Winter 2010

Water, Microecologies + Density

Transit-Oriented Development at Gresham Crossings

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SCI
Sustainable Cities Initiative

UNIVERSITY OF OREGON

Buildings | Neighborhoods | Regions | Architecture | Planning | Landscape | Policy

Acknowledgements

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A huge thank you goes to **Brook Muller**, Associate Professor in the Architecture Department at the University of Oregon. Brook’s vision and knowledge base empowered students to be brave, attempting feats of building that pushed the boundaries of sustainable, ecology minded, transit oriented development. Thank you Brook!

Rena Schlachter’s report of the Fall Studio’s work provided a foundation for the work that was done in the Winter in Portland. Thank you to **Rena Schlachter** and the students in Eugene who worked to produce those innovative, sustainable, built spaces.

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SCI
Sustainable Cities Initiative

About SCI

Sustainable Cities Initiative (SCI) is a cross-disciplinary organization at the University of Oregon that seeks to promote education, service, public outreach and research on the development and design of sustainable cities.

Our work addresses sustainability issues across multiple scales, from the region down to the building, and emerges from the conviction that creating the sustainable city cannot happen within any single discipline. SCI is grounded in cross-discipline engagement as the key strategy for solving community sustainability issues. We serve as a catalyst for expanded research and teaching; market this expertise to scholars, policymakers, community leaders, and project partners; and work to create and sponsor academic courses and certificates. Our work connects student passion, faculty experience, and community need to produce innovative, tangible solutions for the creation of a sustainable society.

About SCY

The Sustainable Cities Year Initiative is a 'partnership' with one city in Oregon per year where a number of courses from across the University focus on assisting that city with their sustainability goals and projects. The Sustainable Cities Year faculty and students work with that city through a variety of studio projects and service learning programs to: 1) provide students with a real world project to investigate; 2) apply their training; and 3) provide real service and movement to a local city ready to transition to a more sustainable and accessible future.

About Gresham

With just over 100,000 people, Gresham is the fourth largest city in Oregon. It is bordered to the west by Portland, the largest city in the state. Gresham is home to the Mount Hood Jazz Festival and is known as "The City of Music". It is close in proximity to the Columbia Gorge National Scenic Area and Mount Hood, the highest point in Oregon. Gresham has a wide variety of neighborhoods including the Civic Center, known for its active transportation network, rapid transit connections and residential, commercial and retail mix.

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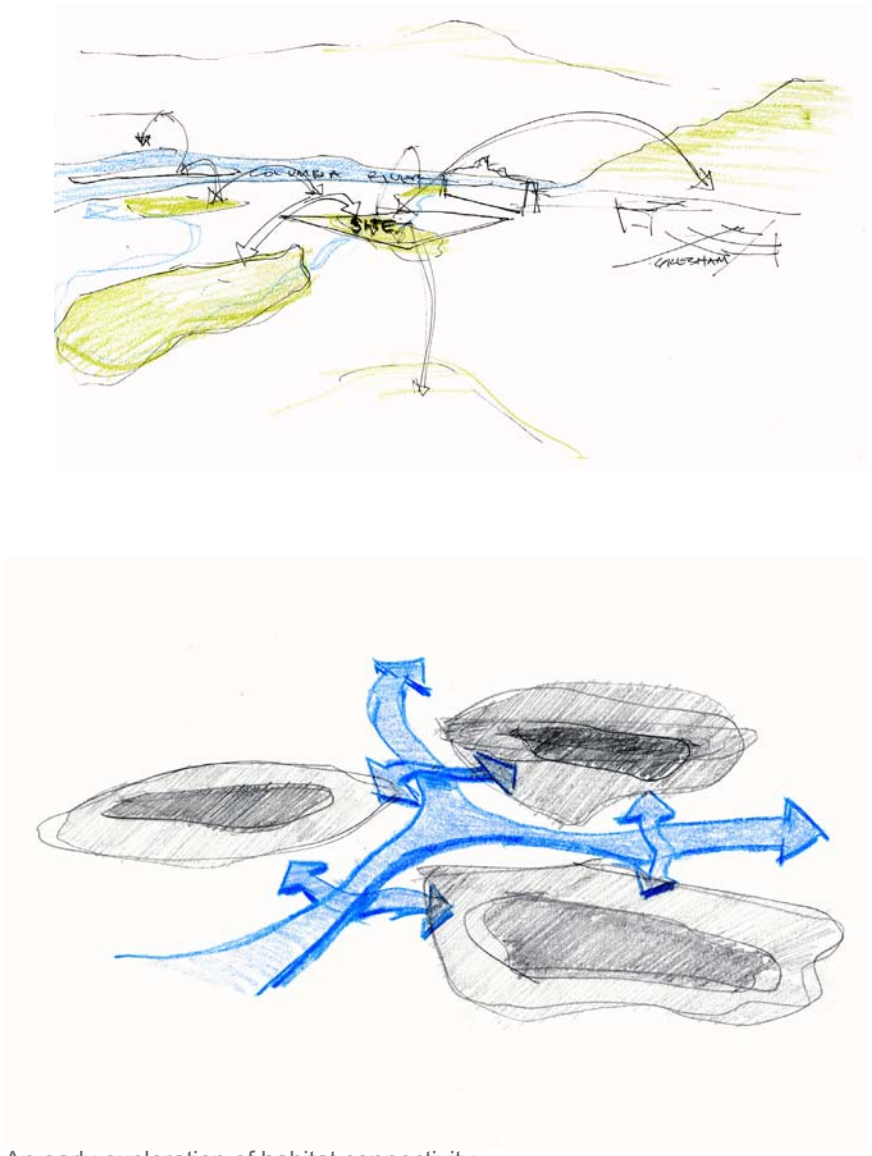
I. Executive Summary

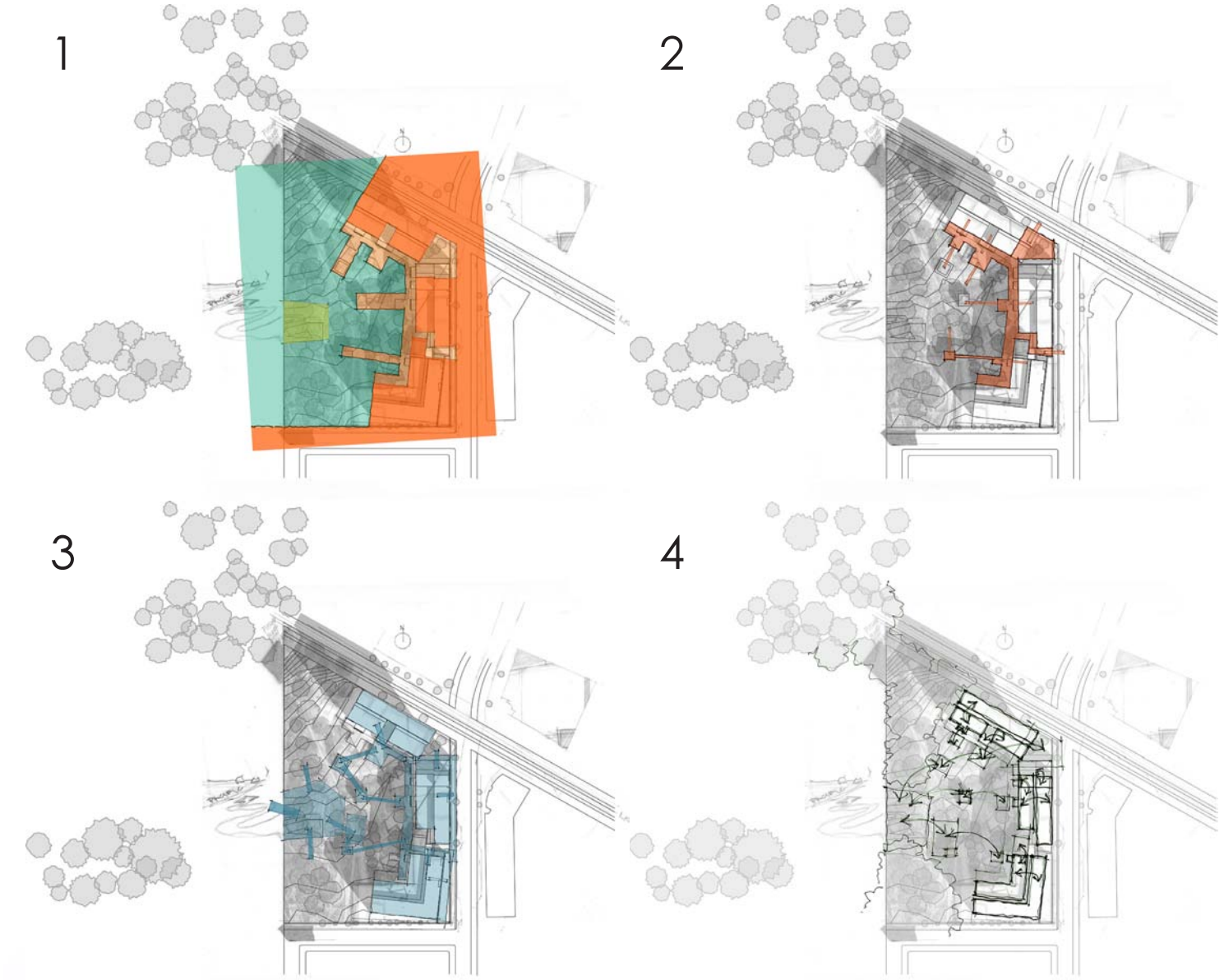
This advanced level research and development focused design studio explored the potential synergies between transit-oriented development (TOD) and habitat sensitive and low impact design. Students were asked to generate dense schemes closely tied to non-motorized transit infrastructure that were rich with green (living) amenities and that support the ecological health of the local community and surrounding region.

The studio built off of a fall ARCH 4/584 Eugene-based studio where student teams working closely with Portland Metro designed a multi-story, mixed-use development at the "Crossing" in Gresham, Oregon. In the fall, teams developed proposals for the 4.4 acre "GCN SW" site, working with a program consisting of compact residential apartments ("microunits"), commercial uses, shared outdoor spaces, parking and path systems that linked the development with the adjacent and soon to be constructed light rail transit stop and points beyond. In the Winter 2010 Portland-based studio, students explored: (1) Portland Metro's "Transit Oriented Development" and "Nature in Neighborhoods" programs, policies and initiatives, (2) the site planning typologies generated by student teams in the fall, (3) a 'fragment' of one of the student projects as a point of departure and (4) the opportunities of this 'piece' thoroughly with an emphasis on dwelling unit livability, construction, water collection and purification, and living facades and roofs.

The quarter was broken into 2-week intensive exercises. These exercises related closely to one another and increased in complexity. Particular emphasis was placed on the behavior of systems (and how to represent this behavior) and the experiential quality that the configuration of systems engendered.



An early exploration of habitat connectivity



An early exploration of built / natural; pedestrian access; water movement; and habitat

II. Introduction

Density doesn't necessarily mean tall skyscrapers and endless concrete. Metro's Transit Oriented Development program and Nature in Neighborhoods program have shown that vibrant, dense development can provide habitat space and sustainable building features and infrastructure that benefit people and wildlife. Truly 'green' density is possible. Professor Brook Muller's winter 2010 Portland based studio employed the work produced in Muller's fall 2009 Eugene based studio as a starting point to further investigate applications of low impact, nature-friendly development practices for built structures, storm water management and natural spaces at the Crossing in Gresham, Oregon.

Building off of the work generated in the Fall in Eugene, students were tasked with refining the schemes to accomodate habitat, tie in closely with non-motorized transit, and demonstrate the utmost in low-impact design approaches.

Studio Goals

- Investigate Portland Metro's "Transit Oriented Development" and "Nature in Neighborhoods" programs, policies, and initiatives.
- Borrow from the site planning typologies generated by student teams in the Fall.
- Choose a "fragment" of one of the student project as a point of departure
- Develop this "piece" thoroughly with an emphasis on dwelling unit livability construction, water collection and purification, and living facades and roofs.
- To create a rich and collaborative studio culture
- To incorporate low impact development and other ecological design approaches throughout the design process in ways that inspire our thinking as to what transit oriented development can be
- To consider how an integrated approach to architectural design and ecology can contribute to a broad, participatory dialogue about the future of urban development
- To continue to develop and improve explicit and effective working methods and design processes
- To develop rich graphic representations in close association with a clear statement of design intentions
- To express enthusiasm about what you are doing and demonstrate the tenacity to move forward and develop your schemes
- To help Portland Metro explore and articulate meaningful, synergistic relationships between its "Nature and Neighborhoods" and Transit-Oriented Development" policies and initiatives (see program)
- To 'bracket' (set constraints upon) the design problem so as to be able to develop a piece of architecture at a high level of rigor and richness

III. Review of Existing Data / Reports / Conditions

Transit Oriented Development (TOD)

Metro's Transit Oriented Development program, or TOD, provided strong tennents of pedestrian and transit centered development, allowing the studio to radically reconsider the more common car-centered development plan.

TOD recommends three land-use principles: density, diversity, and design. It has been shown that greater density means greater transit ridership. Diversity of land-use types (i.e. residential, retail, and commercial,) makes a transit-oriented lifestyle more viable. Finally, carefully considered, pedestrian friendly design is instrumental in bringing pedestrians from the built environment to the transit stop or shelter.

Nature in Neighborhoods

Incorporating wildlife habitat with fairly dense urban development required the knowledge and expertise of Metro's Nature in Neighborhoods program. They provided a series of recommendations to consider when incorporating "green" elements in a built space.

Nature in Neighborhoods advocates for consideration of the building's solar orientation; minimizing impervious surface areas; fitting roads and buildings in among the natural resources; maximizing the amount of green space; minimizing soil compactions and stockpiling and reusing topsoil; and using native plants to restore some habitat after construction. Additionally, designers and builders might consider swales for roadway drainage, pervious paving, and opportunities to fit rain gardens into open spaces to reduce runoff and minimize the need for retention basins.

Further recommendations for creating urban wildlife habitat: connect canopy of site with nearby areas of tree canopy; incorporate vertical layers and a diversity of plant species; incorporate hollow logs or brush piles, downed logs or snags as additional places for wildlife refuge; remove invasive, non-native plants; consider incorporating bird and butterfly feeders; provide a source of water; incorporate bird houses, bat boxes, or toad abodes.

Josh Cerra, Environmental Consultant

Cerra, an ecologist and landscape designer with Herrera Environmental Consulting of Portland, was instrumental at each phase of the design, with a keen eye toward ecologically minded strategies that could be included to meet the goals of the studio.

Cerra asked the studio to consider amphibians, pollinators, birds, native bats, as well as native plants. Further, he encouraged students to think about the life of the project over time - how would species use the provided habitat throughout the seasons and over the course of several years? Additionally, Cerra encouraged students to consider habitat as a teaching opportunity, to educate residents and visitors to the site about species thriving there. Finally, Cerra encouraged students to use habitat elements that strengthened and refined the architecture rather then simply adding on to it.

Green Studio Handbook

The studio was tasked with reducing the amount of water used within the building and also encouraged to celebrate the journey of water through the site. Alison Kwok and Walter Grondzik's Green Studio Handbook was instrumental in implementing storm water treatment strategies, water catchment basins, grey water recycling systems, and living machines. Kwok and Grondzik presented clear, detailed calculations allowing students to appropriately size and place the various water conservation design elements.

Rena Schlachter's Fall Report

Professor Muller's Fall studio set the stage for Portland's Winter studio. Students were tasked with using a Fall groups' project and adapting it with a specific ecological framework in mind. Rena Schlachter's report of that studio's work showcased the design intentions of that group of students.

An early scheme, showing a gradation from built to habitat.

IV. The Site: Crossings at Gresham

An Overview:

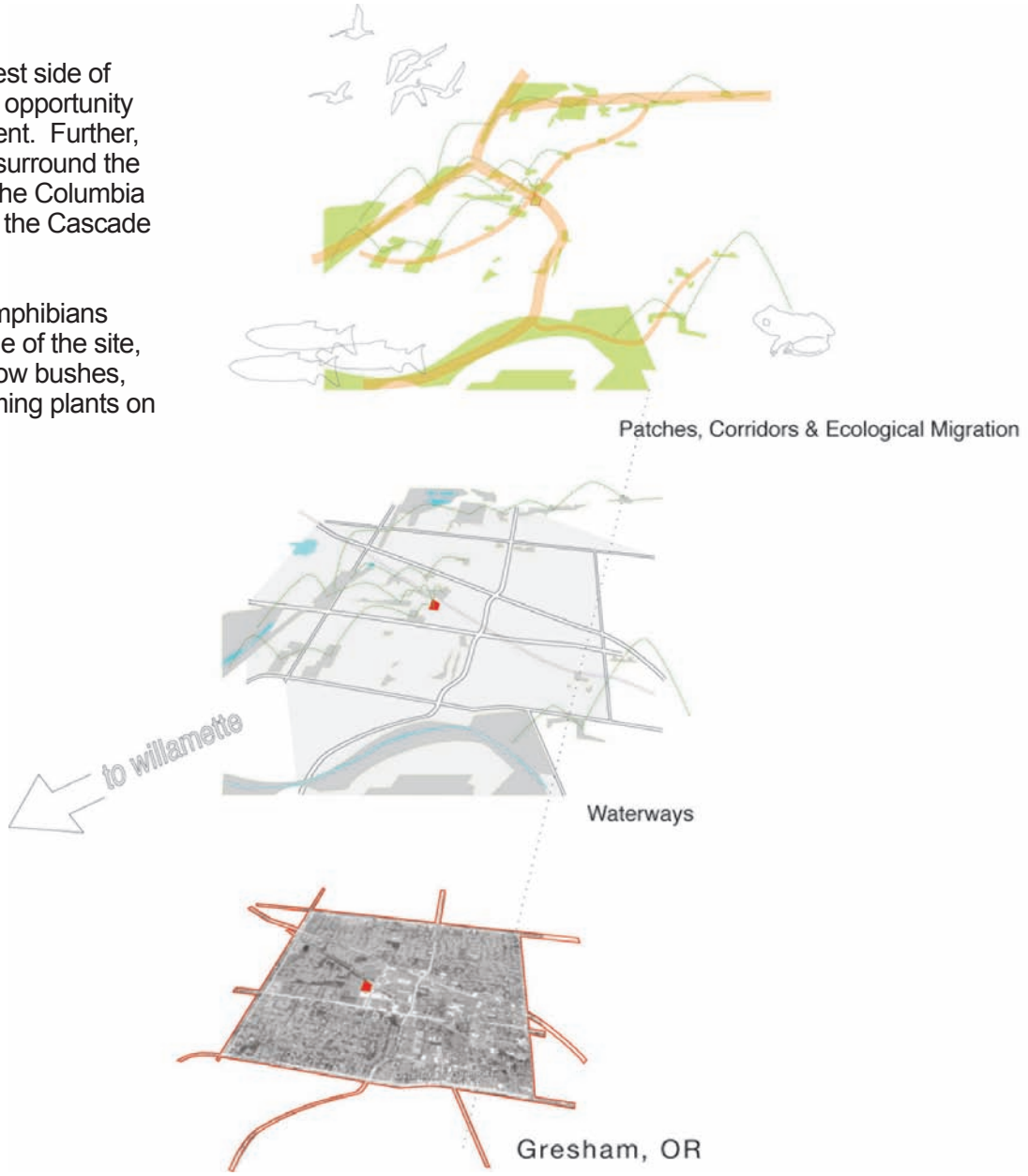
In the heart of Gresham, the 4.4 acre Gresham Crossings site sits at the intersection of Civic Drive and NW 13th Street. A new Blue MAX station stop is planned just to the north of the site, furthering the cities' goals of a livable, walkable, transit-oriented town.

The site is mostly flat and the western half, bordering a property with multi-family housing, is thickly forested with riparian and Douglas-fir mixed woodland. A handful of the Douglas-fir on site are estimated to be 80 years old. The eastern grass covered edge along Civic Dr. is 8 feet below grade. The site's neighbors include the Center for Advanced Learning, another site owned by Metro, Gresham Station, and a site owned by Seattle-based American Properties.

Habitat on the Site:

With existing trees and wetland on the west side of the site, the Crossings presents a unique opportunity for ecologically minded, green development. Further, patches of park, greenways, and woods surround the site - providing “pads” of habitat north to the Columbia River, west to the Willamette, and east to the Cascade foothills and Mt. Hood.

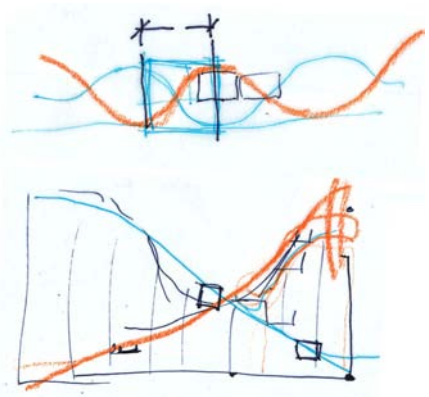
With intentional and thoughtful design, amphibians might inhabit the wetland on the east edge of the site, birds might occupy the tree canopy and low bushes, pollinators might take advantage of blooming plants on site, and native bats may roost.



V. Design Scenarios

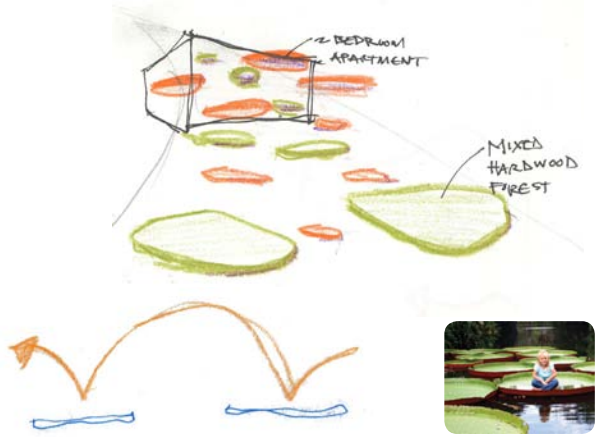
gradient

ıg as nexus of urban and natural landscape



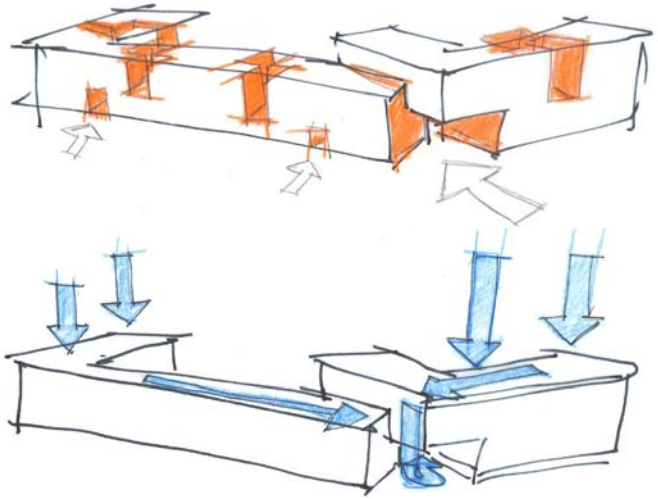
habitat [pad]

habitat[pads] allow for dwelling;
provide moments of connectivity and isolation



filtration/percolation

circulation is collected and focused along the same paths as water
allows for filtration and purification



Early diagrams exploring habitat “pads” and rainwater collection / movement

Scenario One: The Alley

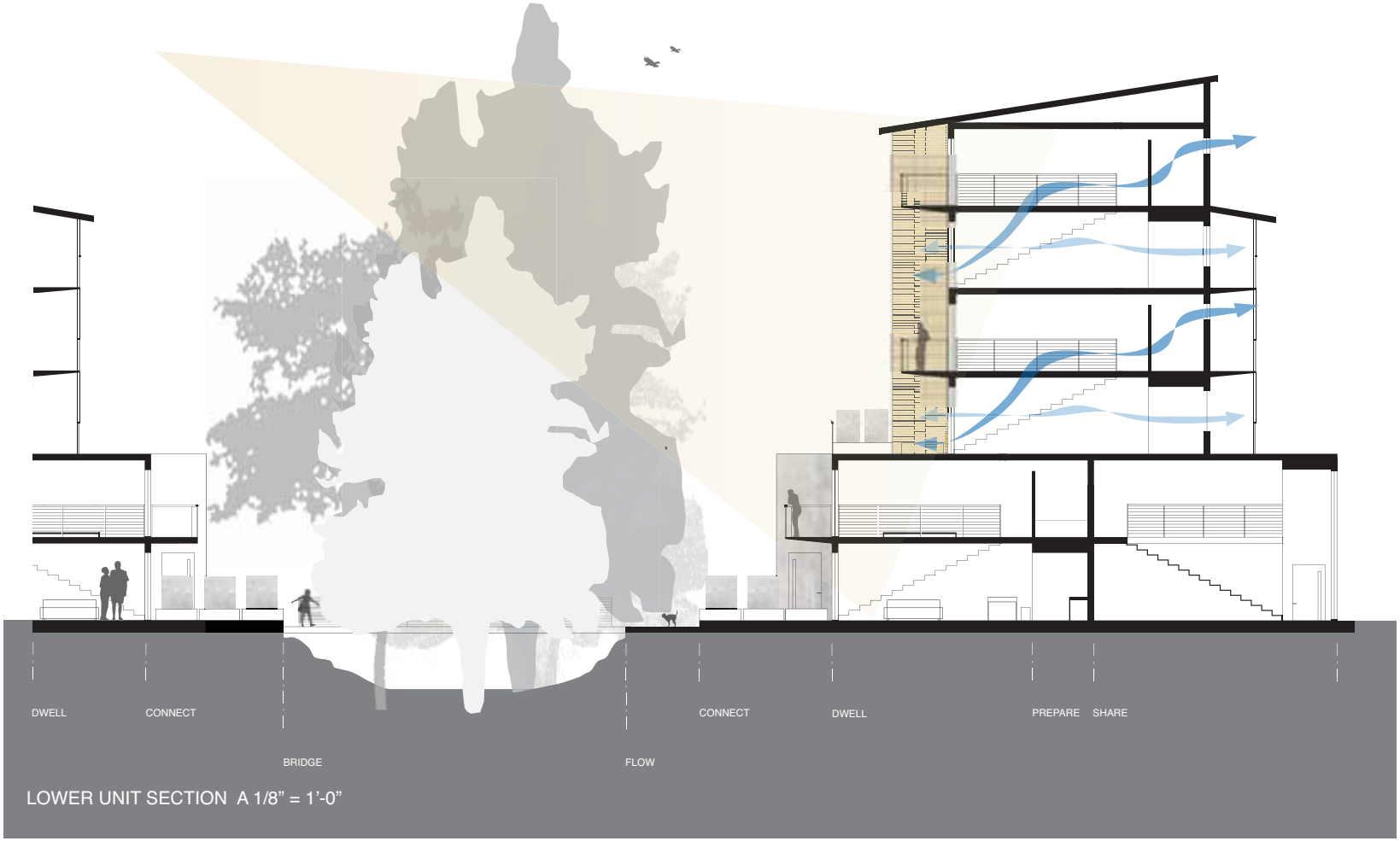
Sina Meier and Bennett Hart

Introduction:

In this scheme, Bennett and Sina wanted to provide as much light as possible to the individual units. Creating single-loaded corridors on the upper floors of the "fingers" that extend toward the wetland, they hoped to maximize opportunities for light and air movement through units while simultaneously creating space for the canopy of the trees lining the bioswale running through their lush alley ways. Finally, Bennett and Sina wanted to celebrate the journey of residents coming home. They employed snags as place marker and gateway announcing one's arrival home to a habitat-centered environment for animals, native plant species, and human beings.

Design Intentions:

1. Provide natural light and ventilation 2. Create lush habitat filled alley ways 3. Celebrate the journey of water and of people



LOWER UNIT SECTION A 1/8" = 1'-0"

1. To provide natural light and ventilation

Instead of a dark double-loaded corridor with entrances to units off of both sides, this scenario presents a single-loaded covered outdoor corridor. In this way, more space is allowed for light and air and trees to flourish in the alley ways between bands of units.

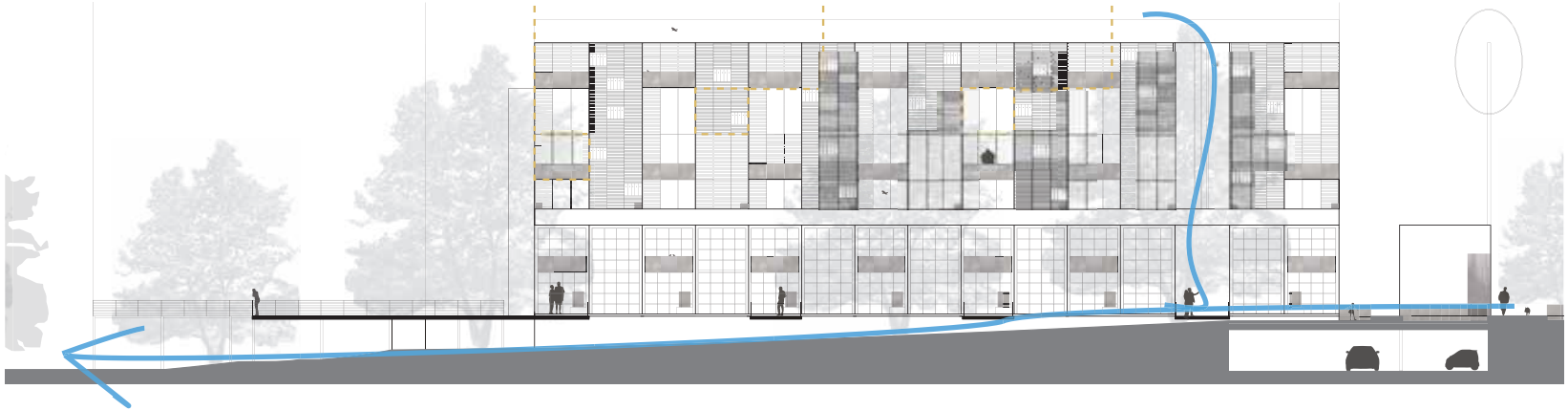
2. To create lush, habitat filled alley ways

This scenario shows a bioswale in the alley ways between bands of building. Native species could thrive in the environments created and residents would experience a lush, green journey from the MAX to their home.

Releasing into the wetland

Water wall brings rain from downspouts into the alley's bioswale

Retention basin cleanses water collected from street bioswales



3. To celebrate the journey of water and the journey of people

This scenario brings water from street bioswales under the sidewalk, through a horse tail filled cleansing retention basin, under a pedestrian path, and through the lush alley ways before finally releasing into the wetland on the west side of the property. Additionally, rain water flows from the rooftops through downspouts, across water walls and into the swale. The human inhabitants of the site follow a similar path as the water - traveling along the bioswale to get to their prospective units, and climbing stairs that rise behind the prominent downspouts and water walls.

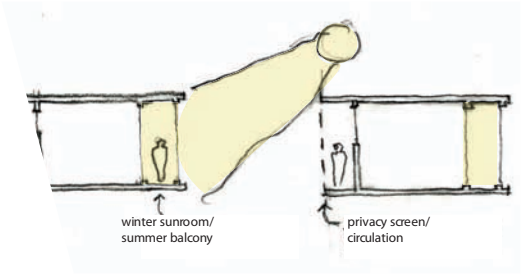
Scenario Two: Urban Habitat

Roussa Cassel and Audrey Craig

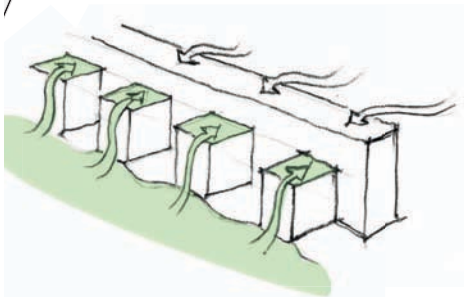
Introduction:

In this scheme, Audrey and Roussa situated the units to maximize solar access. Instead of a double-loaded corridor, they decided to create a series of courtyards flanked with dwelling units. In this way, each unit is open on two sides, allowing for both access to sun but also passive heating and cooling. The courtyards make for a transition from the built to the natural wetland with rain screens and vertical rain-cables that bring rain water from the green roofs down the facade, through channels in the courtyard and finally into the wetland. The courtyards are full of specific native plants that attract pollinators, from honey bees to humming birds. Finally, their courtyards also provide space for residents to grow vegetable gardens.

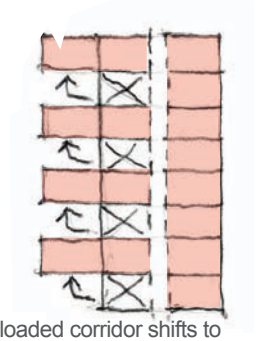
interlocking buildings and habitat with water



sunny living spaces/ shady circulation



green roof for habitat connection/ east front building buffers winter wind



double loaded corridor shifts to "finger" plan, providing passive cooling

Design Intentions:

1. Orient units for solar access 2. Provide habitat connections with green roofs 3. Unify built and natural environments with water.

interior perspective- courtyard unit

courtyard entrance

civic drive entrance and breezeway

units

studio (68 units)

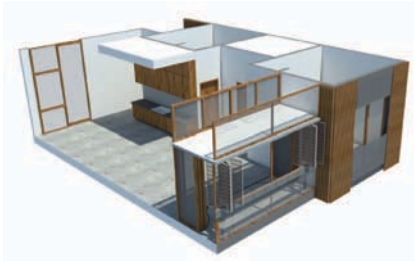
550 sq ft

1 br (64 units)
live/ work (6 Units)

625 sq ft/ 900 sq ft (l/w)

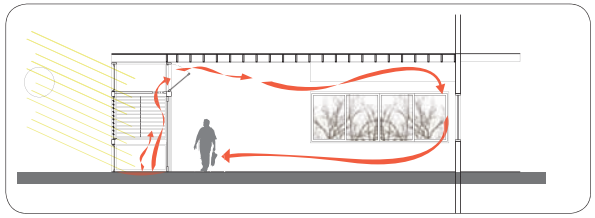
2 br (44 units)
live/ work (4 Units)

850 sq ft/ 1375 sf ft (l/w)

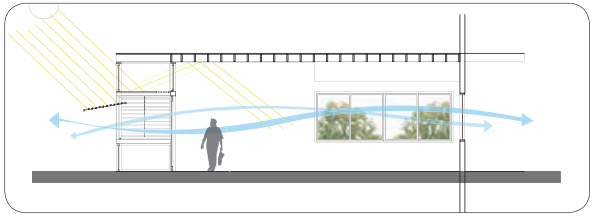


typical 'courtyard unit'

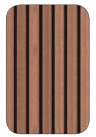
typical 1 br live/ work 'civic unit'



indirect solar gain- winter heating



cross ventilation- summer cooling



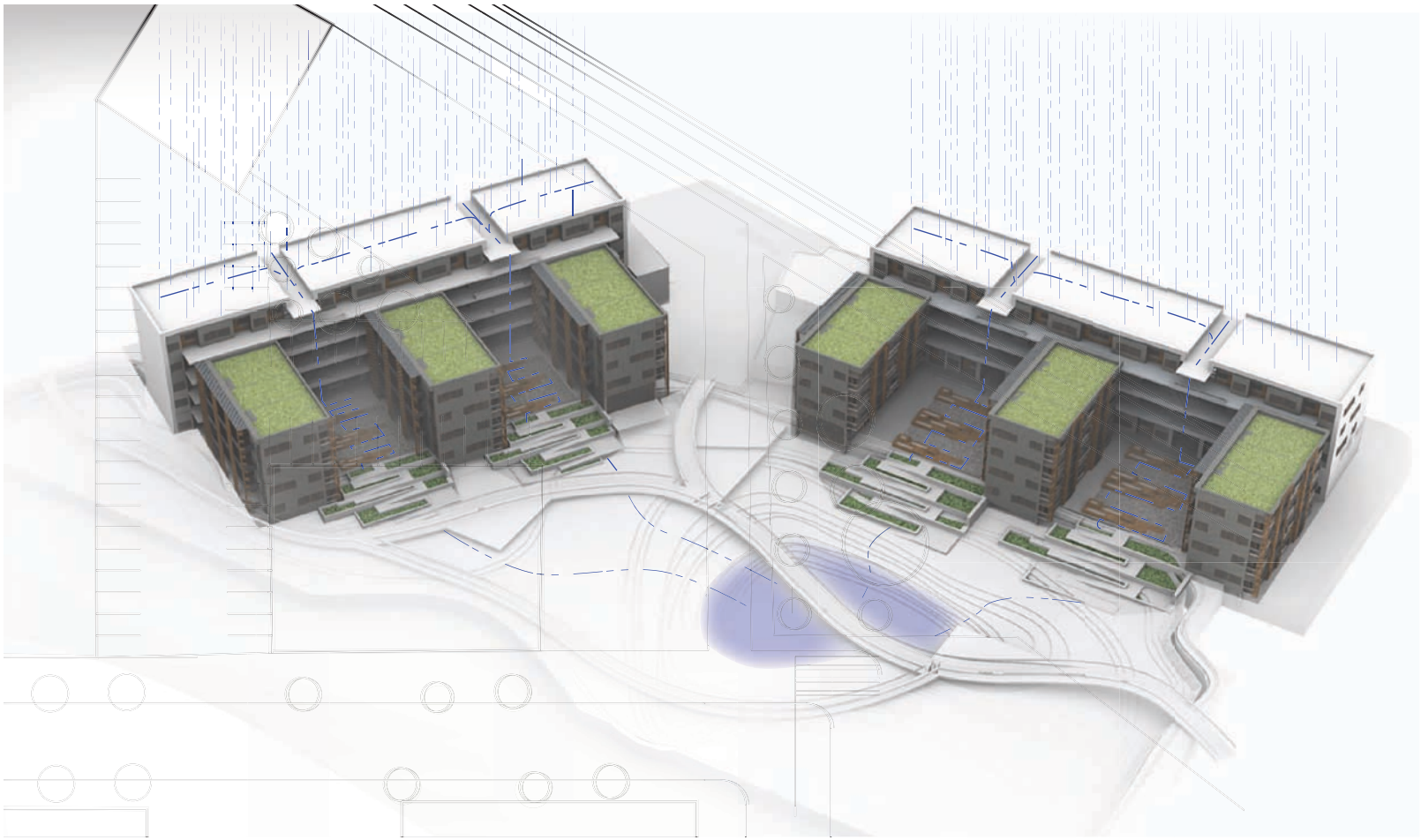
1. To orient units for solar access and passive cooling

This scenario places units and decks on the south facade of the buildings in order to maximize solar gain. Passageways are placed on the north side of the buildings where individuals spend less time and where less natural light is required. Because the units have openings on two and sometimes three sides passive cooling and heating can be achieved.

courtyard section 1/8” = 1’ - 0”

2. To provide habitat connections with green roofs

This scenario bridges the connection between the wetland and the built environment with a series of garden ramps, where residents can grow vegetables and other plants. Planting continues in the lively courtyard spaces attracting birds and pollinators. The link between natural habitat and the built environment is strengthened with vines that snake up the rain cables and green roofs on the buildings that flank the courtyard spaces.



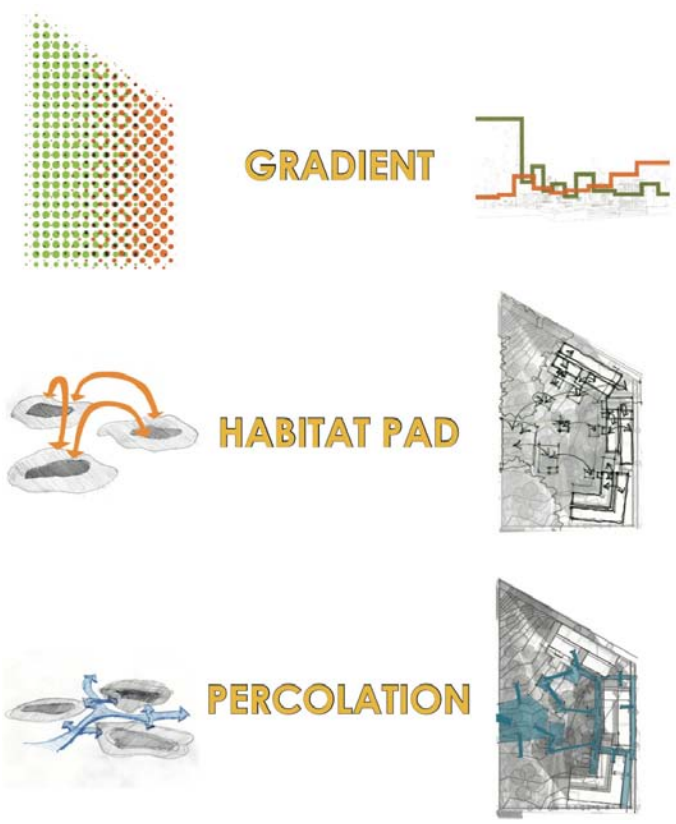
3. To unify the built and natural environments with water.
This scheme brings rainwater from the roofs down rain screen walls as well as special rain cables, through channels in the courtyard spaces, and ultimately into the wetland. As rain makes it journey from the rooftop down the facades of the building through the public space and out into the wetland, residents are able to experience the journey. They can see the water running down cables, touch is as it percolates through channels in the courtyard and all the while they can hear the water winding its way through the space.

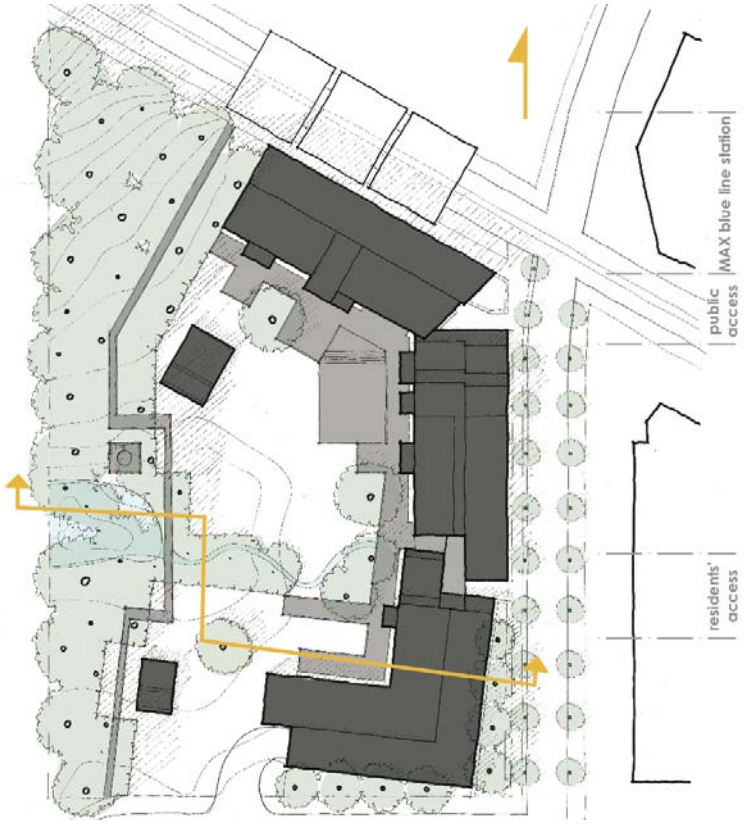
Scenario Three: Available Habitat

Marc Becker, Jeffrey Mass, Caitlin Cartlidge

Introduction:

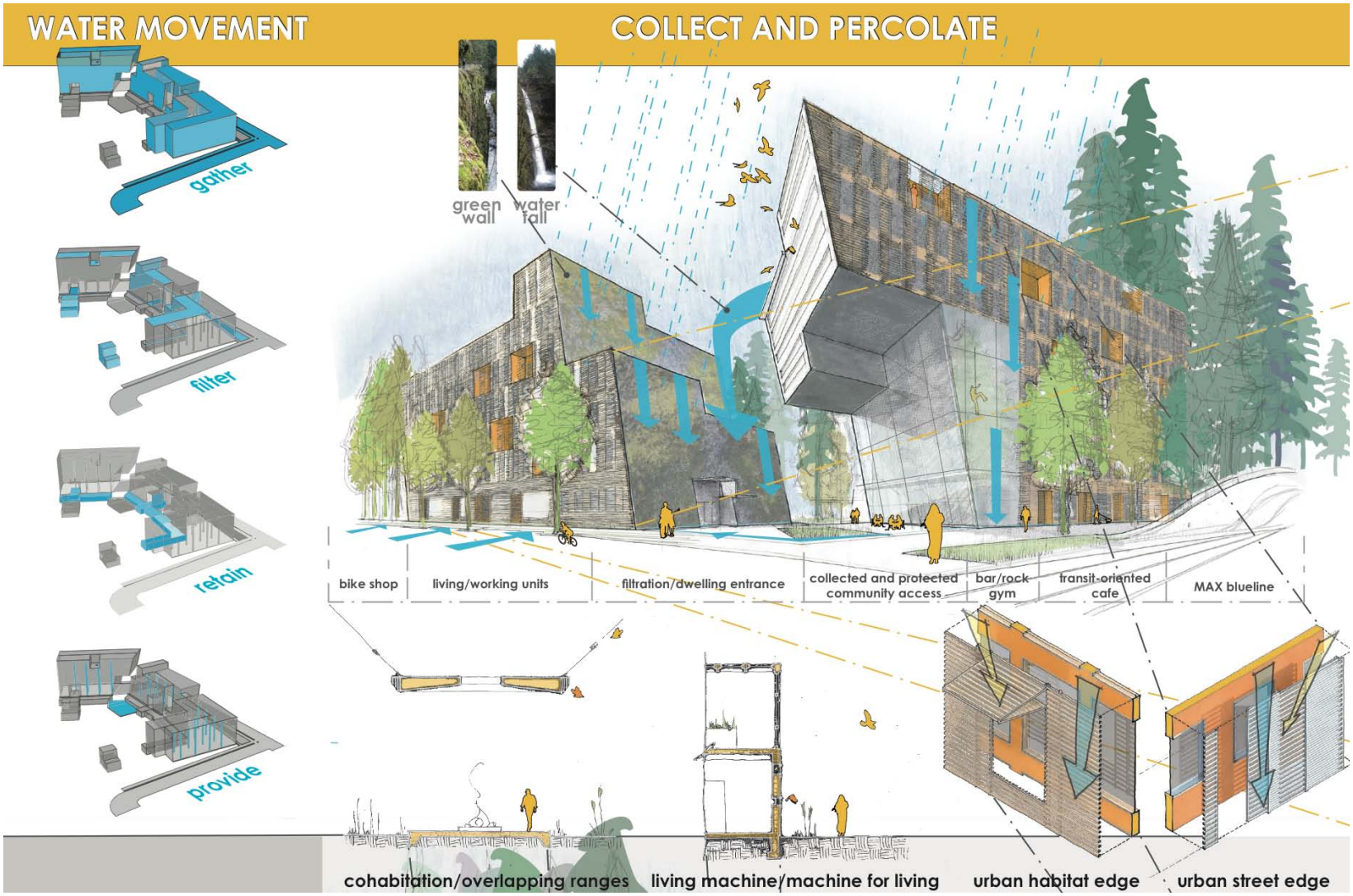
In their scheme, Marc, Jeffrey, and Caitlin hoped to create a gentle gradient between the built and natural environments. They incorporated rich green walls, green roofs, bird houses embedded in the facade, as well as screens to bring rain down the side of the building before percolating into the wetland. Further, the green walls and roofs work as habitat connecting "pads" or stopping-over places for wildlife that inhabit Gresham and the surrounding areas. Finally, grey and black water is recycled in this scheme through an innovative living machine that processes waste water for appropriate reuse. Marc, Jeffrey and Caitlin created a building that provides habitat for people, certainly, but they worked to create a kind of co-habitation between wildlife in addition to the human residents of their complex at the Crossings.





Design Intentions:

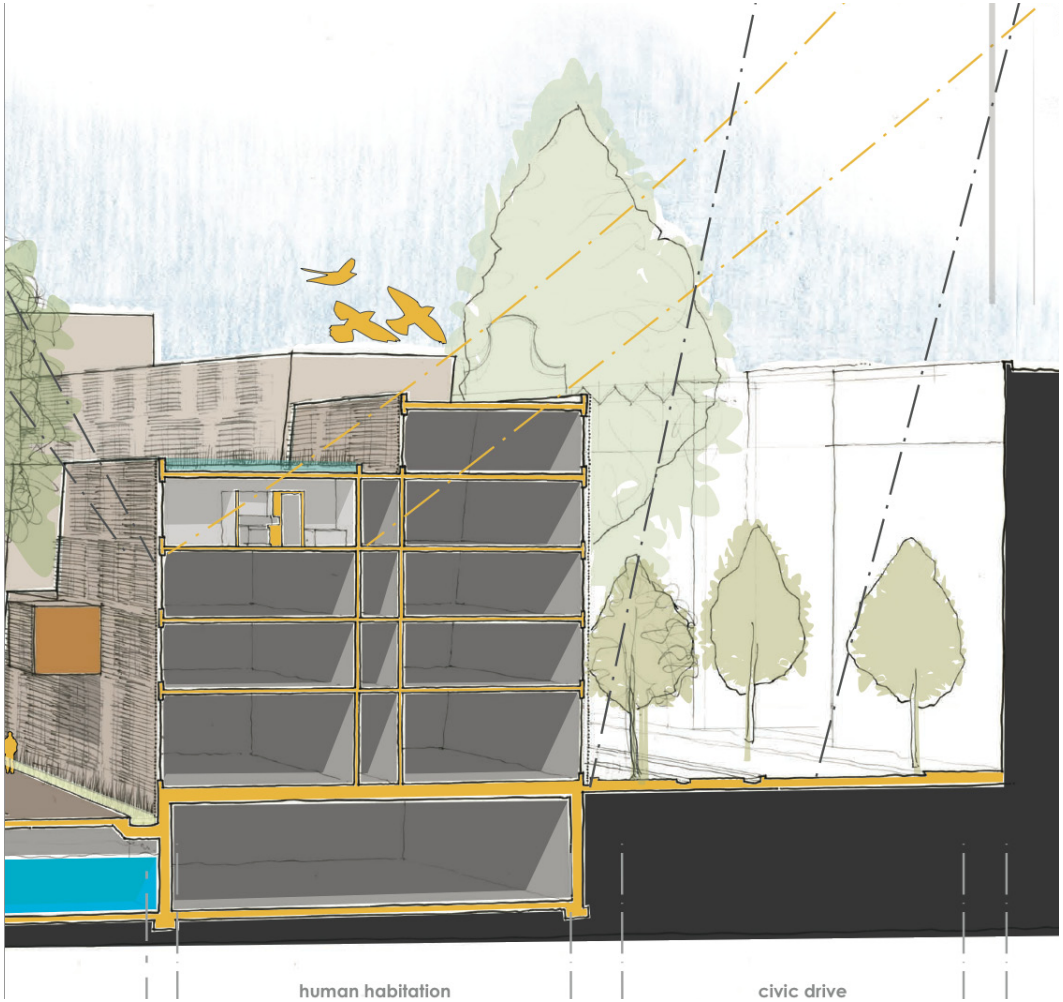
1. Celebrate the journey of water 2. Create "pads" of habitat 3. Establish a gradient between the built and natural environments

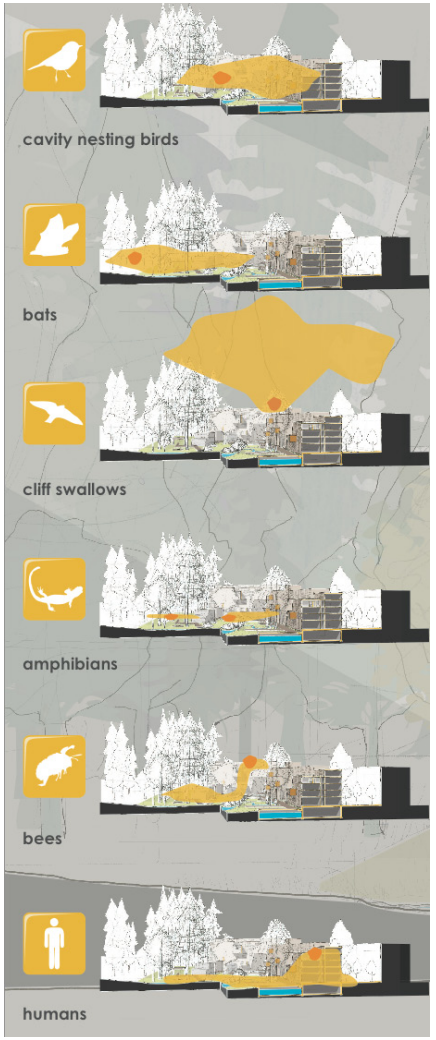


1. To celebrate the journey of water, cleansing and reusing this finite resource.
Marc, Jeffrey, and Caitlin created a scheme that gathers water from the roof-top green spaces allowing it to percolate down the rain screen facades. Street storm water is also collected off of Civic Drive. Grey water is retained and cleansed in basins at the base of the building and black water is purified in a living machine. Ultimately the water is appropriately reused by the occupants.

2. To create "pads" of habitat for wildlife (and humans)

This scenario creates "pads" of habitat in the wetland, within the building facade, and on the patches of green roof on top of the building. In this way, bats, birds, amphibians, and bees are provided with habitat throughout the site, as opposed to common building practices that create a clear and somewhat harsh division between the built and the natural. In the wetland, a "pad" is created for bats in the form of a roost that doubles as a rain shelter for human visitors. On the facade, penetrations are made where cliff-dwelling sparrows can make nests and raise their young. Roof gardens provided habitat for wildflowers and their bee pollinators.





3. To establish a gradient between the built and natural environments

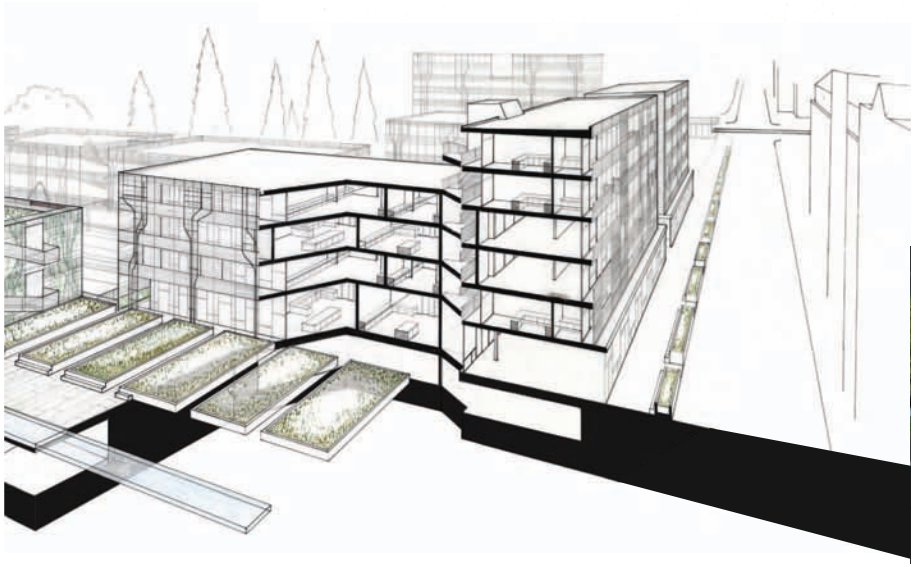
Green roofs, green walls, rain screens, and bird houses imbedded in the facade, work to create a kind of blending between the built form and the natural environment. This gradient is furthered with boardwalks through the wetland space as well as a canopy in the wetland that provides protection from the rain for humans as well as roosting space for bats.

Scenario Four: Gresham Yards

Alana Armstrong, Will Ives, Craig Riegelnegg

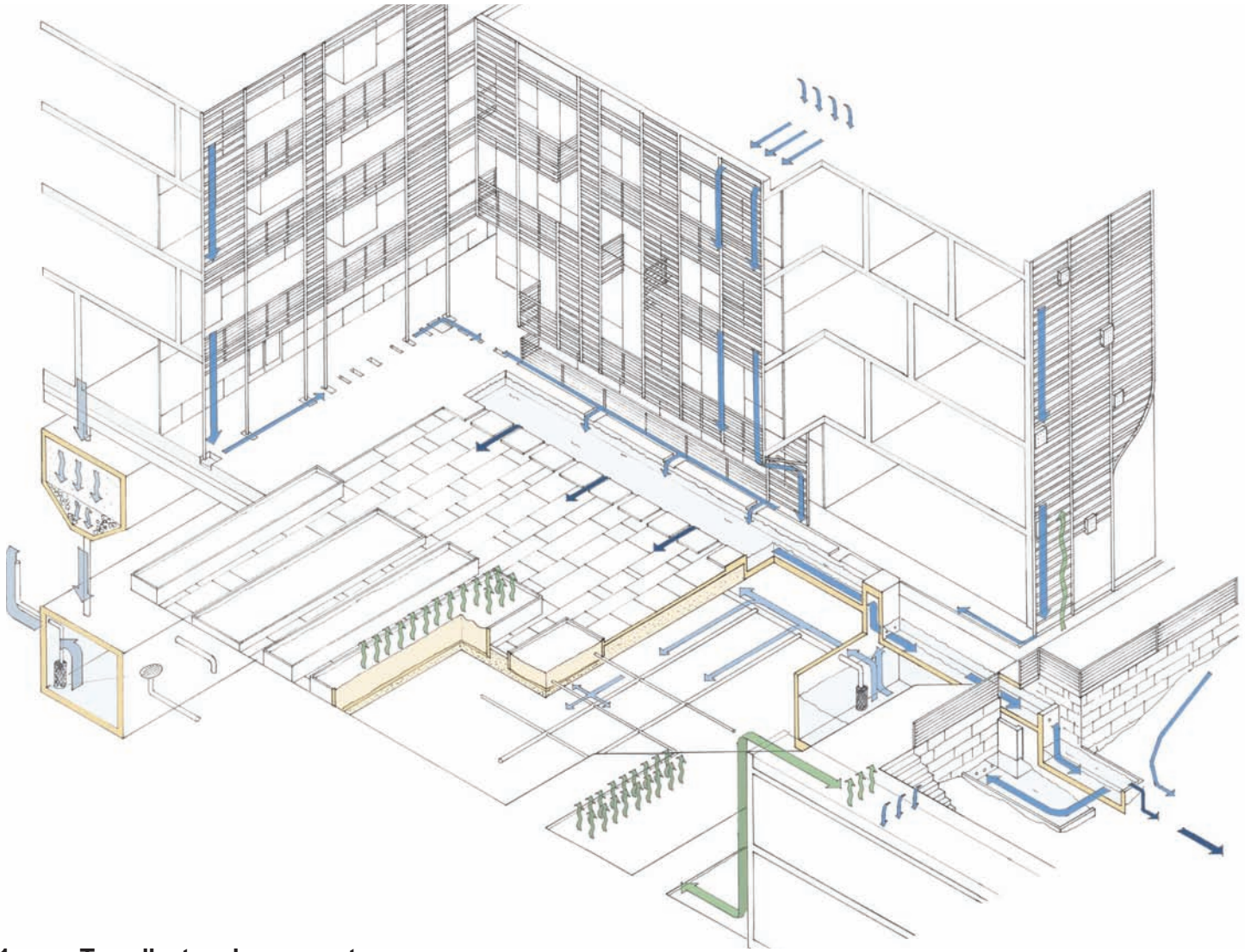
Introduction:

In their scheme, Alana, Will, and Craig wanted to show the journey that water takes from the roofs, down the facade, through the courtyard spaces, and ultimately into the wetland. Water is allowed to “flood” the courtyards in large rain events, leaving a just a few pavers dry - enough to travel safely to one’s unit with dry feet. The team also worked to create a strong urban edge with the building mass and the materials that were chosen for the facade. This urban edge transitions into bands of lighter dwellings, clad in wood that extend like fingers into the wetland, a more organic layout of buildings that sit lightly on the more natural western side of the site.



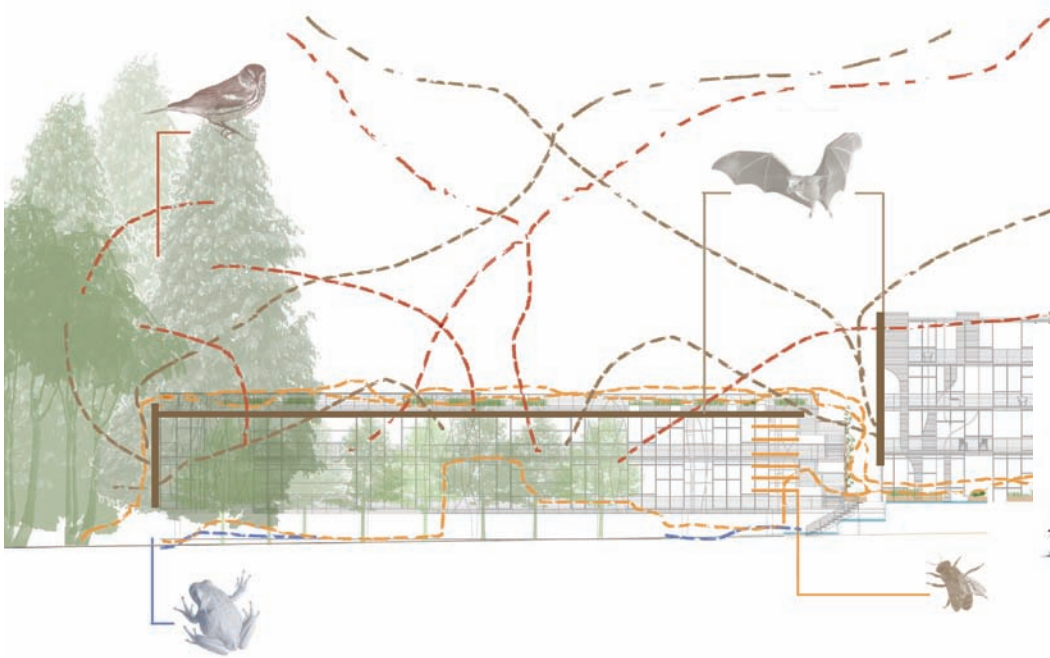
Design Intentions:

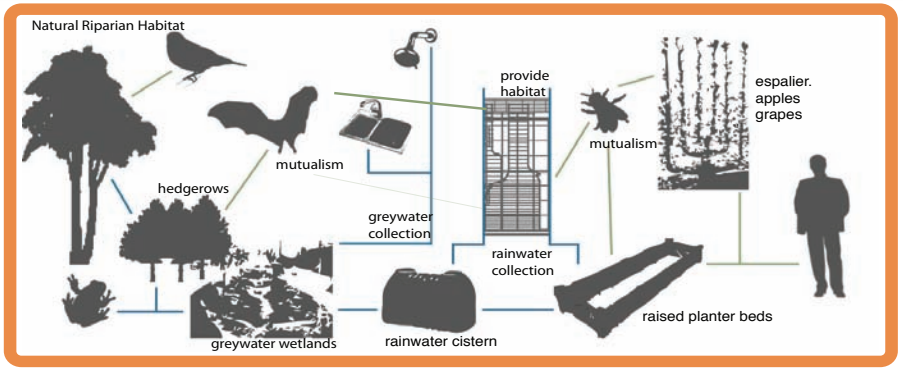
1. Collect and reuse water 2. Integrate habitat for wildlife 3. Establish a strong urban edge transitioning to habitat

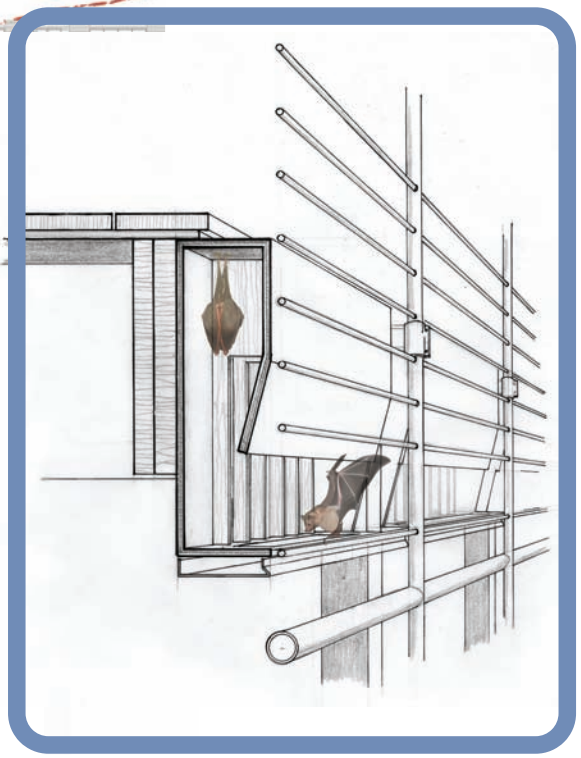


1. To collect and reuse water

This scheme pulls water from the rooftops and from the paved spaces, cleaning it before ultimately returning to units for appropriate reuse. With large rain events, water that collects in the courtyards slowly fills the portion of the space lined with low lying pavers, creating a large low pool, with only higher pavers remaining dry. In this way, rain storms are experienced as a part of the architecture.







2. To integrate habitat for wildlife

Habitat for wildlife is woven through this design. Honey bee hives and houses for bats are incorporated in the rain screen facades. Amphibians are supported in the wetlands on the west side of the site, and migratory birds are accomodated with rooftop green spaces.

3. To establish a strong urban edge transitioning to habitat

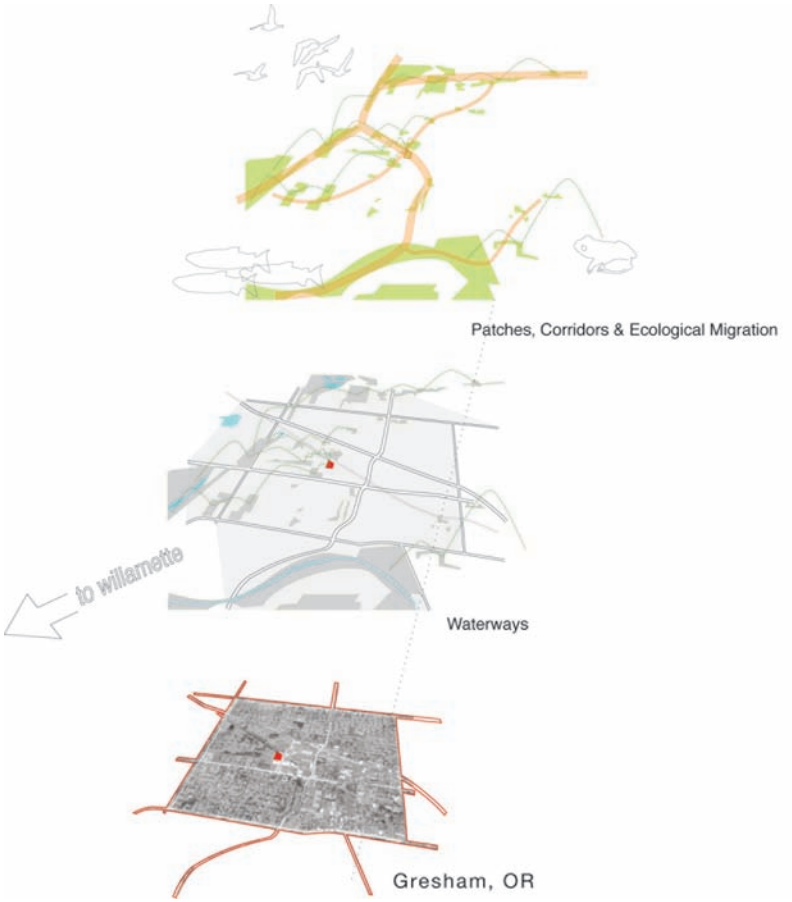
The team created bands of larger, metal clad buildings along Civic Drive. Through massing and materiality, their intention was to foster a rich, dense, urban environment. The bands of dwelling units extending to the west take on a lower profile, are clad in wood, traversed by climbing vines, and are lifted above the ground to allow habitat to exist beneath. These fingers of dwelling spaces sit lightly as opposed to the more solid, thick bands of dwelling units that make up the urban face.

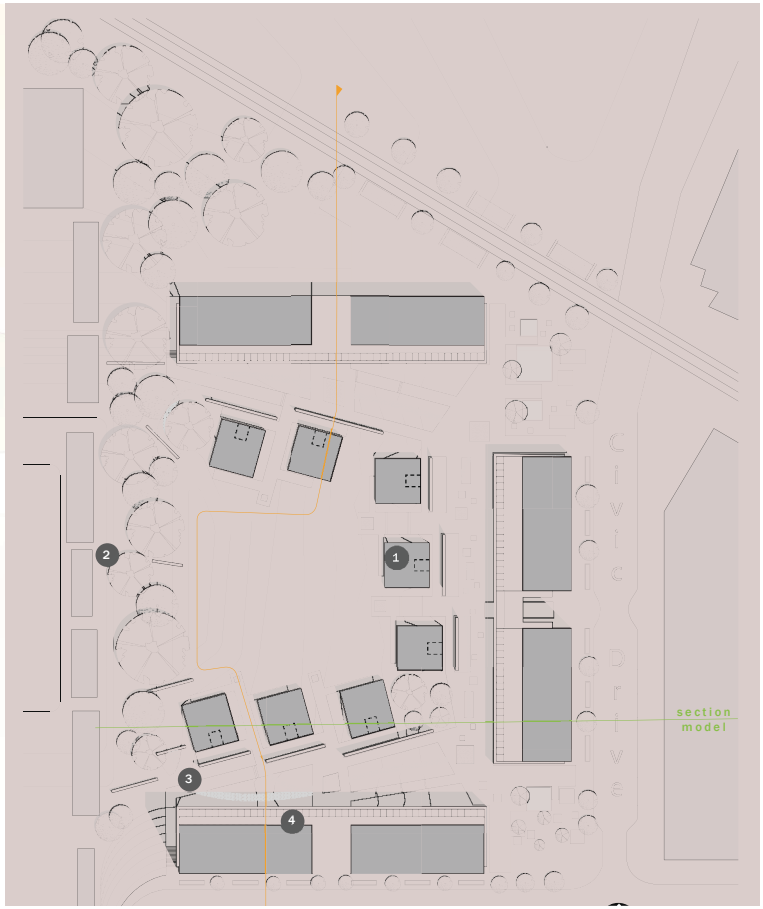
Scenario Five: Co-Habitation

Andrew Harmon, Nan Kambhu, Nicole Holt, Max Taschek

Introduction:

In their scheme, Andrew, Nan, Nicole, and Max worked to create a rich connection between the buildings and the wetland. They achieved this link between human habitat and natural habitat with a strong Gabian wall - providing definition for their buildings, but also habitat space for native bats, birds, and pollinators. Further, a boardwalk connects the buildings, winding in and out of the Gabian wall with spaces between for native planting, providing space for rainwater to percolate into the wetland and for amphibian habitat.



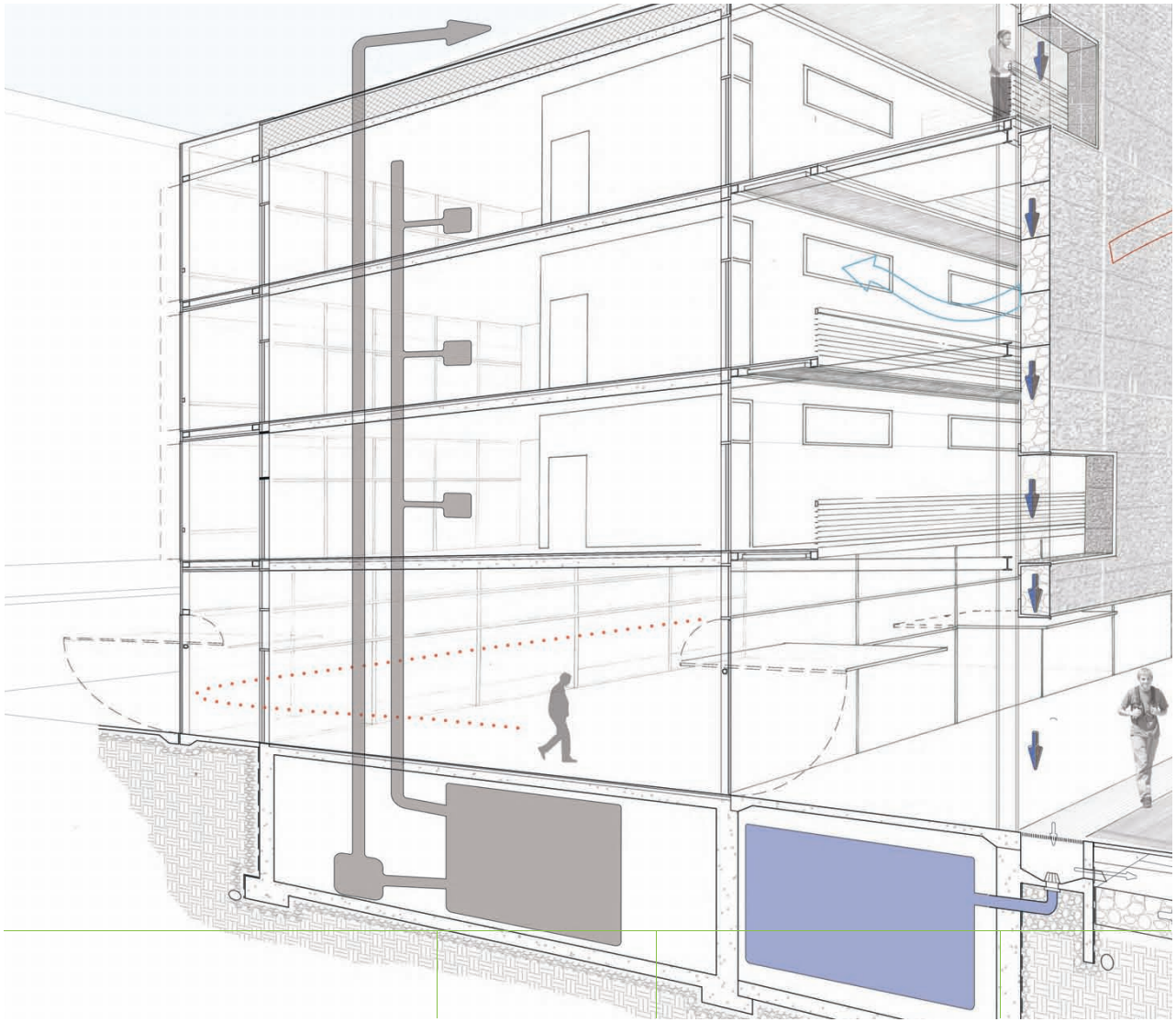


Design Intentions:

1. Create a layered, habitat rich environment 2. Cleanse and reuse water 3. Provide habitat connections

1. To create a layered habitat rich environment with a Gabian wall and boardwalk

This scenario creates a lush environment between building blocks with a Gabian wall facade detached from the facade of the buildings. In the interstitial place between facades, circulation occurs. The Gabian wall acts as a place for habitat, but also allows rain water to percolate down to collection basins at the base of the buildings - to be reused as irrigation water. To connect the buildings, a boardwalk weaves through the site, breaks in the boardwalk providing space for native plants and wildlife habitat.



2. To cleanse and reuse water

Rainwater is allowed to percolate through and down the Gabian wall into a cistern at the base of the building. Ultimately, that water can be reused for irrigation on the site. Greywater is also collected in cisterns at the center of the building, cleansed, and then sent back to the units for appropriate reuse.

3. To provide habitat connections

The Gabian wall provides roosting space for native bat species, and nesting opportunities for birds. Further, cracks between the rocks provide space for moths to gestate and honey bees to hive. Finally, the fingers of wetland bordered by the boardwalk provide habitat for native amphibians.

Scenario Six: Urban Forest

Dustin Foster, Mariah Marshall, Rachel Bailey

Introduction:

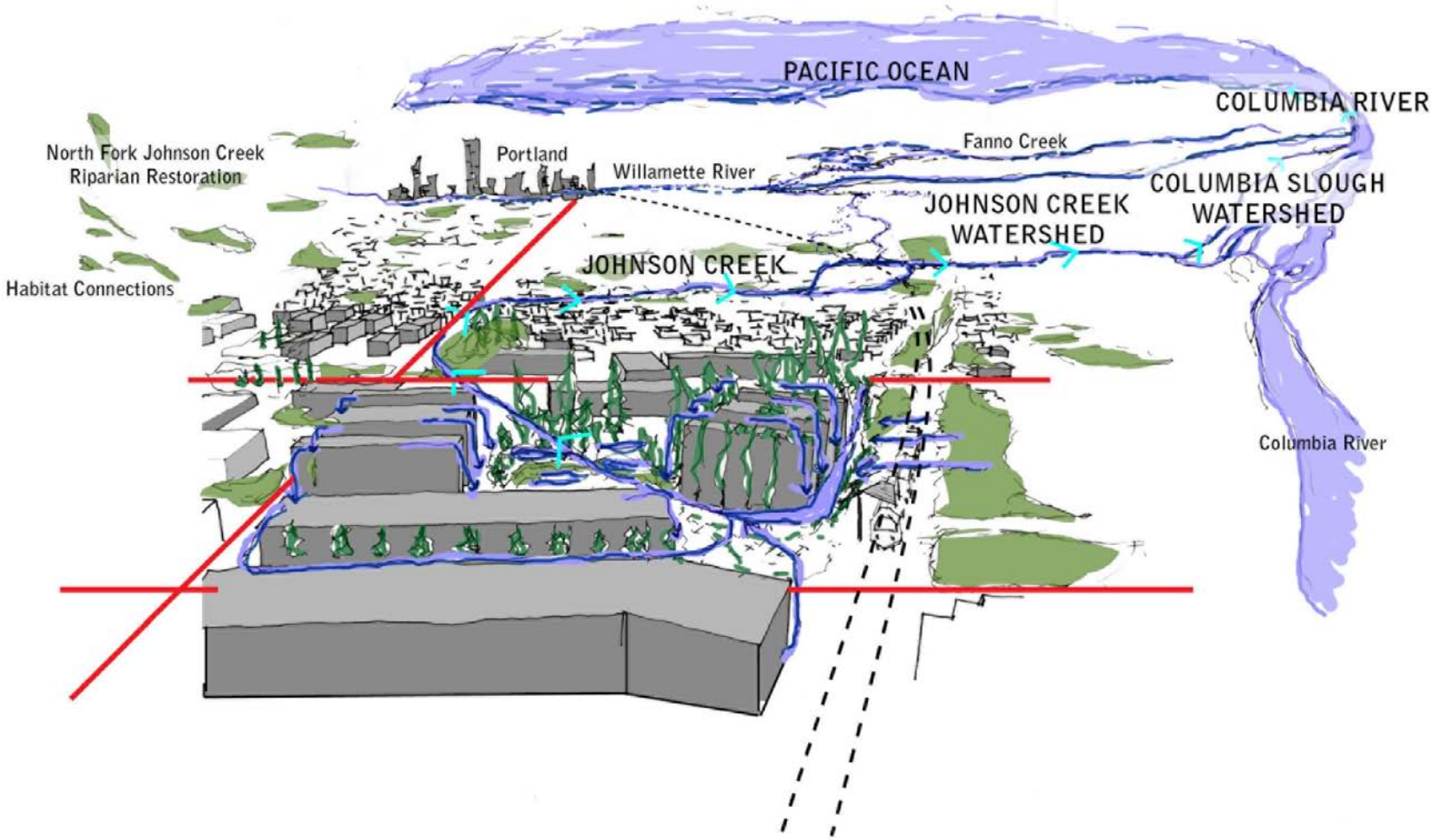
In their scheme, Dustin, Mariah, and Rachel worked to create a strong urban edge, in order to maximize the space left over for boardwalk, pathways, gardens, and wildlife habitat. Their buildings surround lush courtyards, providing rich views and wildlife habitat where community members circulate to their units, talk with one another, and enjoy the beauty and serenity of the space. Further, the team worked to harvest rainwater for reuse, and also to cleanse street storm water runoff through biotropes before sending the water into the wetland on the east side of the site.

Urban Forest through the seasons

Design Intentions:

1. Create a dense, urban-scale providing ample habitat 2. Cleanse and reuse rainwater 3. Create rich courtyard spaces

1. To create a dense, urban-scale providing ample space for wildlife habitat
This scheme worked to lift the buildings up along the edge of the site, creating an urban face while leaving ample space for wildlife habitat at the core of the site. The scheme presents a strong example of achieving density that supports livable walkable downtowns, while at the same time preserving area for wildlife and other non-human species of thrive.



Scenario Six: Urban Forest

2. To cleanse and reuse rainwater, cleansing street storm water runoff

Rainwater is harvested off of rooftops to be cleansed in biotropes and ultimately appropriately reused within the building. Further, storm water is collected off of the streets lining the site, channeled through the sidewalks and plaza, ultimately cleansing the water on its way to the wetland on the western edge of the site.

3. To create rich, habitat-filled courtyard spaces
Lush courtyards were created between buildings. Units face onto the courtyard, and circulation occurs around the space. Accordingly, the rich space filled with native shrubs and trees becomes a kind of community hub allowing neighbors to interact with one another and for individuals who dwell there to witness birds nesting in the tree canopy just outside their window.

VI. Conclusion

In this studio, students investigated a wide range of strategies to link their schemes with non-motorized transit options in Gresham; to celebrate the journey of water and to cleanse and appropriately reuse water on site; and to thoroughly integrate wildlife habitat with human habitat.

Sina and Bennett explored lush bioswale lined alley ways bringing residents from the MAX to their home. Roussa and Audrey incorporated specific native flowering plants in their courtyards to attract pollinators. Marc, Caitlyn and Jeffrey incorporated habitat literally within the facade of their buildings. Alana, Craig and Will created a courtyard that largely floods in rain events, leaving just a path for residents to reach their units. Nan, Max, Nicole and Andrew created a substantial habitat-rich Gabian wall providing definition and complexity to their scheme. Finally, Rachel, Mariah and Dustin achieved density along the perimeter of the site, leaving a rich habitat-filled space at the center of the site.

The work of the students in this studio represents a broad range of innovative strategies that could be employed to achieve ecological, transit-oriented, dense urban development in the heart of Gresham.

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