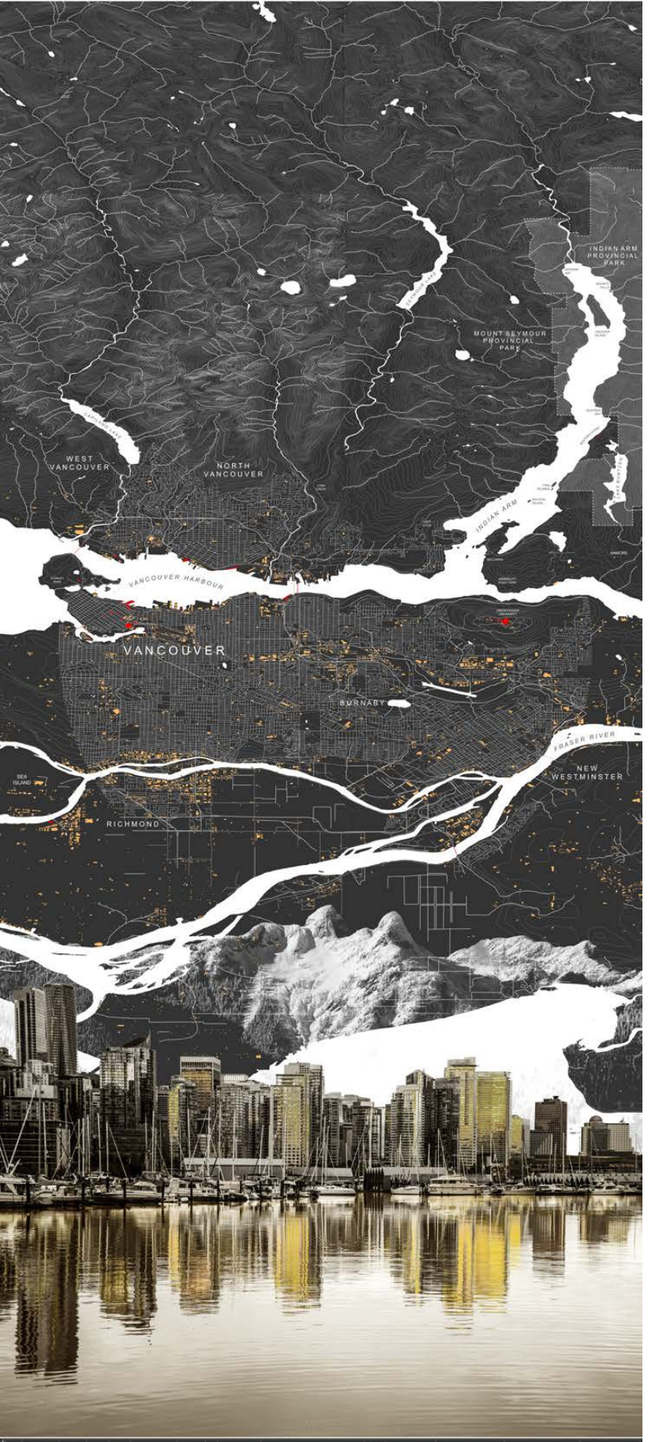
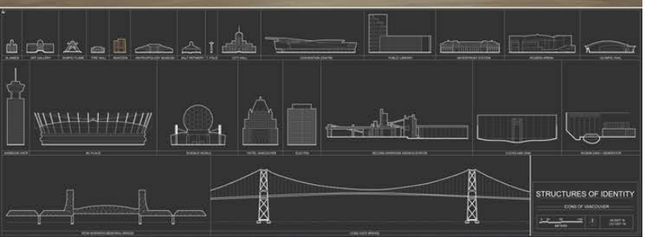


ELECTRIC SPACE

A NEW NARRATIVE FOR AGING HYDROELECTRIC FACILITIES IN BC



ABSTRACT

This thesis addresses the hydroelectric structures of the Buntzen Generating Station located within an area of restricted access in Indian Arm Provincial Park in British Colombia, Canada. Situated between ocean and mountain, the century-old power-generating stations of Buntzen Lake are nearing end of service. Over time, these isolated, dangerous, and increasingly obsolete machines in the landscape have been superseded by alternatives from a new energy era and out-muscled by Vancouver's relentless thirst for fresh water. As relics of the past, this is an opportunity to reimagine British Columbia's relationship with purpose-built structures and engage the experiential, atmospheric and imaginative capacity of this forbidden site. In addition to power generation, this thesis defends that obsolete hydroelectric structures could be used as devices of imagination, sensation, and memory to decipher a landscape's invisible energy and reconnect us to nature in powerful and unpredictable ways. To not only remediate and connect the site, but to strengthen our relationship to history, materials, land and water as fundamental aspects of societal well-being.

FUTURE RUIN

At a global scale, these aging structures pose important questions for the future. Throughout North America, an impressive legacy of unique hydropower structures are nearing end-of-life. Once decommissioned, these isolated giants, built of thick, reinforced concrete are remarkably difficult and expensive to remove. Like the Jordan River Generating Station on Vancouver Island, many are left abandoned to rot in nature. Architecturally, these abandoned structures offer unique spatial experiences irreplaceable in new construction, enabling a powerful opportunity to reconsider the human relationship with purpose-built structures and amplify connection to place specificity.

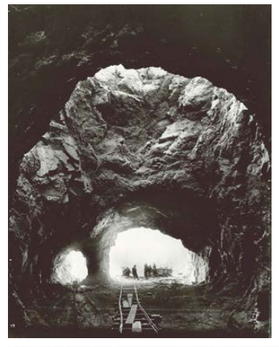
BUNTZEN LAKE

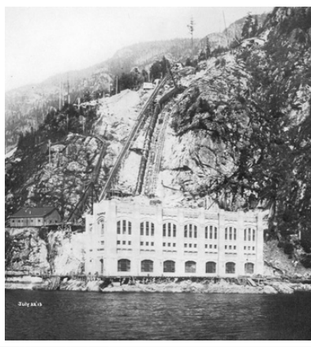
As a recently decommissioned site, Buntzen Generating Station may face this same fate. Built in 1903, Buntzen was the first hydroelectric facility in British Columbia and has supplied Vancouver with inexpensive, sustainable electricity for over a century. For residents and visitors alike, the Buntzen Generating Stations are iconic within the fabric of the city. Like the Lions Gate Bridge, Waterfront Station, or the Iron Workers Memorial, these structures are icons of place identity that help us remember the past.

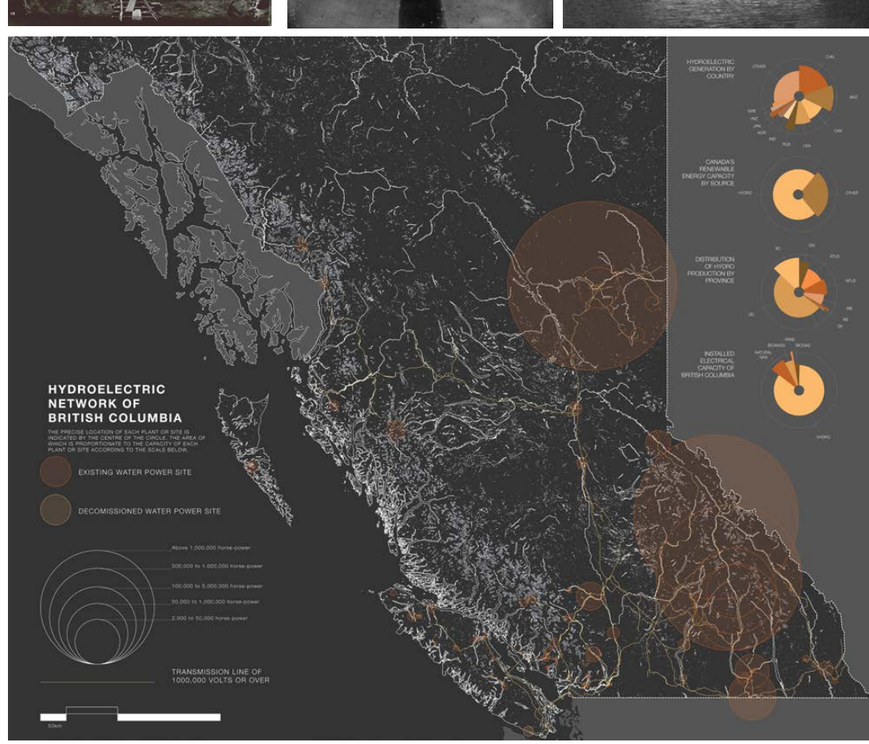
Buntzen contains two independent, off-limits generating networks and a two mile long hydraulic tunnel connecting Lake Buntzen to Lake Coquitlam. These generating facilities are known as LB1, which is online and active, and LB2, which is decommissioned. The scope of this thesis is limited to the LB2 network, which has been offline and abandoned since the early 2000s. Designed by architect Francis Rattenbury, LB2 features a robust and elegant powerhouse on the ocean shore and a smaller intake house submerged in Buntzen Lake. Underground, a hydraulic tunnel and large diameter penstocks connect these two buildings with gravity-fed water. At the mouth of the tunnel is a giant concrete tank embedded into the mountain. This 32 foot diameter surge tank connects the sky above with the dark, hydraulic water running below.

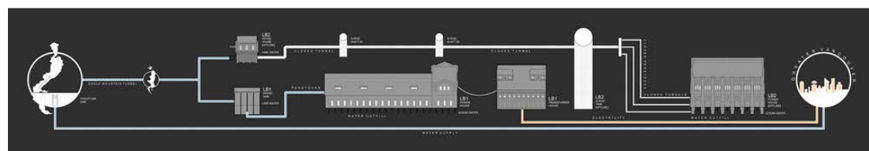
DESIGN INTENTION

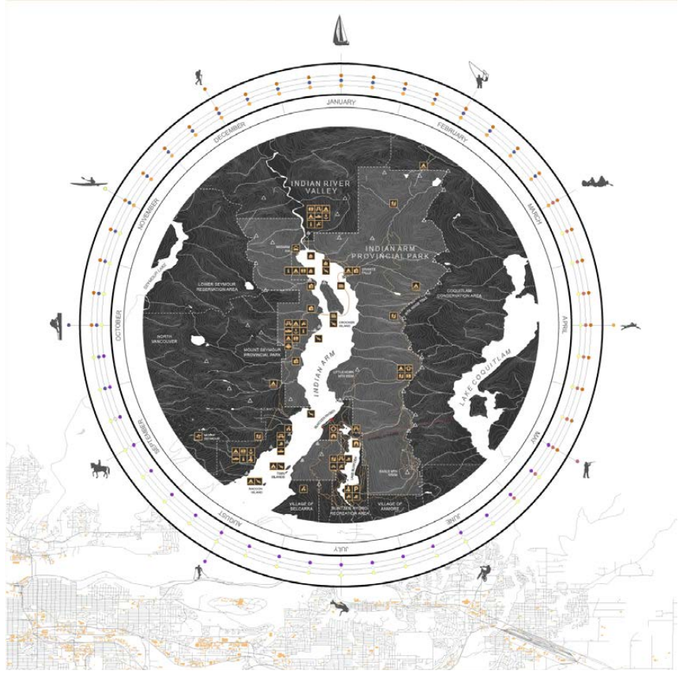
This thesis defends that the decommissioned hydroelectric structures of Buntzen Lake must end their isolation and engage a new narrative with the city and surrounding parkland. In addition to power generation, this narrative should reflect the site's symbiotic relationship to hydrology, landscape, urbanity, and history. By activating unique intersections between building, land, and water, decommissioned hydroelectric infrastructure could be used as devices of imagination, sensation, and memory to engage in intense and meaningful dialogue with the site's past, present and future.

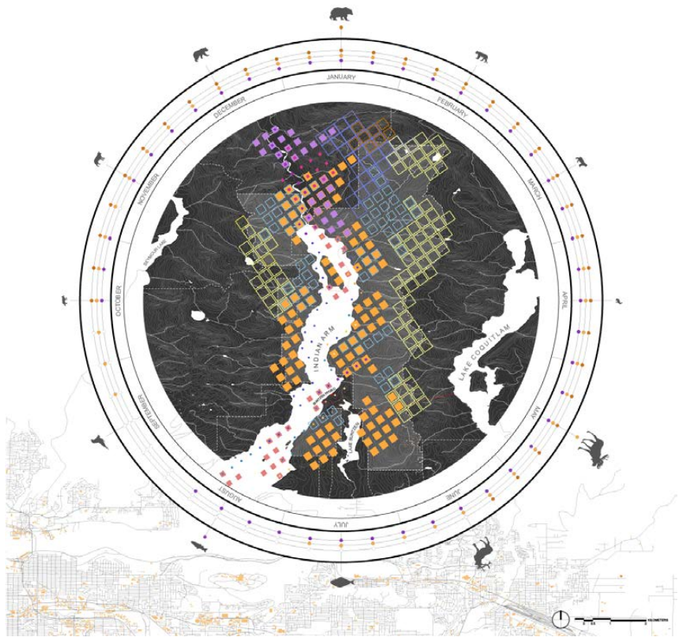






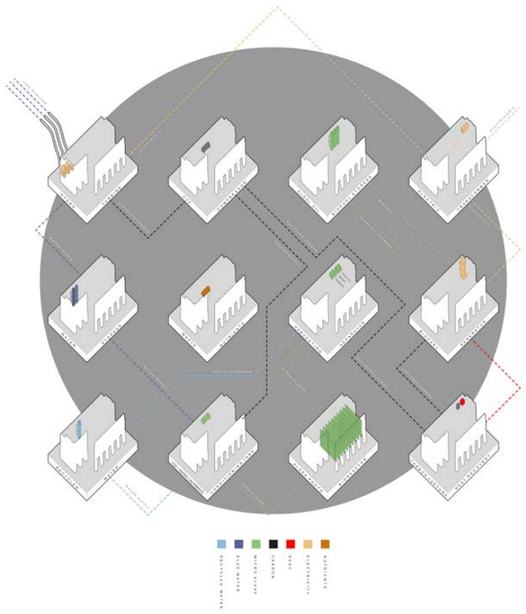


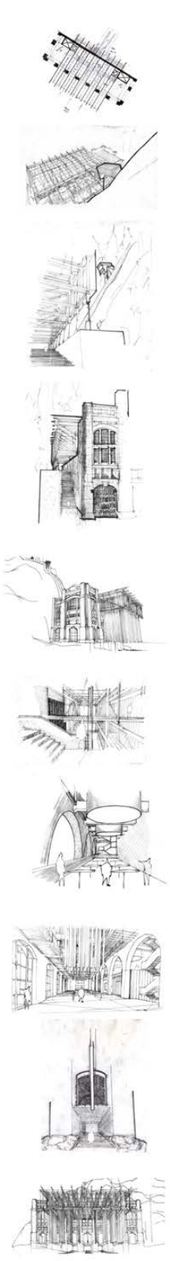


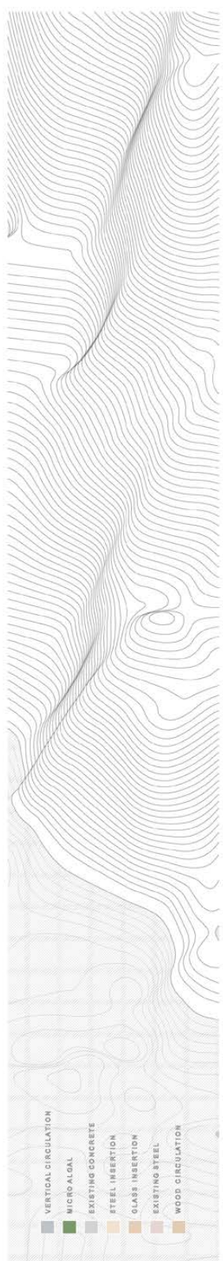


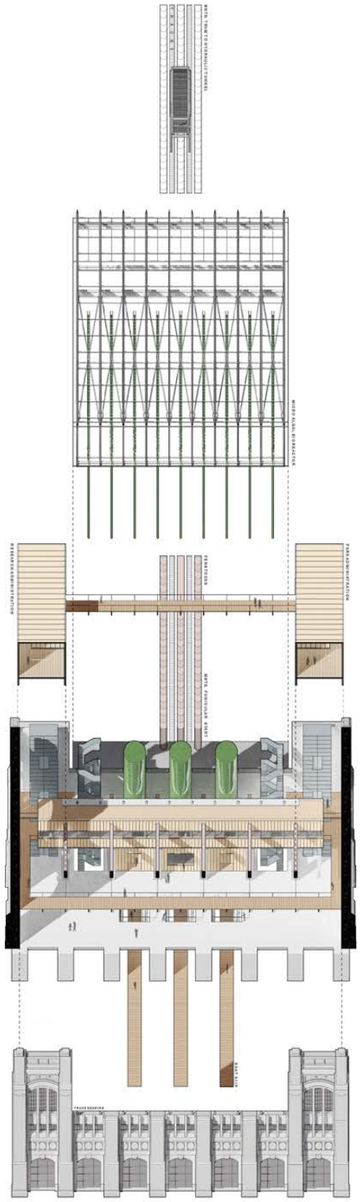
INDUSTRIAL SANCTUARY

Buntzen is significant not only its industrial heritage, but also for the vast wilderness sanctuary it unintentionally forged in order to protect the watershed that fed its industry. In an odd fate, Buntzen's industrial operation preserved not only a fully functioning and pristine watershed for future generations -- but a sanctuary for heritage -- one of the only remaining old growth forests in the Lower Mainland. Buntzen shaped what would later become Indian Arm Provincial Park. A popular and diverse recreation site that stands in stark contrast to the off-limits and dangerous hydroelectric site that shaped it.





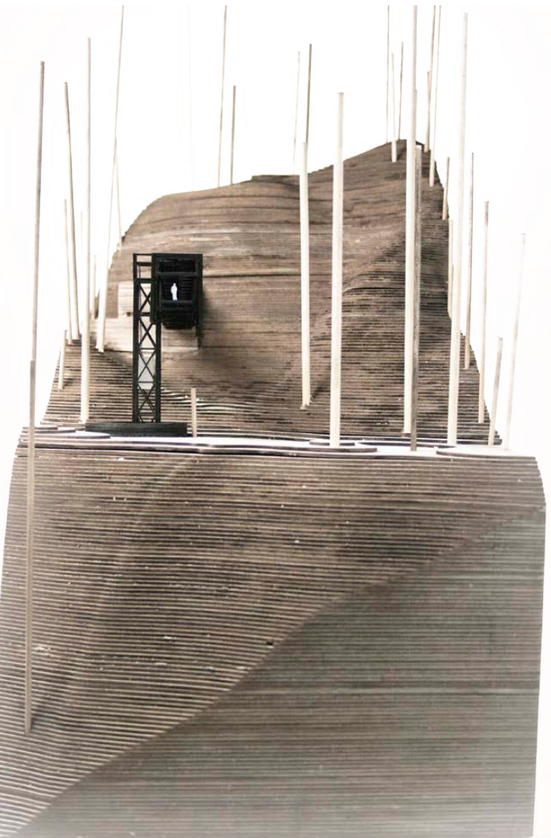


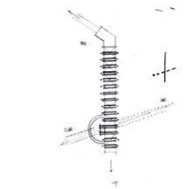


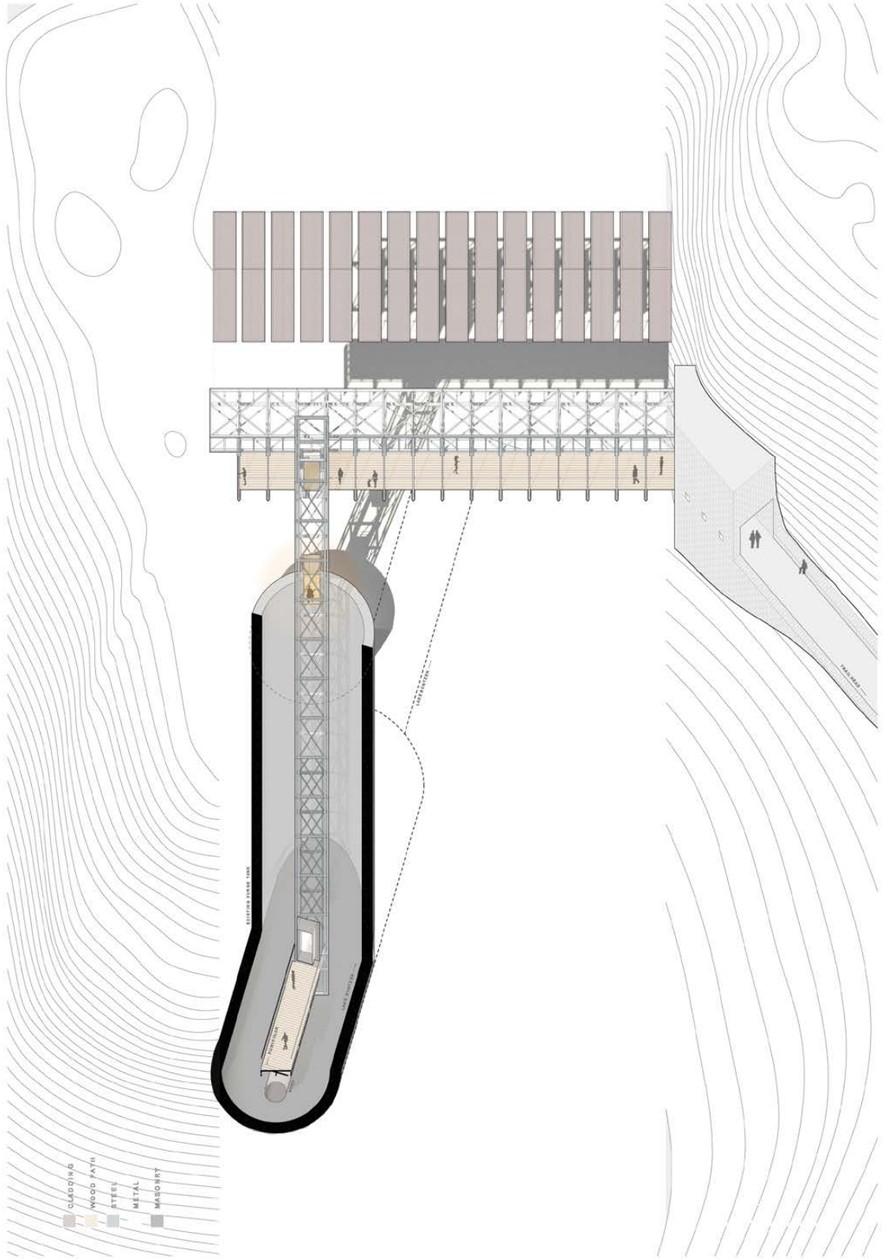
PHASE I - CATALYST

Phase 1 responds to the Provincial's Park's lack of a formal entry or gateway. Despite its popularity, access to the park is limited to informal trails stemming from the Buntzen Recreation area. Phase 1 is a joint venture between the owners, BC Hydro, and the Provincial Park. This proposal suggests transforming the powerhouse into a hybrid building that integrates a park visitor's center and a micro algae research facility. By integrating these two programs, the Powerhouse Research and Visitor's Center serves as a catalyst for new programmatic development throughout the park – all the while preserving the site's legacy of sustainable energy production.

In this proposal, part of the original façade is subtracted, and a new cantilevering structure that uses the mountain as its anchor is inserted. This cantilever allows the reactor to extend past the original footprint, maximizing sun exposure while creating a dramatic water-level procession into the park. Occupying the four-story gallery below is the visitor's center, which contains a cafe, information desk, bathrooms, equipment rentals, first aid and other park amenities. Suspended above this public space are glowing green glass algea-filled tubes that hang from above like a vertical forest.



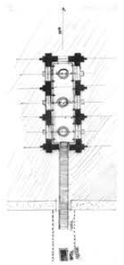


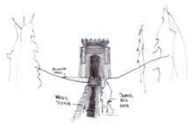


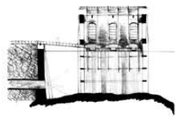
PHASE II - CONNECTION

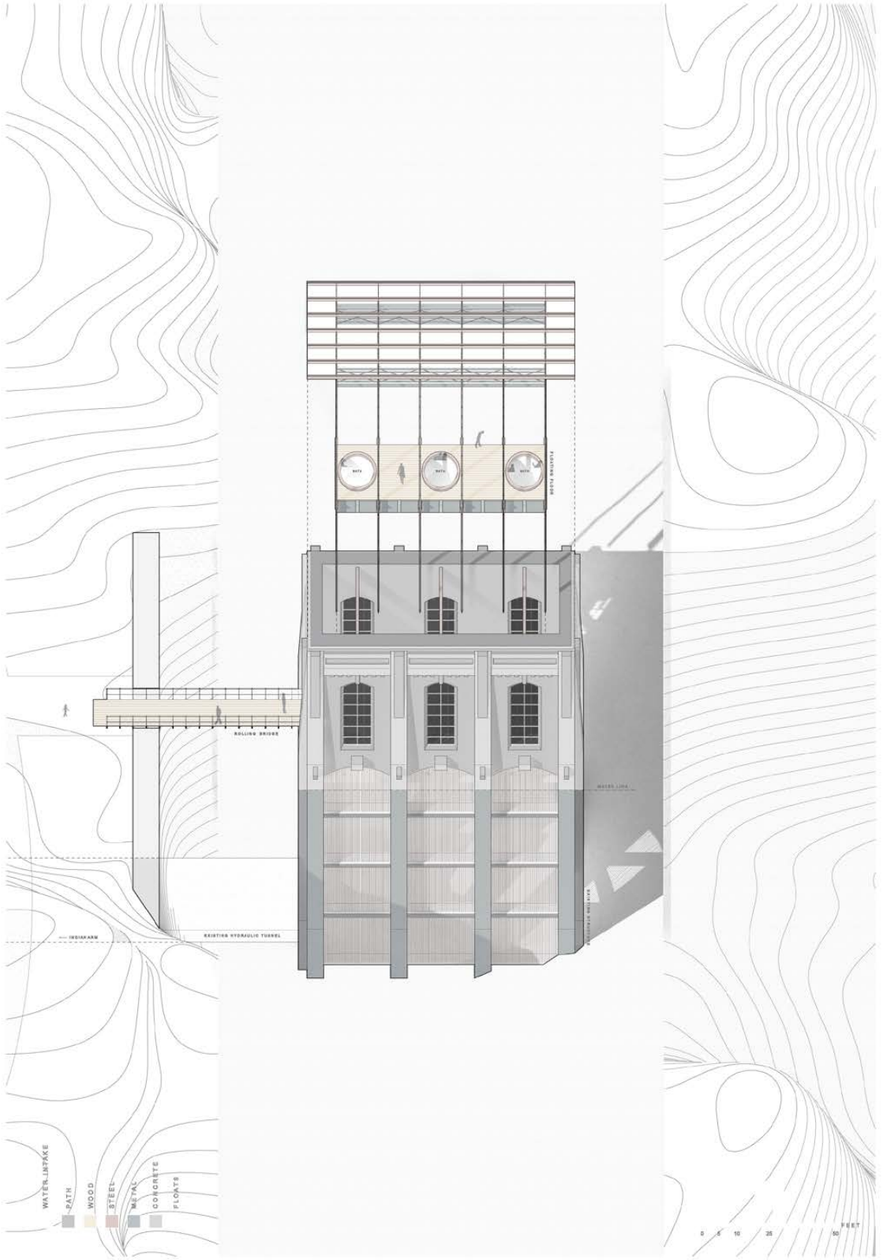
Phase 2 transforms the penstocks and hydraulic tunnel into a vertical circulation network, connecting ocean and lake. Grafting onto the penstocks, a small funicular allows visitors to travel five hundred vertical feet along the rusty metal pipes to the mouth of the hydraulic tunnel. Exiting the tram, visitors enter a dark tunnel travelling along an elevated, wooden path and walk towards light in the distance. At the end of the tunnel, visitors arrive to the surge tank; an oculus inside the mountain that opens to the sky above. Visitors enter a wood and glass elevator car to get to the mountain forest above.

At the top, visitors step out of the elevator and onto a bridge. Stepping onto the bridge, visitors are reoriented to a different axis than the tunnel below. At the end is framed view of Vancouver, the city this network powered for over a century. On the bridge, the floor hangs from a roof truss. Walking along the interior, park-goers are able to see between the skin of the building and the edge of the floor. This gives a view of the dramatic sloping terrain below, as well as a bird's eye view of the surge shaft. Situated in trees, the bridge's cladding is analogous to the solid and void of the surrounding forest--giving slices of view with dappled light. The bridge's exit becomes the entrance to a popular, and well-used trail system.





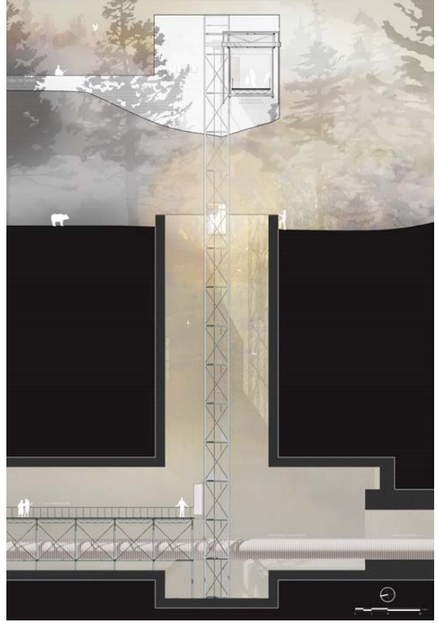


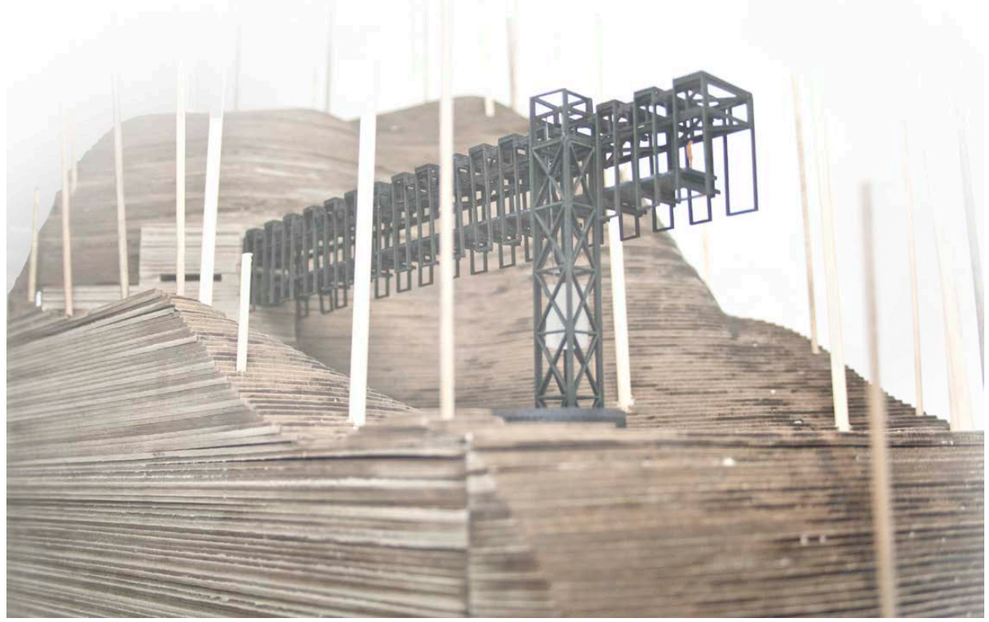


PHASE III - REFLECTION

Phase 3, the gate house, once controlled the intake of water into the hydraulic tunnel. Built in a lake, the gate house is regularly submerged two thirds underwater, bearing unique weathering patterns from the rising and falling water of a hydroelectric holding pond. This proposal embraces this wild force of nature and suggests to use the fluctuating water level to transform user-experience with this historic device.

Hidden along the shores of a densely forested lake is the Bath. Visible from cross the lake like a beacon, as the steam rises through an elegant, light, steel roof. Inside, the century old floor has been removed. In its place, a thick, chunky cedar floor floats on the lake water inside the building – as it rises and falls with the water. The wood gives warmth to the human body and stands in contrast to the cold, industrial concrete walls. Along the sides, slender black columns are pulled away from the walls on steel pins, so to only touch the old lightly. Inserted in the floor are three hot tubs, built the same diameter and in the same location as the building's original surge valves. Creating a place of relaxation and reflection to bathe inside a hydroelectric ruin. These tubs allow visitors to occupy a memory of the building's former function: a powerful experience that is strangely familiar, yet entirely new.





C O N C L U S I O N

Many forces, both physical and political, have shaped Lake Buntzen's hydroelectric landscape and its changing relationship to Vancouver and surrounding parkland. Despite the unique aspects of this site, the decommissioning of the LB2 network is a challenge many aging hydroelectric sites will face in the future. As our energy networks transition away from mega-projects, Buntzen stands as an icon to the Neo-technic transformations that redefined the North American continent. Like monuments, these structures embody a specific attitude that reflects a desired, yet often unattainable, relationship with nature. As icons of identity, these structures serve an important role in the city by preserving memory and giving an understanding of this time and place for future generations. Over time, these retired workhorses establish a palpable link between history, culture, industry, and nature – forging a collective memory that informs an authentic sense of place specificity.

As a recently decommissioned site, there is little information available in regards to the future of LB2's purpose-built, industrial structures. As one of British Columbia's oldest green energy producers, this future should respect the site's legacy. Although no longer fit for large-scale, hydroelectric production, these monoliths have the capacity to support newly emergent, renewable energy industries that leverage the site's existing infrastructural investments. By utilizing this legacy, the inherent sustainability benefits of adaptively re-using decommissioned infrastructural pieces may serve as catalytic prototypes for similar sites across North America. By forging a new narrative, these sites present an incredible partnership opportunity between parks, researchers, and industry to re-engage these aging structures with the wilderness sanctuaries they unintentionally forged.

When approaching these decommissioned hydroelectric sites, the goal must supersede simply wishing to preserve what exists. By reimagining the former function and pairing the qualities of these devices with the programmatic needs of their surroundings, the adaptive re-use of hydroelectric sites can dramatically enhance the experiential capacity and place specificity of surrounding parkland. In this alternate vision there is a powerful opportunity to decipher the invisible energy of a landscape, creating a sense of place through time by connecting memory, community, and nature to Buntzen's rare and unique spaces.