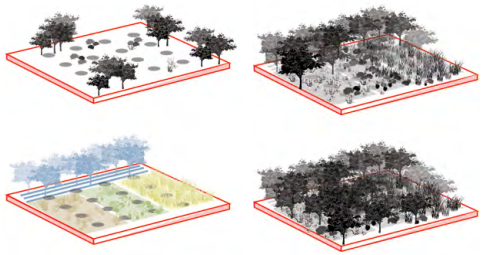
+1 347 244 8210
rlama@risd.edu
www.rashalama.com

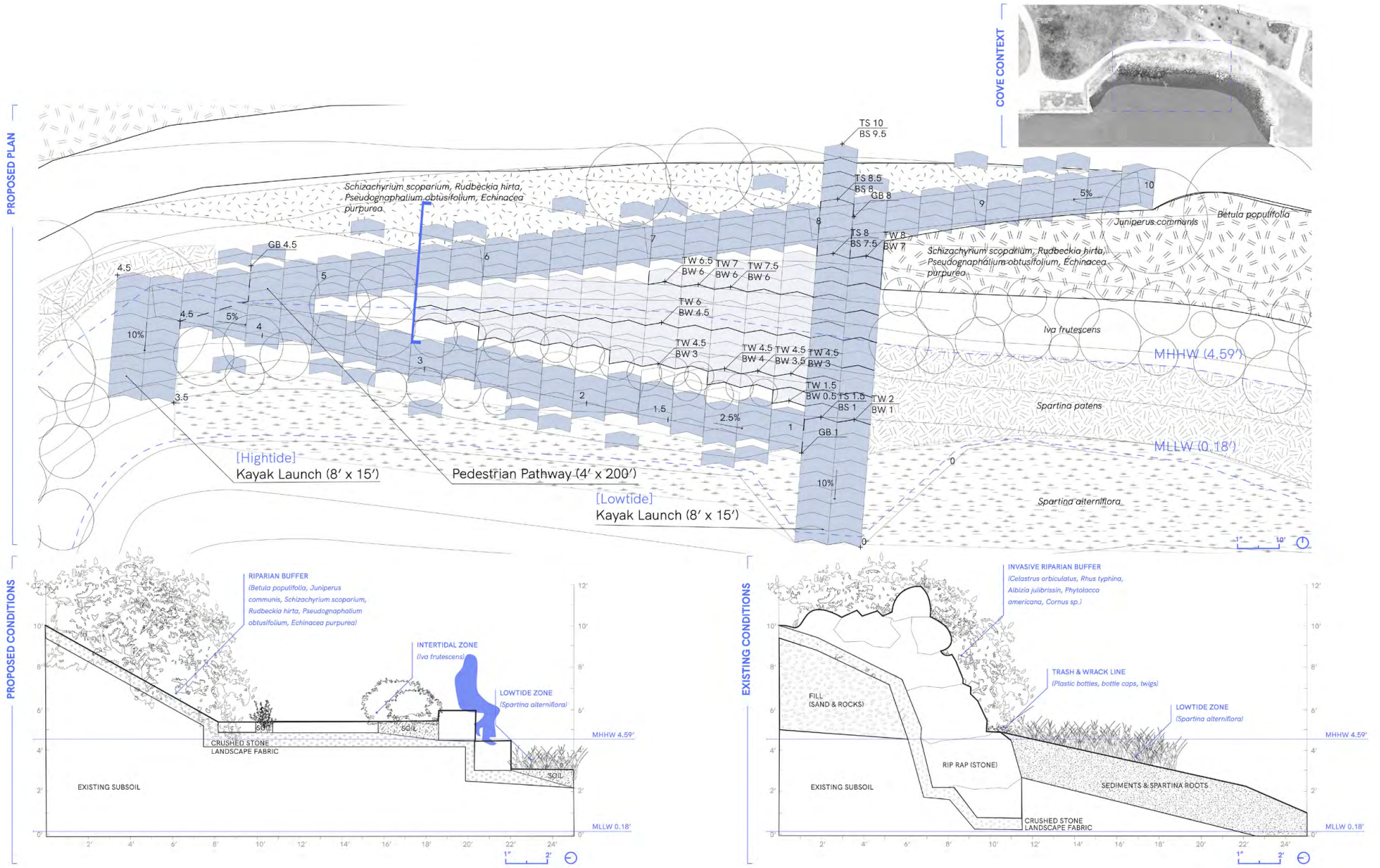


Lowtide Kayak Launch Model (1:2)

Vertebrae Cove

Biomimetic Modular Seawall Infrastructure
India Point Park, Providence, RI

Fall 2024
Material Tests
Sara Cohen & Adrian Fehrmann

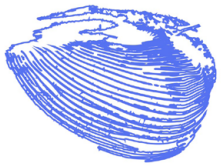


Proposed Plan (1:10) & Site Condition Sections (1:2)

BIOMIMETIC DESIGN

Whale Spine

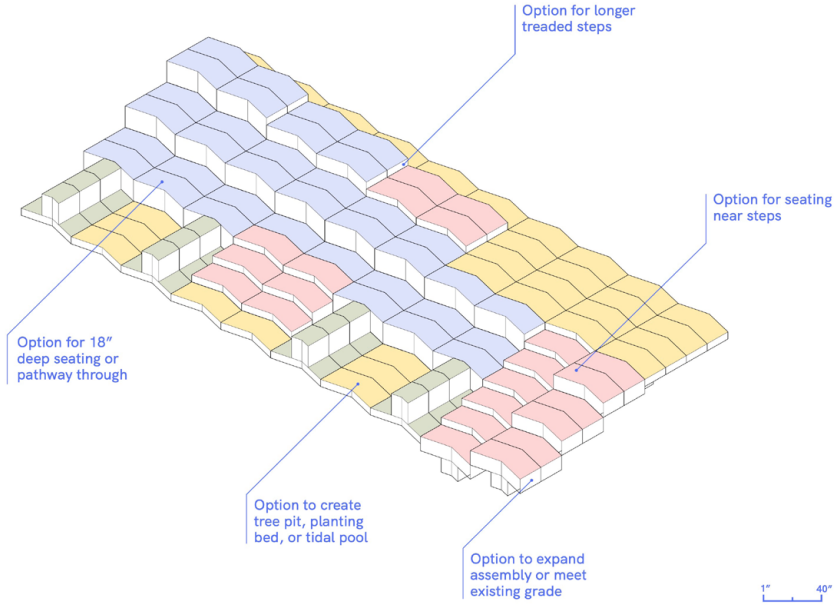
Inspired by the organic changes between each vertebra of a whale's spine, the seawall infrastructure pieces gradually evolve for use in specific contexts.



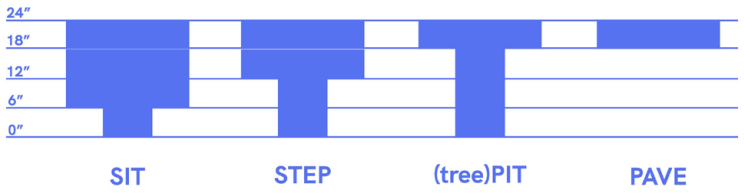
Ventral Gills

The mutualistic relationships these gills permit by allowing barnacles to attach themselves onto whales provide an interesting relief pattern to aid moss and marinelife growth on the seawall infrastructure.

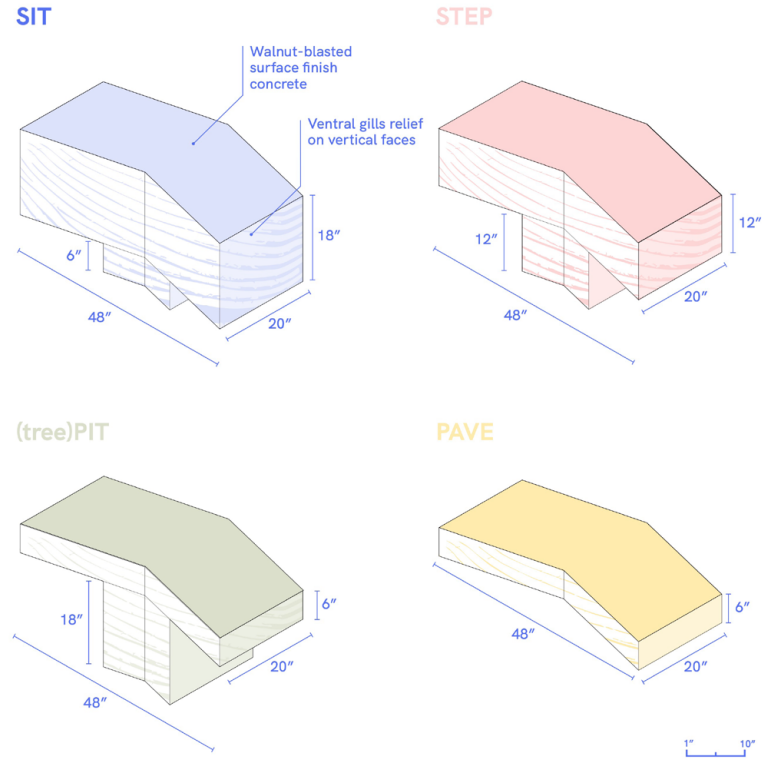
ASSEMBLY DIAGRAM



VERTEBRAE LOGIC

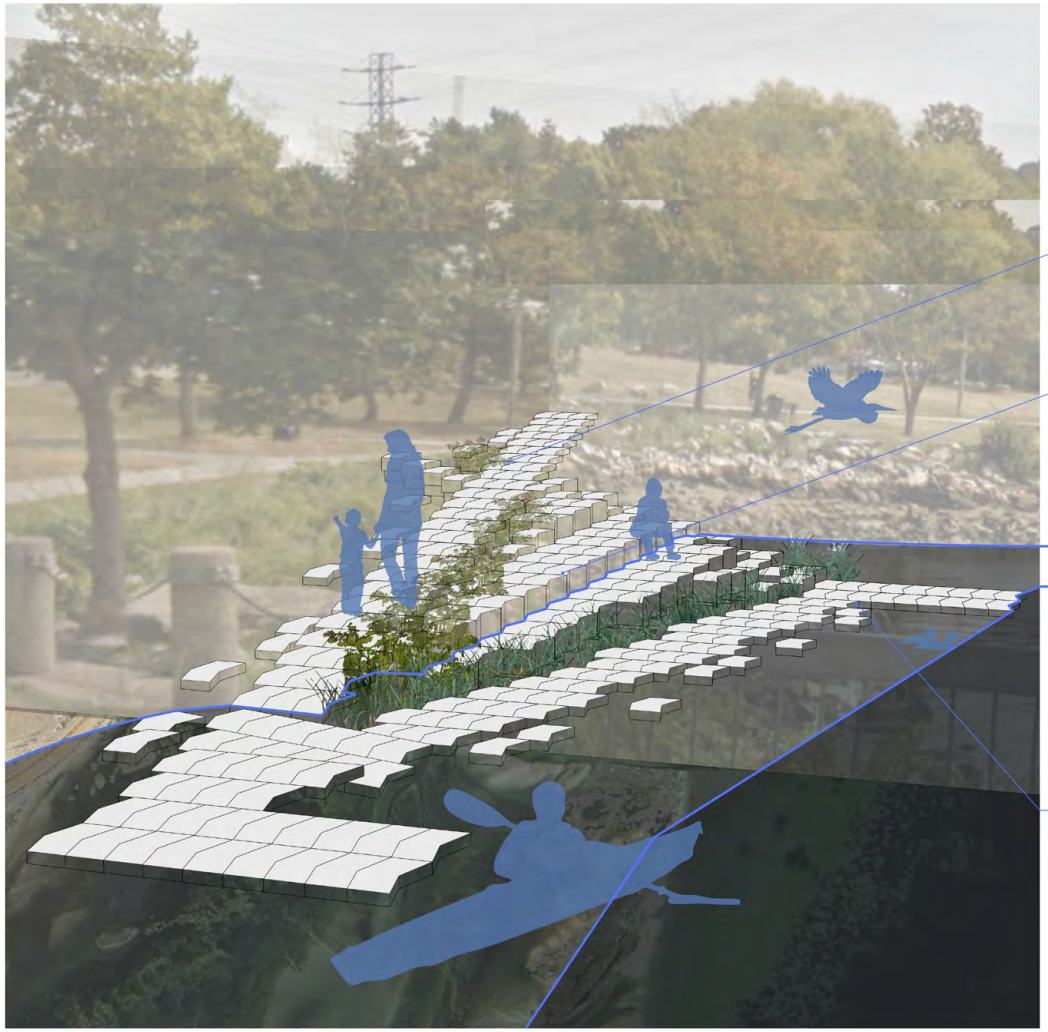


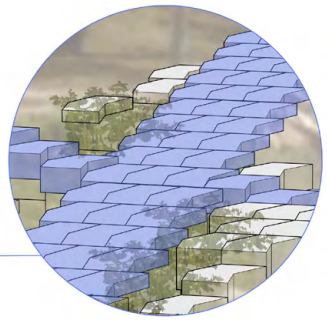
VERTEBRA BY VERTEBRA



Biomimetic Design, Vertebrae Logic, & Assembly Diagram

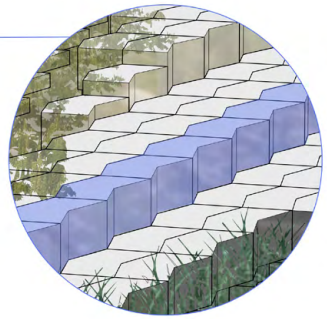
INSTALLATION VIEW





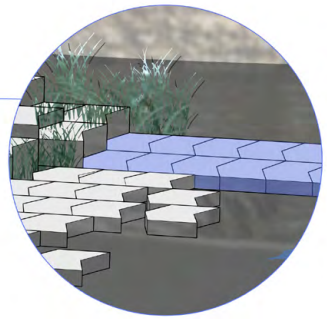
ADA-Accessible Path & Shortcut Steps

A continuation of India Point Park's existing pathways, the ADA-accessible path leads down to both kayak launches and through the intertidal zone. For a shortcut, steps lead directly from the top of the path to the lowtide kayak launch.



Intertidal Seating

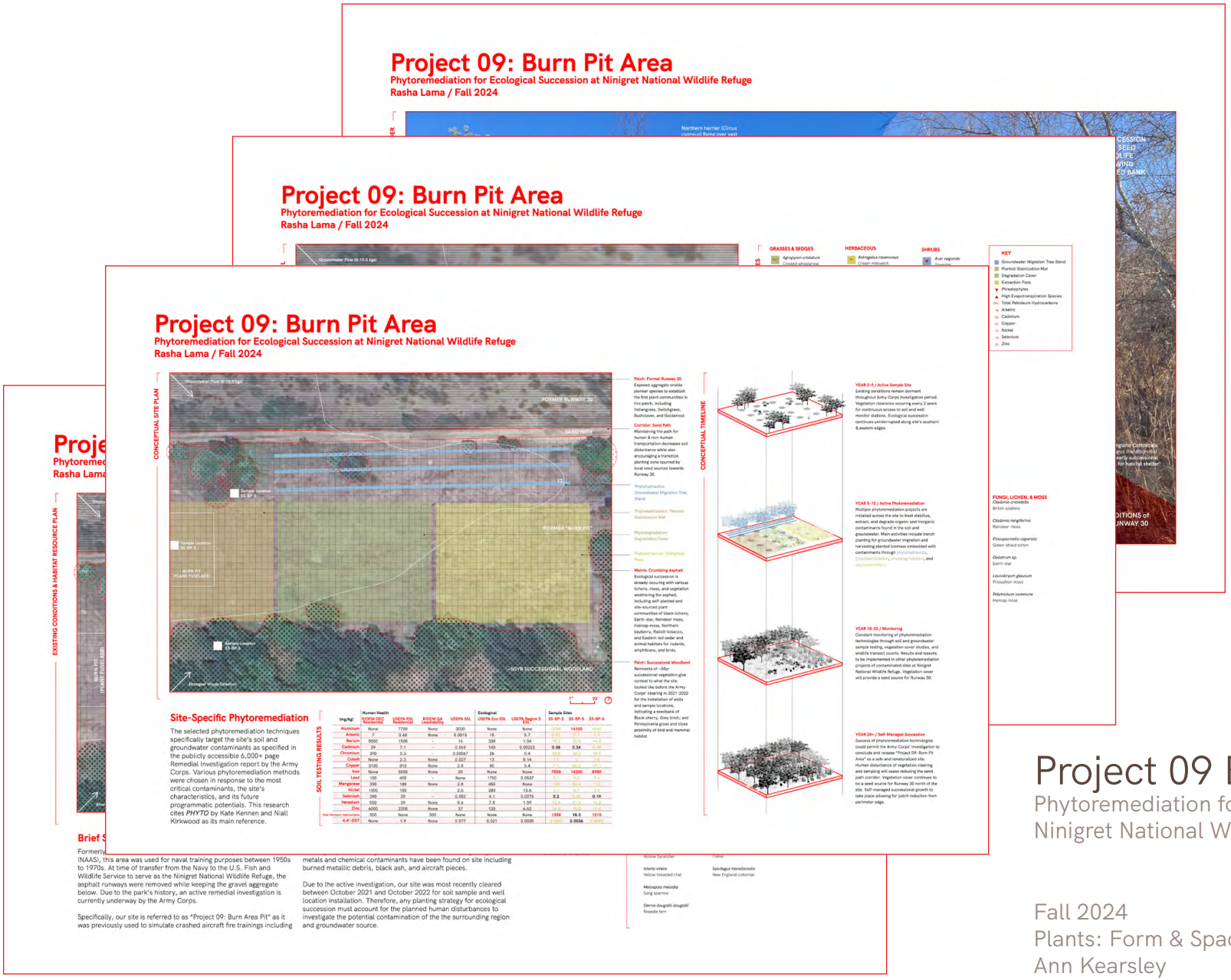
Interspersed between the upper and lower pathways are the intertidal seats. Depending on the time of day, these seats might offer an intimate view of the water, or they might completely disappear. The dynamic temporal change makes this an intriguing phenomenon to experience.



Hightide & Lowtide Kayak Launches

Adapting to the twice-daily tidal changes of the Providence River, two kayak launches allow kayakers, canoers, and perhaps adrenaline-filled swimmers to launch and dock at the Vertebrae Cove. Both kayak launches are 8' by 15' and are graded at a 10% slope.

Installation Render & Programmatic Features



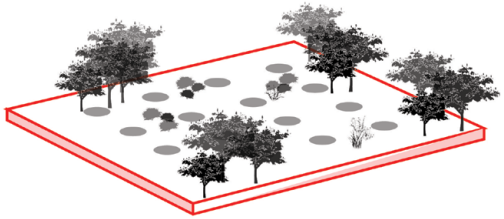
Project 09 Burn Pit Area

Phytoremediation for Ecological Succession
Ninigret National Wildlife Refuge, RI

Fall 2024
Plants: Form & Space
Ann Kearsley

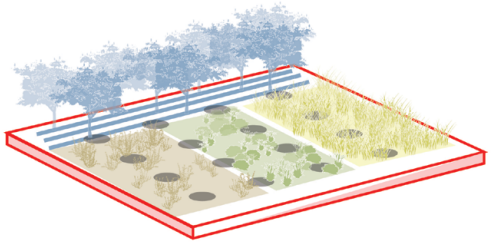
Project Boards (ARCH D, 24” x 36”)

CONCEPTUAL TIMELINE



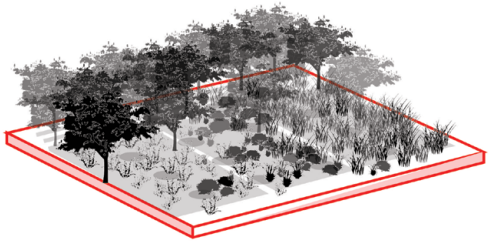
YEAR 0-5 / Active Sample Site

Existing conditions remain dormant throughout Army Corps investigation period. Vegetation clearance occuring every 2 years for continuous access to soil and well monitor stations. Ecological succession continues uninterrupted along site's southern & eastern edges.



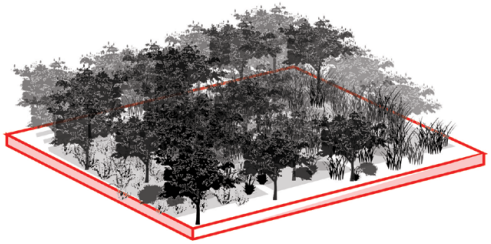
YEAR 5-10 / Active Phytoremediation

Multiple phytoremediation projects are installed across the site to treat stabilize, extract, and degrade organic and inorganic contaminants found in the soil and groundwater. Main activities include trench planting for groundwater migration and harvesting planted biomass embedded with contaminants through phytohydraulics, phytostabilization, phytodegradation, and phytoextraction.



YEAR 10-20 / Monitoring

Constant monitoring of phytoremediation technologies through soil and groundwater sample testing, vegetation cover studies, and wildlife transect counts. Results and lessons to be implemented in other phytoremediation projects of contaminated sites at Ninigret National Wildlife Refuge. Vegetation cover will provide a seed source for Runway 30.



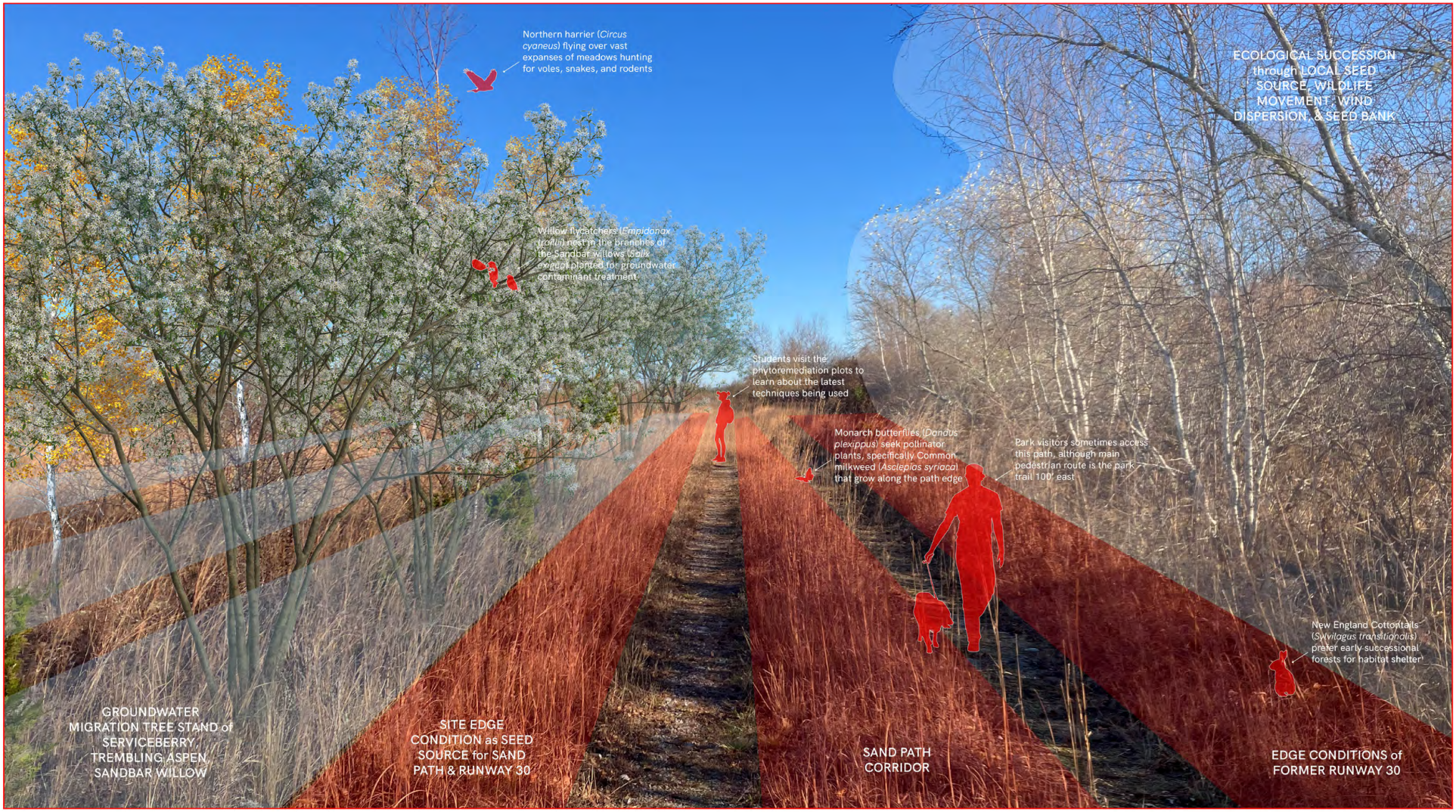
YEAR 20+ / Self-Managed Succession

Success of phytoremediation technologies could permit the Army Corps' investigation to conclude and release "Project 09: Burn Pit Area" as a safe and renaturalized site. Human disturbance of vegetation clearing and sampling will cease reducing the sand path corridor. Vegetation cover continues to be a seed source for Runway 30 north of the site. Self-managed successional growth to take place allowing for patch reduction from perimeter edge.

Site History

Formerly known as the Charlestown Naval Auxiliary Air Station, the Ninigret National Wildlife Refuge currently has multiple active remedial investigations led by the Army Corps. Specifically, our site is referred to as "Project 09 Burn Area Pit" as it was previously used to simulate crashed aircraft fire trainings including dousing airplane fuselages in combustible liquids and igniting.

Conceptual Timeline of Ecological Succession through Phytoremediation Techniques



Perspective Render During Year 5-10: Active Remediation Stage

Vegetative Cover Detail Plan (1:10) w/ Phytoremediation Techniques

Phytohydraulics: Groundwater Migration Tree Stand
Trench planting to access groundwater 8-10.5′ bgs by cracking asphalt up to 2′ deep and inserting dormant plant cuttings or bare-root vegetation with 10-12′ spacing. Phreatophytes and high evapotranspiration species selected to treat groundwater contamination including Serviceberry, Trembling aspen, and Sandbar willow.

Phytostabilization: Planted Stabilization Mat
Excluder species to contain contaminants in place and minimize soil and wind erosion. Functioning similarly to a traditional clay cap, the mat is planted in soils typically too tocis for many plants to establish. Species include Bentgrass, Red fescue, and Wild mustard.

Phytodegradation: Degradation Cover
Thick, deep-rooted herbaceous species with fibrous root zones to remove Total Petroleum Hydrocarbons (TBH) contaminants in surface soils up to 5′ deep including Indiangrass, Little bluestem, Switchgrass, Goldenrod, and Sandbar willow.

Phytoextraction: Extraction Plots
Hyperacculumator species to remove inorganic contaminants in surface soils up to 3′ deep. Harvesting biomass must occur before the plants dieback, performed with protection wear, and disposed of in a regulated area or phytomined out of the biomass such as nickel. Hyperaccumulator species include Spring sandwort (Cadmium & Zinc) and Hairy goldenrod (Nickel).

SOIL TESTING RESULTS

(mg/kg)	Human Health				Ecological		Sample Sites		
	RIDEM DEC Residential	USEPA RSL Residential	RIDEM GA Leachability	USEPA SSL	USEPA Eco SSL	USEPA Region 5 ESL	SS-BP-2	SS-BP-5	SS-BP-6
Aluminum	None	7700	None	3000	None	None	5320	14100	6440
Arsenic	7	0.68	None	0.0015	18	5.7	0.92	7.7	1.9
Barium	5500	1500	-	16	330	1.04	10.2	22.8	14.2
Cadmium	39	7.1	-	0.069	140	0.00222	**0.38**	**0.34**	0.48
Chromium	390	0.3	-	0.00067	26	0.4	33.8	12.2	19.9
Cobalt	None	2.3	None	0.027	13	0.14	1.2	3	1.6
Copper	3100	310	None	2.8	80	5.4	7.1	66.3	19.1
Iron	None	5500	None	35	None	None	7850	14200	8900
Lead	150	400	-	None	1700	0.0537	5.1	9.5	7.4
Manganese	390	180	None	2.8	450	None	139	86.4	113
Nickel	1000	150	-	2.6	280	13.6	3.1	6.1	3.6
Selenium	390	39	-	0.052	4.1	0.0276	**0.2**	0.62	**0.19**
Vanadium	550	39	None	8.6	7.8	1.59	15.4	21.3	15.3
Zinc	6000	2300	None	37	120	6.62	14.8	15.8	19.6
Total Petroleum Hydrocarbons	500	None	500	None	None	None	1350	**18.3**	1010
4,4'-DDT	None	1.9	None	0.077	0.021	0.0035	0.0082	**0.0036**	0.0092

PHYTOREMEDIATION SPECIES

GRASSES & SEDGES

- TPH — *Agropyron cristatum* Crested wheatgrass
- As/Cu/Pb/Zn — *Agrostis tenuis* Bentgrass
- TPH — *Axonopus compressus* Carpet grass
- TPH — *Bouteloua curtipendula* Side oats grass
- TPH — *Bouteloua dactyloides* Buffalo grass
- TPH — *Carex stricta* Tussock sedge
- TPH — *Elymus canadensis* Canada wild-rye
- Cu/Ni/Zn — *Festuca rubra* Red fescue
- TPH — *Panicum virgatum* Switchgrass
- TPH — *Schizachyrium scoparium* Little bluestem
- TPH — *Sorghastrum nutans* Indiangrass
- TPH — *Tripsacum dactyloides* Eastern gamagrass

HERBACEOUS

- Se — *Astragalus racemosus* Cream milkvetch
- Se — *Atriplex confertifolia* Shadscale saltbush
- Cd/Zn — *Cardaminopsis halleri* Rockcress
- Se — *Castilleja chromosa* Indian paintbrush
- Cd/Zi/Zn — *Noccaea caerulescens* Alpine pennycress
- Cu — *Oenothera glazioviana* Evening primrose
- Cd/Zn — *Sabulina verna* Spring sandwort
- Ni — *Senecio pauperculus* Balsam groundsel
- Cd/Cu/Pb/Zn — *Sinapis arvensis* Wild mustard
- Ni — *Solidago hispida* Hairy goldenrod
- TPH — *Solidago nemoralis* Grey goldenrod

SHRUBS

- ▼ — *Acer negundo* Boxelder
- ▼ — *Cornus amomum* Silky dogwood
- ▼▲ TPH — *Salix interior* Sandbar willow

TREES

- ▼ — *Acer rubrum* Red maple
- ▼ — *Amelanchier canadensis* Serviceberry
- ▼▲ — *Betula nigra* River birch
- TPH — *Celtis occidentalis* Hackberry
- ▼ — *Magnolia virginiana* Sweetbay magnolia
- ▼ — *Quercus alba* White oak
- TPH — *Pinus sylvestris* Scots pine
- ▼▲ — *Populus deltoides* Cottonwood
- ▼▲ — *Populus tremuloides* Trembling aspen

KEY

- Groundwater Migration Tree Stand
- Planted Stabilization Mat
- Degradation Cover
- Extraction Plots
- ▼ Phreatophytes
- ▲ High Evapotranspiration Species
- TPH Total Petroleum Hydrocarbons
- As Arsenic
- Cd Cadmium
- Co Copper
- Ni Nickel
- Se Selenium
- Zn Zinc

Selected Phytoremediation Species targeting soil testing results

Site-Specific Phytoremediation

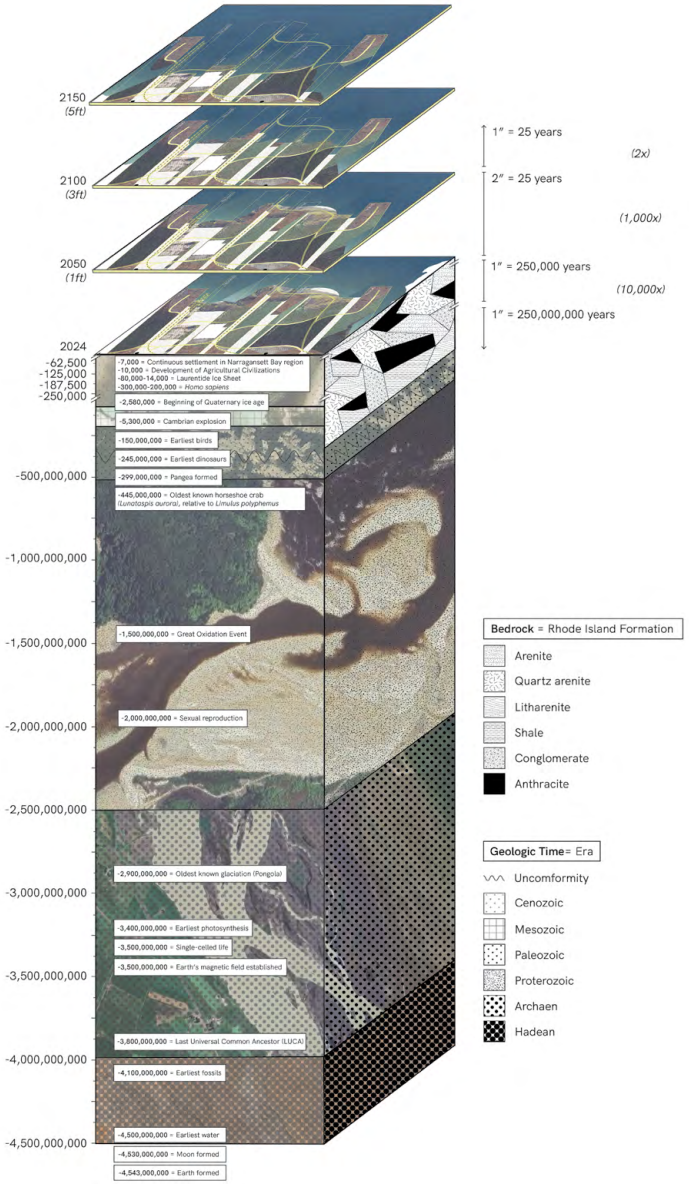
Applying *PHYTO* by Kate Kennen and Niall Kirkwood, the selected phytoremediation techniques specifically target the site's soil and groundwater contaminants as specified in the publicly accessible 6,000+ page Remedial Investigation report by the Army Corps. Various phytoremediation methods were chosen in response to the most critical contaminants, the site's characteristics, and its future programmatic potentials.

Site Model (1:60)

Strata & Phenomena

Deep Time at Allens Ave
Providence, RI

Spring 2024
Site, Ecology, Design Studio
Emily Vogler & Fatema Maswood



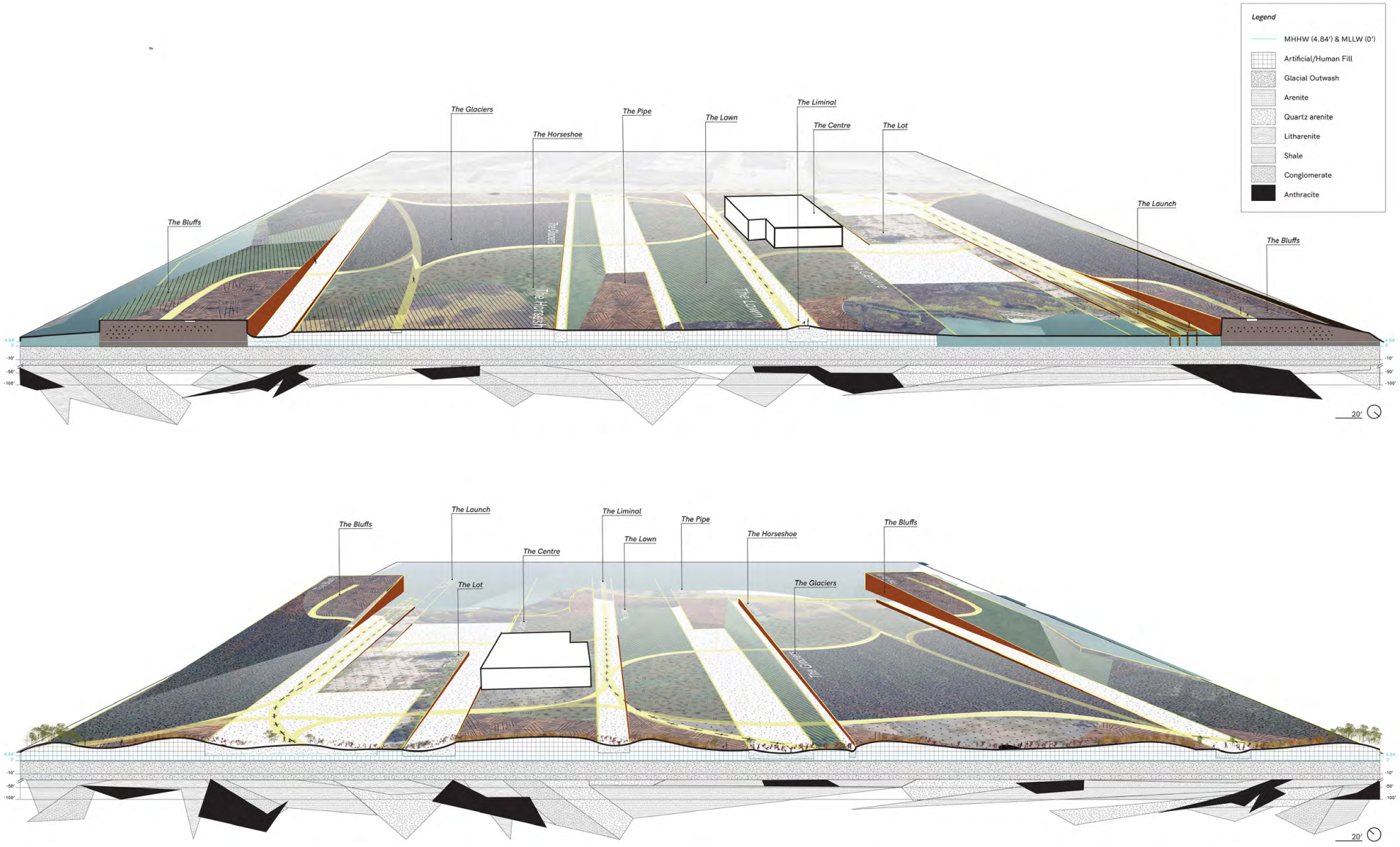
Concept Drawing (1:60)

Program

Strata & Phenomena invites local communities and residents to learn about Providence's history through an experiential park and community learning centre. Specific programmatic functions include:

- Indoor venue to host yearlong programming for kids (K-8), teenagers, families, and adults/elderly,
- ADA-accessible pedestrian pathways throughout the site informed by the placement of the existing non-operative railroad tracks,
- Bicycle and running circuit with waterfront access,
- Kayak launch with vehicular access and parking,
- Stormwater management and BMPs in the "uncomformities,"
- 2.5 acres of salt marsh habitat.

Site Plan (1:60)



Site Sections (1:20)

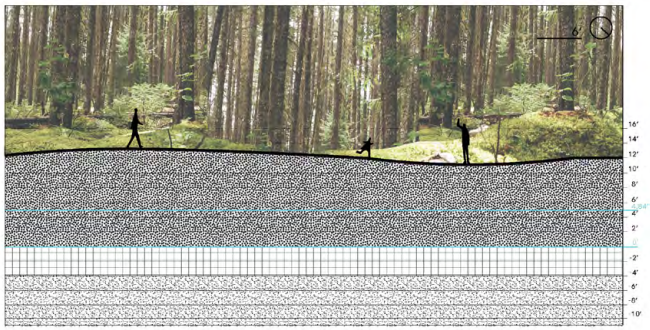
Zones of Phenomena Models (1:8)

Zones of Phenomena

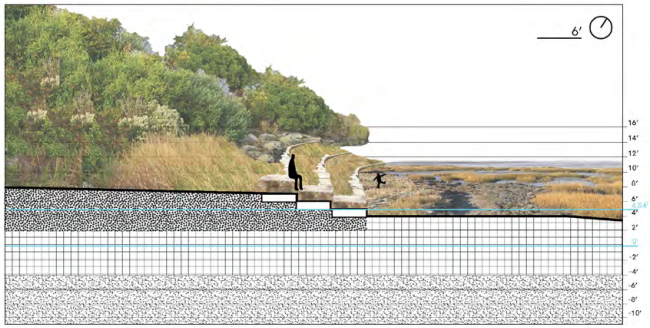
Inspired by geologic strata and the site's vast industrial history, the site's organization allows for a self-guided exploration through various programmatic zones grouped by phenomena.

These zones expand knowledge into a sensorial exploration of phenomena of differing scales: "The Bluffs" highlight the Bank swallows' bi-annual migration; "The Liminal" reveals Narragansett Bay's 3- 4 daily tidal changes; "The Glaciers" showcase drumlins and erratics similar to those deposited during the glaciation period; and "The Horseshoe" gathers community in a coastal amphitheatre where humans can witness the Horseshoe crab phenomena during the specific spawning season of May and June.

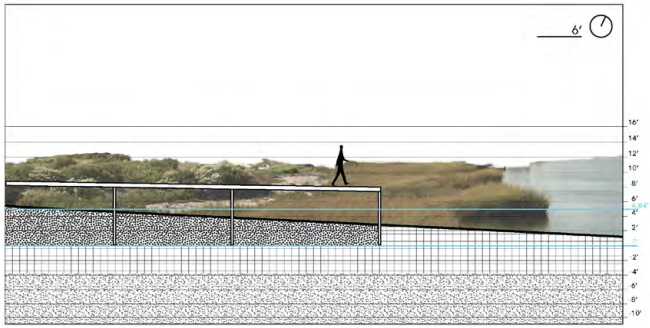
THE GLACIERS



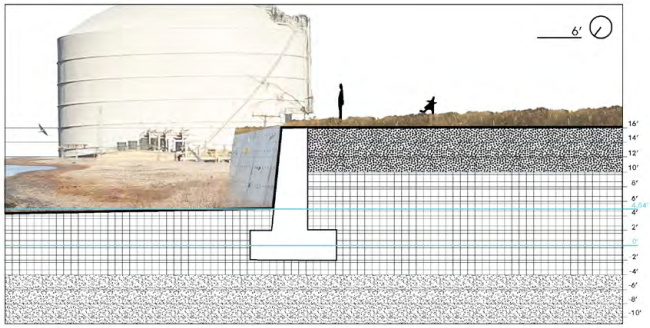
THE HORSESHOE



THE LIMINAL



THE BLUFFS



Zones of Phenomena Sections (1:6)

Artifacts Case (18” x 24” x 3”)

Uncomformity

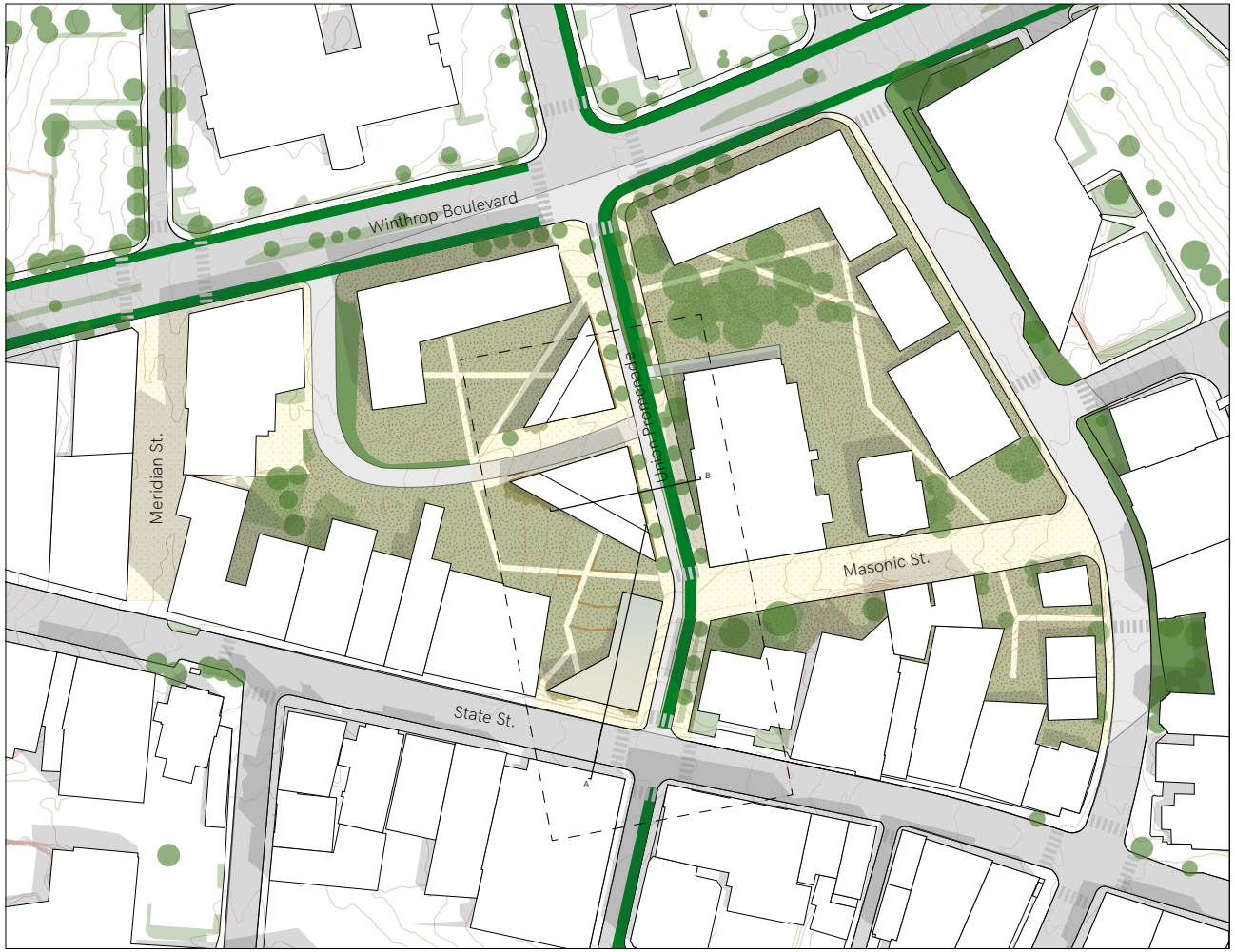
Between each stratum exists the “Uncomformity:” the strips of time erased in earth’s history. On the coastline exists various intriguing artifacts of past uses, stories, and histories of this site. By filling the “unconformities” with these artifacts, visitors have an opportunity to discover this site in its originally found condition at time of design (discarded, misused, and forgotten) and set a new datum in its place.

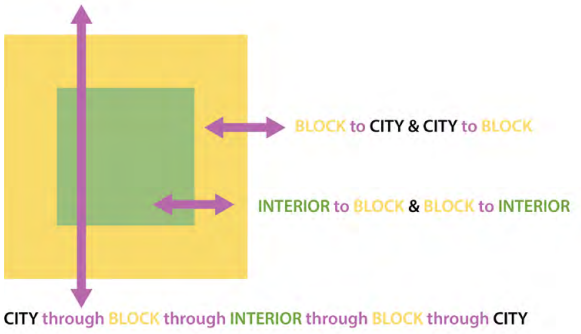
Detailed Model View of The Sanctuary lawn roof & urban plaza (1:8; 3' x 5' model)

The Backyard

Reintroducing the Residential Neighbourhood
New London, CT

Fall 2024
Constructed Landscapes Studio
Jacob Mitchell & Gabriel Vergara Gajardo





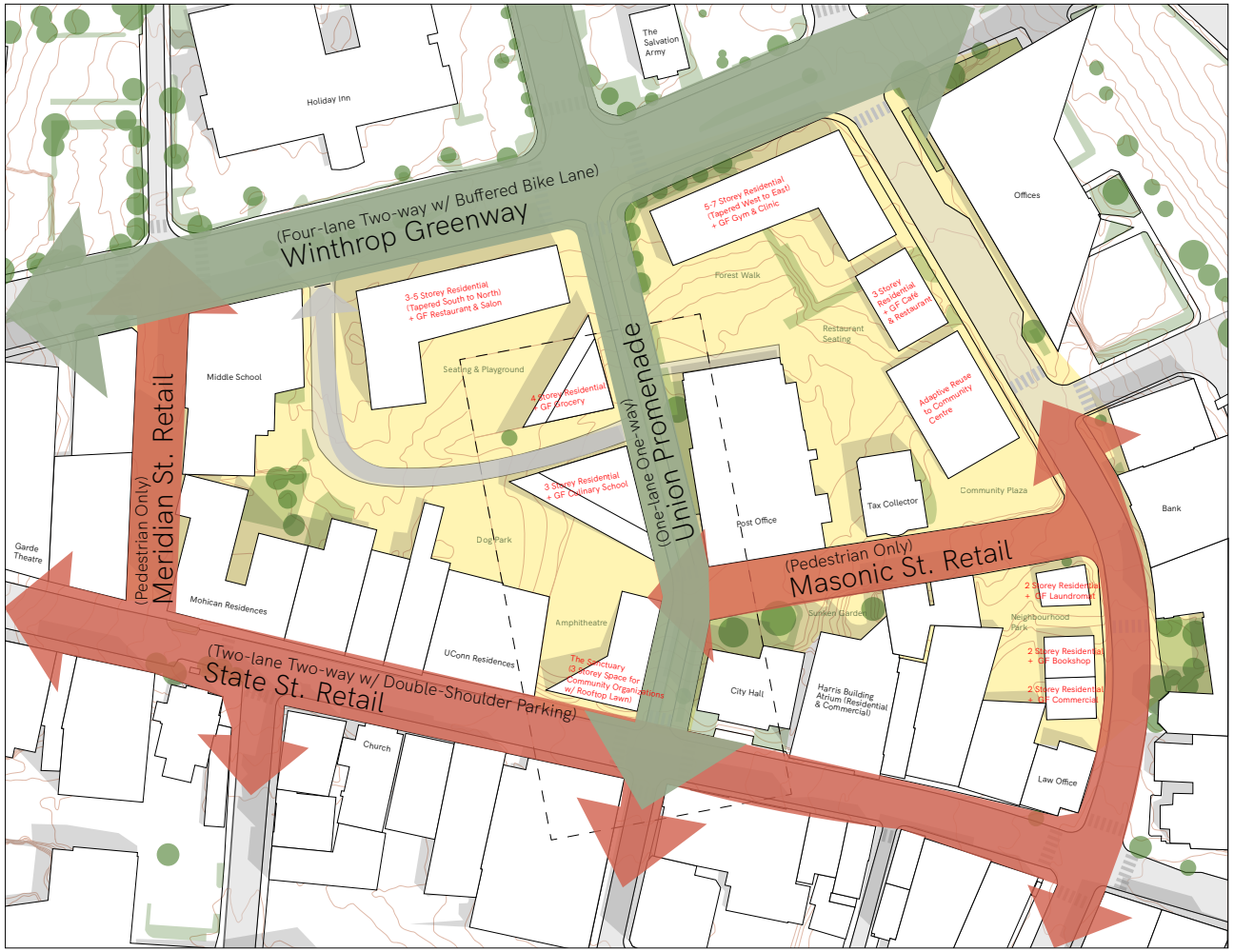
Concept

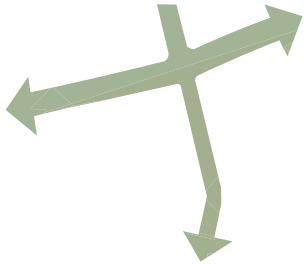
A neighbourhood proposal organizing mixed-use affordable housing and a variety of public spaces that encourage *connection, spontaneity,* and *livability* within the historical civic region of New London, Connecticut.

Strategy

Build the block by densifying the building footprints with residential and commercial spaces, enclosing an interior for public-access parks and plazas, and improving transportation infrastructure for an interconnected neighbourhood within the city's grid.

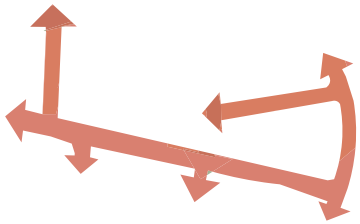
Illustrated Plan (1:40) & Framework Strategy





Mixed (Winthrop Greenway & Union Promenade)

Passive (The Backyard)

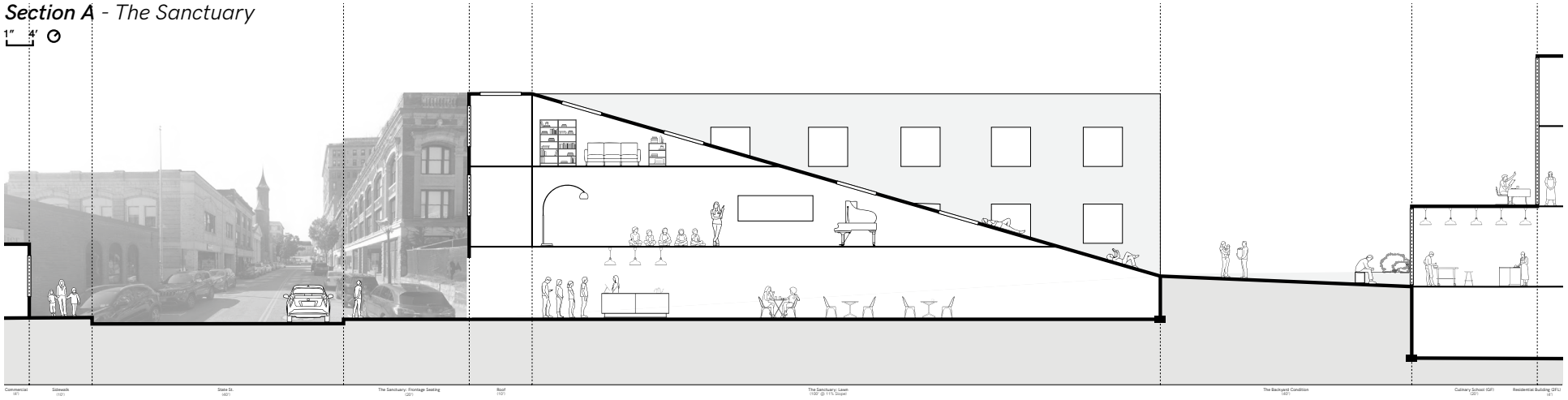


Active (State, Meridian, & Masonic St Retail)

Parti (1:40) & Program Diagrams

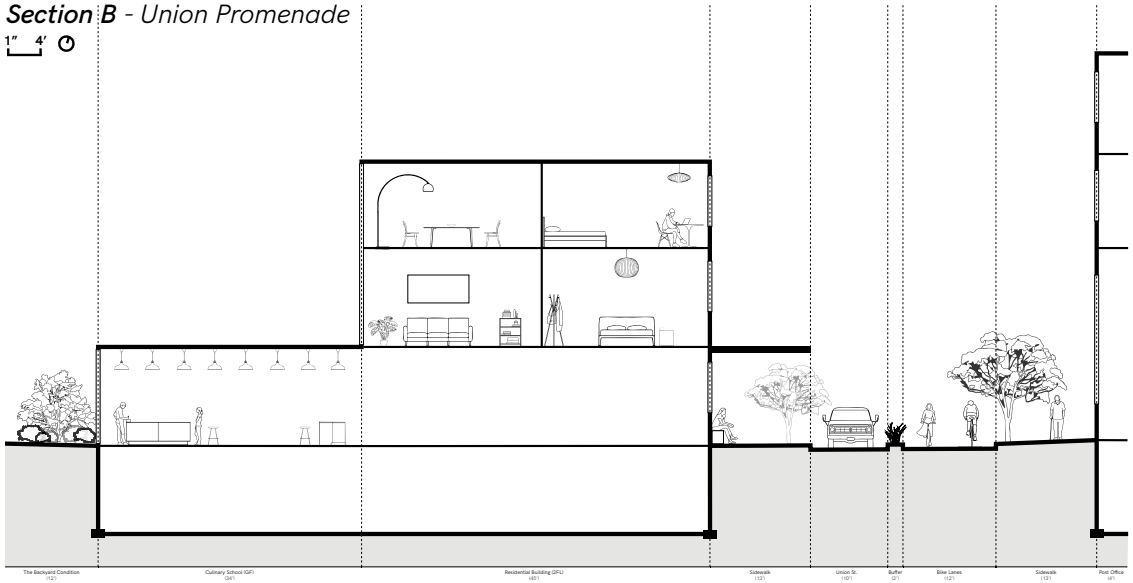
***Section A** - The Sanctuary*

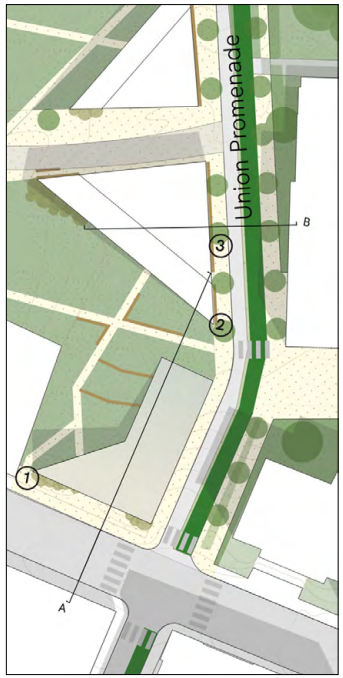
1" 4'



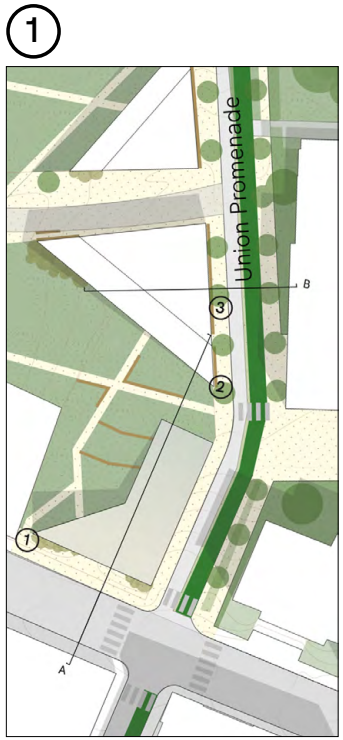
***Section B** - Union Promenade*

1" 4'

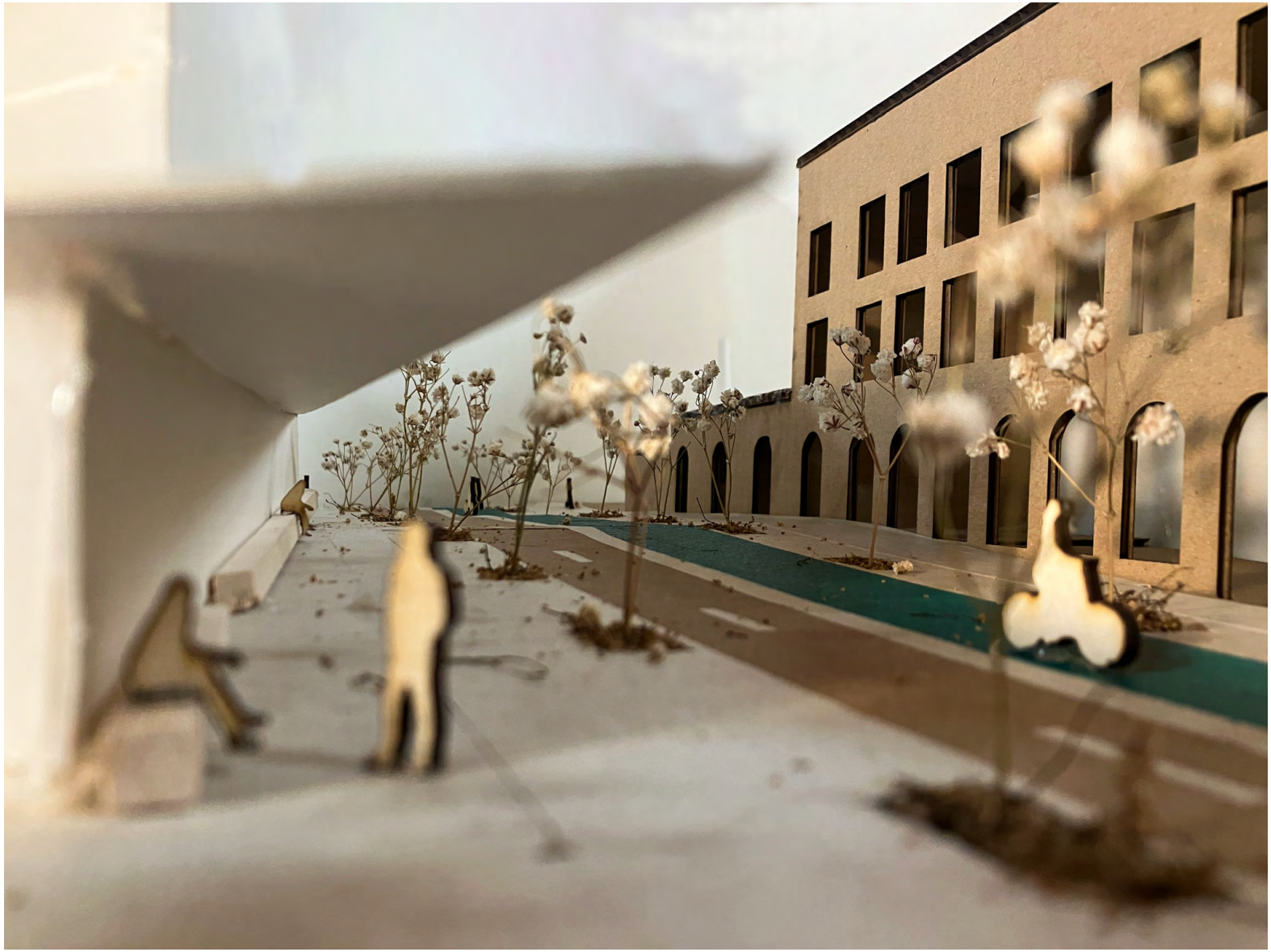


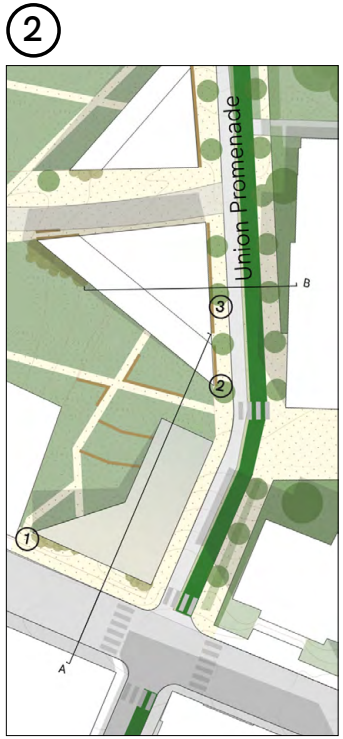


Sections (1:4)

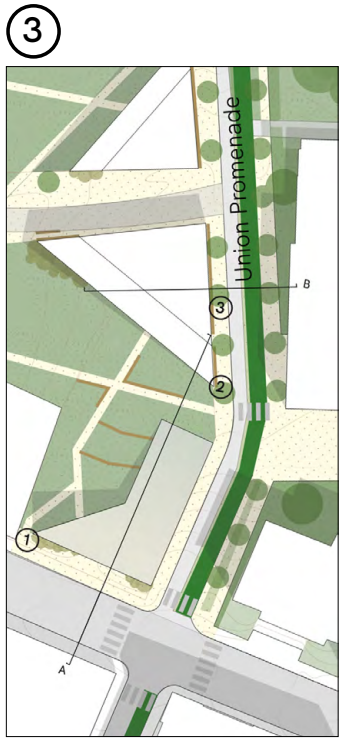


Model Perspective Shot: A neighbour's view of The Sanctuary's lawn (1:8)





Model Perspective Shot: Looking north, seating under building's awning on Union Promenade (1:8)



Model Perspective Shot: Looking south, The Sanctuary's lawn roof at Masonic St. x Union Promenade intersection (1:8)

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