Bay, Vietnam, 21st Century.

The greatest illusion of this world is that of separation. Not only does architecture shape our visual perception of the world, it acts as an operant, ally, conspirator, influencer, and distributor of elements. The edge between architecture and landscape is fluid (sometimes seamless); exterior phenomena penetrate the sanctity of interiors, and novel landscapes can be borne from these interventions. Architecture is always an actor within a larger system, its physical form affecting the landscape around it in ways that are economic, social, environmental, and political. Architects often focus on how a

design responds to local conditions, but less frequently consider the way that existing conditions will respond to it. The qualities of a composition cannot be reduced to a singular site, and should be thought of as interacting with large, abstract, and undervalued moments within a liquid system.

In co-existence with architecture, water moves across roofs, through pipes, and to the ground. By paying close attention to this, we can see that there is exceptional architecture that purposely changes and redistributes water – modified, codified, distorted and shared. The most outstanding architecture in the world involves a reciprocal relationship with landscape, and the form of this interdependency can be traced with the path of water. Using four sites, this paper will analyze the reciprocal relationship between landscape and architecture, using water as a conceptual lens which will focus the discussion. The site chosen are:

1. Amphibious Housing: Mekong Delta, Vietnam: Vernacular typology 4th century BC
2. Mont Saint Michele: Normandy, France: Bishop of Avranches, 8th century CE
3. *Acqua Vergine*, Roman Aqueduct: Rome, Italy: Agrippa: 19 BCE
4. The Blue Lagoon Geothermal Baths: Reykjanes Peninsula, Iceland: Sigríður Sigþórsdóttir and Basalt Architects: 1999

This paper will include a formal analysis of each site and will expand on individual analysis by examining architecture through the lens of landscape urbanism.

Vietnamese Liquidity: Amphibious Approaches to Flood-Tolerant Housing

Fig. 1. View of the stilted style amphibious house, (view from the river looking inland), Region surrounding Can Tho, Mekong Delta, Vietnam, 20th century.

The air is so dense with water, that rain precipitates without clouds, coagulating invisibly, signaling a monsoon. The rain is a cause for celebration, the start of a new season, and an unexpected holiday. In the lowland valleys of Vietnam, the rainy season floods agricultural fields, preventing villages from working. While on this imposed vacation, the adults wear waist-height waders and put on water puppet shows in the flooded fields. Raised on stilts, a few of the houses have relatively dry porches where children gather to watch the show. The front edges crowd with kids, and small legs dangle over the

sides, while arms encircle each other. Heroes and dragons dash across the river's engorged surface, creating waves and arcs, using the water as a tool of creative expression in this uniquely Vietnamese art form.

The water puppets exemplify this cultural relationship with a flood prone environment—it is something to be both embraced and exploited, understood in the context of its careless temporality. In the same way water puppets are a regional version of a global artform, the amphibious architecture of the the Mekong Delta is a unique flavor of an international phenomenon. Resilient design is popular in the era of climate change, but the vernacular of this country uniquely embraces water, imbibing it as a part of the architecture, recognizing water to be of central importance.[1] In this region, the native housing is amphibious, adapted to every point on the river's edge.[2]

[1] Thi Hong Hanh Vu and Viet Duong, "Morphology of Water Based Housing in Mekong Delta, Vietnam." Ho Chi Minh, Vietnam: University of Architecture Ho Chi Minh City, 2018.
[2] Ibid.

Fig. 2. Trade between land and water at the floating market, (View from bridge above the Phong Dien floating market), Phong Dien, Mekong Delta, Vietnam, 21st Century.

The Mekong River is the third largest in Asia, draining a 300,000 square mile watershed across Tibet, China, Myanmar, Laos, Thailand, Cambodia, and Vietnam. The water is muddy brown, the runoff from seven countries and dozens of ecosystems. During monsoon season, the rains carry soil downstream, deposit it in the Delta, and replenish the viability of agricultural lands. Southern Vietnam can be thought of as a one large delta landscape--flat, moist, and made of a thousand branching river systems on their way to the sea. This has obvious repercussions, putting pressure on the buildings which must be able to withstand problems of bank erosion, first floor flooding, and wet structural elements, resulting in architecture inextricably linked to its topography. Even the best architects shy away from engaging unstable physical systems, like riverine edges. Designers usually opt for predictability over complex engagement--but in this region, there is a shining example of environmentally responsive design. In conjunction with this monsoonal climate, Vietnam has developed a suite of typologies, which can be understood as a spatial manifestation of the national approach to water, rain, and flooding.

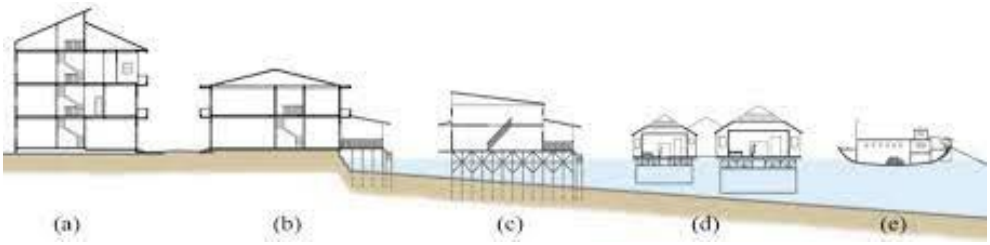

Fig. 3. Vu and Duong, Housing variability according to placement on the river, University of Architecture: Ho Chi Minh City, 2018.[3]

[3] Ibid.

Vietnam's amphibious architecture has exceptionally adaptable characteristics, ranging from fully waterborne to completely landlocked. According to Thi Hong Hanh Vu and Viet Duong, scholars at Ho Chi Minh University of Architecture, there are five main amphibious housing categories--—mobile, floating, stilted, flood-tolerant, and dry-fortified—-each a product of the building's location relative to the river's edge. As an expansion on the foundational work by Vu and Duong, this can be refined into two categories: variable and static.

Fig. 4. A typical group of floating house with storage sheds, dog kennels, fish farming, and potted plants, note the lack of vegetation on the cliffside indicates the water level changes over seasons, Cát Bà Island, Ha Long Bay, north Vietnam, 21st Century.

The houseboat, stilted, and flood-tolerant structures directly respond to water and climate, while the dry-fortified and floating forms are static within their site. The fortified houses block the entrance of water, while the floating form simply uses water as a

stationary building site, each working on preventing flooding instead of embracing it. New houses tend to be dry-fortified, so they are safer every day, but do not have the flooding benefits seen in the most vibrant design of the Delta. While the relevance of the static form is undeniable, as it remains a popular style, it would be more beneficial to spend time analyzing the variable typologies, as they can be used to glean information about the future of resilient housing inside and outside of Vietnam. While amphibious vernaculars cover South-East Asia, the Mekong Delta in Vietnam is the best place to study it because of the ecological consistency and low level of modern development. While this strategy is present in all riverside settlements in Vietnam, the strongest historical example can be seen in the ancient town of *Hội An*.

Fig. 5. A floating house in the northern Vietnamese Highlands, (View from inland hiking trails), Ho Thuy Dien Thac Ba Reservoir, north Vietnam, 20th Century.

Fig. 6. Quan Thang Ancient House with adaptable facades and Chinese influenced ornamentation, (View from street facing northeast), Hội An, Vietnam, 18th century.

Hội An, a city dressed in silk and rain, is a delta town in south-central Vietnam, which has functioned as a major textile trading hub since the 15th century. The city was settled on the broken landmasses of the inner delta--inland enough to avoid daily tides, coastal enough for seafaring trade. *Hội An* categorizes its weather into two seasons: wet and dry. During the dry season, the river depth is consistent day by day; however, in the wet season, *Hội An* can experience major floods every week. The Vietnamese government restored this city to resemble its 19th century glory, and now a historical

example of amphibious architecture can be observed in the field, instead of through texts. Here, because of its exceptional preservation, it is possible to understand traditional components of the flood-tolerant architectural style including an adaptive façade, interior-exterior connectivity, and the highly porous urban plan.

Fig. 7-8. Two adaptable façades viewed while open and closed, *Hội An Historic Center, south-central Vietnam, vernacular since 4th Century CE.*

In *Hội An*, the fronts of buildings are unique, with facades amenable to climatic conditions. Families gather in the central market to feel the air, and the coming storm can be predicted by the humid tactility of the wind. Houses that line the waterways have an open front, a living room which takes up most of the first floor, and a wide staircase connecting to the second-floor bedrooms. The lowest portion of the buildings are open from front to back, and closed side-to-side, creating a box open on two ends. To prepare for the flood, families dismantle their facades, then move furniture and valuables upstairs before hunkering down with family and friends to wait out the

storm. The buildings are designed to remove the horizontal wooden slats from the facades, and during a monsoon, water flows unimpeded through the lowest level. The flood-tolerant style is constructed with strong, water-resistant material, allowing the lowest floors to safely fill with water during a monsoon. Walking down the riverside streets of ancient *Hội An*, the façade style is consistent and noticeable because it is a functional response to the local pressures of water, creating a distinct regional aesthetic.

Fig. 9. View from the streets of *Hội An where a renovated tea house has a two front doors and a contiguous interior with the parallel street, (view facing south), Hội An Historic Center, southcentral Vietnam, 4th Century CE.*

In addition, many buildings in *Hội An* have a contiguous interior between parallel city streets. The shops and homes are thin and deep,

connecting with adjustable facades on each end. Looking at the front of a shop, a viewer can see to the opposing street, with teasing views of motorbikes, pedestrians, lanterns, and flowers. By opening the buildings on two sides, they limit hydrologic pressure on the structure during a flood event, letting the water flow through, in, and around the form. This native design responds to the flow of water in a way that provides safety and stability for housing during flood events; and on normal days, the effect is the same on light, wind, and circulation, letting the interior have a comfortable fluidity with climatic conditions. At an individual scale, wind, water, and light flow unrestricted through the buildings; At an urban scale, the repetition of this form creates a porosity in the pedestrian dominated streets of *Hội An*. In the same way that the buildings do not serve as a barrier to water, they consequently produce fluid circulation patterns through the streets of the city. Parallel roads are perforated by secret passages through shops and restaurants, and this climate responsive strategy has resulted in vibrant urban circulation.

The architecture of this city creates a spatial index of the most common regional aesthetic—-the flood-tolerant house—-enabling scholars and designers to draw connections between the historic and the contemporary. Individual homes echo the spatial organization of Hội An's buildings, even if they are not on a flood plain, proving the wide-spread influence of this traditional vernacular. By using *Hội An* as a basis for comparison, it is possible to draw connections with contemporary housing patterns and traditional flooding adaptations,

understanding what ancient strategies may matriculate into the future of climate responsive design.

Fig. 10. A houseboat transporting agricultural soil, (view from bridge facing the river), exact location unknown, Mekong Delta, Vietnam, photograph taken 22 July 2022.

The boats moving through the Delta make light waves, towing goods at all hours and in all weathers. These large, motorized boats, with their obese cargo containers, are a surprisingly sweet shade of faded blue. The front end of the boat is clear, swept, and stacked with only a few sample items. On the back of the deck is the main cabin, out of which, spill lawn chairs, cooking surfaces, drying laundries, and colorful toys, all precariously encroaching on the captain's wheel. The houseboats of Vietnam move according to changing seasons and fluctuating river levels, docking depending based on where trade winds blow, settling a different site each day. The houseboats are generally occupied by members of two professions: fishing and shipping. As they

move along the Delta, the families are catching squid, tuna, and anchovies, or moving fruit, vegetables, and dry goods. River life is isolating, and while on the move, it is difficult for houseboaters to find a sense of connection outside of the immediate family. The floating markets, pervasive in the Delta, are the answer to this isolation.

Fig. 11. Tour boats leaving Can Tho before sunrise, (view facing east), Can Tho, Mekong Delta, Vietnam, Photograph taken 16 July 2022.

Before the sun rises, boats gather. They arrive in the dark, using headlamps and intuition to find their way through the winding tributaries of the lightless ochre river. The largest and most famous floating market is at Can Tho, and the major trading takes place before the sun rises, when houseboats anchor together, trading from

their front decks. Used by all members of the community, but especially loved by houseboaters, the floating markets are an important social system on the water. The boats make their own little world, where people eat and socialize, having coffee with their morning gossip. Once the sun rises the market radically transforms into a crowded tourist destination. Some of the houseboaters lazily disperse while the river rapidly fills with tour cruisers and small dinghies. The small, pliable boats sell fresh fruit, artisanal coffee, sesame pastries, and bowls of rich Pho, like restaurants bobbing around the water, complete with reusable bowls, utensils, and tea services. Like many rural ways of life in Vietnam, this ancient system stays vibrant by supplementing diminishing traditional revenue streams with income from tourism.

Fig. 12. Pho served from a waterborne restaurant boat, (morning at Cai Rang floating market), Cai Rang, Can Tho, Mekong Delta, Vietnam, photograph taken 18 July 2022.

Fig. 13. Sunrise over a traditional local market, (View from bridge at Phong Dien floating market), Phong Dien, Mekong Delta, Vietnam, 21st Century.

Fig. 14. One rower at sunrise, (View from bridge at Phong Dien floating market), Phong Dien, Mekong Delta, Vietnam, 21st Century.

While many markets are moving towards this contemporary model, some holdouts remain, always far into the tributaries and deeply local. Far into the Delta, the market of Phong Dien is only a dozen small, wooden boats. To the east, the clouds are veiled in iridescent fire, budding with dawn while a broken horizon works to reestablish the sun. In the rouge morning river, run threads of violent indigo and pale ochre, catching birds and flowers on its woven shores. I had never imagined anything could be so beautiful as Vietnam's jungle under the detonation of this dynamite sky. The small boats of Phong Dien create intimacy between traders, and the distance between people

is not much more than at a dinner table. Most are socializing more than exchanging goods--the men have a group of boats, and the women have a group of boats, mixing only to trade, but never to mingle. I am an unexpected presence in this tightly knit group, an accidental spy, an unforeseen voyeur, and will speak no more.

For Vietnamese river traders, the houseboat model allows industriousness and adaptability; however, what is gained in flexibility is lost to instability. The houseboats are constantly moving up and down the Delta, creating transience and truancy in the mobile education system. Because of this, children in houseboat families are almost exclusively homeschooled, widely accepted to be a diminished education relative to the strong national public school system. Although the social programs available to houseboaters are improving—including a recent law providing stable educational services to children—the remainder of the country is rapidly developing, and this community is at risk of being left behind.

Fig. 15. Goods leaving a houseboat, (View from boat at Cai Rang floating market), Can Tho, Mekong Delta, Vietnam, 21st Century.

Fig. 16. Stilted structures in the Delta, (View from opposing road), exact location unknown, Mekong Delta, Vietnam, 21st Century.

In the widest areas of the Mekong, where water flows most swiftly, a Venetian jungle grows from the river. The stilted houses hang over the riparian zone, using water and land in equal amounts, shown by a dock facing the river and a driveway facing the street. The stilted houses, add to the available area for a domestic building's footprint. The riparian zone, normally too unstable for housing, is now used as an extension of the home, next to which grow productive orchards, beautiful flowers, waterborne plants, and lotus gardens.[4] The

[4] Footnote: The Water Lotus is the National Flower of Vietnam.

deep columns, which support the mounted homes, buffer the fast-moving water, and this spatial configuration creates strange ecologies which directly influence the river's ecosystem.

Fig. 17. Wetland forming at stilted structures in the Delta, (View from opposing road), exact location unknown, Mekong Delta, Vietnam, 21st Century.

Around the stilts, soil gathers at the base of the columns, slowing down the water and stabilizing submerged banks. The space underneath the structure's floor has little light available for growth, creating what could have become an ecological dead zone. Instead, the pneumatophores[5] of mangroves lean in, and use this

[5] Pneumatophores are a type of root adaptation where roots of plants grow underwater into submerged banks for stability, then up and out of water to colonize the emergent zone where oxygen exchange takes place.

lightless area as a place to oxygenate their shoot systems. Waterborne plants also congregate around the stilted structures, where the tangled combination of stilts and mangroves catch transient plants like *Eichhornia crassipes*, water-hyacinth, and *Nelumbo nucifera*, Vietnam's national Lotus flower. Weeds are captured in this natural trap, escaping just as easily because of the high level of human activity, causing riverine disturbance. Each morning, when the boats depart from their docks, Lotus break loose from their temporary clumps. Small bundles of leaves and flowers travel in a steady stream downriver, catching on boats and traveling with the river traders. At the floating markets, water-hyacinth lazily gather at the bows, waiting until the market ends to break away, and to continue this ephemeral ecology downstream.

Fig. 18. Mobile water hyacinth temporarily trapped by houseboats, (View from boat at Cai Rang floating market), Can Tho, Mekong Delta, Vietnam, 21st Century.

Because the national relationship with water is so culturally ingrained, it has a multi-scalar presence in the identity of the country. The approach, defined by Vietnamese liquidity, can be seen in the city of Ho Chi Minh--amphibious architecture at an urban planning scale. Much like *Hội An*, the city is spread widely on a shattered landmass, reconnected with amphibious infrastructure. In the city's precolonial quarters, the streets are aligned with the topographic contours and river edges. The buildings are low, connected with small bridges, and intimately involved with the river. One thing that is so interesting is the radical differences between Vietnamese planning and French Colonial planning, easily observable in the historical map of Saigon located in the Central Post Office.[6] In the areas of the city with a higher degree of Western influence, there is little to no relationship between the urban fabric and riverine waters. The city and river are separated by a highway, a common practice in European cities, and one which alludes to the historical value of riverside property. The French areas of the city pressure landscape to serve as a backdrop for urban formalism; The Vietnamese areas have a more fluid relationship between land and water. Tensions between Eastern and Western attitudes can be seen in this map, and Western architecture spatially critiques its own reductivity.

As recently as 2016, the Vietnamese government has made major infrastructural investments in the region, and it is slowly moving people away from the larger, courser, areas of the river. The

[6] Footnote: This building is a remnant of the French Colonial era.

reduction of stilted buildings is predominantly because of conditions which are unsafe relative to modern standards, and with centuries of erosion and current issues of climate change, this is a valid concern. But with the destruction of amphibious houses, this region is losing something, not only culturally unique, but with massive prospects for tourism. Like Venice, which uses its liquid architecture to bring international travelers, the tourism in the Mekong could stabilize income in rural areas, while also promoting cultural exchange. In a country that prioritizes architectural tourism as strongly as Vietnam, it appears counterproductive to reduce the prevalence of amphibious design. But there is hope. In the wetlands, marshes, and smaller tributaries of the Mekong, the concern about erosion is not as pressing, and thus, this is where the ancient vernacular continues to thrive.

Together, these ideas about architecture in the Mekong Delta can begin to answer questions on the long-term effects that amphibious design has on a modernizing culture. The resilient typology has continued to be updated, and the transfer of this ancient aesthetic has resulted in award-winning contemporary design, hinting at a hopeful future for this threatened vernacular. There is a growing need to preserve amphibious housing because of its ecological properties and cultural heritage, and I argue that this region should be added to the UNESCO World Heritage List, as it contains both "cultural and natural heritage considered to be of outstanding value to humanity."[7]

[7] UNESCO World Heritage Foundation, Operational Guidelines 2021, Committee Reference 44 COM 12. Online Resource, accessed 6 January 2023.

As much as the architecture is responsive to the landscape, the landscape consequently reengages with the housing, forming a distinct integration between design and nature, and together, they form a globally unique typology.

Fig. 19. Man steers a houseboat with his foot, (View from boat at Ha Long Bay), Cat Ba Island, Ha long Bay, Vietnam, 21st Century.

Irreducible Pilgrimage: Liquidity and Danger at Mont Saint Michel

Fig. 1. View of historic pilgrimage looking south, Mont Saint Michel, Normandy, France, 8th Century CE.

On one beach in the north of France, water is an ambivalent element––a villain, a savior, a dragon, a chimera. Pilgrims, coated in sweat and salt, walk the dirty earth to the island sanctuary of Mont Saint Michel. Here, water is a symbol of earthly treachery and baptismal liberation, serving as both a barrier to egress and spiritual challenge. The ocean ebbs and flows, dramatically changing the sea level with each tide, creating a dangerous landscape, made more so by the invisible quicksand which threatens to pull people into watery hells. In the imagination of the monks living on the pinnacle

of the island, this landscape is also home of the serpent, the devil, and the treacherous. Pilgrims travel across the dangerous estuary, despite the risk, so that they might pray in this Gothic Abbey.

Now, Mont Saint Michel is an architectural beacon within a perilous landscape, an enclave of interrelated architectures connected by water. In the peril of the sea, this rocky island sits 1km off the southern coast of Normandy amidst the largest tide in Europe. The bay of the Mont is at the confluence of three rivers and a channelized sea. Twice a day, from 50km away, the tide rushes into the landscape at 25 miles per hour. It gallops in, and crashes against the outflowing rivers, mixing salt and soil which merge into whirlpools leading to the Devil's lair. Even today, every two days a helicopter is needed to save a wanderer who has been swept out to sea. This is the arena for Archangel Michael's earthly trial, where the pilgrim must face the judgement of water.

Fig. 2-3. View of tourists in quicksand and knee-high mud, Bay of Mont Saint Michel, Normandy, France, 8th Century CE.

The placement of Mont Saint Michel can be seen as a seat of Angelic power battling a natural devil, the water. Because the tides are so important to the religious interpretation of the Abbey, the architecture is inseparable from its landscape. In some ways, the pilgrimage is a repetition of the baptismal act. It is a confirmation of faith, where the waters cleanse earthly sins, from which point the pilgrim may ascend into the light of heaven. And here, I walk the thousand-year-old pilgrimage to the cathedral of Saint Michael.

Fig. 4. View of the golden angel on the pinnacle where Saint Michael is shown as the mediator between heaven and earth (looking south from the low-tide landscape), Mont Saint Michel, Normandy, France, 8th Century CE.

Saint Michael the Archangel is "he who leads the souls of the chosen to the land of eternal rest"[1]—the gatekeeper of heaven, the leader of angels. Though angels are often depicted as peaceful or beautiful, Saint Michael was a merciless dispenser of bloody justice. Using the sword with which he fought Lucifer, he slashed a series of earthly trials onto Christendom. On the Summer Solstice, the setting sun draws a line from Ireland to Jerusalem, which marks his Seven Sanctuaries.[2] This phenomenon, known as the sword of Saint Michael, is a line of seven equidistant sanctuaries dedicated to the holy warrior. These churches are strangely similar, each requiring a treacherous pilgrimage to reach the hall of prayer. The violent journeys show that only the most loyal—those religious in the face of danger—would be able to pay patronage to him. The journey is one of humility, insecurity, danger, and justice. Once you have reached the spiritual sanctuary, Michael will be willing to hear your prayers. In the dark of night, Archangel Michael came to the bishop of Avranches in a vision of light and fire, commanding a sanctuary to be built atop a rocky island in the turbulent bay of Normandy.

From the small town of Genet, pilgrims ramble west toward the central *Isle Tombelaine*, where you can see the fossilized body of the dragon slain by Saint Michael—that is, if you believe local legend. Before the Old Testament was written, Archangel Michael chased a dragon from the coast of Brittany until it violently crashed into the Mont. There, Michael won their second battle when he knocked it from

[1] On-Site Exhibition, *Mont Saint Michel*, 2022.
[2] Norbert C. Brockman. Encyclopedia of Sacred Places, 2nd Edition [2 Volumes]. 2nd ed. Santa Barbara, Calif: ABC-CLIO, 2011.

the island into the bay. During the third battle, Michael slayed the dragon, letting the sea harden its body, which now marks safe passage for pilgrims.

The journey to Mont Saint Michel is a thousand years old, through quicksands, rip tides, and rising waters. On the rocky shores, salt tolerant plants cover the lowlands, the base of their stems covered in a chalky soil which marks the tidal fluctuations. Although the silt is superficially uniform—-generally an alluvial gray-brown, sick with clay and ripe with salt—-the soils of the pilgrimage are amazingly diverse, with dozens of tactile experiences touching the feet of pilgrims. Two seemingly identical pools are side-by-side. Stepping into one, it barely covers your feet. Stepping into the other, you sink to your knees in the sticky oceanic detritus—sometimes sand, sometimes mud, sometimes tiny shells, sometimes dead fish. Even with an experienced guide, the trip is disquietingly unpredictable.

Fig. 5. Soil saturated with salt and mud paints the base of plants white during low tide, Bay of Mont Saint Michel, Normandy, France, 8th Century CE.

Fig. 6. The village of Mont Saint Michel (looking north from south pedestrian bridge), Bay of Mont Saint Michel, Normandy, France, 8th Century CE.

From the *Isle Tombelaine*, you turn south and atop a feral landscape, you see the Abbey as it has appeared for generations. Set on a high rocky place, a visitor can see Michael's role as a mediator between heaven and earth manifested in this design. With half a mile left, travelers kneel before the Mont, cleansing their feet in a bit of clear water before entering the sacred site from the main gate. There is a village built on the southern face of the island, originally for the servants of the monastery. The location of the houses protects them from wind, while also preserving historic views during the pilgrimage from Genet. There is a switchback path leading to the monastery, paved with the same warm stones of the Abbey. As you

ascend, views of the cathedral are sporadically blocked by the architecture of the village, enticing you up to the seat of Saint Michael. Three hundred feet above, at the top of the rocky island, sits the Abbey, a masterpiece of gothic architecture.

Fig. 7-9. Architectural details of mediation between landscape and architecture, Mont Saint Michel, Normandy, France, 8th Century CE.

The Abbey at Mont Saint Michel is the primary space for the Benedictine monks. The monastery and cathedral have grand floors supported by a crypt carved directly into the mountainside. The technical challenge of both building into and onto a mountainous peak surpasses typical expectations of Medieval skill, creating a sense of wonder. The circulation routes through the Abbey run in a series of compressions and releases. Tight spaces are followed suddenly by large ones, and grand stairways lead toward intimate rooms. Repeated tension-and-release creates cognitive tension. One corridor forms a 90-degree angle with a west facing one, catching the westerly winds, and forcing air circulation into the lower crypts, which is felt like

a gentle breath. In the cathedral, views from the interior to the exterior are constrained, with perspectives focused on heaven. The cathedral is the highest space on the Mont, and during mass it fills with light and song. The Gothic form provides strong acoustics, and for the pilgrims who came to witness men of God, the pointed arches and vaulted ceilings concentrate sound, turning the monk's chants physical. Set in stone walls, windows glow, their light catching on the convex stone sills. These apertures resemble the Empyrean, reinforcing a Christian interpretation of space and light.[3] The viewers are given a sensory and emotional overload which forces an impression of wonder. Feeling overwhelmed makes people want to ease their burdens, and in a church, what better way to do this than to accept the metaphysical confusion and give themselves over to God. Together

[3] Footnote: Lux, Lumen, and The Empyrean
In his article *Lux and Lumen: The Symbolism of Real and Represented Light in the Baroque Dome,* Fabio Barry makes the argument that the importance of natural light in Catholic Architecture is due to its association with original divine light. In Christianity, it is believed that God's essential nature was an uncreated light, a pure form of energy outshining all else in its own coruscating brilliance. The essence of God cannot be conceptualized by humans, but it can be approximated in imagining a form of pure, perfect energy known as *lux*. Within The Empyrean, the natural light that radiates from it is seen as a direct connection to God, both physically, by its photon path, and metaphorically, by its sacred form. Since antiquity, embrasures and windows were used to create streams of light, which were viewed as funnel connections to the divine. A window had the power to frame and direct light into a tangible ray. Devout visitors believed these streams of light, were paths that lead directly to God – a connection defined by the *lux-lumen* relationship.

this is a catalytic choreography that primes pilgrims for a religious experience within the walls of Mont Saint Michel.

Fig. 10. Controlled light in the Cathedral and Abbey (interior views), Mont Saint Michel, Normandy, France, 8th Century CE.

The architectural interpretation of Mont Saint Michel cannot be reduced to broad discussions of Christian symbolism. There are specificities to Archangel Michael's chosen site which merit investigation. At the *Scriptorial d'Avranches*, the primary archive of Mont Saint Michel, there is a fantastical exhibition about the dragons, monsters, and chimeras found in the Abbey's manuscripts. It states that "worship of Saint Michael was not widespread in antiquity. During the first centuries of Christianity, the Archangel was primarily venerated in Asia minor, and would later spread to the western world via Italy. [At this time], legends of water as a dragon, or monster, were prevalent in Asia minor," and the architecture of Mont Saint Michel shows how this social perception made its way to the

Western world.[4] In the Scriptorium, monks read, write, and craft books, then design illustrations to go inside. These tomes are full of creatures inspired by the wild stories of religious pilgrims. The scholars at the *Scriptorial d'Avranches* claim that "Monsters, by definition, are an aberration of divine rule. They represent a spiritual transgression…a combination of two or more parts of different animals forming composite creatures. And importantly to note, these chimeras embody a moral and spiritual fault."[5] The chimeric combination of fresh and saltwater may have been a medieval device for explaining the treachery of Mont Saint Michel's landscape. Furthermore, the ideas from this exhibition are applicable not only to understand the mediaeval spirit, but to explain how the landscape influenced architectural choices at Mont Saint Michel.

Carved into the capital of the cathedral's north transept, two dragons circle each other, their necks entangled as they curl backwards to bite flowers growing from their tails. For many, this would be a reference to the story of Archangel Michael slaying the devil's dragon; however, there is an alternative explanation. Twice daily, the incoming tides crash against the outflowing river and devilish whirlpools emerge. This carved detail of the Abbey presents the two dragons circling each other, alluding to the tidal whirlpools. This pattern, with two animals encircling their necks, is varied in

[4] "Dragons, Monsters, and Chimeras. What a Bestiary!" Temporary Exhibition at Scriptorial d'Avranches, 9 April 2022 – 4 March 2024. Avranche, Manche, Normandy, France. Accessed July 2022.
[5] "Dragons, Monsters, Chiméras." Scriptorial d'Avranche, 2022-24.

other capitals, with other animals, proving the symbolic importance of water and site.

Not only is the architecture influenced by the landscape, but design choices directly influence the perception of the bay. Inside the Scriptorium, twenty-foot windows are made of bubbled, hand-blown glass, creating a rippled view of the bay, distorting its impression into something impossibly turbulent. In addition, isolation on the island is what kept the monks spiritually pure—separate from, but not ignorant of, life external to the monastery. However, it is possible to see how this isolation might lead to strange imaginings of the outside world. Because they did not have experiences outside of the monastery, their perceptions are tied to it, influenced by the way that architecture frames the environmental and religious systems.

The legacy of Mont Saint Michel extends far past its Gothic form—in the same way that the design and interpretation were affected by its liquid landscape, the operations and preservation of this Abbey have significantly changed the surrounding lands in France. Furthermore, because the landscape is so integral to the religious connection to the Archangel, Mont Saint Michel's continuance as an architectural site also allows this building to be an agent of ecological preservation.

Fig. 11. View of the estuary, dam, and biking trail (From the southern tributary looking north), Mont Saint Michel, Normandy, France, 8th Century CE.

The traditional journey to Mont San Michel was from the northern town of Genet, despite the island being far closer to the southern shores. For centuries, the southern land was a swampy marshland, impossible to traverse and more dangerous even than the tidal waters. In 1879, a dyke was built, and the area was planted with Tulip Poplars.[6] A water drinking specialist, the Tulip Poplar removes massive quantities of liquid from its soil. These trees were planted in a sporadic pattern, which drained the lands on the south shores of Mont

[6] *Genet to Mont Saint Michel*, Interview with State Sponsored Tour Guide. Sourced with assistance at the Office de Tourisme de Pontourson. July 2022.

Saint Michel. In addition to creating a safer, closer passage for pilgrims, this became the major agriculture production area for the Abbey's inhabitants, providing wheat, vegetables, and meat, in addition to supplemental income for the priory's bursar. Once this area was safe, herding became a major part of the southern estuary, where Salt Marsh Sheep eat brackish plants while they roam.[7] Because of their diet, the sheep have a regionally distinct flavor—salty, earthy, and rich. To support the religious enclave, the surrounding site was drastically changed, not only creating novel ecosystems, but also new species. This heavy-handed pattern of engagement continues to affect the contemporary ecology in the bay.

Today, the preservation of Mont Saint Michel's landscape is as important as that of the architecture. Since its construction in the 8th century, the maritime site of Mont Saint Michel has changed. Alluvial soil deposits, upstream dams, and agricultural erosion have encroached into the estuary, moving domesticated lands ever closer to this Gothic island. The silt build up is close to creating a permanent land connection between the estuary and the Mont, threatening the iconic maritime characteristics of this church.[8] In 2009, a dam was commissioned at the mouth of the major tributary south of Mont Saint Michel to protect the fluctuating temporality of this castle.[9] When the tides flow into the bay, the dam preserves some of this water, releasing it slowly back into the ocean. Additionally, it collects

[7] *Genet to Mont Saint Michel*, Interview, 2022.
[8] Alexander Still, "The Massive and Controversial Attempts to Save one of the World's Most Iconic Island" Smithsonian Magazine, June 2014.
[9] Still, "Massive and Controversial," 2014.

rich sediment from the river, and prevents the bay from filling with sand. The dam began as an aesthetic endeavor, preserving how Mont Saint Michel looks to the millions of annual tourists, and it also created positive cascading ecological consequences in the surrounding area.

Fig. 12. Old Quarry worker path now used as hiking trail,(facing east), Isle de Chausey, Normandy, France, 8th Century CE.

Additionally, the *Isle de Chausey* is a fantastic recreational landscape, where the quarry site for Mont Saint Michel has become a regional destination. Using the old infrastructure of the miners, the island is now covered in hiking trails and strange geology, creating a small, but impactful contemporary landscape. Stone was cut at *Chausey*, and transported by boat to the shores of the Mont. The quarry site is now weathered by centuries, filled with plants, and refined for tourism. It no longer appears to be a post-extraction landscape, instead it seems like a bizarrely natural geologic phenomenon. The stone was cut from the steep shores, creating an artificial cliffside, which in addition to the emerald waters, add to the natural splendor of the site. Houses are built into alcoves cleared of stone, below

which, a low tide landscape of discarded cut stone exists. The main viewpoints on *Chausey* are created by former quarry sites, where the builders cleared landscape and opened views. The cliffsides that were cleared of vegetation are connected by old masonry pathways, which have been unused for a thousand years. The island did not need additional development to utilize the landscape, its post-extraction landscape was primed for engagement.

Mont Saint Michel's architecture is not an explicit operator, but it becomes a symbol through which projections and pressure can take place. Though it is a passive effort on the part of Mont Saint Michel, the expensive restoration of the estuary is a result of the architectural preservation of this Gothic marvel. The necessity of preserving the maritime characteristics of the building proves the importance of the landscape, and the combination of the bay, island, agriculture, and abbey should be treated as an interrelated system. While largely positive, the issue also begs questions about the long-term costs of preserving architecture, as well as its related landscapes. The French government's massive efforts to preserve the tidal identity of this Gothic enclave are worth bringing up in an extended exploration of water and architecture.

Mont Saint Michel contextualizes, responds to, and influences the site on which it sits, making it both a masterpiece of architecture, and an agent of landscape design. While contemplating this marvel, overlooking a sunset on the sea, into my mind comes a quote written on one lonely plaque outside of the Abbey. On the overlook adjacent to the cathedral, I imagine I am the person that spoke with this one

lonely monk, gazing out to sea. "What is the point of looking towards the horizon?" I ask. He responds, "We come here to search for heaven."[10] And at this moment, I feel that God is real, and weep.

Fig. 13. Mont Saint Michel at Sunrise, (looking northeast from the bay), Bay of Mont Saint Michel, Normandy, France, 8th Century CE.

[10] Unknown Monk, 11th century ce. Quoted from a plaque located at the southern entrance steps in the Abbey of Mont Saint Michel.

The Art of Utility: Water, Urbanism, and Aesthetics in Rome's *Acqua Vergine*

Fig. 1. Fountain of the *Acqua Vergine*, *Campo Marzio*, Rome, Italy, 18th Century CE.

This is the longest I have ever waited for a photograph. In the center of Rome, as I followed the street signs, the *via delle Muratte* grew increasingly cramped with crowds, its small medieval profile barely able to contain all of us. When my street opens into the piazza, I realize that six others, equally cramped, also empty into the same space, orienting us toward its main attraction. Crowds have never bothered me, they make me feel like I am participating in something exciting, where enough people have a shared goal that it

must be spectacular. Inside of the madness, I become a friend to strangers, and a stranger to my friends, who were lost long ago in the anonymous mass. I was sure this was a tourist trap, and the harassment from tchotchke salesmen, caricature artists, and slick bartenders did not help. Never in my life have I been so sure that a place was over-hyped, and never have I been so wrong, because let me tell you, that first look at the Trevi Fountain took my breath away.

Fig. 2. Nicolo Salvi, The Trevi Fountain, (View centered in front of fountain facing northeast), *Campo Marzio*, Rome, Italy, 18th Century CE.

Step by step, I patiently move towards our collective goal. Almost immediately after the street pushed me into the piazza, it cuts down towards the center basin, a stone cascade of wide stairs and deep

benches. Although my path remains blocked by hundreds of people, its stepped descent provides unobscured views of the soft marble forms which bathe in the maiden waters of the *Acqua Vergine* urban aqueduct.[1] The whole piazza curves to focus on the storybook sculptures, telling the tale of sea gods, set against a backdrop of false architecture. Stone and water are blown to life by imagined winds, sculpted meticulously by the team under Nicolo Salvi, who spent his life perfecting this design.

Fig. 3. Nicolo Salvi, The urban condition of the Trevi Fountain, (View from street level facing north), *Campo Marzio*, Rome, Italy, 18th Century CE.

[1] Footnote: "Maiden Waters" is a historical term referring to the water of the *Acqua Vergine* network.

Now just a few feet from the lip of the central basin, I suddenly feel small. Around me, the architecture of the piazza grows into tall buildings; before me, the generous waterfalls turn to twenty-foot stone Gods, fading into the carved Baroque façade towering above. The actors of the scene erupt outward from the windowed relief, using the power of water to break from the flat backdrop. Alabaster characters are animated by waterfalls, further accentuated by gentle evening lights, which reflect from the cascades, flickering over the coruscating surfaces of the fountain, animated by hydrologic planning.

I take my photograph, and begin to leave, when a deafening cheer erupts all around, and I shift my gaze backwards, catching the last moments of a man on one knee, hugging a tearful woman. In that central amphitheater of the Trevi Fountain, hundreds of people clap and whistle while they use cameras to capture this iconic occasion of romance, beauty, and love. A masterpiece, the Trevi Fountain is the product of a century long architectural experimentation, which used the *Acqua Vergine* as a laboratory for urban, architectural, and artistic design, its aesthetic maturing along with the ideas of the Enlightenment.

Fig. 4. Materials: Basalt, water, and marble, (View facing east), *Piazza di Spagna*, *Campo Marzio*, Rome, Italy, 18th Century CE.

The underlying reciprocity between landscape, architecture, and urbanism is often hidden--pipes are buried and conduits concealed--so that it can be difficult to see the influence it has on urban planning. Historically, water has been main organizing element of cities, where development took place around rivers, lakes, coasts and springs, and urban centers focused on its collection and distribution. Rome is an extreme version of this pattern, and the water infrastructure is foundational to the beauty of urban planning, especially in the famed historic center, the *Campo Marzio*. Nowhere is this relationship between water, infrastructure, and art so apparent as in the fountains of the *Acqua Vergine* network, which serve the *Campo Marzio* in Rome's historic center. Throughout its lifetime, the aqueous infrastructure has undergone deconstruction, reconstruction, and rearrangement--and in the contemporary, the *Vergine* also embodies the idea of the Roman palimpsest, mutating on top of itself and adapting to the zeitgeist.

The Aqueducts are wandering structures, spreading through the city as bridges, tunnels, pipes, and canals, influencing its organization and aesthetics.[2] The aqueducts have been analyzed as an expression of power, of classical geometry, and of urban form. The larger implications of public space and beauty will be expressed through a detailed study of the *Acqua Vergine*, allowing for detailed analysis that speaks to broader issues.

[2] Rinne, Waters of Rome, 2010.

Fig. 5. Della Porta's Fountain in *Piazza della Colonna* under the afternoon sun, (View facing west), *Piazza della Colonna*, *Campo Marzio*, Rome, Italy, June 2022.

Originally commissioned in 19 B.C.E. by Agrippa, the *Acqua Vergine* was built to serve the eastern end of the *Campo Marzio*, allowing the city to expand east of the River Tiber. However, it would not be until the Renaissance and Baroque interventions in the city, that Rome fully organized around its liquid architecture. After centuries of decline, the *Aqua Virgo*—-later renamed *Acqua Vergine*—-was renovated. During the Papacy's calculated restoration of Rome, the *Acqua Vergine* symbolized the beginning of the literal and spiritual cleansing of the Holy City. The aqueduct provided public access to clean water for drinking, bathing, recreating, cleaning, cooking, and

celebrating.[3] The distribution of water was as much for the landed gentry as it was for the growing urban proletariat, as both economic castes were necessary for the growth and military stability of Rome.[4]

The *Vergine* network is a register of spatial thinking in Renaissance to Baroque Rome, as well as a timeline of the city's intellectual trends. Along with the necessary redevelopment of the aqueduct infrastructure, an urban reformation took place, fundamentally restructuring the city, centralizing water and beauty in its planning. The *Acqua Vergine* became the experimental grounds for a radical approach to the city's infrastructure, architecture, and aesthetics. While Rome is famous for its sculptural fountains spread throughout the *Campo Marzio*, when you observe the system underlying this ornamentation, the importance of water becomes clear.

During the Papal Reconstruction of the network between 1562 and 1570, Giacomo Della Porta was the primary architect for the urban level planning, as well as the architect of 18 new fountains.[5] The reconstruction of the *Acqua Vergine* was a complicated engineering task because of the low headwaters in Salone and the flat topography of the *Campo Marzio*. Being one of the lowest places in Rome, *Campo Marzio* had severe limitations on how water might be directed through the fountains. Each portion of Della Portas infrastructure system -- headwaters, *castellum*, *mostra*, conduits, fountains, sewers--honors

[3] Penguin Atlas, Rome, 2002.
[4] Penguin Atlas, Rome, 2002.
[5] Rinne, Waters of Rome, 2010.

water's natural limitations, redirecting and reframing water without distorting its natural inclinations.

Fig. 6. The golden hour at *Parco degli Aquedotti* during a private tour with an state archaeologist, (View from hills facing southeast), *Parco degli Aquedotti*, Rome, Italy, built 1st Century B.C.E.

No longer able to make a fountain impressive with sheer volume of water display, Della Porta experimented with new methods of beauty and construction. He recognized that typical displays of jets, waterfalls, and cascades, seen elsewhere in Rome, would not work because of the lack of water pressure. In response, he chose to use trickles, bubbles, and weeps in the water displays.[6] In *Campo dei Fiori*, a simple basin fountain with a pedestal spout was one of the earliest additions by Della Porta. The early Renaissance had not yet seen the resurgence of the classical Roman sculptural style, and the first fountains in this network were formal and geometric. In the hot summer months when I was there, while the small upper basin was saturated, the lower basin has only a puddle at the bottom, with a smattering of green algae and plastic garbage. During dry months, Campo de Fiori does not receive enough water to fill the lower basin, showing how the network is beholden to small changes in regional climatic conditions.

Fig. 7. Della Porta's *Campo dei Fiori* fountain being used as a bird bath, (View facing west), *Campo dei Fiori*, *Campo Marzio*, Rome, Italy, 18th Century CE.

[6] Rinne, *Waters of Rome*, 2010.

In addition to the drinking, bathing, and laundry fountains like at *Campo dei Fiori*, which were critical for the *salus publica* of the *Campo Marzio*, the Papal office commissioned Della Porta to create public spaces at Piazza Colonna, Piazza del Popolo, Piazza della Rotonda, and Piazza Navonna along with the new fountains.[7] This was an important maturation in the design for the *Vergine* network because the commissions had previously been focused on individual fountains as opposed to their larger spatial consequences.

Fig. 8. Reflected light, (location unknown), *Campo Marzio*, Rome, Italy, June 2022.

[7] Primary Source, Lettere Patente, 4.

To compensate for the simplicity of Della Porta's straightforward basin fountains, sculptural additions became a crucial strategy in artistic progress in the *Vergine* network. At the Piazza Navonna, for example, Della Porta's original basins are wide and languid, simple in their design and impactful in their execution. Later, Bernini was commissioned to add tall sculptures to the pools, adding a crucial vertical element, balancing the visual composition. While this was an important move forward, the urban condition was yet unaddressed in a critical manner.

In Navonna, water, city, and sculpture remain separate elements, attractively placed together in something more like a still life than cohesive design. The wide, oblong shape of the Piazza does not channel pedestrians in a purposeful manner. The fountains are placed on a flat volcanic basalt, the site unengaged in a sectional quality. Furthermore, the scale of the fountains relative to the piazza's architecture is wanting, impressive up close, but not impactful when viewed as a whole. The compositional elements are placed with attention to geometry, proportion, and space; however, the components of landscape, architecture and water do not appear to enhance the characteristics of each other. While not an explicit problem, this lack of engagement does limit the architectural control of views, circulation, and management. Instead, our attention is pulled towards spectacular individual moments, as opposed to a conception of the Piazza as a wholistic design.

Fig. 9. Sculptural addition to Della Porta's Fountain in *Piazza Navonna*, (View facing west), *Piazza Navonna*, *Campo Marzio*, Rome, Italy, 19th Century CE.

The Trevi Fountain is the culmination of Rome's millennia long experiment of the artistic infrastructure, where style moves from sculptural folly to an integrated urban design. The Trevi Fountain, designed by Nicola Salvi and constructed from 1732 to 1762 CE, is arguably the most important cascade still served by *Acqua Vergine*. Water arriving at any urban aqueduct is held and pressurized in a tank called a *castellum*, which is decorated with a *mostra*, the most dramatic fountain in an aqueduct. The Trevi Fountain is the *Vergine's mostra*, and because of the high-volume holding tank, it is one of the only places in the network that has the capacity for a significant

water display. In addition, by sinking the Trevi's basin into the Piazza, Salvi added a crucial amount of hydrostatic pressure to the waterfalls.[8] Not only did this move add a crucial 4ft of head pressure to the water system, allowing for the dramatic cascades seen nowhere else in this low-pressure viaduct, it also creates an articulated architectural design curating an appreciation of water. With this increase of volume available to Salvi, this architect could have regressed to classical forms, such as the triptych waterfall seen in the *mostra* of the *Aqua Felice*. Instead, inspired by Della Porta and Bernini's work on the *Vergine* line, he merged the Classical, Renaissance, and Baroque knowledge, creating a masterful intersection between engineering and art.

Here, utility meets art, using water in ways that are both tightly controlled and responsively flexible, always the main facilitator of urbanism, architecture, and landscape. Like Della Porta's restructuring of the *Campo Marzio*, Salvi approached fountain design as an urban condition. Further inspired by Della Porta, he used wide lagoons to engage the horizontal plane, making the water appear massive, despite its minuteness relative to other aqueducts. Like Navonna, the Trevi incorporates sculptural elements, but its critical connection to urbanism makes it a mature design that Navonna cannot rival. Each compressed street leads to a cathartic release centered on the fountain. The vertical plane is engaged by cutting into the center of the piazza, improving views, and adding pressure. The stepped edges

[8] Rinne, Waters of Rome, 2010.

hug the main basin, explicitly linking water and architecture by way of a landscape design.

Behind the sculptural fountain, a neoclassical façade plays as a proportional backdrop. It falsely implies that this design was added to an existing building, hiding the *castellum* behind a mask of classical columns, baroque ornamentation, and an ancient half-dome. It could be argued that this architectural relief was placed on the *castellum* to provide geometric balance to the central view, but an urban argument is stronger. The architectural visage both covers the large, utilitarian components of the Trevi and decreases the size of the overall piazza. Not only does this create a more appropriate scale for the sculpture of the Trevi, but also closes off the piazza's verticality, creating an urban interior. Furthermore, the addition of architectural ornament connects it to its surrounding context, and references the Neoclassical governmental buildings in Piazza Navonna, which Salvi's work builds on. Each is a crucial architectural decision, reconnecting the style of the Trevi Fountain to its contextual inspiration. Both the seen and unseen aspects of the *Vergine* network are integrally linked to the expression of water.

Many European settlements revitalized their plumbing lines in the Victorian era when modern infrastructure became available, making the gravity fed networks of early Western cities increasingly rare. As opposed to modern plumbing systems which distort the natural movement of water, the gravity fed architecture of Roman aqueducts becomes an enhanced expression of water's natural path. The *Acqua Vergine*, one of

only three surviving aqueducts in contemporary Rome, was preserved because of its foundational importance to the city's cultural sites.

Fig. 10. *Il Nasone di Roma* are "little fountains" for fresh drinking water, (View facing south), *Campo Dei Fiori*, *Campo Marzio*, Rome, Italy, date unknown.

What could be preserved ruins, like the Roman Forum, shows how liquid architecture is irreducible--so integral to the function and understanding of Rome, that it could never be a piece of history in a museum, and becomes a conduit through which one can view Rome's changing relationship with, water, infrastructure, and art. Therefore, there is a reasonable conclusion to be drawn that beauty is crucial in longevity of designed public space. The water infrastructure is not just preserved, but continually integrated within modern Rome. Current

architectural practices work to reinvent the pieces of the *Vergine* as worthy of curatorial display. The artistic approach to utility is what encouraged Rome to preserve this system that in other cities may have been replaceable. The city does not differentiate infrastructure from artistry, underground aqueducts and plumbing units are displayed proudly in the most refined spaces.

Fig. 11. Detail of stone work, (View from street level facing north), *Trevi Fountain*, *Campo Marzio*, Rome, Italy, 18th Century CE.

All of this, I told my mom while we walked through the *Campo Marzio* to the high-end department store, *La Rinascente*. In the underground showroom, the underround western wall displays an excavation of the *Vergine* conduit, framed with a barrel vault and clerestory window. It

is an explicitly contemporary design, not treating the *Vergine* as a ruin, but a piece of Rome that can be given new life. We left and talked during the two-block walk, from *La Rinascente* to the Trevi Fountain, and I could tell that this time, the crowds didn't bother her. "I feel like I've never seen Rome before," she said. Then it began to rain, and while the crowds cleared out, we stayed.

Liquid Luxury: Systemic Design in Iceland's

Blue Lagoon Geothermal Baths

The only things around are lava, moss, and mist. There are no animals, no birds, no people. The air smells like sulfur, and the rocky landscape is dark, crusty, and ancient. Clouds lift off the ground while the sun is rising, but never drift fully into the sky. They hang low on the earth, and at all times, the sky seems to recede into…nothing. There is nothing but landscape. No rain. No sky. Just alienation and mist. Before you, is an alluring shock of blue, which pulls you into this new world.

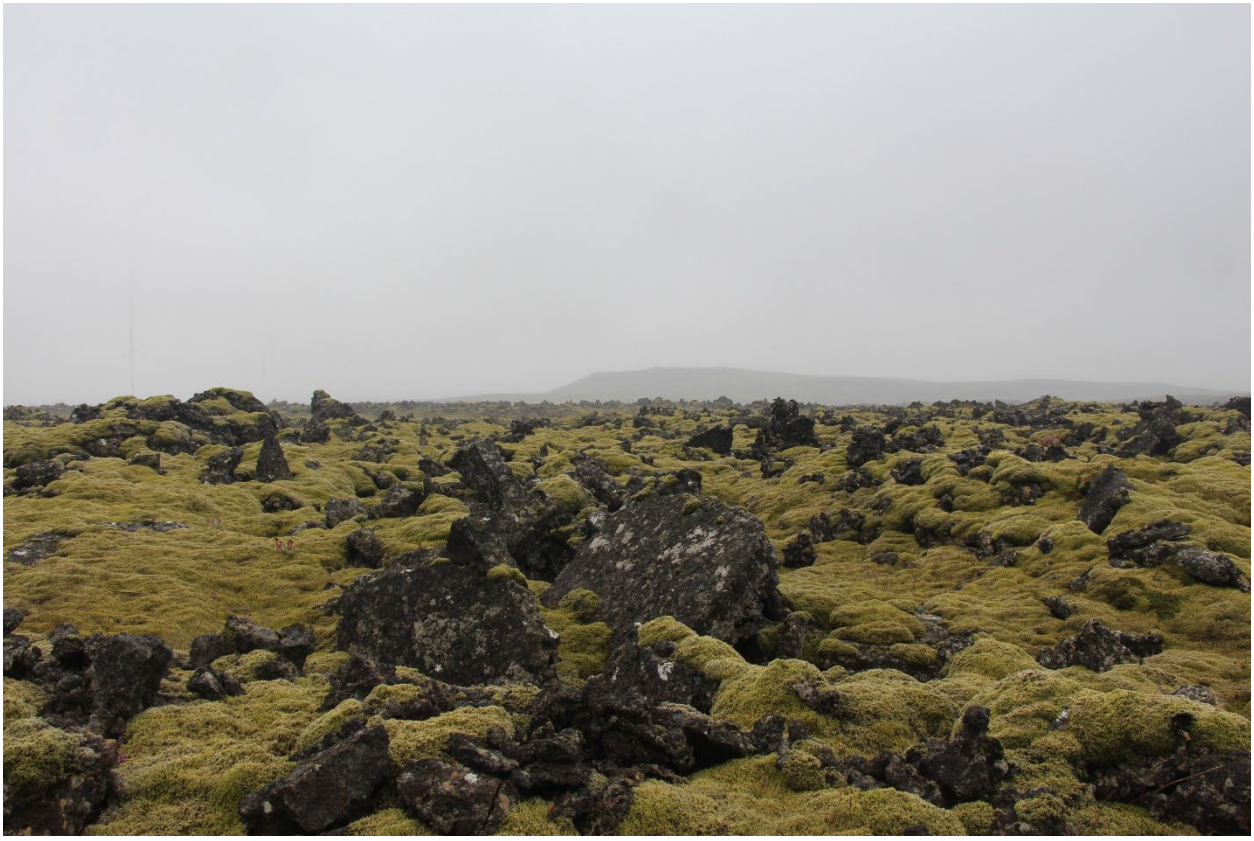

Fig. 1. View of lava field and distant volcano, (view facing northeast), Reykjanes Peninsula, Iceland, formed 3rd Century CE.

In the era of climate change, it is not enough to approach architecture as an exercise in "harm reduction." Landscape urbanism is a contemporary school of thought that believes in interconnected systems, that a site acts within a larger body of design, sociology, and ecology.[1] This discipline argues against simplistic engagement with a site, which it attacks as being irresponsible. Instead, this philosophy states that contemporary architecture must integrate design within the social, economic, and environmental systems of its context. The UNESCO Global Geopark, in the south-west peninsula of Iceland, is a world-renowned ecological complex, where each participatory industry must reuse at least two waste products from other sites within the network. This collective formed an incredible network of adaptive reuse, where businesses can be added if the applicant company takes responsibility of at least two by-products generated within the system. This network now productively uses waste from over two-dozen companies and began with the strange relationship between geothermal energy and luxury bathing.

The Blue Lagoon Geothermal Baths were started by accident in the 1990s with grassroots bathers, and later became famous for its world class architecture, healing properties, and ecological mission. Before the bath house, there was a pool. The water from the adjacent geothermal power plant was released openly into the porous volcanic landscape, pooling strange alien waters among the volcanic geology and

[1] Charles Waldheim, *The Landscape Urbanism Reader*. New York: Princeton Architectural Press, 2006.

moss. In this case, the power plant created a proto-landscape[2], which Sigríður Sigþórsdóttir and Basalt Architects formalized into a complex of lagoonal pools, geothermal industry, luxury hotels, dry saunas, classy restaurants, and hiking trails.[3] Many contemporary architects are taking into consideration how their buildings effect landscapes, and the design of the Blue Lagoon practices a light touch, changing the landscape as little as possible, honoring the natural conditions, influencing and being influenced by the built and natural formations of the world.

Fig. 2. Svartsengi Power Station, Strange atmospheres, (view facing south), Reykjanes Peninsula, Iceland, 20th Century.

[2] Footnote: By "Proto-Landscape," it is meant that a novel and distinct landscape results from this architectural intervention, but it is neither formally designed nor explicitly recognized.

[3] Nordic Adventure Travel Staff, "Blue Lagoon – The History."

Fig. 3. Basalt Architects, View of the central lagoon at the Geothermal Baths, (view from dock facing southeast), Reykjanes Peninsula, Iceland, 1999.

The Blue Lagoon Geothermal Baths is an exceptional piece of design which sits in a network of architectures, purposely connected by water. It is a complex within a complex—a smaller architectural system within Iceland's UNESCO Global Geopark. Connecting the six sites within the enclave, water is the foundation for this masterpiece, moving from an industrial powerplant to the luxurious bathhouse. Sea water percolates into the subterranean volcanic field and is then extracted from 6000ft below sea level to produce power for Reykjavik. When liquids move through the steam plant, the process changes its identity, inoculating the waters with volcanic silica,

thermophilic algae, and oceanic minerals, gifting it with world famous healing properties. This strange fluid is released, artificial and alien, onto the volcanic field—a site which went undisturbed for thousands of years. The components of the spa's iconic ritual are sustainably taken from the site - lava for exfoliating, silica for clarifying, algae for nourishing, minerals for restoring. Sigríður Sigþórsdóttir and Basalt Architects use the Blue Lagoon to spatialize the arguments of Landscape Urbanism. Not stopping with integrating water and architecture, they use their design as a vehicle to gain national and international attention for environmental philosophy, branding Iceland as an ecological paradise.

Fig. 4. Color pallet, view of lava field with silica lagoon, (detail from entry sequence), Reykjanes Peninsula, Iceland, formed in the 20th Century.

Fig. 5. Basalt Architects, Entry sequence, first view of the Blue Lagoon Geothermal Baths, (view from path facing north), Reykjanes Peninsula, Iceland, 1999.

The entry sequence to the Blue Lagoon Geothermal Baths is exquisitely choreographed, immersing visitors in an aesthetic before they enter the water. The main parking lot leads you to an artificial gorge in the [NAME] lava field—a small path runs through it, gradually descending during the approach to the main entrance. As you enter, the lava field grows, the world desaturating into nothing but black lava against white mist. The path curves ever so slightly, revealing the first view of the bath house, just a corner of weathered grey wood. Most of the volcanic rocks are a dusty, porous obsidian, but on top, there is a thin, slate-grey residue. The color on the entry facade of the Blue Lagoon is the exact same shade of gray as this dusty lichen,

creating an amazingly subtle visual connection between the design and the landscape. Most architecture doesn't sit so naturally in its surroundings. Though this building never pretends to be anything but a structure, it is so natural that it might have grown there under the influence of a volcano. As the view finally opens, you enter the bathhouse's welcome landscape, seeing the first views of the icy blue waters next to the façade. This blue is alien, impossible—-a shock of vibrancy against a desaturated world.

Fig. 6. Basalt Architects, Entry sequence, color pallet and detail view of Jatoba wood on entry facade, (from exterior facing north), Reykjanes Peninsula, Iceland, 1999.

Approaching, you open the entry door. Its large vertical handle is sanded smooth but does not remove the texture of natural wood, nor mask its tactility under a layer of polyurethane finish. The entryway door opens into a large interior space, its gentle curve matching the

Fig. 7. Basalt Architects, Entry sequence, view from entryway cafe, (from interior facing west), Reykjanes Peninsula, Iceland, 1999.

natural crests of the lava fields onto which it was built. To the [west], this wall is two-story glass, not giving a perfect view of the central lagoon, but just enough to tease before visitors enter the changing space. To the east, the surface is constructed from rubble

saved during the excavation of the building's foundations—cleaned, shaped, and stacked into an elegant stone wall. It treats lava like a precious gem, something worthy of curated display and high craft. Like the overarching philosophy of the UNESCO Global Geopark, the Blue Lagoon reuses its own byproducts, reframing them as an elegant core material. In the same way that architecture was brought into the landscape, this move brings the landscape into the architecture, lessening the visual barrier between. You check in at reception, shower in the locker rooms, and exit towards the lagoon's indoor entrance.

There is a small ramp adjacent to a curved mineral wall. Moving down the ramp, the water reaches about waist high, and you exit through the sunken door into a grotto on the side of the main Lagoon. The water is warm, the air is cold, and the space is intimate. The path shifts [north], towards a small bridge, less than five feet tall, connecting the out-of-water circulation paths. Not only does the bridge obscure views of the main lagoon, but as you pass under into the pools on the other side, the height of the bridge forces you to fully immerse yourself in the water for the first time. And at that moment, at the exact same time that you first submerge yourself, is when the view under the bridge opens you see the full lagoon for the first time.

Fig. 8. Basalt Architects, Entry sequence, indoor entrance with submerged door, (from interior facing west), Reykjanes Peninsula, Iceland, 1999.

Fig. 9. Basalt Architects, Entry sequence, bridge obscuring views of main lagoon, (from pool facing north), Reykjanes Peninsula, Iceland, 1999.[4]

The lagoon is nested into the lava field, and the architecture clarifies the shape of the original pool. On the other hand, the new tributary pools *are* designed expansions, echoing this original form, lightly manipulated into the geologic folds. Unusually high contents of silica precipitates, forming the white clay that you see on the edge of the pool. Underfoot, the hard smooth surface is not a paved material. Rather, it is silica hardened over decades, solidified into a strangely slick and rough texture, massaging passerby's feet with

[4] CITATION

its soft irregularity. You move through the water, floating to a spa station with face masks, a drink bar with champagne, and a connected pool with in-water massages. What is so interesting is that the normal relationship between water and air is inverted here, where the programming and circulation takes place while submerged, the visitor only takes momentary breaks outside of the pool.

Fig. 10. Basalt Architects, Helicopter Aerial of Blue Lagoon, Reykjanes Peninsula, Iceland, 1999.[5]

In the same way that the opening sequence is so well designed, every bit of the architecture is this well-crafted. The planning of the lagoon did not disturb the lava field, with shapely contours and a

[5] Image courtesy of AirPano.com. Accessed 12 January 2023.

geologic profile thousands of years old. When the boardwalk was being constructed, wooden planks were cut to match individual lava rocks, creating a perfect union between the artificial and natural. In addition to strength in craft, Basalt Architects made creative material decisions inside of a unique set of material constraints. The

Fig. 11. Basalt Architects, Detail and Craft, boardwalk cut to fit existing lava field, Reykjanes Peninsula, Iceland, 1999.

façade material not only uses colors to create a visual connection between landscape and architecture, it also is specially chosen because it is the only wood that can resist corrosive properties of the water. The high mineral content of the vapors weather and rust materials faster than their standard shelf-lives. Jatoba wood is

sourced from Brazil, and though some advocated for Nordic varieties, this was the only choice that could survive the site. The structural portion of the wooden façade has hidden brackets, making the gravity-void design defy immediate comprehension, holding a feeling of impossibility in its floating baffles. In addition to the material connection with water, it is their tension filled identities that brings these pieces together thematically, potentially revealing an approach about conditional architecture in high-level constraints.

The architecture of the bath house doesn't change any aspect of the medicinal waters, instead, the mineral-rich liquid is channeled to surround, frame and curate our experience. The water is pumped from thousands of feet underground, where it is heated in the subterranean volcanic field. It is used in the geothermal energy plant and kept at high heat and pressure before being released into the temperature-controlled lagoon. Throughout the bath, Jatoba wood forms boardwalks which line the edges. Placed strategically, disbursement boxes were built in conjunction with the circulation boardwalks, and these release the heated water in a range of temperatures, allowing customization of experience. There are few lagoons like this with so much water, and the connected steam plant provides ever flowing support. In addition to the high-salinity environment, this is what allows it to fully replace its water every 36 hours, enabling it to be completely chemical free.

In the same way that the designers at Basalt integrated the structure by blending landscape, material, and form, they continue to blur the line between architecture and landscape using connective

illusions. Spaces in the design look radically different from changing views. From the water, the sunken drink bar matches the architectural styles of its surroundings, with Scandanavian form and Jatoba cladding. However, when viewed from an upper story room in the Retreat Hotel, the same structure appears completely different. The roof is piled with lava, covering the unattractive mechanical components of the structure, only letting the Jatoba eave show slightly. Lava encrusted buildings is a pattern, repeated on the small buildings of the lagoon, extending the illusion of a natural field. The perception of the site—undisturbed landscape versus Scandinavian architecture—vary according to how the designers purposely framed a view.

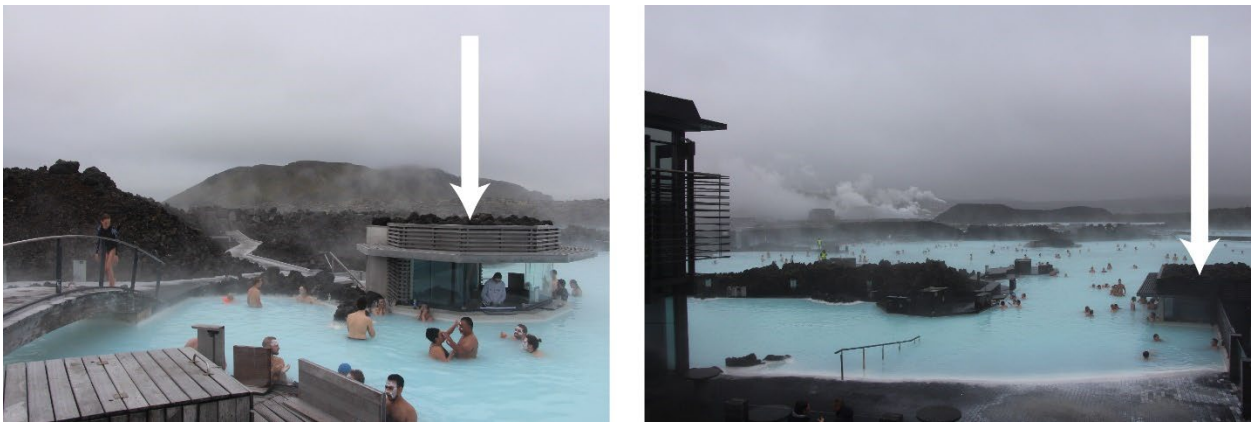

Fig. 12-13. Basalt Architects, Field Illusions, two views of an in-water structure, The Blue Lagoon Geothermal Baths, Reykjanes Peninsula, Iceland, 1999.

In the background of it all, the power plant looms, making the connection between producer and consumer architectures not only functional, but visual. Beauty alone was not enough, and the way the plant, pool and hotel feed off each other aesthetically creates a strangeness in this site's beauty—imperfect and vulnerable. The Geothermal Plant is not hidden, its metallic façade is always visible,

though obscured slightly by the dreamscape clouds released from the smokestacks. Steam pours from the power producer and mixes with the evaporative vapors of the lagoon, intensifying the strange cloudy atmosphere of this peninsula. Surrounded by piles of lava, thousands of years old, the world fades away in this alien atmosphere.

For Sigríður Sigþórsdóttir, the site is like an endless studio project, where a team of dedicated designers put their greatest efforts, and create their greatest successes. The design challenge never ends, because the popularity of the lagoon has allowed it to steadily expand for 30 years. And while for Basalt, they are a dedicated team towards the execution of an excellent project, for Sigríður Sigþórsdóttir, the Blue Lagoon is his magnum opus, his Sydney Opera House, his cathedral. One the forefront of this design team, he was the complex's second employee, shaping its trajectory from the beginning. Now one of the partners of Basalt, Sigríður Sigþórsdóttir uses this spa-specialist practice as an endless iterative exercise, a testing grounds for his visionary site in Iceland. This means that while the Blue Lagoon is experimental, it is not the laboratory where the experiments take place.

Sigríður Sigþórsdóttir and Basalt Architects could have concluded the design process with the commercial success of the Blue Lagoon, but instead, this team is actively using the Geothermal Bath Complex as a vehicle for the branding of Iceland as a Mecca for ecological tourism and design. The Blue Lagoon also expands itself past its own physical border with its influence on the national identity of Iceland and its progressive stance on international connections. After the initial

success of the Blue Lagoon, dozens of lagoons popped up around Iceland, but none quite so fantastic.[6] These other spaces While the beauty of bathhouses like the Sky Lagoon or Myvatn are undeniable, they are an echo, a pastiche, of what the designers of the Blue Lagoon were able to achieve. Furthermore, this complex researches medicinal uses of geothermal sea water, creating medically renowned treatments for psoriasis—free of charge at the medical clinic serving over 4000 people per year—and successful skincare products. The approach at the Blue Lagoon cannot be reduced to a discussion of design. Spectacular and progressive design is at the forefront of this space, and its designers recognized the illusory nature of site-specific borders.

Fig. 14. Basalt Architects, skin rejuvenation at the Blue Lagoon, The Blue Lagoon Geothermal Baths, Reykjanes Peninsula, Iceland, 1999.

[6] It is reported that these other lagoons have high sulfur content and can smell like eggs. Thumbs down.

The Blue Lagoon is successful because of how the designers applied both ancient and modern methods, allowing it to become a global standard for excellence in liquid architecture. Learning from ancient methods while simultaneously integrating forward thinking strategies is what allows the Blue Lagoon to surpass its contemporaries. While the connections between a contemporary bath house and ancient sites are not obvious, this is because the designers subconsciously reference exceptional strategies that ought to be universal. Like Mont Saint Michel, regional ecology and atmosphere becomes integral to the experience of space; Like the *Acqua Vergine*, urban level water infrastructure is used as an exercise in artistry and design; Like Vietnamese amphibious architecture, the water, land, and architecture are one. All of these yield an exceptional reciprocity between architecture and landscape that is furthered by use of modern technology. The water coming from the geothermal energy plant is tightly controlled by the archi-industrial complex, involving engineering and art in equal amounts.

Rethinking the way that architects engage with water should be one of the primary exercises within contemporary pedagogy. The one-of-a-kind nature of each of these buildings is not understood to be replicated in everyday design. Instead, an evaluation of the most extreme cases of liquid-architecture can help push the discipline forward. In order to speculate about future versions of liquid architecture and its landscape byproduct, a study of rogue individualism in fluid building design can reveal, not only relevant themes, but creative appropriation for future scenarios. The

boundaries between design disciplines have become fuzzy in recent years, and architects are recently participating in the robust field of landscape architecture with increasing frequency.

Fig. 15. View of from old shipping yard on the Reykjanes Peninsula with distant volcano field, (view facing east), Reykjanes Peninsula, Iceland, date unknown.

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