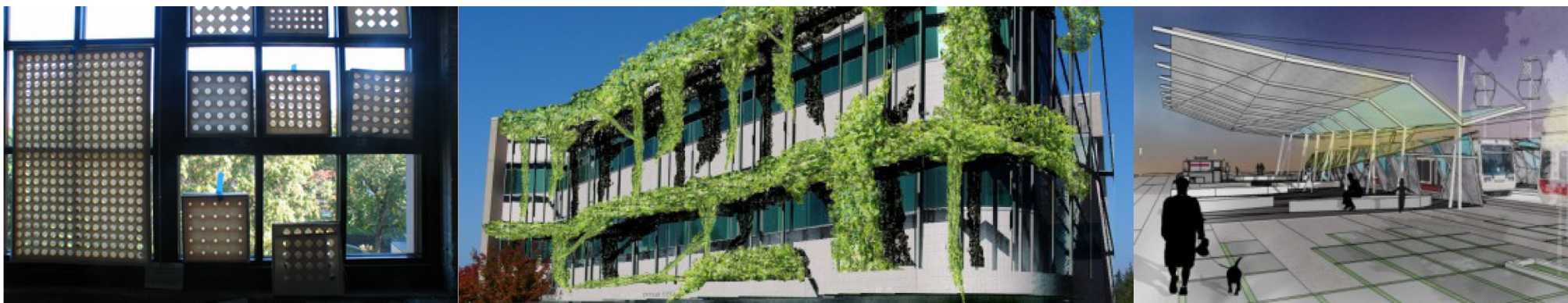


Fall 2009



Shaping Light

Sunshade Studies for Gresham City Hall and
Rockwood/Civic Drive Light Rail Station Designs

1206 U of Oregon
Eugene, OR 97403

t 541.346.3582
f 541.346.3626

sci@uoregon.edu
sci.uoregon.edu

Sina Meier, Architecture

Professor Nancy Cheng
Department of Architecture



Sustainable Cities Initiative



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

Acknowledgements

The University of Oregon and Nancy Cheng would like to thank the following individuals for their participation in this project:

City of Gresham

David Brugato : Facilities Manager
Lauren McGuire : Senior Planner
Michael Parkhurst : Project Coordinator

Metro

Meganne Steele, AICP : TOD
Christopher Yake : TOD

TriMet

Bob Hastings : FAIA
Jeb Doran

Others

Nancy Clark Brown : Autodesk
Karen Munro : University of Oregon Library
William Robert Taylor : Digital Visualization
James M Harrison : Art and Design

Reviewers

Jamin Aasum, Mahlum Architects
David Byrne, LEED AP : Hennebery Eddy
Erica Cedar, Fletcher Farr Ayotte
Katalin Czege, Hennebery Eddy
Susan Emmons, Susan Emmons Studio
Josh Fuhrer, Gresham City Councillor
Karyn Goodfriend, Fletcher Farr Ayotte
Richard Grace, YGH
Suenn Ho, Mulvanny G2
Justin Hunt, Amethyst Development
Chad Kirkpatrick, Witness to Beauty
Bill Neburka, Works Partnership
Hajo Neis, UO Architecture
Dan Petrescu, Hennebery Eddy
Jim Pettinari, UO Architecture
Tomas Quijada, MulvannyG2
Mick Richmond, YGH
Edward Running, YGH
Jeffrey Server, MulvannyG2
William Robert Taylor
Michael Thraikill, YGH
Brienne Wassmer, THA Architecture

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.

SCI Co-Directors

Nico Larco, Assistant Professor of Architecture

Marc Schlossberg, Associate Professor of Community & Regional Planning

Robert Young, Assistant Professor of Community & Regional Planning

Nick Fleury, SCI Program Manager

Price Armstrong, SCI Research Assistant

Course Participants

Shaping Light Studio

Nancy Cheng, Associate Professor, Architecture

Jason Bauer, Architecture Graduate

Jon De Leonardo, Architecture Graduate

Ellen Hagen, Architecture Graduate

Kate Kandell, Architecture Graduate

Casey Kent, Architecture Graduate

Bill Kirkwood, Architecture Graduate

Drew Krauss, Architecture Graduate

Katherine Martenson, Architecture Graduate

Sina Meier, Architecture Graduate

Zach Prowda, Architecture Graduate

Adina Tudorache, Architecture Undergraduate

Tony Walsh, Architecture Graduate



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Table of Contents

I.	Executive Summary	7
II.	Introduction	8
III.	Design Studies	9
	1. <i>Light Modulators</i>	10
	2. <i>Sun Shade Studies</i>	17
	3. <i>Light Rail Stations</i>	26
IV.	Conclusion	43

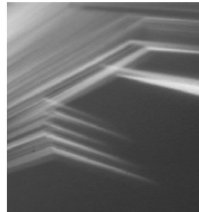
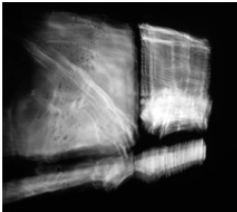
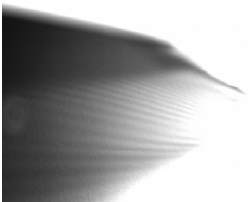
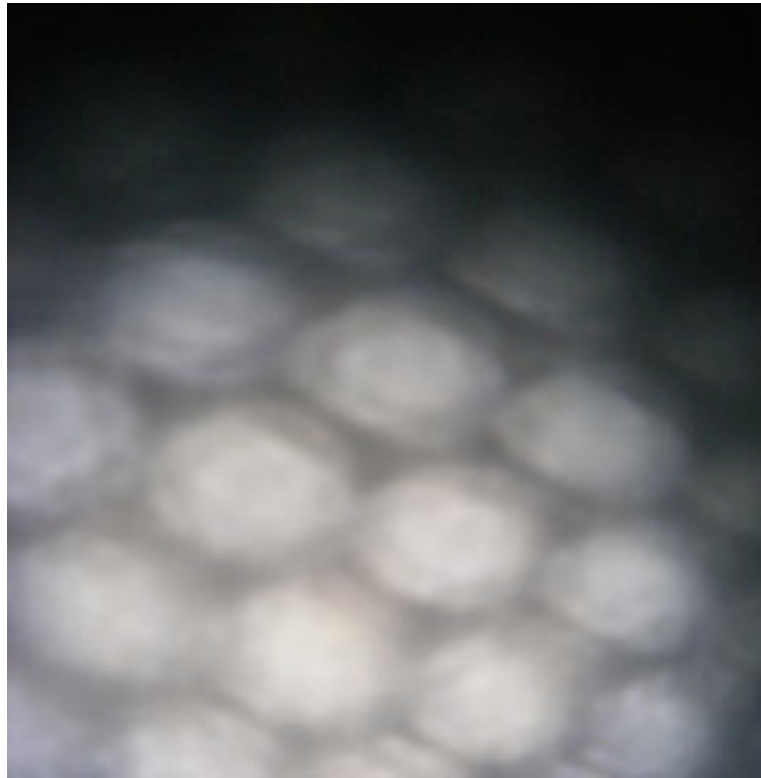
I. Executive Summary

The following report summarizes design proposals and findings produced during professor Nancy Cheng's design studio held in Fall 2009. The focus of this course was to explore optical phenomena involving light and shadow and their influence on the experiential qualities of architectural space.

This course was comprised of three major exercises: the design of a light modulating screen; the design of a sun shading device for Gresham City Hall's west-facing facade; and the design of a light rail station at Civic Drive and Rockwood Station.

This report describes in detail all three projects and includes samples of student work as well as findings and design recommendations.

Students in this class were asked to keep a web blog throughout the duration of this course. All design proposals can be viewed on the main class blog: <http://ufolio.uoregon.edu/shapinglight>.



II. Introduction

The goal of professor Nancy Cheng's Fall 2009 intermediate design studio was to explore light and shadow as it relates to natural cycles, material properties and form. The main objectives of this course were to help students develop form-finding methods that engage material and light; to re-conceptualize forms as components of beautiful and functional environments; and to develop and share reflective design thinking with online systems.

The course was comprised of three major exercises: The design of a light modulating screen; a sun shade device for Gresham City Hall's west-facing facade; and a light rail station design for stops at Civic Drive and Rockwood. Working on these assignments, students attempted to address the following questions:

1. Can evocative changing daylight help people appreciate natural cycles?
2. How can architectural surfaces, materials and apertures be activated by changing light?

The design of a light modulating screen at the beginning of the term allowed for an exploratory introduction to materials and lighting properties. Through a series of quick sketches and study models, optical phenomena such as translucence, reflection, color, diffraction and refraction were studied and recorded. Architecturally, the design proposals for such light modulating screens could be translated into sculpted ceilings, reflective lightshelves and filtering screens.

The second assignment, a shading device for the west-facing facade of Gresham City Hall, allowed for a more analytical approach to light and shadow. Utilizing digital modeling programs such as Google SketchUp and Autodesk Revit, shadows could be studied and recorded at different times a day. Such models were then imported into Autodesk Ecotect where daylighting levels and heat levels for the proposed shading devices could be recorded. While focusing on successfully eliminating the overheating of City Hall's interior spaces, such shading devices might also help activate the facade and frame views.

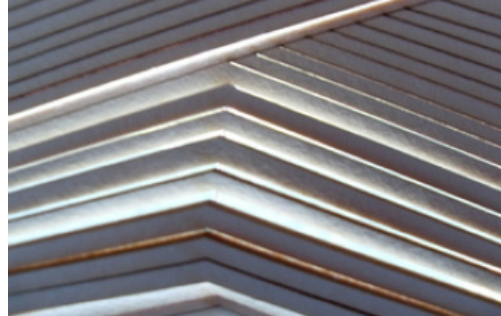
The third and last assignment of this course focused on the comprehensive design of a light rail station and its immediate environment. By using minimal means, students attempted to create a sense of place that can be understood at the speed of the train, bike and pedestrian. Metro, TriMet and the City of Gresham intend their commuter stop to be a safe, comfortable, cost-effective gathering space. While addressing these client needs, students also considered the following: site context, user interaction, material choices, sustainability as well as the incorporation of optical phenomena such as effects of light and shadow.

This report summarizes and illustrates student proposals and highlights findings from all three projects. It also includes design considerations and recommendations.

III. Design Studies

1. Light Modulators

The goal of this project was to playfully manipulate and explore light and shadow possibilities. Many materials and fabrication techniques were used to create 12x12 inch or 24x24 inch panels that manipulate light in various ways. These light modulators were then tested under different lighting conditions, following experiments by Laszlo Moholy-Nagy. Students created light patterns by adjusting relationships between the panel, the light source or the viewer. They documented the visual results with photography and video, studying the results of the optics involved.



2. Sun Shade Studies

A more analytical approach towards the phenomena of light and shadow was taken to address the second project of the term. Students were asked to design a shading device for Gresham's City Hall and analyze its performance. The extensive use of glazing along the west facade of City Hall causes the interior of the building to overheat during the late afternoons of the summer months. A successful shading device needs to protect City Hall employees from excessive glare and solar gain, while aesthetically enhancing the exterior of the building.



3. Light Rail Stations

The final project of this studio course focused on the design of a light rail station at either Gresham Civic Drive or Rockwood Station. The Civic Drive MAX Station is located at NW Civic Drive north of NW 13th Street and has already been partially constructed. The station is currently projected to open in late 2010. Rockwood Station is located at E 188th Avenue and E Burnside Street. The goal for both sites was to create a station that would respond to the unique character of the chosen locale. Topographical information, neighborhood demographics, surrounding functions as well as wind and water data were researched and analyzed to inform the design. Students considered site issues, user needs, material assemblies, sustainable design and light and shadow.



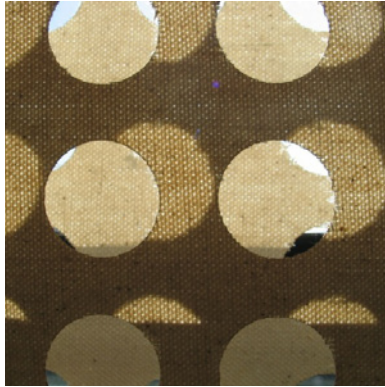
1 : Light Modulators

1 : Introduction

2 : Literature Review

3 : Explorations

4 : Findings



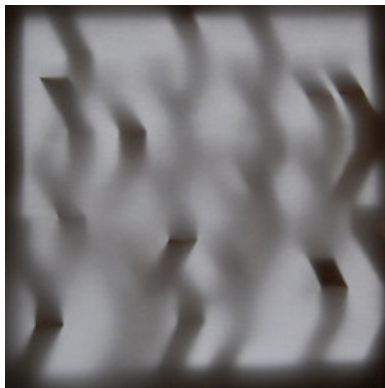
Jason Bauer : Layering



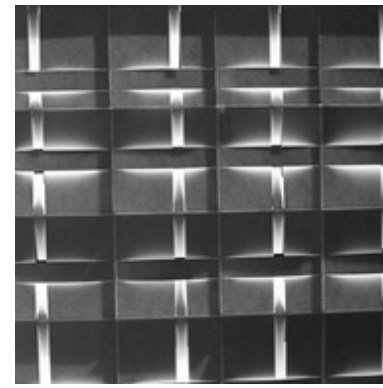
Zach Prowda : Reflection



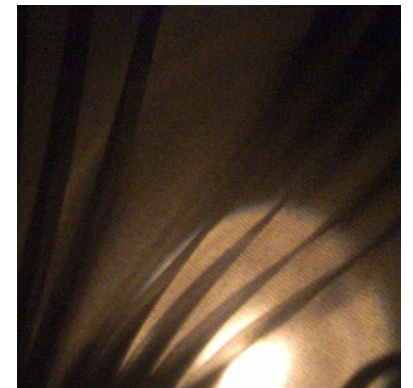
Ellen Hagen : Movement



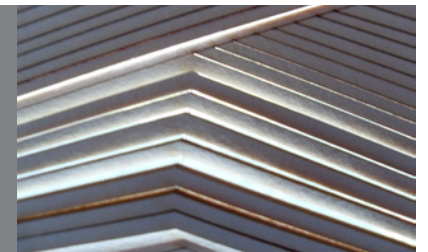
Katherine Martenson : Shadows



Kate Kandell : Intensity



Adina Tudorache : Color



Project Description :

The goal of this project was to playfully manipulate and explore light and shadow possibilities. Many materials and fabrication techniques were used to create 12x12 inch or 24x24 inch panels that manipulate light in various ways. These light modulators were then tested under different lighting conditions, following experiments by Laszlo Moholy-Nagy. Students created light patterns by adjusting relationships between the panel, the light source or the viewer. They documented the visual results with photography and video, studying the results of the optics involved.

Objectives :

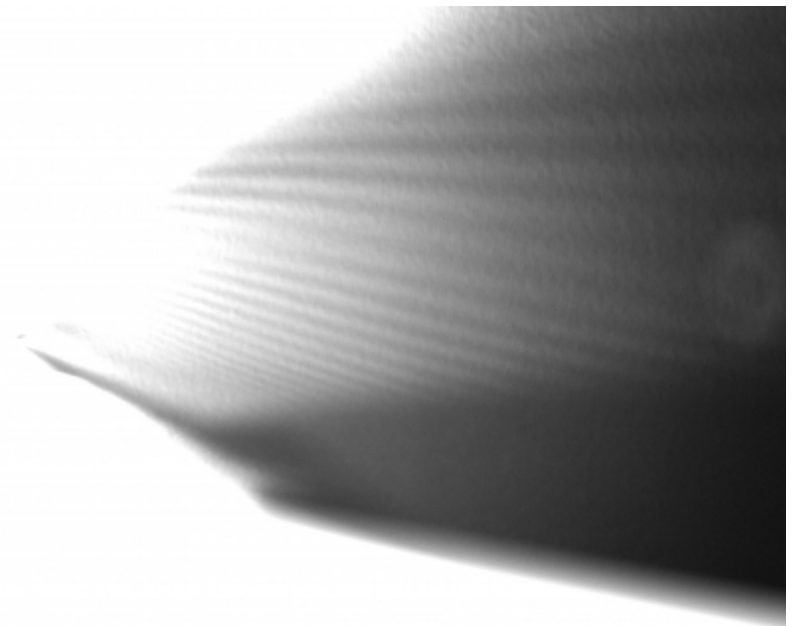
1. To understand how to manipulate light and shadow for emotional impact
2. To develop workshop fabrication skills
3. To cultivate a group discovery process for design

Process :

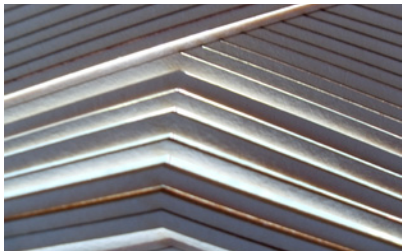
Students were encouraged to experiment in order to understand material properties and their relationship to light and shadow. Through a series of exploratory sketch models and drawings students arrived at their final proposal for their light modulators. In addition to traditional model-building techniques, students used digital lasercutting and milling.

Approaches :

Some light modulators were created to be still, others were meant to be moved to best experience the play with light. While some panels were to be backlit by either sunlight or an artificial light source, others were meant to be lit from the front in order to achieve the desired lighting effect. The following pages highlight two of the light modulators as well as the findings generated during this initial exploration period.



Experimenting with Light and Shadow



Literature Review

Books :

The Art of Light and Space : Jan Butterfield, Abbeville Press, 1996
An Engineer Imagines : Peter Rice, Artemis, 1994

Artists :

James Turrell

Creates visual experiences with natural and electrical light.
<http://www.pbs.org/art21/artists/turrell/>

Olafur Eliasson

Creates provocative installations and structures exploring material properties, geometry and perception.
<http://www.olafureliasson.net/>

Tools :

Fabrication tools available at the UO Portland Woodshop :
Laser Cutter, 3-D Printer, Router

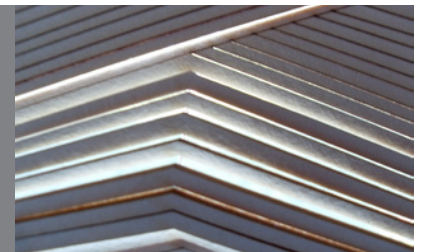
Shaping Light Blog :

Throughout the term, students kept a web blog, where articles and resources were shared.

<http://archgraphics.pbworks.com/light+and+shadow+resources>



James Turrell : *Spread*, 2003



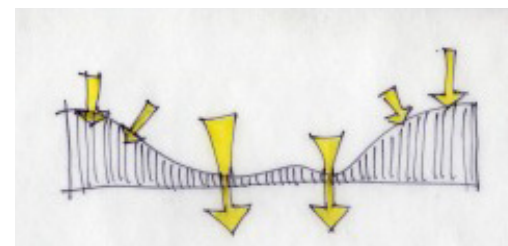
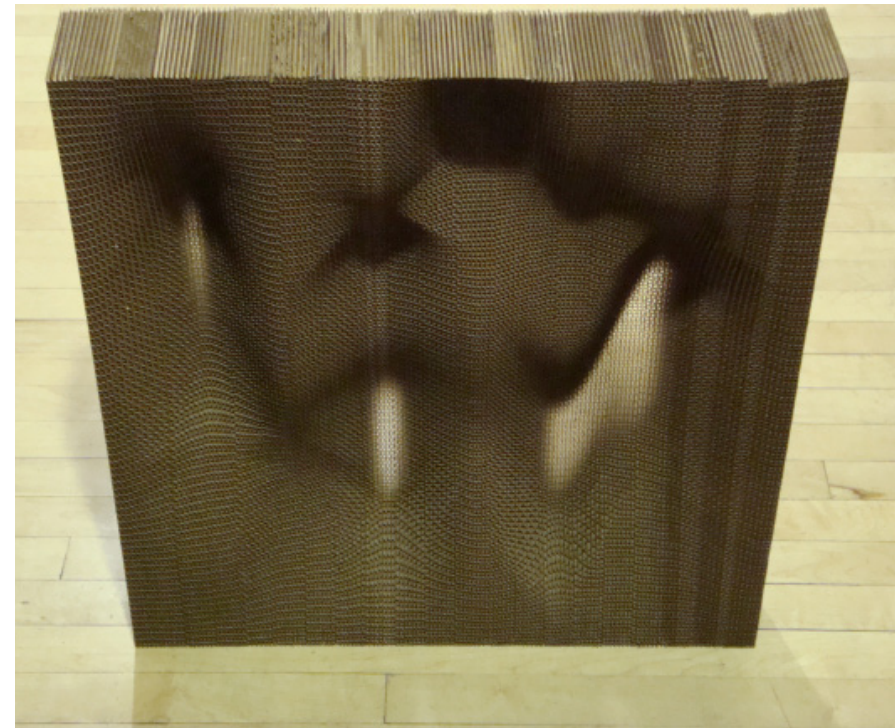
Explorations : Ellen Hagen

Ellen Hagen's light modulator was created by laminating layers of corrugated cardboard. The cardboard components were modeled in Rhinoceros software. They were then numbered, cut on the laser cutter and assembled into a 24x24 inch panel. There is a sculpted as well as a flat side to each cardboard fin, which gives the panel two distinct faces.

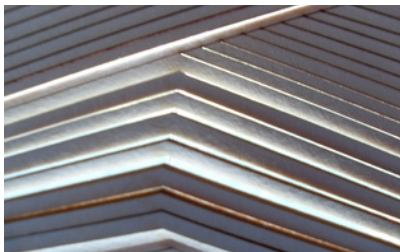
Due to the corrugation in the cardboard as well as the various shapes of the individual components, a variety of intriguing lighting effect are achieved. Where fins have less depth, more light penetrates the panel and creates an organic, almost fluid pattern. Where the fins are deeper, shadows occur and intensify the effect of a deep impression in the shape's surface.

Even though this panel was created to explore lighting effects and material qualities, one can also start to think of its potential architectural applications. It might be used as a screened wall that separates two spaces. Due to its thickness, it provides a sense of privacy. However, because it does allow for light and views, it does not act as a visual barrier.

When moving the panel, the views through it change. The small openings between corrugations allow for small glimpses of what is on the other side. Sometimes shapes are recognizable, other times suggestive. Therefore, this panel might be successful at adding visual interest to a public space. It can be experienced at different speeds and scales and has a very tactile quality.



<http://ellenhagen.weebly.com/1/category/material%20study/1.html>



Explorations : Jason Bauer

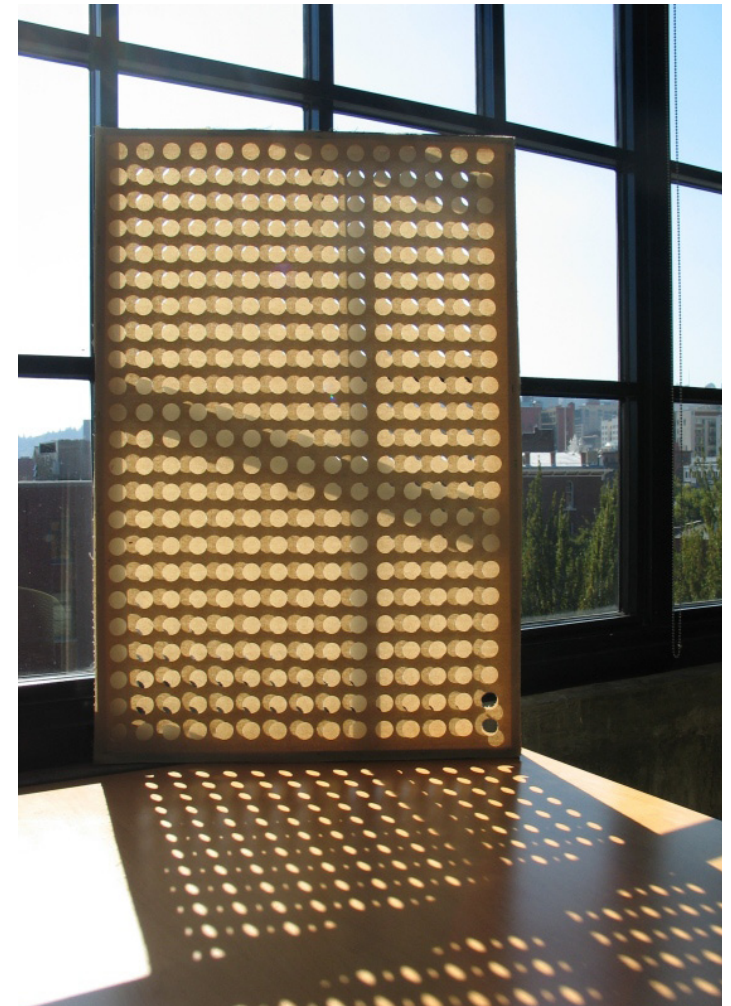
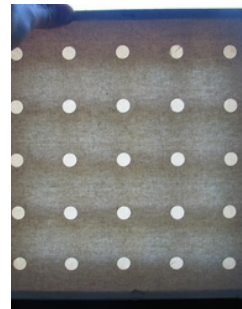
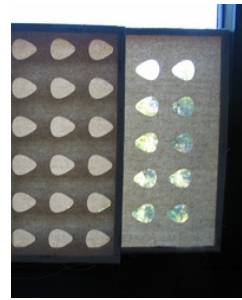
Jason Bauer created a series of mix and match 12x12 inch panels as well as a larger 24x36 inch screen. In each panel, a series of round, oval or teardrop shaped openings were cut out of the stretched canvas.

The smaller screens have the potential of being layered in order to create varying degrees of transparency and overlay. A single screen emphasizes the simple grid pattern and shows the individuality of each opening. When layered, the gridded shapes blend into a more complex surface pattern.

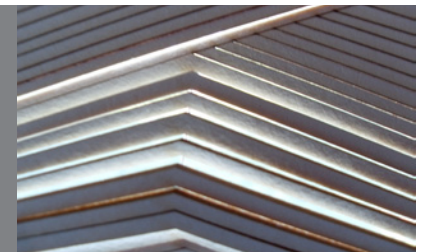
When placed in front of a window on a sunny day, these light modulating screens create a strong shadow pattern. When backlit with more diffuse light, the shadows become softer and more evocative. The second layer accentuates changes in light direction and intensity.

The potential layering effect might be useful when thinking of the canvas panels as adjustable window treatments or exterior shading devices which help modulate natural light levels. The canvas could be hung with more freedom of movement to make the shadows dynamic with wind or user interaction.

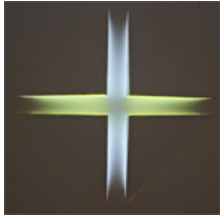
The screens could also be used as flexible room dividers. Depending on the overlay, more open or private environments can be created.



<http://jasonjbauer.weebly.com/panel-study.html>



Light Direction :



We need to consider how light direction shapes the visual result. According to the panel configuration, materials and lighting conditions, we saw bounced light, glow, or sparkle along with shadows.

1. Front lighting highlights an object against its shadow.
2. Side-lighting accentuates surface relief with raking shadows.
3. Direct backlighting can produce uncomfortable glare, but it can make translucent materials glow.
4. Reflected backlighting can create beautiful light gradients and bounced color.

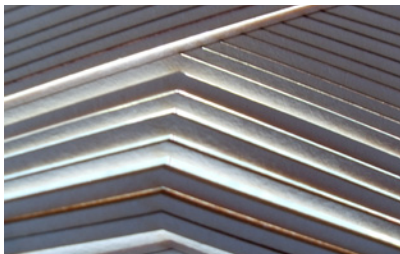
Layering :



Typically a free-standing opaque object casts shadows on surfaces according to the light direction and quality. When this opaque object is layered behind a translucent surface, that surface catches the shadow like a projection screen, constraining the geometry of the shadow and how it is viewed. Some shadow effects can be composed by layering surfaces with apertures and silhouettes. The gap between layers exaggerates the variation of visual effects caused by different sun angles and seen from different viewing angles.

Scale :

Because lighting intensity drops off at the inverse-square of distance, model-scale reflection effects only scale up with much brighter intensity sources. We enjoyed seeing how narrow slits and pin-holes can create unfamiliar diffraction effects. Because diffraction depends on the relationship between the wavelength of light and the size of aperture, it is not scaleable.



Findings

Time and Motion :

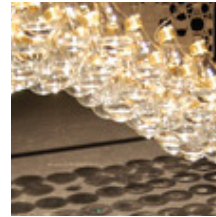


Optical effects such as diffraction were even more compelling when generated with a moving source because they illuminated the connection between the source, material and visual effect. Experiments with flexible paper, smoke chambers, shifting sand and eroding earth showed how light can highlight dynamic effects and how dynamic materials can create interesting lighting. Participants can become engaged when adjusting objects changes the lighting effect. The lighting variations become a reward for playing with the objects.

Sharpness versus Softness :

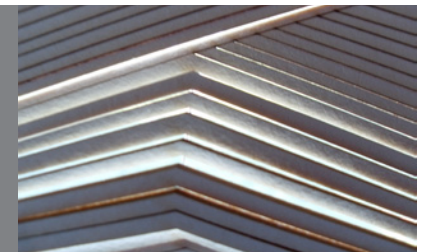
Shadow contrast and crispness varies according to the light intensity, the light's directional cohesion and the proximity of the casting object to the projection surface. Our panels left in front of windows changed in character completely depending on whether it was sunny or cloudy. Students working with bright point sources were disappointed that their panels went mute under more diffuse conditions. Theatre spotlights on dimmers allowed us to experiment with light direction and multiple sources.

Materials :



Optical and physical properties of materials dramatically shape their interaction with light. Surface color and reflectance are particularly critical in working with bounced lights and small apertures. Projects created from white paper, cardboard or plastic work well for diffusing or bouncing light. The designers who used colored paper, plastic or leaves understood how to enrich the cool abstraction they were seeing in the white studies. In the case of corrugated cardboard, the dark material accentuated the surprise of visual access only when aligned with the corrugations. So while the darker materials lacked the luminous bounced light, the contrast of dark materials with light could be a positive effect.

Several designers experimented with lasercut acrylic pieces, variously using the polished surface for reflection or playing with variable opacity. Etched lines and textures on clear plastic catch raked light to produce a glow in otherwise dark surface. Translucent milky acrylic, glass or marble naturally glows from internal reflection. Students created caustics (sharply focused highlights) primarily with the geometry of found glass objects.



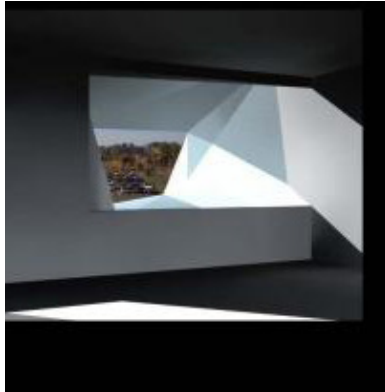
2 : Sun Shade Studies

1 : Introduction

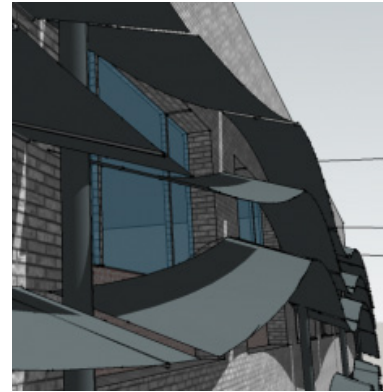
2 : Literature Review

3 : Explorations

4 : Findings



Drew Krauss : Framed Views



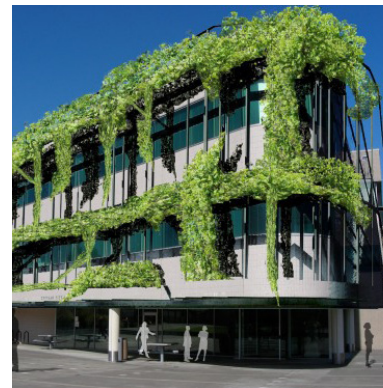
Adina Tudorache : Horizontal Fins



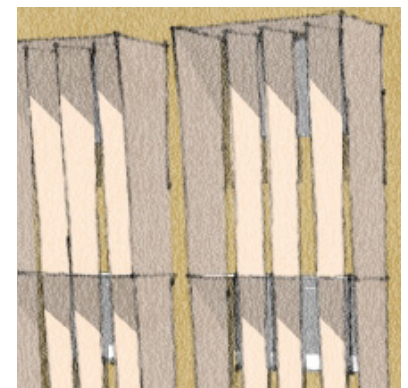
Tony Walsh : Vertical Slating



Casey Kent : Solar Cloud



Bill Kirkwood : Deciduous Vines



Sina Meier : Vertical Sails



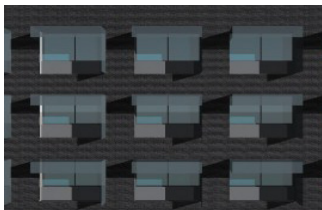
Introduction

Project Description :

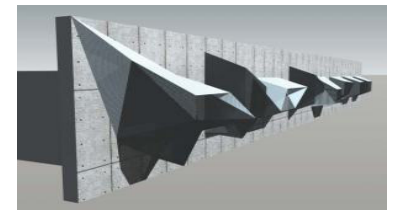
A more analytical approach towards the phenomena of light and shadow was taken to address the second project of the term. Students were asked to design a shading device for Gresham's City Hall and analyze its performance. The extensive use of glazing along the west facade of City Hall causes the interior of the building to overheat during the late afternoons of the summer months. A successful shading device needs to protect City Hall employees from excessive glare and solar gain, while aesthetically enhancing the exterior of the building.

Objectives :

1. Understand and document current thermal conditions at Gresham City Hall
2. Explore design alternatives, considering performance and aesthetics
3. Test and analyze proposed shading devices through the use of Autodesk Ecotect software



Shadow Studies



Process :

An initial site visit familiarized students with current conditions at Gresham City Hall. Critical spaces were documented during the building walk-through led by facilities manager Dave Brugato. Initial ideas were generated and explored through a series of quick study models and sketches. Simultaneously, students conducted and shared research on the most suitable shading solutions for a west-facing facade. Finally, a digital model of a typical City Hall suite was created to study and analyze daylighting and heat levels.

Approaches :

Students explored a variety of shading options including vertical and horizontal slatting, vegetation, large scale shading structures and interior blinds. The following pages highlight two of the twelve student proposals.



Literature Review

Software:

Autodesk Ecotect

Used to test performance of proposed shading devices, including daylighting levels and temperature levels

Autodesk Revit

Used to model and render existing spaces as well as proposed shading devices

Google Sketch Up

Used to model and render existing spaces as well as proposed shading devices

Nancy Clark Brown's Video Tutorials :

Ecotect Basics, Ecotect Daylight Analysis, Ecotect Visualization, Ecotect Shadows

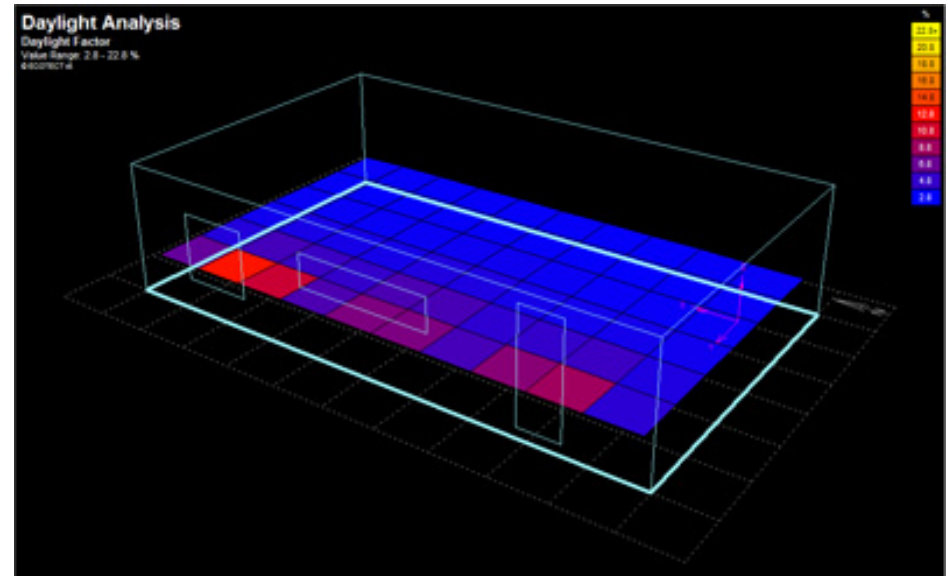
Books :

Green Studio Handbook

Alison Kwok, Walter Grondzik, Elsevier, 2006.
<http://www.greenstudiohandbook.org>

MEEB

Mechanical and Electrical Equipment for Buildings, Alison Kwok, Walter Grondzik, Benjamin Stein, John S. Reynolds, Wiley, John & Sons, 2005



Ecotect Interface



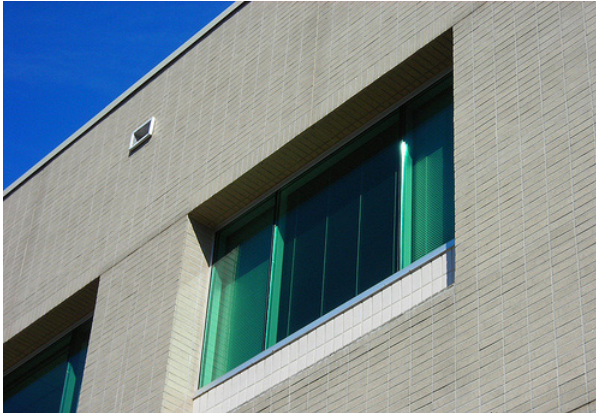
Current Conditions



West-facing facade



South-facing facade



Window detail of west-facing facade



Window detail of elevator lobby



Jon Deleonardo's sun shade uses a simple system of horizontal and vertical louvers that step away from the punched window opening. Horizontal louvers are offset and descend along a 45 degree angle.

The design addresses summer overheating by placing louvers on the vertical axis rotated at 30 degrees to the north to deflect the problematic southwest afternoon sun. In winter, this proposal allows light to enter and bounce off adjacent walls from where it is carried deeper into the space, increasing usable daylighting. Year around, louvers placed in the lower third of the window bounce light onto the ceiling where unobstructed by furniture.

An Autodesk Ecotect model was used to optimize the design. The model shows that by adding the proposed shading device to the west-facing facade of Gresham City Hall, a drop of six degrees Celsius (interior temperature) could be achieved during the summer months.

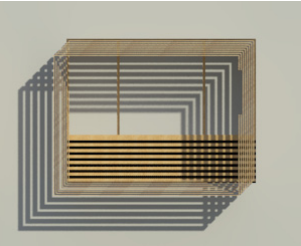
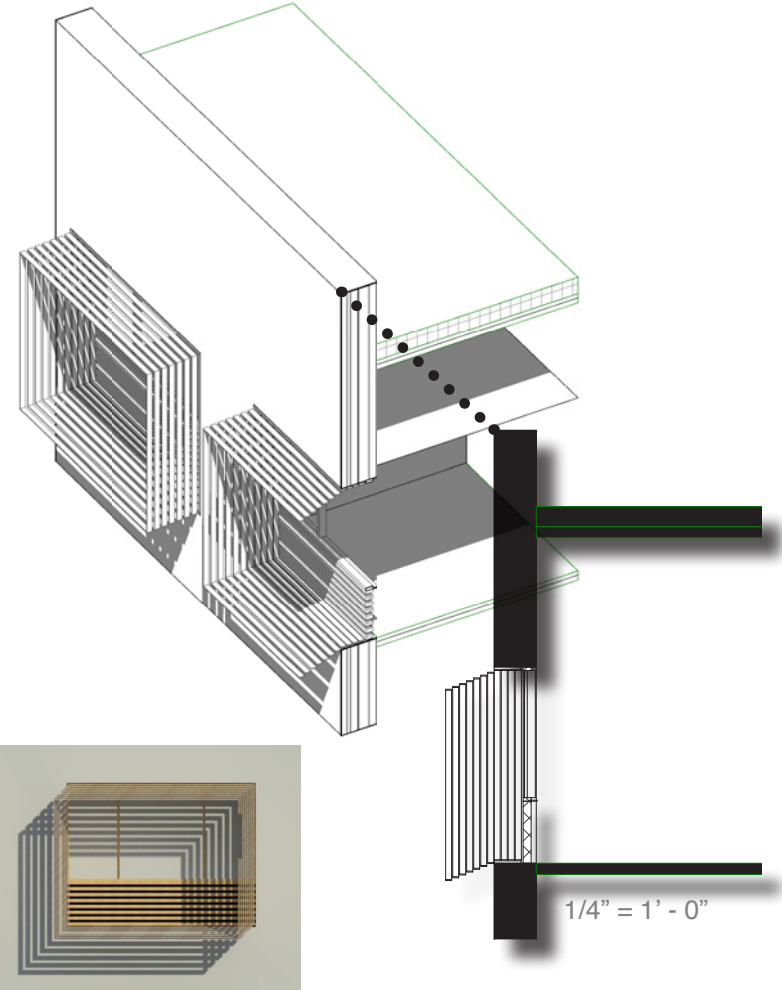
The design maintains excellent views while providing strong winter solar access and adequate summer shading in a visually balanced, well-proportioned framework. The designer wanted to further improve the shade's performance by using an expandable W-shaped lath design, using the material's flex as hinges for adjustable geometry. Further refinements could include tuning the angle of each slat and the material's reflective characteristics.

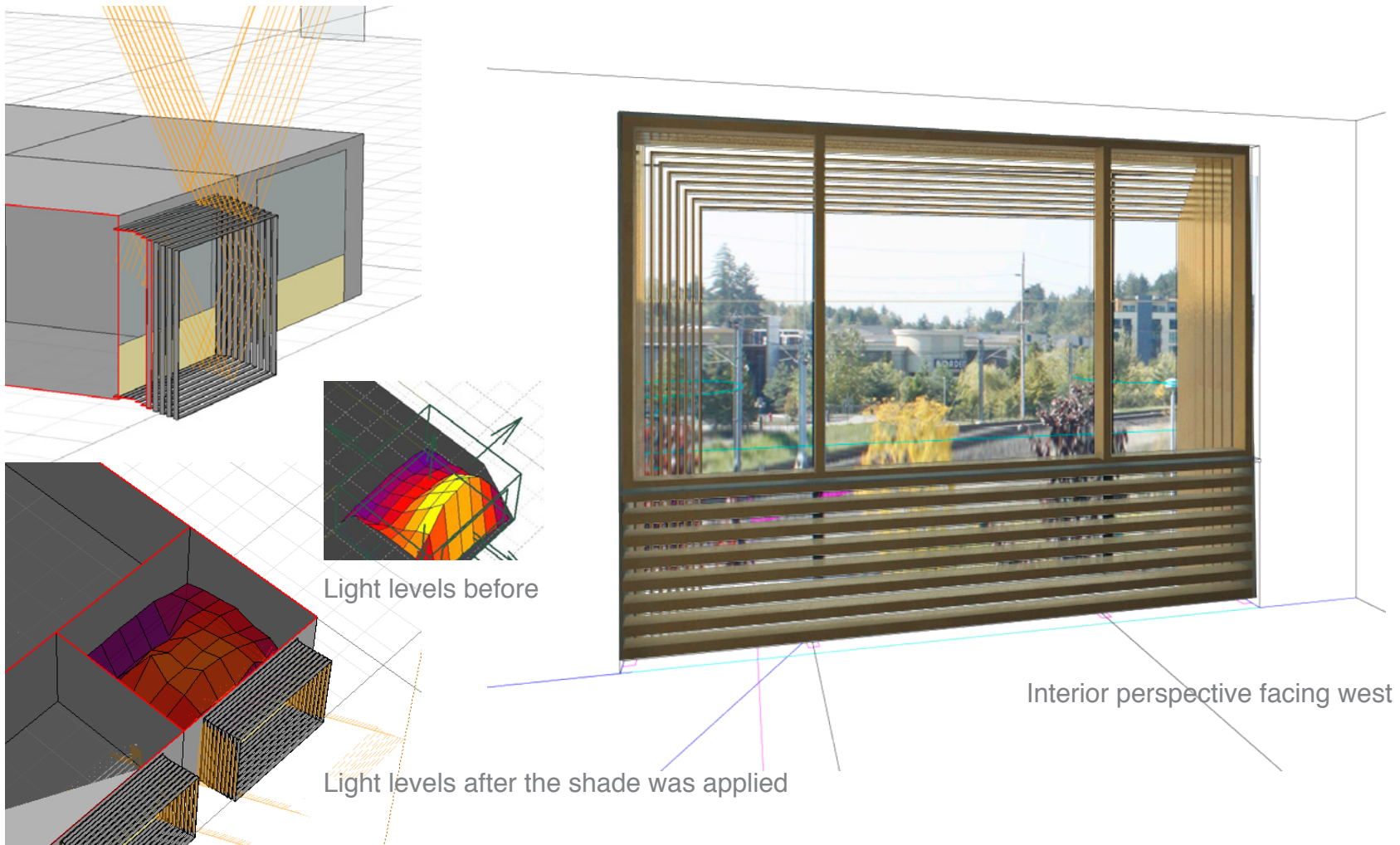


<http://jondeleonardo.weebly.com/sun-shade.html>



Explorations : Vertical and Horizontal Shading : Jon Deleonardo





Explorations : Vegetation : Bill Kirkwood

Bill Kirkwood proposed the planting of deciduous vines as a shading option for Gresham City Hall's South facade. The main advantage of such plants is that they provide shade in the summer and allow light in during the winter.

While the vines' main purpose is to provide shade, they would also express Gresham's commitment to sustainability in a highly visible location. Classmate Jason J. Bauer explained that either ornamental or edible grapes would be a good choice.

Grape leaves would grow from minimal buds to a luxuriant green network, dropping in autumn to allow winter sun to penetrate the offices. Edible grapes would provide a community harvest event, ornamental grapes bring spectacular autumn foliage. Since blocking late afternoon western sun requires obscuring the views out, monotonous interior blinds could be replaced by ever-changing foliage which attracts birds and butterflies.

A minimal framework with planters and a drip irrigation system could be hung off the facade, from the building parapet or supported from below. The city could develop expertise in maintaining green facades and train youth to spread this sustainable technology throughout the city.

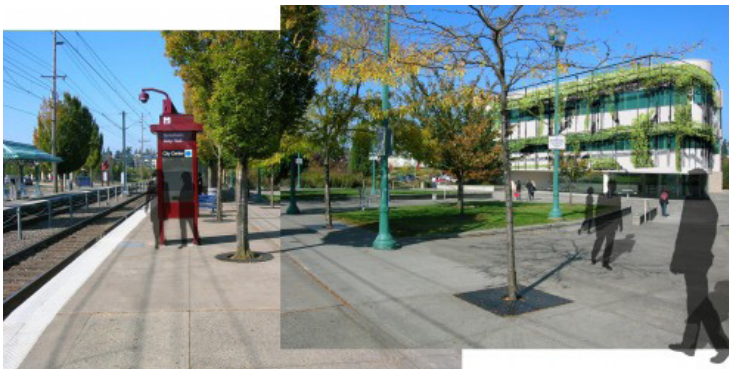


<http://billkirkwood.wordpress.com/2009/10/21/09-1016-gresham-city-hall-light-shading/>



Shading West-Facing Facades :

1. A vegetative solution such as quick growing deciduous trees or vines could work well with Gresham's 'green' image. Such a solution might however require extensive maintenance and may compromise views in order to be effective.
2. Multiple components can work together. The combination of vertical as well as horizontal elements provides better shade than any of these components on their own. However, some views might be compromised by such shading devices. Shading patterns on work surfaces created by the exterior slatting or fins need to be considered.
3. Blinds can supplement external shading solutions to block problematic low western sun.



Vegetation as Shading

Secondary Design Ideas :

1. To reduce lighting costs, skylights can be added in open offices near the corridors. This additional light increases visual comfort by reducing problematic high contrast.
2. Thin-film photovoltaic laminates could be used to shade the southern and western exposures.
3. Aesthetically, color could relieve monotony of repetitive shading units. For example, a color gradation over the whole facade would unify and activate the building appearance.

Design Process Ideas :

1. Quick iterations with simple tools gave good design feedback about shading effectiveness: As a first pass, simple cardboard fins around a rectangle with a sun path and gnomon to locate the light source OR a SketchUp interactive sun path worked well for identifying effective components.
2. Clients need to see the detailed design of an individual window, as well as how it fits into the interior room context and exterior building settings.



3 : Light Rail Stations

1 : Introduction

2 : Literature Review

3 : Explorations

4 : Findings



Jon Deleonardo and Jason Bauer : Site Planning



Sina Meier : Materials



Bill Kirkwood : Plaza Design



Katherine Martenson : Site Planning



Zac Prowda : Plaza Design



Project Description :

The final project of this studio course focused on the design of a light rail station at either Gresham Civic Drive or Rockwood Station. The Civic Drive MAX Station is located at NW Civic Drive north of NW 13th Street and has already been partially constructed. The station is currently projected to open in late 2010. Rockwood Station is located at E 188th Avenue and E Burnside Street. The goal for both sites was to create a station that would respond to the unique character of the chosen locale. Topographical information, neighborhood demographics, surrounding functions as well as wind and water data were researched and analyzed to inform the design. Students were asked to consider site issues, user needs, material assemblies, sustainable design and light and shadow.

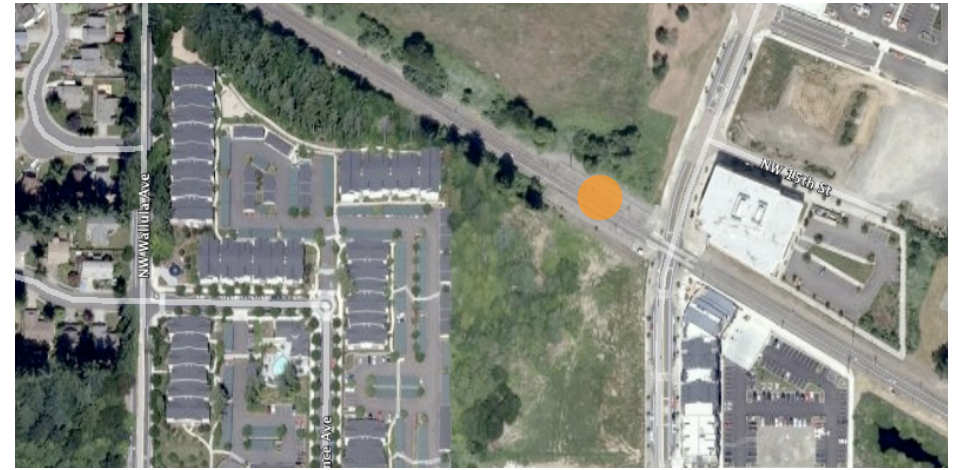
Site Information :

Civic Drive Station

Civic Drive Station is surrounded by Metro-owned land. The parcel north of the light rail tracks might be developed into a park or plaza as an amenity serving the station as well as the neighborhood. A series of mixed use buildings is planned for the eastern end of the southern parcel, leaving the site's natural wetland in tact.

Rockwood Station

Currently, Rockwood Station is surrounded by low-density strip mall development and a series of empty parking lots to the south, as well as a residential neighborhood north of the site. Residents are looking for a station design that responds to the unique character of the neighborhood and references the history and cultural diversity of Rockwood.



Civic Drive Station



Rockwood Station



Literature Review

Presentations :

Gresham Transit Design Principles

Bob Hastings, FAIA TriMet

Rockwood Cultural Identity

Jeb Doran, TriMet

Civic Drive Station and Plaza

David Byrne, Associate at Hennebery Eddy

Websites:

Gresham Planning Documents

<https://scholarsbank.uoregon.edu/xmlui/handle/1794/1934>

Rockwood Urban Renewal

<http://greshamoregon.gov/city/city-departments/urban-renewal/>

Zotero :

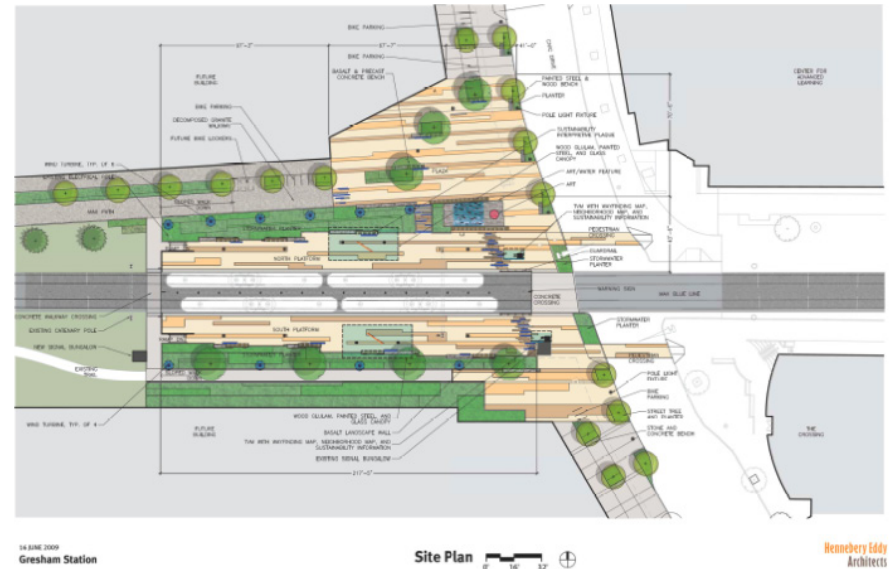
Class Bibliography

<http://www.zotero.org/groups/arch4854>

Shaping Light Blog :

This blog includes links to participating students' web blogs, where final design proposals are exhibited.

<http://archgraphics.pbworks.com/light+and+shadow+resources>



Hennebery Eddy Proposal for Civic Drive Plaza and Station



Objectives :

1. Site

What are assumptions about the context?

How does the design respond to the unique characteristics of the place?

What is the design vision for the near term and 30 years from now?

2. User Needs

What emotions are felt on arrival, waiting and departure?

How are pragmatic needs such as safety and security accommodated?

How does the design address time?

3. Materials Assemblies

How does the look and feel of the street furniture contribute to the design?

4. Sustainability

How is the design addressing sun, wind and water?

5. Light and Shadow

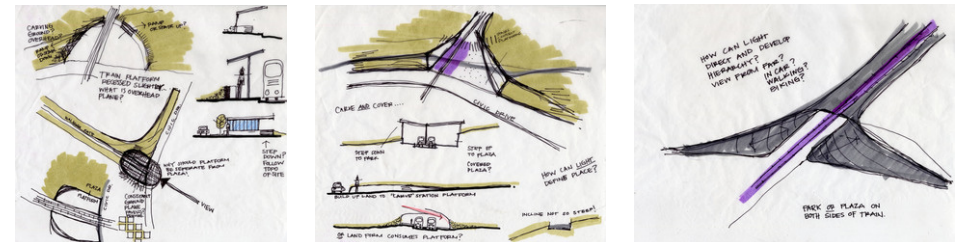
How does the design maximize the expressive qualities of daylighting and electrical lighting?

Process :

Design explorations began with an in-depth site analysis (conducted in teams), followed by a series of precedent and material studies, and the production of many exploratory models and sketches. Finally, hand and computer media was used to illustrate findings.

Approaches :

Students chose a variety of approaches to address the design challenges mentioned above. One group of students investigated and explored the larger context of each site, considering site planing, plaza designs as well as large scale shelters and station structures. A few students took a more detailed approach, considering the construction and materiality of station components. The following pages illustrate all twelve student proposals, describing how they each address the above design considerations.



Early Site Design Investigations



Explorations : Site Planning : Jon Deleonardo and Jason Bauer

Project Description

Rather than phasing in built development, Jon Deleonardo and Jason Bauer envisioned a modern agrarian vision. They proposed a community chestnut orchard, alluding to Gresham's agricultural past. The orchard would bring together residents in a promising economic endeavor while providing a public green amenity amidst other development.

Site Considerations

The scheme fills the hillside adjacent to the Civic drive station with rows of trees. At the edge of the grove near the station, paved walkways, regular walls and decorative tree grates contrast with the natural topography and changing tree canopy. Four shelters reach towards each other to provide a gateway. Low walls and benches extending away from the tracks invite arriving passengers to explore the orchard.



User Considerations

The planting of the proposed chestnut trees provides rhythm, order and a sense of belonging. Seasonal changes would be punctuated with community gatherings to harvest and sell the nuts. The changing cycle of the deciduous trees contrasts with the timelessness of the built structures. The proposed shelter is open and transparent and allows for clear supervision.



<http://jasonjbauer.weebly.com/> <http://jondeleonardo.weebly.com/>



Material Considerations

The cantilevered pedestrian shelters have cast-in-place concrete frames supporting two layers of fabric. The fabric includes a transparent layer for rain protection and an opaque layer with two-foot diameter openings to generate changing shadows.

Light and Shadow

The design idea for the canopy of the transit shelters originated in Jason Bauer's initial light and shadow explorations. Tested in a series of models, the changing shadow patterns give scale and visual interest to the bold gestural shape of the canopies. The chestnut trees also effect the lighting conditions around the station. While contrasting in shape with the geometric fabric shadows, the irregular tree shadows overlap with the shelters to blur the boundary between the two unlike elements.

Sustainability

The project meets the triple bottom line. Ecologically, the orchard would oxygenate the air and provide a natural stormwater drainage area. Economically, the chestnut trees have high promise because of the potentially high demand for chestnuts and the possibility of worker and business management education. Socially, the trees would create a novel public environment for community building.



Explorations : Site Planing : Katherine Martenson

Project Description

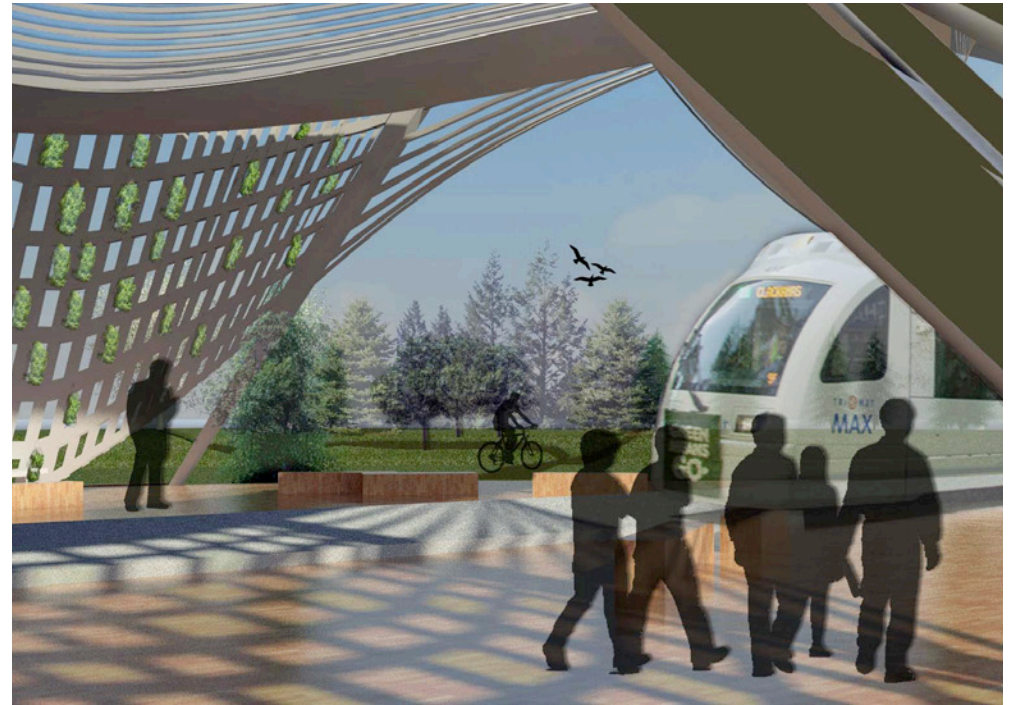
Kat Martenson's project takes advantage of the slow economic climate to propose a green amenity for the area. She proposes two looping ramp structures that provide an overview of the open space while sheltering commuters and providing an important connection between the southern and northern sides of the site.

Site Considerations

The proposed ramp structures hold the two divergent ecologies on either side: to the north a formal park space, to the south a natural habitat area. Each form holds to their corresponding environment: the tighter curve to the south clutches the natural habitat and walking paths; while the more open curve to the north is a slower-paced move connecting to the Max path destined for Portland. Together these woven structures meet above the transit stop for a brief opening and the opportunity to switch paths.

User Considerations

The design provides accessibility on multiple levels: waiting areas for the train, a means to travel through the neighborhood, and the integration of habitat for local species. The grid-structure of the intersecting forms provides a light and open environment for the users. The various functions of this design generate more activity on the site providing a safe environment. The green space could remain an oasis that makes surrounding development more attractive or it could eventually be developed as the market evolves.



<http://katmartenson.weebly.com/>

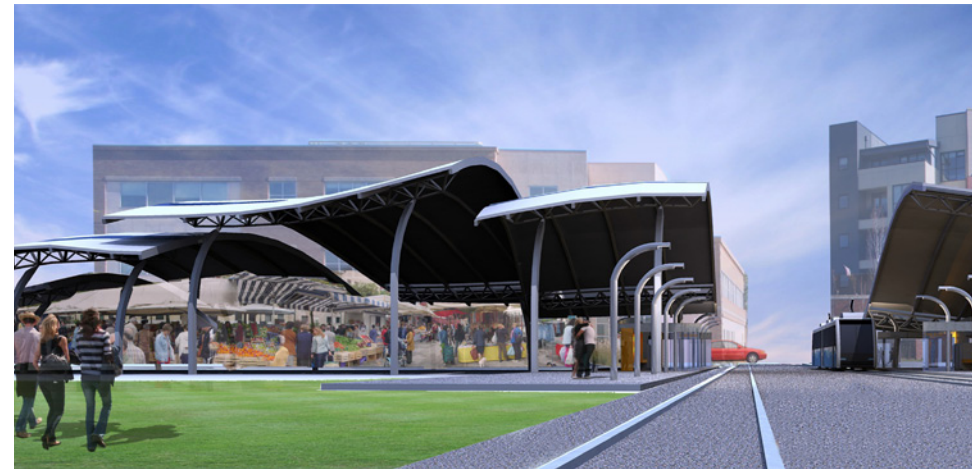


Project Description

Tony Walsh proposed a large-scale structure, arching over both sides of the tracks and extending into the landscape on either side. This monumental design proposal intends to serve as a place maker and integral part of the Civic Drive identity.

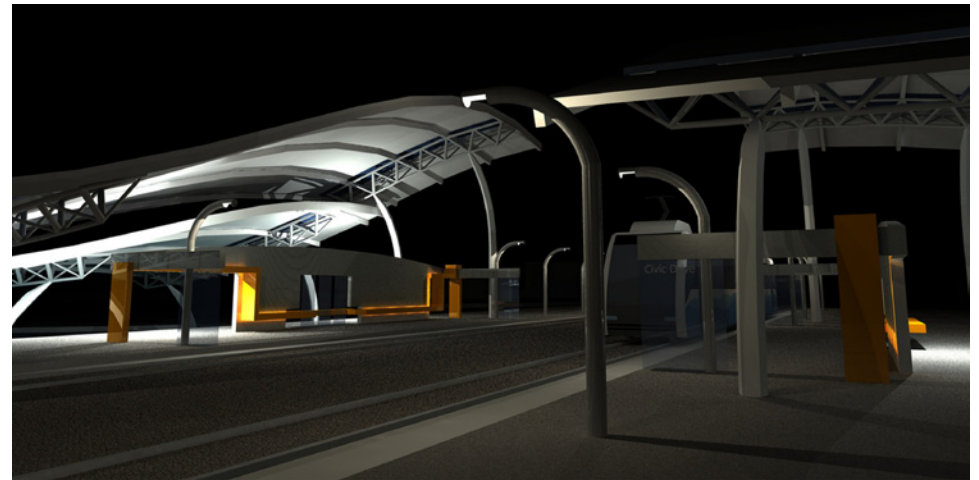
Site Considerations

The large structure mimics the gentle slopes to either side of the site, while the segmentation of the form can be read as an interrupted whole that coalesces around an important place. The large covered space allows outdoor events to take place protected from the wet weather.



Light and Shadow

Shaping light was a constant consideration while developing the design of the roof structure. Skylights are placed in the roof skin to interact with both daylight and artificial light. The skylights illuminate the structural elements. They are met by a series of perpendicular breaks in the roof, which allow shifting bands of sunlight to intersect each other on the ground. The majority of the structure is located on the north side of the site where people wait to go downtown. This roof's photovoltaics collect solar energy to illuminate the underside of the room at night.



<http://tonywalsh.weebly.com/blog.html>

User Needs

Station services such as ticket vending and seating are integrated into bright yellow furnishing with a human scale.



Explorations : Big Shed Designs : Kate Kandell

Project Description

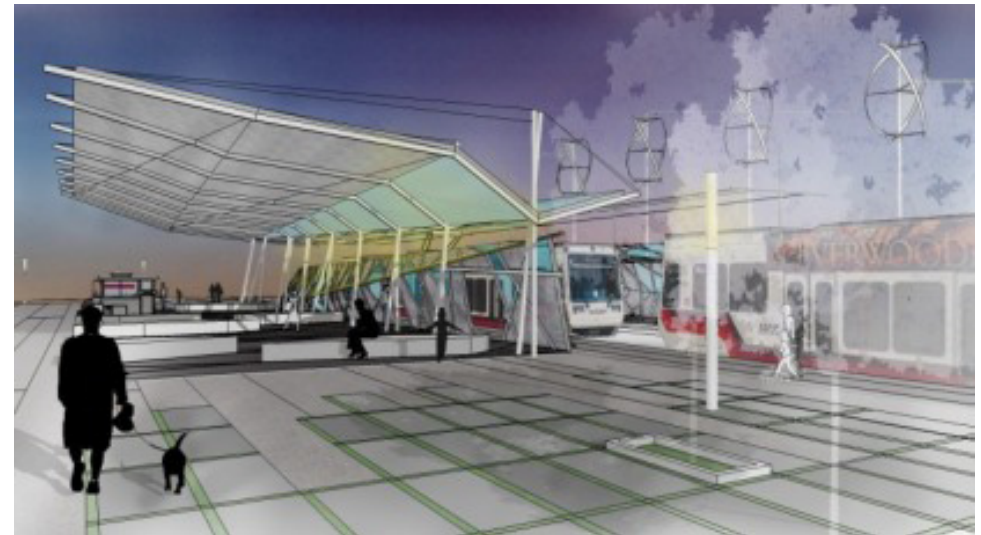
Kate Kandell's proposal for the Civic Drive light rail station includes a large roof-dominated structure as well as a series of proposed wind turbines and bio-swales, aspiring to educate individuals waiting and gathering at the station.

Sustainability

Through the architecture of this proposal, visitors can learn about wind, rain, sun, geology and temperature. The large roof form at the North platform is intended to collect rainwater in a bio-swale. Adjacent signage and a water gauge let people know how much rain is running off the roof. Wind is harvested through large wind turbines, providing electricity to light the platforms at night. Large pavers of basalt reflect the geology below the platform.

User Experience

As users move from Civic drive towards the platforms and beyond, they experience a gradual transition. The landscape elements become more dense, the platform goes from public to private. While the station makes a large civic gesture, the regular bay structure and benches are tailored to fit the human body.



<http://shapinglight.weebly.com/>



Project Description

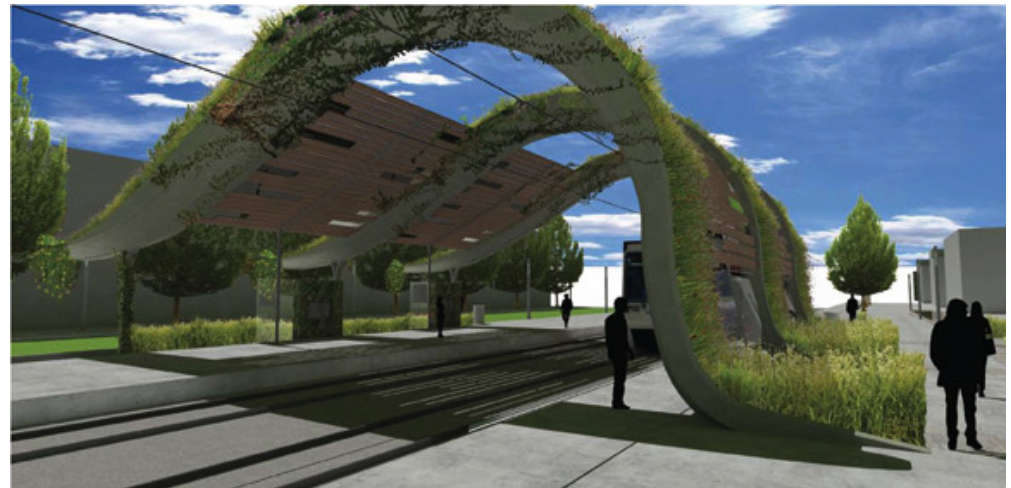
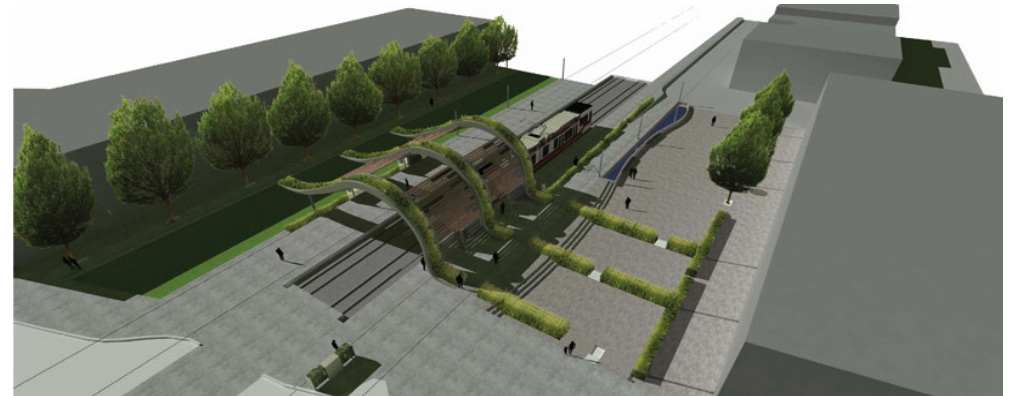
Adina Tudorache's design, dramatized the power of nature through bold vegetated structures arching over both platforms of the Civic Drive station like a green dragon. The three lines of green connect to a network of tall grasses, providing both a literal stormwater path and a metaphor for the interconnection of natural systems.

Site Design

This design intends to bridge the landscapes on the southern and northern sides of the tracks. This proposal takes into account future adjacent development and investigates how new buildings, parks and landscaping might be arranged within the larger context of the site.

Sustainability

This proposal takes advantage of a natural depression in the landscape to the south of the light rail station. This area is intended to be used to treat stormwater runoff. A large infiltration basin may not only serve as a cleansing mechanism for runoff, but also contributes to a more active street scape or plaza. A cistern under the plaza space was also considered for collecting runoff to irrigate the plant material on the proposed arches.



<http://tudorache87.wordpress.com/>



Explorations : Plaza Designs : Ellen Hagen

Project Description

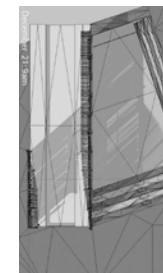
Ellen Hagen's design links the people waiting for a train with those in a sunken plaza beyond through an interactive illuminated wall. The wall acts as dynamic artwork for those on both sides.

Site Considerations

The proposed plaza steps five feet down from platform level. It is gently pitched to direct water towards the bio-swale located at the western end of the plaza. A series of smaller water features around the plaza also direct stormwater run-off towards the large bio-swale. The addition of a wide boardwalk within the plaza as well as improved street scaping help enhance the walking experience of the Civic Drive neighborhood.

User Considerations

The proposed metal panels are lined with milky acrylic and are kinked in one corner to bend light as it comes into the station. The panels are moveable and station users are encouraged to adjust them to their liking, both for entertainment and lighting purposes. At night, the panels illuminate along the plexi sides which creates a dynamic wall of light.



<http://ellenhagen.weebly.com/>



Project Description

Bill Kirkwood's proposal for the Civic Drive light rail station invites people into a plaza that features a bioswales and dynamic shelter structures.

Site Considerations

The proposed plaza acts as an extension of the MAX platform, creating an amenity for station users as well as neighbors and visitors to the site. Sunken below Civic Drive and the MAX lines, the plaza offers noise protection. As pedestrians arrive to the site, they will experience the meandering motions of water as it percolates through a series of infiltration basins. Ascending to the platform, users will find ticket dispensers, validators and trash receptacles integrated in the timber walls, creating a clean transition from walkway to seating area.

Material Considerations

Both wind and visual access are important factors at the Civic Drive site, the design proposes pre-formed acrylic panels for a transparent wind barrier that can be replaced if damaged or vandalized. Horizontal slats for solar protection allow clear views through the structures. They admit low-angle sunlight while deflecting harsh mid-day summer light.



<http://billkirkwood.wordpress.com/category/final-design/>



Explorations : Plaza Designs : Zach Prowda

Project Description

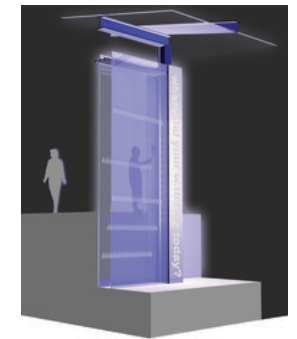
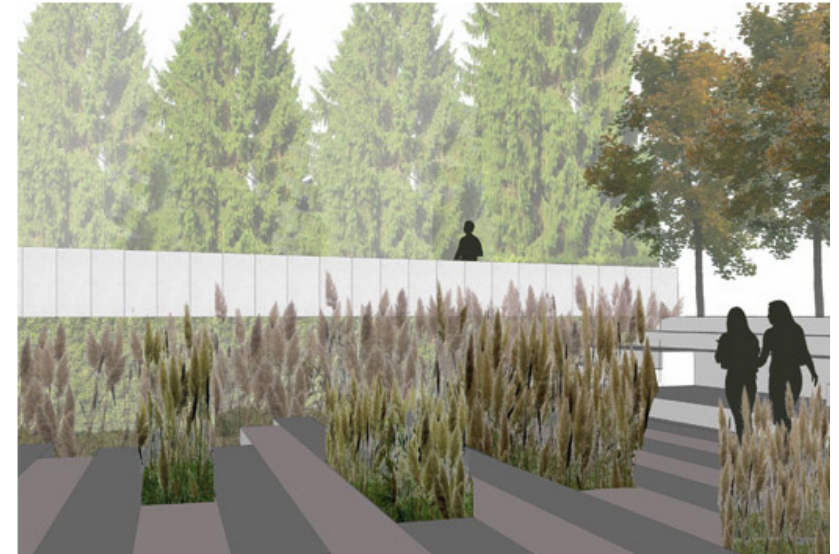
Zach Prowda's design encourages community through an attractive plaza which artfully combines built and natural elements. Between the plaza and Civic Drive station are walls which will gradually be filled by participatory art projects.

Site Considerations

The western edge of the sunken plaza is a bio-swale and wetland, which gradually transitions into a mix of paved surfaces and more manicured green spaces. The plaza and station are designed to act as a watershed – all water that falls on the site is directed to the bio-swale for treatment. The plaza acts as a nexus and transition between the natural forested lands to the west and the suburban land to the east of the site. The plaza and station are designed to act as a watershed – all water that falls on the site is directed to the bio-swale for treatment.

User Considerations

This project acts as a catalyst for bringing the exurban community together. To accomplish this activity, community is incorporated into the design. Found objects are donated by the community and used as art installations, giving people a sense of ownership to the site while also providing sustainable undertones. For the first panel, the community will be recruited to donate their old incandescent lights in return for a new compact fluorescent bulbs. These bulbs are then incorporated into an art installation.



<http://illuminateddesign.weebly.com/>



Project Description

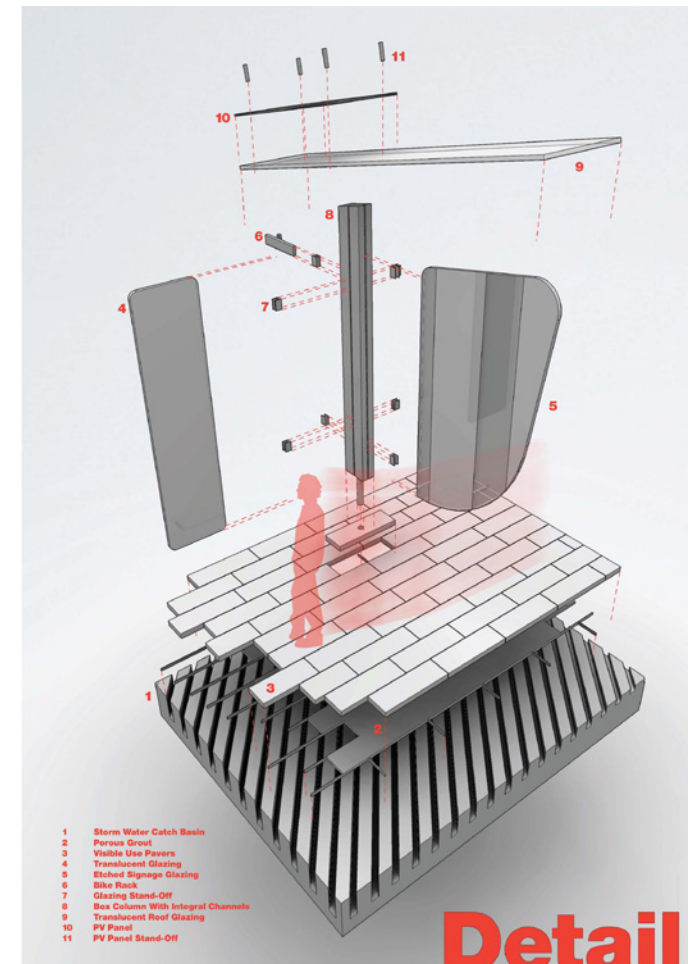
Casey Kent's proposal focuses on the idea of perception of time. The project explores how motion is experienced and changes how surrounding context is perceived. Architecturally, this project is based on a modular system deployed in a series that creates a dynamic rhythm when seen from a moving train.

Material Considerations

Each of the five modules is derived from and intends to address a transit user need, including seating, purchasing of tickets etc. These modules can be arranged in a variety of ways, which allows for maximum flexibility and site specific adaptation. The modular components attach to the ground at only one area, enabling easy reworking of the shelter configurations based on future maintenance needs. The five modules can be arranged in small clusters and provide a sheltered yet open waiting area.

Sustainability

The modules' shed roofs collect storm water which is then moved to holding areas below ground. There, the water is stored and later used for platform maintenance. These roof forms also allow for the placement of a series of photovoltaic panels, which could light the station platform at night.



<http://caseykent.weebly.com/studio-blog.html>



Explorations : Materials : Sina Meier

Project Description

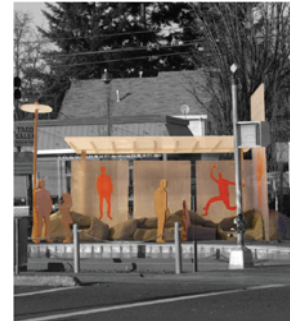
The main focus of Sina Meier's design proposal for the light rail station at Rockwood was the use of rock as the main building material. It references the community's history and its geographic proximity to a former excavation site. It can also be used in a variety of ways: rough or smooth, processed or natural. This variety contributes to a tactile and interactive waiting experience.

Material Considerations

An early study by Zeba which identified potential station materials helped guide the design process. TriMet's preferred smooth, industrial and transparent materials such as glass and steel while the community liked tactile, natural and interactive materials helped guide the design process. While rock was chosen for the base of the platform design, glass was used for the shelters' walls and roofs. Glass is light and transparent enough not to compete with the rock's solid and heavy presence.

Light and Shadow

The shelter itself was to be used as a light source for the platform. Therefore, in addition to using regular street lights, the glass walls of the shelter are back lit; during the day by the sun, at night electrically. This will not only make the rock glow, but also showcase the movement of the plants behind the glass. In addition, there might be smaller accent lights embedded in the rock itself.



material transformations

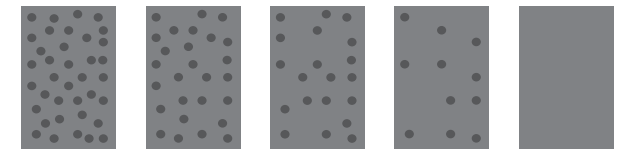
opaque to translucent



opaque to translucent



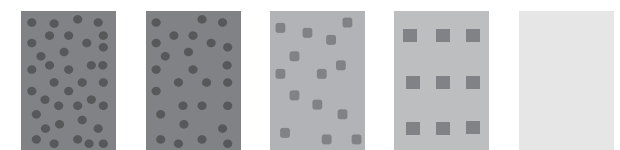
rough to smooth



dark to light



natural to industrial



<http://ufolio.uoregon.edu/smeier/>



Project Description

Drew Krauss' proposal for the Rockwood transit station focuses on providing a fully sheltered yet transparent waiting area that acts as a gateway to Gresham.

Material Considerations

The purpose of this design is to provide shelter from wind and rain for patrons of TriMet, while also shaping light and nature to create a distinctive place. Transparency was the major driver in the design. Transparency was used to provide maximum visibility for safety and to be less obtrusive in the environment. The work attempts to subtly suggest a transition between hard scape and more dense vegetation.



Sustainability

The natural landscape was integrated directly into the platform by creating punctures in the platform with plantings to help absorb storm water runoff. Transparency was again a consideration for the variety of plants to be used. For this reason the native vine maple was selected, as the trunks are thin and allow for visibility. The selected ground cover, Corsican mint, also maximizes visibility, providing a lush dense green carpet without compromising views. Corsican mint is also favored for durability and its potential appeal for children. It is a “steppable” sedum and emits a mint odor when touched. A swath of dwarf cherry trees line the street edges.



<http://drewkrauss.wordpress.com/2009/12/07/post-final-post/>



Findings

Overall Findings:

1. New stations at both sites should be safe and secure places, while being inviting and welcoming to transit users. Striving to achieve this balance is important. Transit structures should provide shelter from wind, rain and sun, while allowing for views and clear visual access.
2. Stations and proposed plaza spaces should serve as neighborhood amenities and help create a sense of place. Referencing the site's past as well as respective neighborhood traditions can help users take ownership of their station.
3. Interactive elements in both station and plaza designs can help engage transit users. Such components might also serve as educational tools. Exposing natural cycles and processes through architectural form and the incorporation of art installations, might help make the time spent waiting more engaging and informative.
4. It is important to consider stages of implementation when designing public spaces, such as light rail stations and plazas. Are there interim uses that could be proposed until a plaza space is fully finished? Can the light rail station and plaza initiate future development?

Civic Drive Station:

1. At Civic Drive it is important to create a new sense of place and belonging. A place that can serve as a center for the community as well as an attractive destination for visitors.
2. At the same time, the site's agricultural past might be referenced in the design proposal. It is also important to respect and utilize the wetland currently located to the south of the proposed light rail station. As a natural low point in the topography, it might help collect and cleanse stormwater runoff.

Rockwood Station:

1. A transparent design is important to create a safe and secure waiting area. Preserving views and visual access is crucial. Therefore, a series of smaller, open shelter components might serve this station better. Larger place making elements might be part of an adjacent plaza or line the streets around the station.
2. A design that respects and represents the many cultural groups of Rockwood might help transform the neighborhood into a vibrant and safe place. Referencing the site's past in materiality and form can help create a unique sense of place.



Throughout the course of this design studio, students explored and described ways of enhancing the experiential quality of an architectural space through the addition of light and shadow. Participants were encouraged to use a variety of media to understand and record properties of light, materiality and their influence on architectural form. The design studio served as a platform for exploration and innovation in finding ways to maximize expressive qualities of daylighting, electrical lighting and the perception of architectural space.

Lighting effects and properties were integrated differently in all three projects. However, the basis for exploration was driven by the same curiosity: Can light and shadow help enhance a built environment both functionally and aesthetically?

Major Findings:

1. Light and shadow can be minimal means to define, divide or join spaces. They can add movement, visual interest and delight to architectural surfaces and materials.
2. Natural lighting can help conserve energy and make more pleasing spaces. Interior apertures need to be carefully positioned to reduce glare, minimize head load and balance light color.
3. Lighting phenomena can be interactive and engaging and serve as educational tools to reveal natural cycles and processes. Dynamic light, sparkle and interactive elements can be entertaining for waiting spaces. Quieter work spaces benefit from more subtly changing light that is less distracting.



Ellen Hagen

