GREENER BELLTOWN : BLUER SOUND
City / Nature for Climate Adaptation
Scan | Design Master Studio 2017
GREENER BELLTOWN: BLUER SOUND
City / Nature for Urban Resilience

2017 Studio Objectives

explore urban design strategies for climate adaptation and urban nature

working at various scales to cultivate social resilience, biodiversity, human health, and artfully integrate water into the cityscape for hydraulic function and human delight
2030 DISTRICT GOALS

Manage the combination of stormwater and potable water use to 50% below the District baseline

50% in Belltown is about

67 million gallons
2030 DISTRICT GOALS

VINE STREET BASIN (165 ACRES)
80% GREEN ROOF
100% OF ALL NON-ROW PROPERTY

PRECIPITATION
161,300,000 GAL/YR

STORMWATER RUNOFF
124,500,000 GAL/YR
(22.8% Reduction; 5.8% additional stormwater reduction)
SPU STORMWATER STORAGE GOALS:

130,000 GALLONS

Central Waterfront (Vine) Basin 69
STUDY TOUR: 09/01 - 09/17

DENMARK  SWEDEN

CPH  MALMÖ
The Trip: Copenhagen + Malmö

Cycling

Office Visits/Tours

Lectures
STUDY AREA: Belltown, Seattle
STUDY AREA: Belltown District
MOBILITY

DISTRIBUTION ANALYSIS

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Yearly Ecological Impact Of Trees In Belltown

1,528 trees

304,363.05 lbs of CO2 sequestered

816,826 gal of water conserved

38,095.23 kwh energy conserved

$28,244.51 saved
Belltown is the 6th fastest growing neighborhood in America.

- **Density of Belltown:** 19,025 / square mile
- **Density of Seattle:** 8,161 / square mile

**Belltown Public Spaces**

- **Driveway:** 31-40 minutes
- **Bike:** 0-10 minutes
- **Walk:** 0-10 minutes
- **Taxi:** 10-25 minutes
- **Bus:** 21-30 minutes
- **Other:** 31-40 minutes

**Transportation to Work**

- **Drive Car:** 98 Travel Score
- **Walk:** 97 Walkability Score
- **Bike:** 71 Walkability Score

**Family Households**

- 22.9% born in Washington
- 18.1% Non US Citizens

**Total Population of Belltown:** ~12,000

**Belltown Public Spaces**

- **447** Carolina
- **243** Belltown
- **39** Seattle Central
- **76** Belltown
- **133** Seattle Central
- **55** Belltown
- **103** Seattle Central
- **13** Seattle Central
- **26** Belltown

**Drawings:** Rachel Wells
DEEP CONTEXT

MATERIALITY TIMELINE

POPULATION GROWTH AND RESOURCE USE

DISTRICT ANALYSIS

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PLANS

Washington State

Waterfront Seattle

Downtown Seattle Association

City of Seattle

Project Belltown

Growing Vine Street

Community Members

Seattle 2030 District

King County

Recharge the Battery

Bell Street Park Extension

Battery Street Portal Site

Project Belltown Community Plan

Growing Vine Street Book

Bezoning Cistern

Lake to Bay

Market to MOHAI

Seattle Climate Action Plan

Seattle Green Factor

Seattle 2035

CSO Reduction Plan

Strategic Plan 2016-2020

Other Stakeholders
STORMWATER TOOLBOX

PERVIOUS PAVEMENT
STRATA/STRATA CELLS
URBAN FOREST
BIOFILTERATION CELLS/PLANTERS
GRASSPAVE
GREEN FACADES
GREEN ROOFS
GREEN WALLS
SPLASH BOXX
CISTERNS
CONSTRUCTED WETLANDS

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Typical Green Wall Components
- Waterproof Layer
- Steel Structure
- Irrigation
- Growing Planters

Collect rain water from roof and pavement to re-use it.

Image: Yunxin Du
Daylighted portions of the Battery Street Tunnel

- Vertical Flow Constructed Wetland
- Pedestrian access to interior of tunnel
- Mycoremediation areas in portions remaining capped
- Greywater collection basin for sidewalk planters
- Bioretention sidewalk planter boxes
- Permeable pavement
- Greywater outflow
- Blackwater inflow to lower levels of constructed wetland
- Lowland riverine forest
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MOBILITY

DISTRICT FRAMEWORK
Maximizing Wide Sidewalks:
Green walls on the neighborhoods building facades utilize and slow stormwater runoff from rooftops. The north-east side of the buildings supports healthy management of the vegetation due to the orientation to the sun and managed water access from rooftop cisterns. These wide sidewalks on the shadier side of the street allow for large and continuous bioretention cells to manage water from all surrounding impervious surfaces.
What if every historic building in Belltown had...

A Blue Roof... An External Cistern... A Raingarden...

<table>
<thead>
<tr>
<th>Historic Buildings</th>
<th>Potential Site Area</th>
<th>Historic Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>7,000 sq. ft.</td>
<td>23</td>
</tr>
<tr>
<td>Avg. Roof Area Per Building</td>
<td>3&quot;</td>
<td>Avg. Depth of Blue Roof</td>
</tr>
<tr>
<td>Avg. Depth of Blue Roof</td>
<td>13,090 gallons</td>
<td>Avg. Depth</td>
</tr>
<tr>
<td>Total Volume of Water</td>
<td>13,090 gallons</td>
<td>Rainfall Captured in Rain Event</td>
</tr>
<tr>
<td>Total Storage In Potential Sites</td>
<td>206,667 sq. ft.</td>
<td>Total Volume of Water</td>
</tr>
</tbody>
</table>

301,070 gallons 515,400 gallons 1,610 gallons
STORMWATER METRICS

POTENTIAL IF FRAMEWORKS IMPLEMENTED

2,338,670 GALLONS
STORMWATER STORAGE

894,413,635 GAL.
STORMWATER MANAGED

468,819,140 GAL.
POTABLE WATER SAVED

TARGET

130,000 GALLONS
STORMWATER STORAGE

67,000,000 GALLONS OF
POTABLE WATER SAVED +
STORMWATER MANAGED
SITES: BELTOWN

1 Alleyways
2 Small-Scale Interventions
3 Battery Street Portal
4 Battery Street
5 Waterfront and Connections
6 P-Patch Parking Lot
Our vision is to fill this void in the city fabric, by growing and layering social, cultural, ecological, and hydrological networks across the site. We looked at a pre-development ecotone of beach to bluff, and overlaid it onto the contemporary urban condition, interpreting beach, deflation plain, backshore, bluff, and upland forest into our interventions. In addition, we looked to the Native Belltown Vision for guidance in this culturally rich area.

Our big moves are reclaiming much of Alaskan Way, adding new pedestrian zones and access, several expansive new habitat areas, and a GSI alternative to the CSO interceptor pipe.
VIBRANT SOCIAL & CULTURAL SPACES

RECONNECT WEBS OF LIFE
SENSE OF PUget SOUND

NEW HABITAT ZONES

WATER / GSI
RECLAIM ALASKAN WAY
VOID IN CITY FABRIC

PEDESTRIAN SPACE
VIBRANT SOCIAL & CULTURAL SPACES

RECONNECT WEBS OF LIFE
SENSE OF PUget SOUND

NEW HABITAT ZONES

WATER / GSI
RECLAIM ALASKAN WAY
VOID IN CITY FABRIC

PEDESTRIAN SPACE
Water system overview diagram

- **Bioretention cells**: Slow and treat storm water.
- **Cisterns on rooftop store rainwater for gravity-fed irrigation during dry season.**
- **Planted swale conveys storm water along pedestrian path to raise awareness of water cycle.**
- **Green roofs and walls detain and evaporate rainwater.**
- **Subsurface flow wetland intercepts CSO, treats blackwater and provides water for irrigation.**
- **Bioretention strip treats street run-off.**
- **Structural glass overlook allows light for marine habitat.**

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Roxanne Glick
UPLAND FOREST WALKWAY

Image: Aaron Parker
Street claiming typology:

Transferring streets from cars to usable pedestrian space.

Connections from the waterfront into Belltown offer a unique challenge; one must cross train tracks and navigate between uninviting buildings, there is very little attractive signage or wayfinding, and there is a substantial elevation change and steep grade.

This typology offers an ADA path smoothly winding between open flexible and durable turf area, seasonally colorful plantings, and a substantial green stormwater infrastructure to manage adjacent building stormwater runoff.

The stormwater infrastructure offers simple biocell technology gathering drainspout runoff and also provide extra storage during substantial rain events.
The existing Bell Street Bridge infrastructure is layered onto, thickening function and enhancing the experience. Cedar slats, green roofs, string lighting, and vines inhabit what was once a utilitarian space. Treated runoff and greywater is brought over the bridge and vaporized into clouds in the summer, cooling the sunny bridge. A new connection is made to the interceptor wetlands running along Alaskan Way. Black water is brought from the above neighborhoods into two large storage tanks underneath the new under-bridge plaza. At the upper entrance, a new Native Landing Portal welcomes visitors to Belltown, and the historic site of babáqwab, or Little Prairies, the Duwamish village that once stood here.
A new pedestrian connection between Elliott Ave and Alaskan Way at the base of Battery Street, draws formal inspiration from a ravine that used to exist in this area. The experience walking the bridge travels through history and the water cycle. View “C” shows an enclosure over the train tracks etched with historic photos of the same view beyond and could integrate other memorial elements to the burial ground in this area. In view “B” a native-planted seasonal stream (fed by roof runoff) is integrated with the bridge structure. In View “A” the pedestrian bridge terminates in a multilevel viewing deck with a structural glass ground level to maximize light for salmon habitat below.
New Battery Street Pedestrian Bridge Section

- View B. Eco-revelatory swale-bridge
- View A. Waterfront stair-shelter with glass deck

Diagram notes:
- A: New pedestrian bridge
- B: Raised crosswalk on Alaskan Way
- C: Street run-off bioretention strip
- Subsurface wetland cells
- Noise barrier wall with green screen
- Passage Through Time enclosure
- Green wall and roof
INTERCEPTOR WETLAND

A 45,000 square-foot wetland can fit in the space of the removed trolley tracks and two lanes of road on Alaskan Way between Bell and Wall Streets and provide a needed neighborhood green space and waterfront connection. To make a CSO-treating wetland at this location worthwhile, a new pipe is proposed along the existing Bell Street pedestrian bridge that connects to the city system on Western Ave and Bell Street. The proposed CSO pipe hugs the existing Bell Street pedestrian bridge before plunging into underground pre-treatment tanks (accessible for maintenance through decking). Treated water is used for irrigation in waterfront planting areas.
Subsurface Flow Wetland

This proposal calls for blackwater-treating green infrastructure with a capacity up to 850,000 gallons of water that could be collected from 12 blocks of southern Belltown would help prevent combined sewer overflows. Water is treated in a series of horizontal flow subsurface wetland cells without the risk of contact with people or pets. According to the EPA Wastewater Technology Fact Sheet on Subsurface Flow Wetlands, water quality improvement is due to physical, chemical and biochemical processes, especially microorganisms attached to submerged surfaces including the gravel itself.
WATER’S EDGE
COMMUNITY CENTER

This center provides 4,000 ft² of public indoor space, plus a large plaza, performance space and roof deck. It has sports and educational capacity, restrooms and showers, a visitor’s center, and a cafe incubator on the roof. Pop-up events can be held both inside and out. Summer camps and after school programs use the space. In summer, the building is open and airy - in winter, warm and inviting. Both upper and lower levels have green roofs, fed by greywater from the building. A kayak dock brings waterborne visitors up to the center and Alaskan Way. Locals and tourists alike come for the views, the programming, the food, and the conviviality.
(Above) Site Hydrology: Arrows depict the movement of water throughout this area of the site. Water is collected from surrounding rooftops, parking lots, and streets. It then infiltrates the boardwalk and enters the underground water storage layer before being deposited to the sound.

(Above) Plan Detail: This segment of the plan depicts how the Dunescape connects and functions with the community center and boardwalk.

(Above) Social Use and Movement: The site comprises of activity nodes, featuring places to play, gather, socialize, wander and relax. The site serves to connect people out onto the water as well as up into Belltown.
DUNESCAPE BOARDWALK

The waterfront dunescape is a series of rolling boardwalk decking and sunken wetlands that help bring and connect people to the waterfront, provide habitat for birds and wetland creatures, and contain stormwater runoff.

The re-designed boardwalk will serve as a dynamic, open-ended public amenity with areas for relaxing, socializing, strolling, playing + learning. Underneath the boardwalk is an water storage layer that collects water from surrounding streets + buildings. A series of meandering wetland, dunegrass and structural features provide habitat throughout the waterfront.

(Above) Concept: Flexible, adaptable “cells” respond to weather events and function as part of an integrated social and ecological system

The Dunescape at night

Soft, inviting pathway and overhead lighting allows the Dunescape to transform into a nighttime strolling + social gathering space. The lighting is designed for minimal interference with bird and wildlife habitat, as overhead structures block light from reaching the osprey nests above.

All images: Margot Chalmers
Inspired by the movement of avian wings, these multi-functional structures are found throughout the dunescape. These customizable shelters allow users to turn the wheel to open and close the aluminum shelter flaps to their desired extent. The structures funnel water via rainchains into wetland grasses and transfer water to the underground water table storage layer. The structures support nests for ospreys, drawing the user’s eye up and around the site.
DUNESCAPE DECKING AND HYDROLOGY

Pipe allows water to flow into impermeable, lined “box” that stores water for wetland plants.

Dry, sandy soil for dunegrass.

Impermeable liner contains water.

Uncompacted subgrade.

Gravel water table storage layer slopes 1-2%.

Non-slip wood decking.

Bullrush (Scirpus spp.)

Dunegrass (Elymus mollis)

All images: Margot Chalmers
LOG JAM
FLOATING WETLANDS

At the foot of Vine St., between the Victoria Clipper and the Edgewater Hotel, a series of floating saltwater wetlands and docks brings visitors out into the water. Anchored near the seawall and allowed to float over deeper water, the docks move up and down with the tide thanks to hinged entrance ramps.

Positioned over CSO 069, these wetlands help clean the water in the event of an overflow, in addition to providing habitat and delight for people. Kayaks can pull up to the south edge of the docks. Inviting, ecological lighting activates the space at night, while protecting wildlife from too bright or harsh photonic disturbance.
LOG JAM: PAST AND PRESENT

Inspired by log jams along the coast, this design references both the natural environment and the history of timber, logging, and shipbuilding along Seattle’s waterfront. Large trees growing on bluffs fall into waterways, eventually ending up as driftwood logs. Loggers would use waterways to bring felled trees to the open harbor, where they could be shipped or processed.

Now, the shapes inspired by these histories bring new life and vital processes to the waterfront.
Northwest Waterfront:
Rerouting Alaskan Way allows expansive pedestrian movement on the waterfront to connect existing public resources to future opportunities. Opening this large flexible space on the waterfront will allow for historic trolley cars to be used as incubator markets supporting local start-ups and small businesses. This area connects tourists through popular attractions as well as providing local event space utilizing an enlivining waterfront.
TROLLEY PLAZA & UPLAND MEADOW
This project was catalyzed by the planned removal of the waterfront trolley tracks running along Alaskan Way. Despite its prime waterfront location, this area is used as a conduit for transport and boat tourists. It is largely an impermeable, grey expanse.

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A P-PATCH PARK FOR BELLTOWN
Location:
Elliot Avenue between Vine Street and Wall Street

Image by Jessica Vetrano and Julia Brasch
SITE VISIONS | P-PATCH PARK

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SITE VISIONS

<table>
<thead>
<tr>
<th>P-PATCH PARK</th>
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<tbody>
<tr>
<td>vine st</td>
</tr>
<tr>
<td>wall st</td>
</tr>
<tr>
<td>elliott ave</td>
</tr>
</tbody>
</table>

- the vine condos
- walton lofts
- millionaire club charity
- the nature conservancy
- the vinegar conservancy
- the millionaire club charity
- the walton lofts
- the belltown
- the vine st
- the wall st
- the elliott ave

2601 elliott parking garage
art institute of seattle
vine street storage
belltown p-patch
cottages
parking lot
abandoned building
tent

Seattle School of Theology & Psychology

Legend:
- Bike path
- Pedestrian path
- Private
- Public
- Existing green stormwater infrastructure
- Stormwater capture areas

Image by Diana Settlemyer and Jessica Vetrano
**SITE VISIONS | P-PATCH PARK**

### USERS

- **Community**
  - Lack of public seating, gathering space

- **Students**

- **Local Employees**

- **People Experiencing Homelessness**
  - Lack of facilities

- **Tourists**

- **Gardeners**
  - Shortage of plots

- **Pollinators + Birds**
  - Lack of habitat

- **Water**
  - Polluted runoff

### ISSUES & OPPORTUNITIES

### INTERVENTIONS

- Terraced Seating
- Community Pavillion
- Splash Pad
- Revitalized Historic Building
- Cafe Providing Transitional Jobs
- Public Interpretive Art
- Terraced Garden Plots
- Roof Top Garden
- Pollinator Plants
- Terraced Rain Gardens
- Constructed Wetlands
- Bioretention Planters

*Image by Julia Brasch*
SITE VISIONS | P-PATCH PARK

Image by Jessica Vetrano
SITE VISIONS | P-PATCH PARK

20' Alleyway

133' Site

57' ROW

20' Alleyway

125' Belltown P-Patch and Cottage Park

120' Site

8' Wall St ROW

Images by Kyle Cotchett
A. Relocated cottage
B. Expanded building footprint & new roof greenhouse & garden plots
C. Community Pavilion
D. Connection to existing p-patch
E. Connection to alley
F. Connection to wall street
G. Gathering area

H. Protected bike lane
I. Bioretention street planter with new vegetation
J. New green space
K. Vegetated bike lane buffer
L. Connection between existing vine street bioretention planters
M. Terraced rain gardens connected to wall street bioretention planter & adjacent building’s roof runoff
N. Splash pad utilizing uv cleaned rainwater from terraced rain gardens
O. Constructed wetland connected to building graywater
P. Interpretive fountain into constructed wetland feeding clean water back into building
Q. Gently sloping terraced topography
R. Water cistern for surface water storage and p-patch irrigation with 6,000 gallon capacity
S. CSO vault with 143,626 gallon capacity
SITE VISIONS | P-PATCH PARK

Image by Julia Brasch
A Strategy for Battery Street + Tunnel

A project by Dorothy Mulkern, Rachel Wells, and Sophie Krause
Battery Context

- 120,000 square feet
- $133 million
- 12,840,000 gallon capacity

“Ideally situated between the city’s leading destinations, Battery holds promise to welcome millions of visitors to stop, linger, and recharge.”

Growing Vine Street + Project Belltown
Strategy: A Vertical Typology

+ Harness verticality
+ Capture and clean water at multiple stages
+ Increase visibility and performance of GSI
Above Ground Plaza Concept

- Repurpose viaduct rubble as gabion architecture
- Close off street to traffic to enhance pedestrian use
- Glass art beacon starts water runnel which extends through site
- “Runnel to Tunnel” water transfer to tunnel
Above Ground Plaza Concept

+ Harness solar energy from adjacent roofs
+ Allow spaces for pop-up cafes
+ Keep the site open and publicly programmable
+ Preserve precious open space in Seattle’s downtown
Below Ground Concept

Public Gallery  Reservable Event Space  Parking
Metrics and Savings

Just utilizing $\frac{1}{2}$ of the tunnel’s capacity

= 6,000,000 gallon potential for storage and treatment

+ Helps meet 2030 District Goals
+ Reduces runoff to nearby 069 Outfall
+ Encourages long-term planning
+ Preserves precious open downtown space
Thank you!

Seafair Queen Iris Adams and Mayor Allan Pomeroy had something to laugh about Saturday as they bent every effort to cut the ribbon to open the Alaskan Way Viaduct.
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