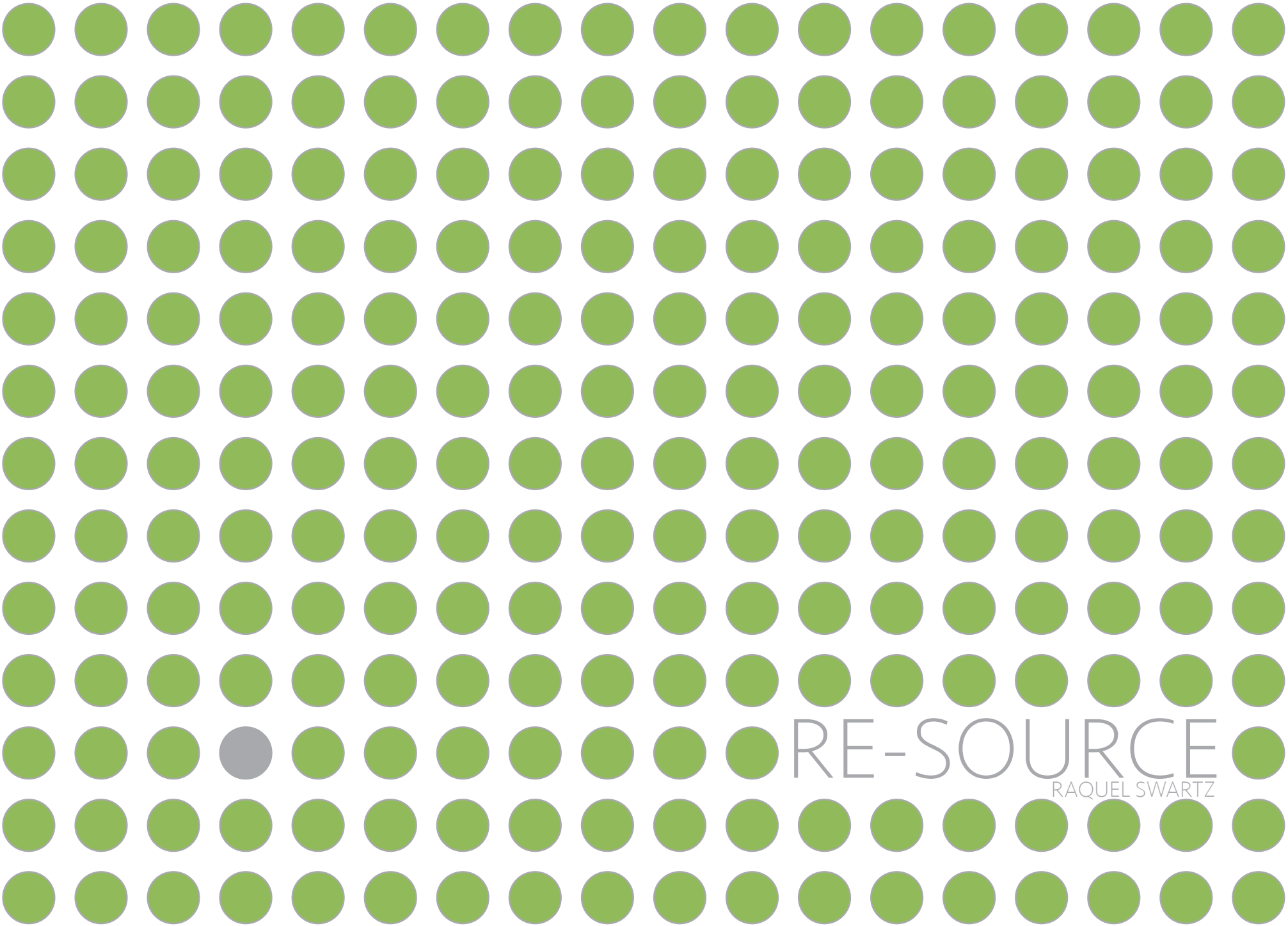
RE-SOURCE
RAQUEL SWARTZ

RE-SOURCE

Re-source your resources

A thesis submitted in partial fulfillment of the requirements for the degree Master of Design in Interior Studies [Adaptive Reuse] in the Department of Interior Architecture of the Rhode Island School of Design

By:
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2020

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RE-SOURCE

Re-source your resources

Thesis Book

Raquel Swartz

Spring 2020

Rhode Island School of Design
Department of Interior Architecture

D E D I C A T I O N

My first thesis was devoted to preserving my grandmother's story: upholding my commitment to 'never forget' the Holocaust. This thesis, my second, is dedicated to *my* grandchildren. To make sure they have a world in which they can create their story.

Table of Contents

Specialist Advisor: Sara Ossana, *Department of Furniture, Rhode Island School of Design*

Abstract

Humans are using all of the earth's natural resources and releasing unprecedented levels of greenhouse gases into the atmosphere, endangering the planet's viability. The implementation of sustainable design is no longer a luxury, and though eco-conscious construction and architecture have gained traction and have proven to reduce the built world's contribution to the carbon footprint, interior design lags behind, even though it too, can reduce the industry's negative impact. If architects and interior designers further consider the interaction between humans and objects with interior space through the awareness of sustainable practices, materials, and finishes, the built world's contribution to the carbon footprint will decrease.

Sustainable design, especially in adaptive reuse projects, incorporates the repair, repurpose, and reuse of materials with prior lives, whether from demolitions or recycling programs. The following design thesis not only introduces a sustainably designed space to source and specify green materials and finishes, but it also proposes a program for designers to produce and to exhibit works created sustainably.

By designing an eco-conscious space in Chelsea, Manhattan, guided by sustainable principles of natural light and air flow, as well as repurposing demolished materials, designers and architects are introduced to radical green adaptation methods. Furthermore, the program emphasizes the powerful intersection of design and sustainability through supporting eco-design practices and showcasing results. Creating a designer's studio, alongside an eco-conscious material and finish library, to support designers' building furniture from salvaged materials that will then be displayed in the gallery space, will educate on the power of the circular economy and increase architects and designers ability to specify sustainably.

The opportunity to reverse the course of climate change is less than an arms distance away: you can sit on it.

Thesis Motivation

Humans experience the built world every day. They wake up in it, commute through it, and operate within it. As the climate not so subtly changes, researchers have studied the impact of various industries and how each contributes to the greater carbon footprint. The built world makes up approximately 40 percent of the total carbon footprint (Environmental and Energy Study Institute). United States industry professionals have created the Leadership in Energy and Environmental Design [LEED] standard which guides architects, designers, and others to make sustainable, even carbon neutral or net positive, design decisions primarily in relation to the building envelope. The WELL Building Standard, a second building guide, maps out how to create healthy environments for people: through managing light infiltration, clean air quality, and more. Less emphasis, unfortunately, has been placed on the footprint and life-cycle of furniture and interior design. The Business and Institutional Furniture Manufacturers Association (BIFMA), unlike the LEED and WELL standards, focuses on furniture itself by providing standards and a third party rating system for products; however it can only be accessed by organization members, representing a roadblock to universal sustainable design.

Despite the lack of regulation and attention given to interior design and its relationship to the built world's carbon footprint, every space still has furniture, materials, and finishes. Every space needs and will continue to need these and if they all significantly contribute to the built world, why are more designers not sourcing products made from recycled materials or items that will biodegrade at the end of their life cycles? Research shows that designers and consumers prefer to purchase sustainable furniture; however, they do not because pieces are hard to find and vet (Hayles). Lauren Collins, in an article for the *New Yorker,* eloquently states that "When IKEA stopped selling incandescent light bulbs, last year, six hundred and twenty-six million people became environmentalists" (Collins). This line emphasizes the importance of access. Stores like IKEA can help encourage the purchasing of sustainable furniture to those seeking a lower price point; however, few manufacturers and designers of high-end furniture promote green design, leading to a gap in the green furniture market. If high-end green furniture becomes easy to find, view, and specify, designers and architects catering to this clientele, like Americans in an IKEA store, will make sustainable decisions.

This thesis, aims to make sustainable interior design accessible as well as, through architectural intervention and exhibition design, to create a consciously curated gallery, material and finish library, and workshop, that educate on climate change and put industry professionals in contact with sustainable furniture, materials, and finishes.

I can design sustainably. I can make this pledge. But if 'green' design exists and people just don't know about it, well, then it's my responsibility to tell them about it, to spread the word. Because then, the impact will be exponential. If architects and interior designers become more aware of sustainable opportunities and designers, the built world's contribution to the carbon footprint will decrease.

RESEARCH

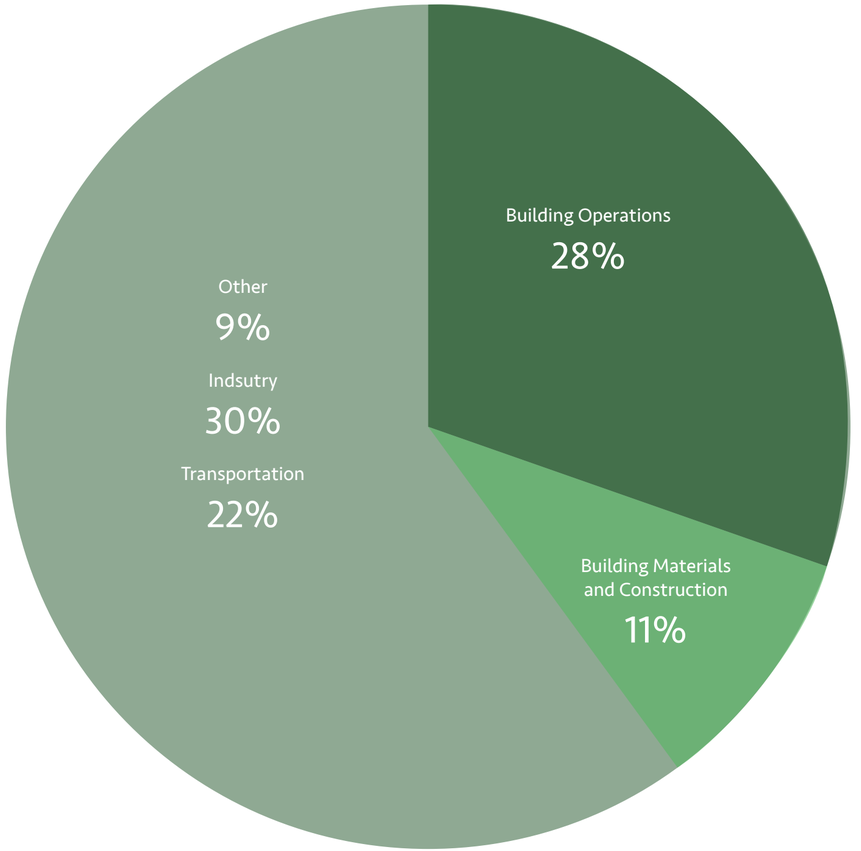
Climate Change, The Built World, and Furniture

Climate change, as it sounds, means that our climate is changing. Earth is getting warmer (Dunbar). Climate change can happen naturally; for example, the Ice Age. Today's changing climate, though, is largely attributed to human abuse of natural resources, exponential population growth, and industrial inventions tampering with earth's natural cycles. The current habits exercised in first-world countries diminish biodiversity, produce toxic waste, introduce new allergies and stress, and lead to water shortages (Moxon, 10, 12).

Many industries, ranging from agriculture to industrial design, produce greenhouse gases, which are gases that trap heat in our atmosphere, ultimately contributing to climate change (epa.gov). The built world, specifically, is responsible for approximately forty percent of carbon emissions: twenty eight percent from building operations and 11 percent from materials and construction (architecture2030.org). From the start of the design process , through inhabitation, and concluding with demolition, a building uses energy. The environmental impact of a building must consider the transportation and packaging of building and design materials, construction, site operations and maintenance, and waste created by demolition materials. These categories not only apply to the building envelope, but also to it's interior, whether it be a residential or commercial site.

Various elements of interior design contribute to the construction industry's overall carbon footprint. Furthermore, interiors have higher turnover rates than buildings; the average commercial interior has only a five to seven year life and at its end, often finds itself dumped into a landfill (Hayles, 102). Since a family likely dwells in its home for longer than the lifespan of a commercial interior it takes longer for furniture to reach the landfill, but regardless, the footprint of materials and finishes during production, paint chemicals, appliance energy usage, ability to reduce, reuse, repurpose, and recycle, must seriously be considered at the start of any and every residential project.

Material, perhaps above all other components of an interior, has the greatest potential to damage our planet. Material production can lead to "resource depletion, biodiversity loss, waste, and health [problems]" (Moxon, 64). For example, many interiors use mahogany and walnut wood for flooring materials, but both mahogany and certain species of walnut are classified as "vulnerable," meaning that if action is not taken to reduce human consumption, these resources will soon be endangered (Moxon, 84). Material production, in addition to endangering natural resources, often uses large quantities of water. Cotton production claims responsibility



for nearly three percent of global water usage.

It is also paramount to consider the impact of natural versus man-made materials. Though the process can be non-polluting, creating synthetic products often uses both energy and water during production. Natural products, on the other hand, though renewable, typically rely on fossil fuels during production. Natural materials end-of-life does not necessarily harm our environment, while synthetic products can introduce harmful toxins and often times do not biodegrade.

A study conducted by Jusselma compared the carbon footprint of residential interiors with commercial interiors and found that furniture "used in residential buildings have higher impacts than those used in offices" and thus much attention needs to be given to sourcing sustainable materials and finish products during the residential design process (Jusselma, 412). Both the World Watch Institute and U.S. Green Building Council (USGBC) state that the built world is responsible for forty percent of all materials used annually and that "three billion tons of raw materials are turned into foundations, walls, pipes, and building finishes" (Foster, 9). Additionally, the study looks at energy usage of appliances, like washing machines, refrigerators, and electric ovens, which also greatly contribute to the built world's carbon footprint during both its operational phase and its embodied carbon during production.

To conclude, the interior design of a site, when not practicing environmentally conscious decision-making, can significantly harm our environment and planet. The World Watch Institute depicts the built world's carbon footprint in relationship to its economic impact: "Ten percent of the global economy involves the construction, furnishing, and operation of a building, thereby using fifty percent of the world's natural resources" (Jones, 7). An industry worth ten percent of the global economy should not be using half of all resources.

Sustainable - Defined

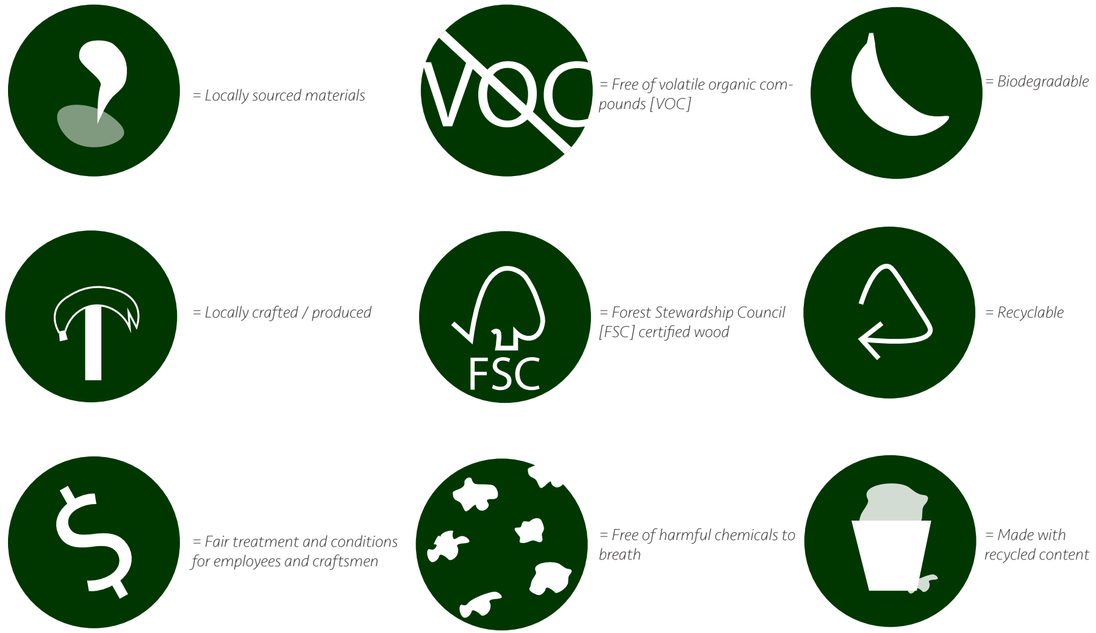
"Sustainable" is a popular term and can be applied to many industries, products, and habits. Defining this word can be tricky given its all-encompassing characteristic. The following paragraphs will explain this word in reference to the built world, specifically interior design. The ultimate goal of sustainable interior design is to "have minimal environmental impact and so 'tread lightly' on our planet" (Moxon, 25).

On a macro level, ideal sustainable interior design uses products that are biodegradable, recyclable, locally produced with local materials, and consume little energy during production and use. The most sustainable products form a circular cycle, meaning that they are produced from salvaged or recyclable materials and at the end of their life, either biodegrade or their materials are repurposed in the production of other items. During the design process, a designer should prioritize reducing materials used and asking, prior to purchasing, if every intervention or modification is actually necessary. Then, one can turn to reusing and recycling.

The first priority of green interior design is to determine what is actually needed. Second, when materials are needed, one should consider using reclaimed materials that can be reused to create new products. If new products are needed, those with recycled content are the best option; however, if this is not possible, virgin materials should be from renewable sources. Natural materials, especially those from renewable sources, often use less energy and water during production than their synthetic alternatives. Designers also must prioritize working with local materials and local craftsmen in attempt to reduce transportation emissions and packaging waste. Finally, it is paramount to support healthy and legal labor conditions.

Green design includes thinking about the entire life-cycle, beginning with material production and concluding with end-of-life considerations. Prioritizing the entire life-cycle also includes a product's functionality, quality, durability, and maintenance requirements. An area of tension often arises when weighing the impact of two similar products where one had less of an environmental impact during production (embodied carbon), while the other, maintaining a higher embodied carbon, will last longer and have diverse applications (for example, modular furniture). In this case, as long as the latter product considers finiteness of natural resources, water and energy use, air quality, and waste during production and does not exude toxins dangerous for humans and the planet, the more durable, multi-purpose product can be thought of as more sustainable since it will live longer and is less likely to end up in a landfill.

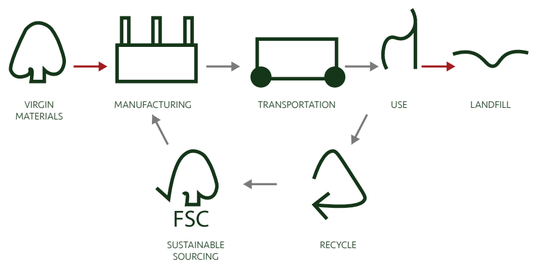
In addition to focusing on the impact of furniture



Icons representing components of sustainable furniture and interior design

and casework, attention must be devoted to paint, finishes, and textiles. The "Red List," published by Living Future, provides a helpful guide for chemicals to avoid in all areas of design and especially during furniture specification. Designers, when possible, should "avoid man-made paints, ideally opting for linseed oil-based emulsion with natural pigments or water-borne plant-based paint" (Moxon, 104). Textiles also must be given special attention during the specification process. Building Green states that the textile industry has "one of the worst environmental and social-equity records of any industrial product" and thus designers must understand the materials and chemicals that go into fiber production and finished fabrics, potential water pollution, and chemistry of surface treatments while sourcing textiles for a project (Buildinggreen.com). Finally, during a sustainable design process, a designer should always specify energy-efficient appliances and lighting.

Beyond furniture and details, interior design and interior architecture play a large role in the "green building" approach in that they convert existing structures to meet the needs of new occupancy types or programs which prevents demolition and waste. Ultimately, sustainable interior design aims to reduce dependency on non-local energy sources and materials, use renewable sources for energy and materials, avoid toxic elements in all areas of the design process, incorporate recycled content into design and products, repurpose existing materials, specify biodegradable products, reduce packaging and transportation, improve air quality, extend the life of products with high quality materials that consider the entire life-cycle, think about a building's maintenance and operational needs, control waste and pollution during and after the construction phase, conserve water, and reduce energy consumption (Foster, 58).



Is the material or product necessary?

Is the source renewable?

What is the environmental impact of production?

Does the product produce toxins during production, installation, and / or use?

Is the product made of reused or reclaimed materials?

What is the embodied energy?

Does the product include recycled content?

Does the product's application, treatment, and / or finishes have a low environmental impact?

Are materials locally sourced?

What is the embodied water?

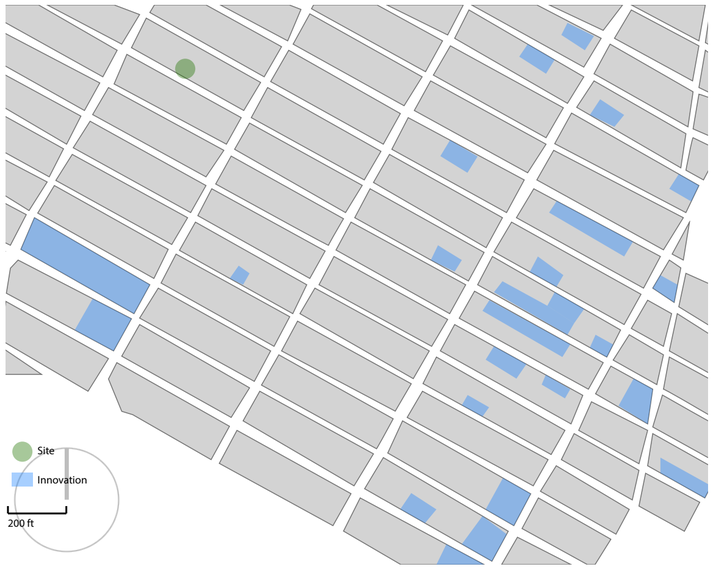
Is there unnecessary packaging?

What are the maintenance and cleaning requirements, and by non-toxic methods?

Can it be reused or recycled at the end of its life?

SITE DOCUMENTATION AND ANALYSIS

Innovation Map



- Chelsea is home to many start-up and tech offices, as well as showrooms
- Google's NYC head quarter is located in the neighborhood
- Homepolish, Yelp, among others also have offices in the area
- Apple showroom location in Chelsea
- Given that the site intends to address cimate change and interior design through a radical method, it makes sense to locate the site in an entreprenural environment

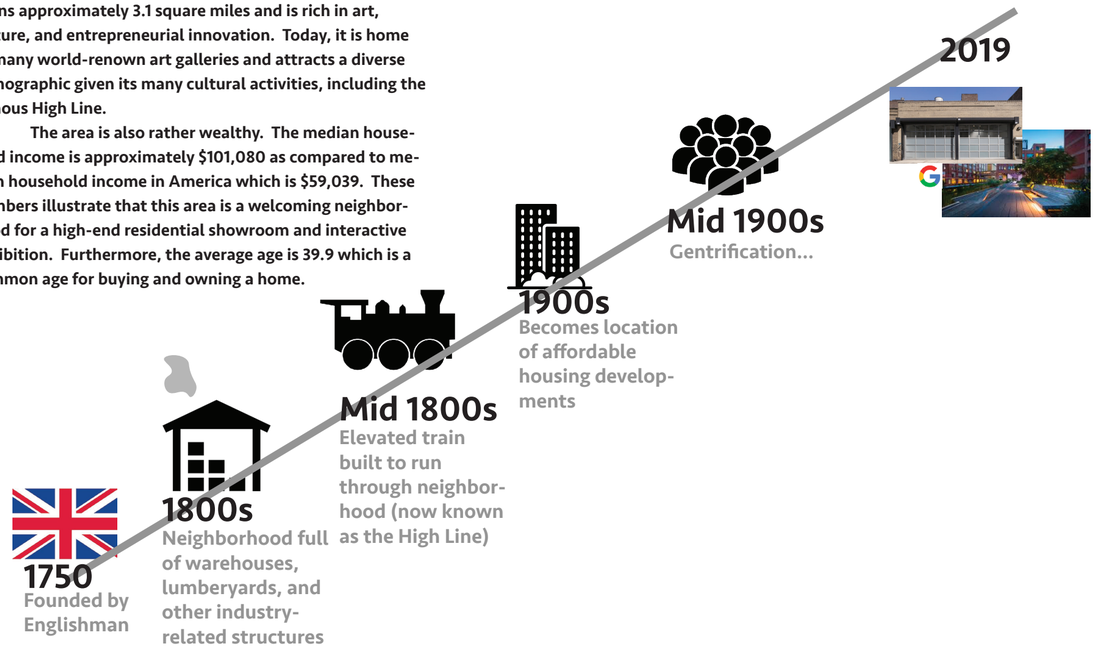
Design Map

- Chelsea, historically and currently, is a destination for art galleries, creating an aura of art-appreciation and awe
- Various luxury furniture brands have showrooms in the area, including but not limited to Waterworks, ABC Home, and Design Within Reach
- Other more mainstream stores also have locations, such as William Sonoma, West Elm, Room and Board, and Pottery Barn
- Architects and interior designers also have offices spread throughout the area

Chelsea, NYC

Chelsea is a densely populated district of Manhattan. It spans approximately 3.1 square miles and is rich in art, culture, and entrepreneurial innovation. Today, it is home to many world-renown art galleries and attracts a diverse demographic given its many cultural activities, including the famous High Line.

The area is also rather wealthy. The median household income is approximately $101,080 as compared to median household income in America which is $59,039. These numbers illustrate that this area is a welcoming neighborhood for a high-end residential showroom and interactive exhibition. Furthermore, the average age is 39.9 which is a common age for buying and owning a home.



Site

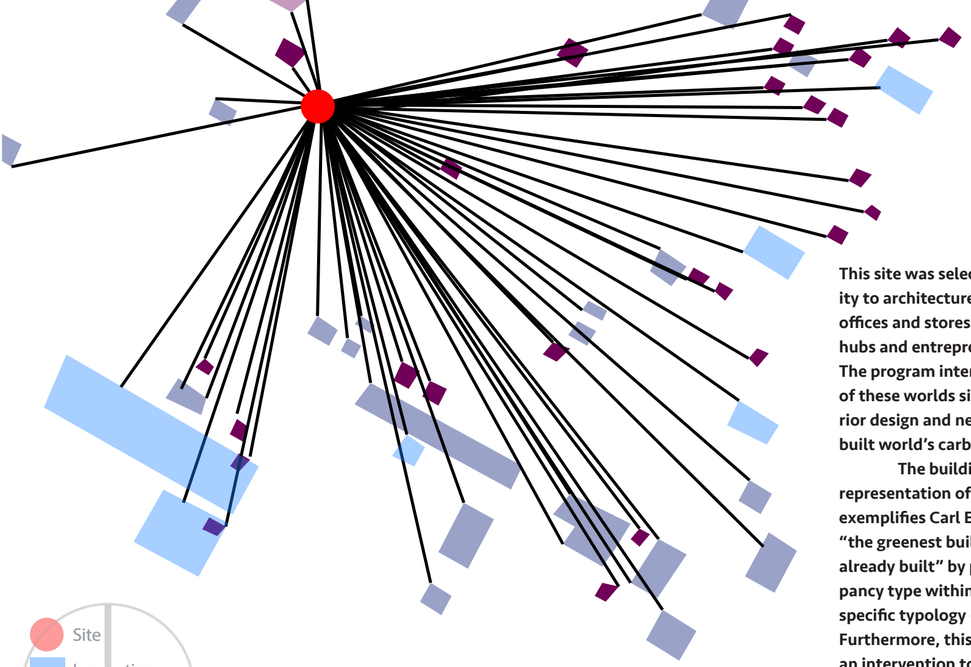
Address: 323 West 21st Street, NY, NY 10011

Year built: 1864

Typology: Townhouse/row-house

Original use: Firehouse

Size: ~8000 square feet



Architecture / Design / Innovation within .25 mile radius

This site was selected given its proximity to architecture and design related offices and stores as well as innovation hubs and entrepreneurial companies. The program intends to tap into both of these worlds since it focuses on interior design and new ways to reduce the built world's carbon footprint.

The building is also a clear representation of adaptive reuse. It exemplifies Carl Elefante's statement "the greenest building is the one already built" by placing a new occupancy type within the shell of a very specific typology (firehouse to retail). Furthermore, this thesis will propose an intervention to transform this townhouse into a green structure, thus creating a prototype for the common NYC bulding typology.

Row houses represent approximately twelve percent of NYC housing and thus proposing a prototype for sustainable intervention can inspire significant impact (Freeman).

Materiality & Environment

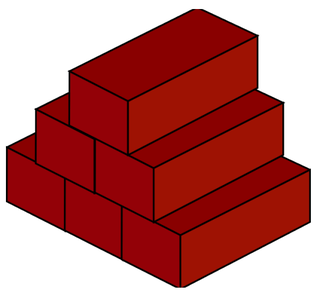
MATERIALITY

Exterior

- Masonry: running bond
- Original firehouse garage door
- Iron fire escape
- Detailing along outer-edge of roof
- Northeast and Southwest facing windows
- Main entrance on Southwest
- Double hung windows

Interior

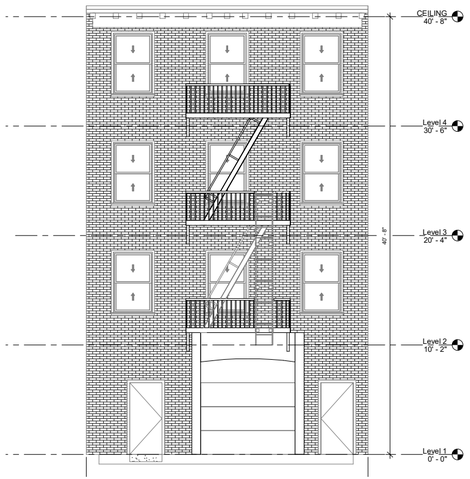
- Original firehouse remains: garage, sink, safe



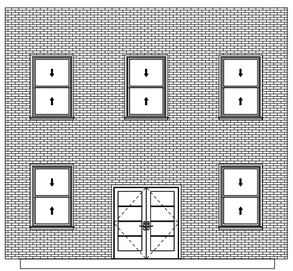
ENVIRONMENT

- Four seasons: heat, humidity, rain, snow
- Mean particulate matter/pollution (PM): 2.5
- Temperate climate
- Temperature range: 27 - 84 degrees Fahrenheit
- Poor air quality and high levels of pollution
- Loud street noises
- Rush-hour traffic (car and foot)
- Proximate to public transportation (1, 2, 3, F, B, D, A, C, E)

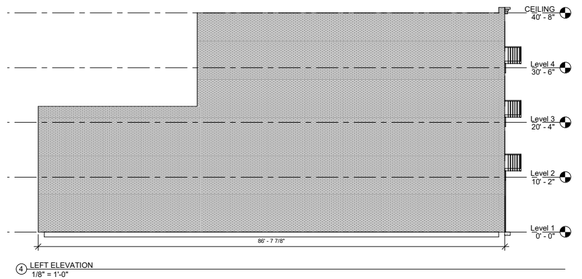
Existing Conditions: Elevations



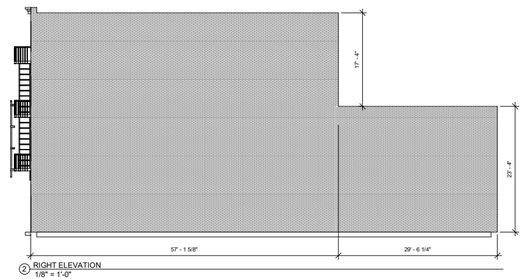
ELEVATION - FRONT
EXISTING CONDITIONS



ELEVATION - BACK
EXISTING CONDITIONS

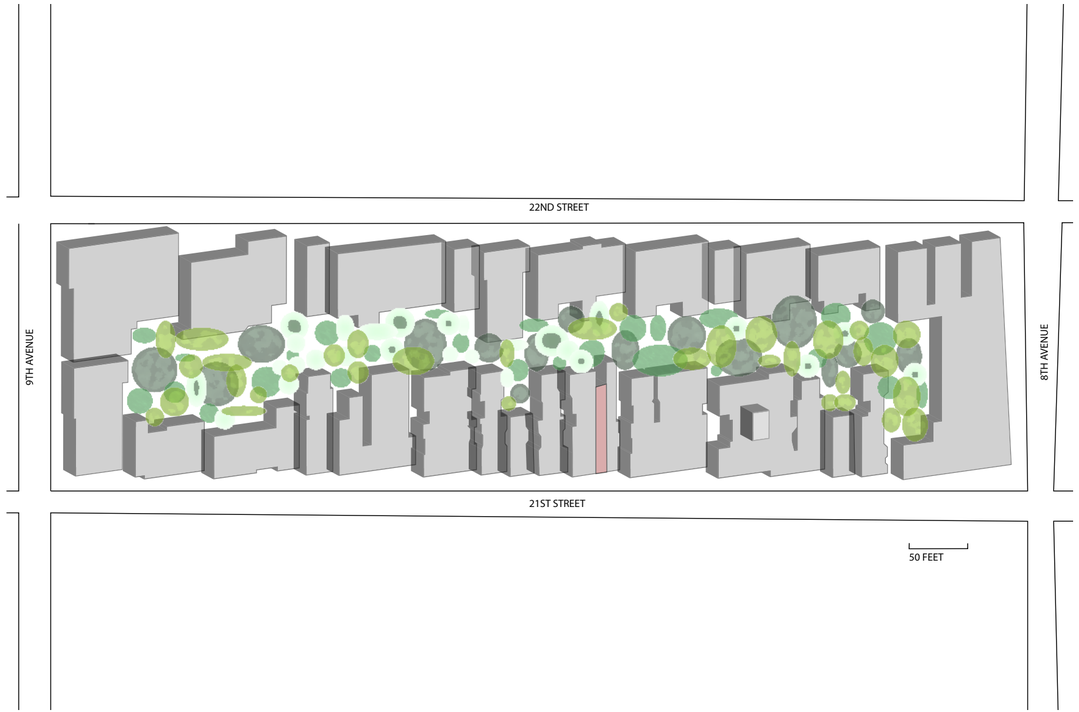


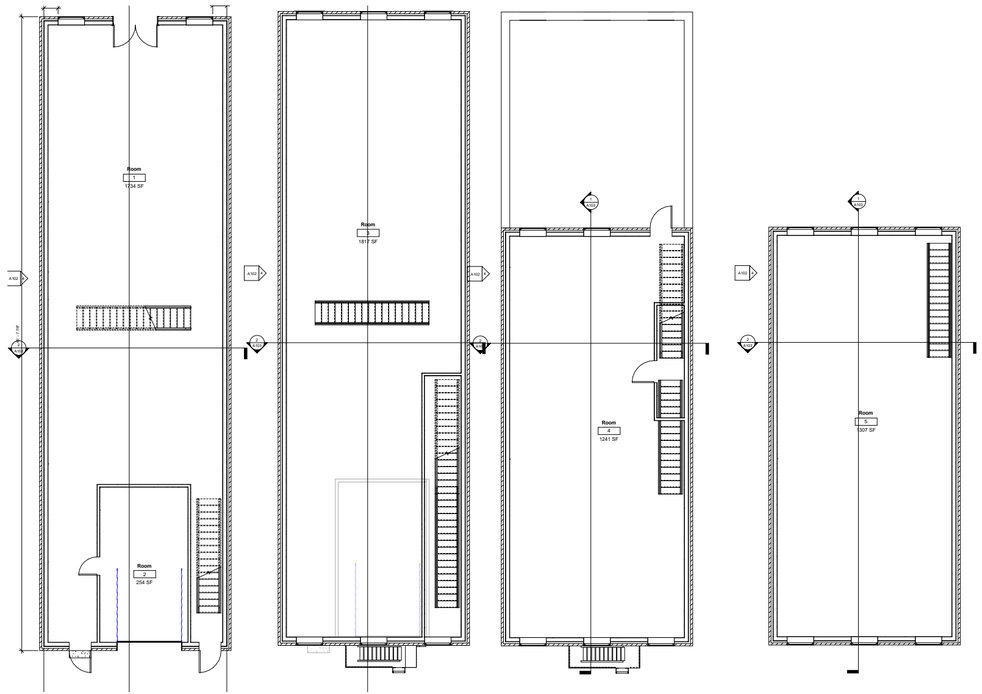
ELEVATION - RIGHT
EXISTING CONDITIONS



ELEVATION - LEFT
EXISTING CONDITIONS

Existing Conditions: Site Plan and Floorplans





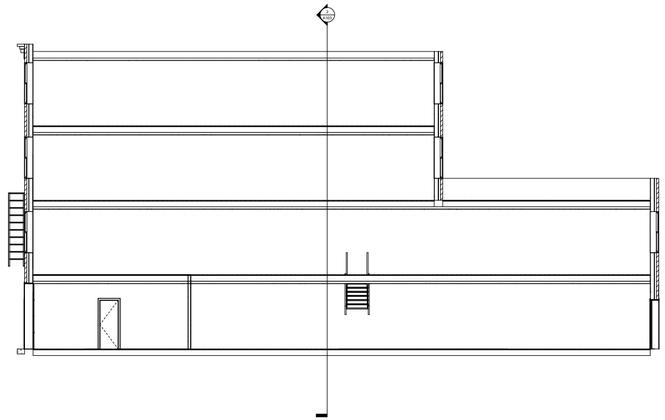
FLOOR 1
EXISTING CONDITIONS

FLOOR 2
EXISTING CONDITIONS

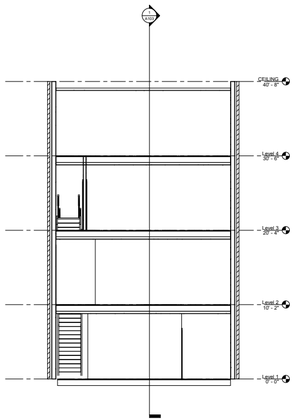
FLOOR 3
EXISTING CONDITIONS

FLOOR 4
EXISTING CONDITIONS

Existing Conditions: Sections



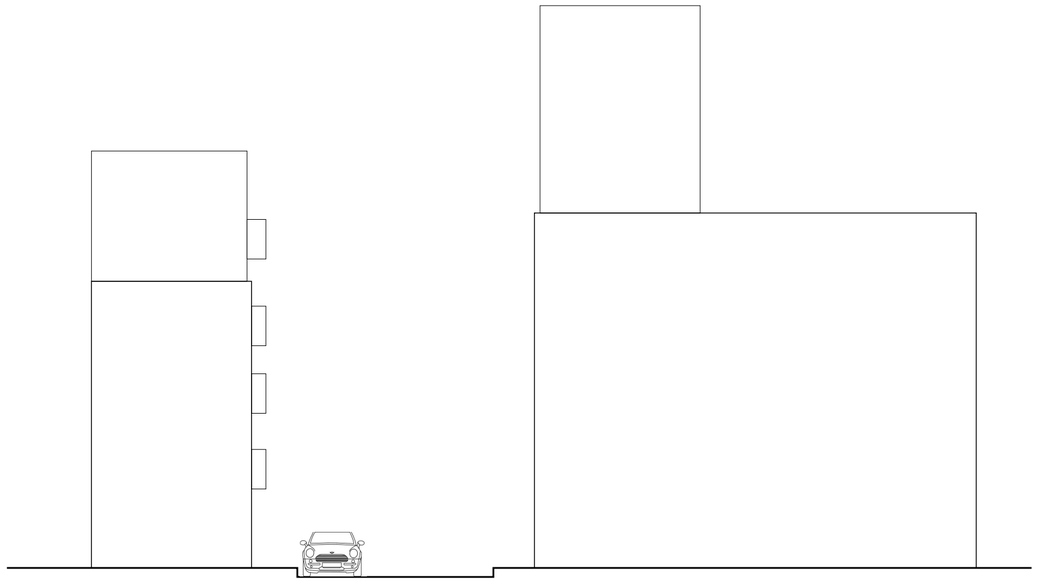
LONGITUDINAL SECTION
EXISTING CONDITIONS



TRANSVERSE SECTION
EXISTING CONDITIONS

Existing Conditions: Site Sections

SITE SECTION



SITE SECTION

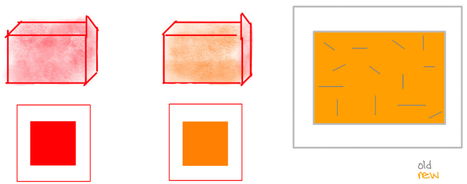
PRECEDENT STUDIES

APPLE STORE, UPPER EAST SIDE

Architect: Bohlin Cywinski Jackson
Typographic Precedent: retail/showroom typography

The Apple store on the UES juxtaposes new and old by placing a technology store/showroom within the shell of the U.S. Mortgage and Trust Co. building. The architects did not hide or destroy the site's historic value, but rather embraced it by studying its history and preserving unique elements, like a vault door (Chapman, Apple Store, 108).

This project exemplifies glorifying an existing shell and inserting intervention within the historic shell. The architects left unique characteristics, which reference history and reduce waste.

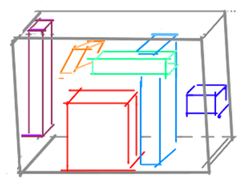


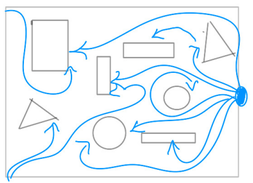
DOVER STREET MARKET, NYC

Designer: Rei Kawakubo
Programmatic Precedent: interactive retail/gallery

Dover Street Market in NYC utilizes a giant space, about 22,000 square feet, and showcases various designers' work. The threshold between each space, unlike in a typical or standard shopping center, is not divided by a wall, but rather by design and thematic decisions and dividers. The space operates as a showcase for fashion and evokes the sensations similar to those felt in museums and galleries rather than those found in the traditional store (Berstein, 222).

Dover Street Market epitomizes creating an exhibition out of atypical museum items. The interior design created an experience for visitors. Visitors look, feel, and interact with showcased items. Furthermore, people can purchase if desired, but ultimately, the experience evokes emotion and sensation through exhibition.





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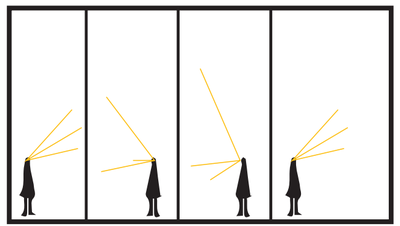
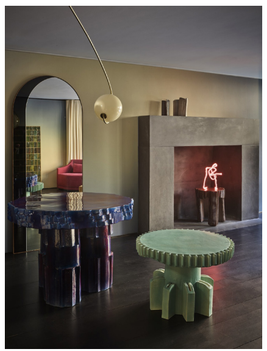
CASA PERFECT, NYC

Designer: Future Perfect
Programmatic Precedent: interactive retail/showroom

The furniture brand/showroom, Future Perfect, introduces a unique concept for displaying furniture and accessories in a home as opposed to a store. In LA, they've adapted Elvis Presley's home and in NYC they've taken over a once-Rothschild brownstone. This new approach to showcasing furniture evokes emotion from visitors by relating their experience to a familiar and known experience - being home. Perhaps through this approach, visitors feel connected to the pieces on display and thus feel imprinted and remember the interaction and product.



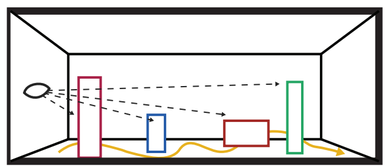


3

GALERIES LAFAYETTE, PARIS

Architect: Bjarke Ingels Group (BIG)
Programmatic Precedent: retail as museum

Originally a bank and then an office space, this site has been re-imagined by BIG. The historic building does not lend itself easily to a traditional retail experience, but given its location on Champes Elysees, a shopping center made sense. Thus, BIG decided to design an "ambiance and experience" by "...give[ing] people the feeling of strolling through an art museum" (Ayers, 72). Through architectural intervention, the design team created a museum-like experience as opposed to a traditional shopping experience to sell and market goods.



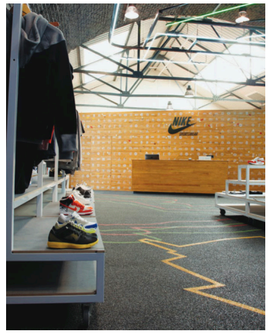
4

NIKE 1948, EAST LONDON

Architect: Wilson Brothers
Adaptive reuse precedent: modular furniture and historic structure

This Nike store location exhibits modular pieces that can be reconfigured based on display needs and spatial function. For example, in early hours, a class might take place and furniture can provide seating, while in the afternoon, the furniture can be used for displaying inventory (through rearranging or stacking). Furthermore, the store sets an example for using recycled materials in its interior design , like the fully recycled rubber floor that is partially derived from sneaker soles (representing a cradle to cradle, as opposed to typical cradle to grave, life cycle of a sneaker). Lastly, the store is situated in a historic space and makes use of its unique characteristics, like highlighting railroad arches as opposed to demolishing them.

In conclusion, this precedent epitomizes how modular furniture, repurposing materials, and adaptive reuse can strengthen a retail program.



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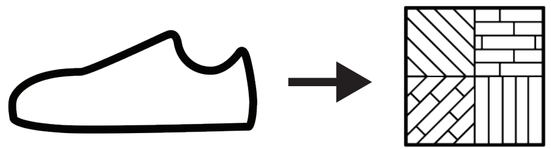
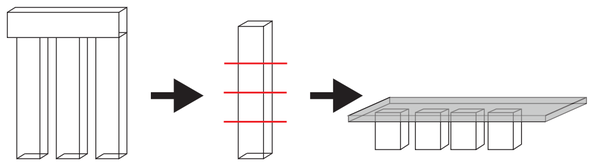


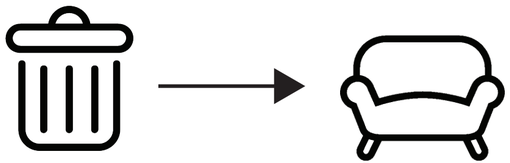


AESOP, LOS ANGELES

Architect: Brooks + Scarpa
Sustainable interior design precedent: reuse of typcially-disposed materials

The Los Angeles Aesop store showcases sustainable design in its reuse of cardboard tubes that were originally used to hold fabric. The designers noticed the immense waste created by constantly disposing usable materials, and thus proposed a high-end design that recycles and repurposes materials. In this space, visitors do not feel as though they are surrounded by what typically ends up in a landfill, but rather, they experience an objectively beautiful space. Other elements of the design are also constructed out of recycled materials.

6

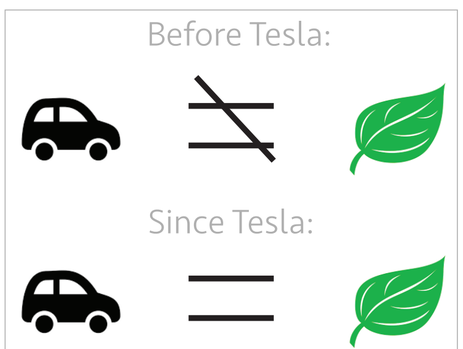


TESLA

Designer: n/a
Theory Precedent: luxury sustainability and accessibility

Before Tesla created its beautiful and efficient car model, few green car options existed on the market; one could drive a Nissan Leaf or Toyota Prius, but not a luxury car. Though these cars offered a sustainable alternative to gas-guzzling driving, they did not always appeal to one seeking a high-end sports car. Elon Musk and his team at Tesla solved this problem by designing a sexy luxury item that met the aesthetic and quality standards of luxury vehicles while also providing a green alternative to sports cars. With the introduction of Tesla cars, a person could drive a sports car, remain in the luxury car market, and act sustainably. Tesla made it easy for people to marry luxury and sustainability. People buy Tesla cars even if they aren't eco-minded. The opportunity to meet the demand of eco-conscious and non-eco-conscious increases impact.

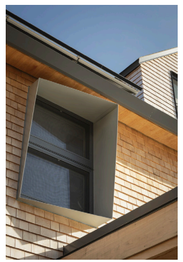
8

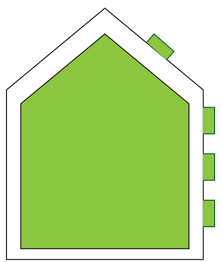


CAMBRIDGE HOUSE ZERO, CAMBRIDGE

Architect: Snohetta
Architectural Intervention Precedent: adaptive reuse of home to net zero structure

Snohetta conducted a retrofit of a pre-1940s residential building that converted the structure into a net zero structure. The site uses almost no energy for heating and cooling, relies completely on daylight during day hours, and produces zero carbon emissions. This project provides an ideal example of applying green intervention to an older structure through the incorporation of light shelves, sky-lighting, and much more. The architects also demonstrate the importance of understanding a site and its surrounding location when intervening.





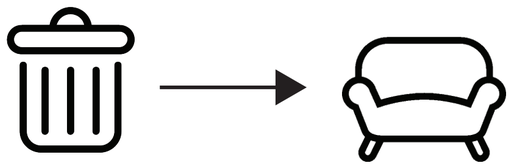
ZERO WASTE BISTRO, NEW YORK CITY

Designers: Harri Koskinen and Linda Bergroth
Interior Design Precedent: zero waste interior design

Designers built and furnished a space with recycled materials and prove that eco-design does not sacrifice aesthetic or quality. The extra creativity and effort required to create something from something enhances the outcome and adds a new dimension to the final design.

Wall partitions are made from repurposed Tetra Pak and even accessories, like trays are made from recycled materials, like Durat. The idea of sustainability is carried throughout the entire business model. Ingredients are local and organic and engineers worked to create a kitchen that minimized water usage. Sustainability is encompassed through the design and mission

44



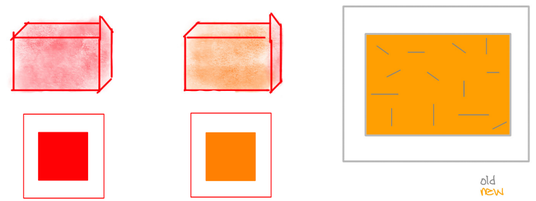
FIREHOUSE NINE, GARDEN DISTRICT

Architect: David Braly and Mark Montoya
Typographic Precedent: firehouse typology to residential

Originally constructed in the early 1900s, this firehouse has been transformed into a private residence. The architects intended create a residence in the firehouse and to not erase firehouse characteristics. (Braly, Home is a Firehouse, 20).

This precedent illustrates how one can adapt a firehouse to a new occupancy type. This once-firehouse has been transformed into a single family home that has salvaged the shell and certain components, like the firehouse pole and garage doors. These sorts of decisions memorialize the site's history while adjusting the space to meet its current needs.

10



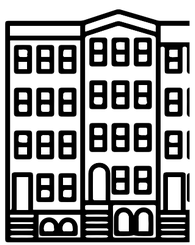
DESIGN PROPOSAL

Background

Current interior design habits negatively impact our environment by depleting natural resources, contributing to the water scarcity, furthering biodiversity loss, producing waste, and polluting our air during production, transportation, and use (Proctor, 84). Interior designers, for example, often specify international furniture, select textiles with no understanding of its production pipeline, and eventually ship pieces to a far destination. Various phases of design impact our environment, either directly or in their embodied carbon.

If designers do not need to spend significant time searching for quality and aesthetically comparable [to non-sustainable furniture] sustainable options, they will likely specify the greener choice. With knowledge and access to high-quality eco-conscious design, interior designers increase their participation in reducing the built world's carbon footprint and negative health implications.

Additionally, by providing designers and makers with tools and materials for sustainable design, more eco-products will hit the market. Also, exposing those outside of the industry through workshops and lectures to the growing danger of climate change and its relationship to the built world can also prompt action. The more people who know, the more people who will act. Thus, it is imperative to educate the masses as well as provide tangible skills and tools to encourage the collective effort to improve our environmental impact.



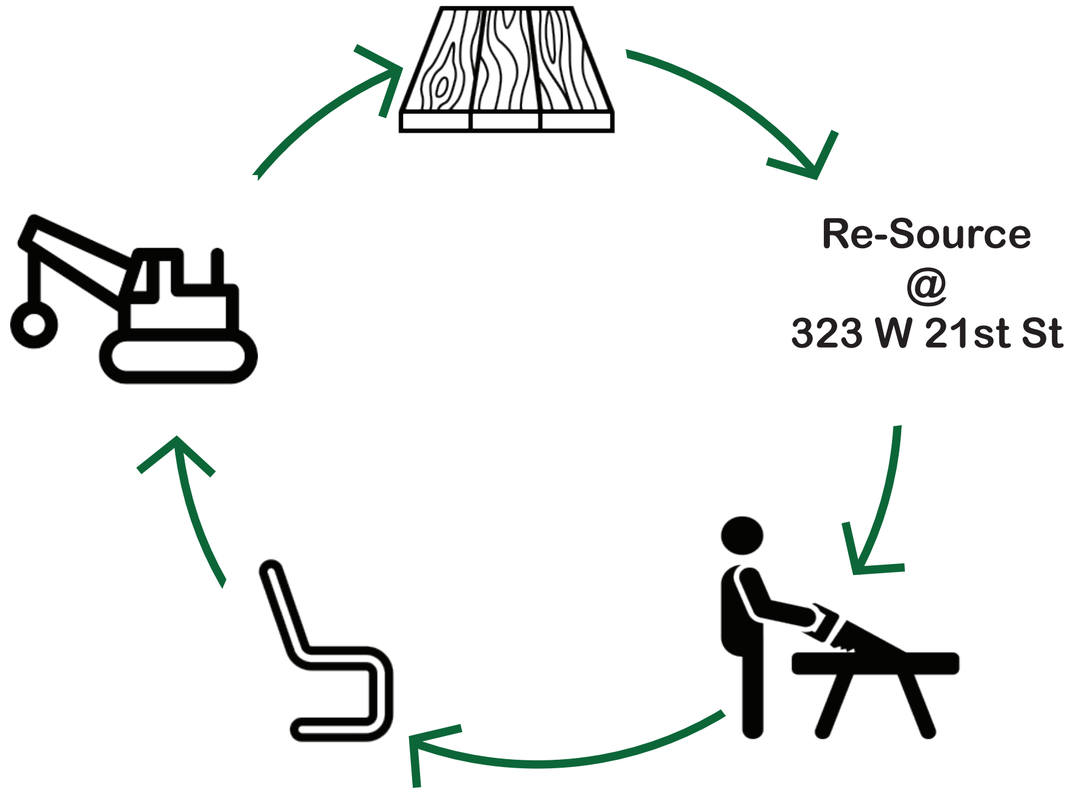
Audience

The target audience of this program is interior designers and architects, as well as furniture designers. The space reaches out to the general public through workshops and lectures; however, the main intent of the space is to provide sustainable materials, finishes, and furnishings to industry professionals. In addition to the library, the space houses a studio for a designer to create from recycled and repurposed materials and a gallery to showcase the results. The additional goal of inviting non-designers into the space for targeted programming bases its foundation in that the more people whom are educated on climate change, the more action that will be taken to combat environmental damage.

Interior designers and architects use this space to learn about the environmental impacts of furniture, materials, and finishes, and also to discover innovative artists creating products and pieces from recycled materials. This program creates a space for sustainable design, education, and specification. Those encountering the space inevitably learn about environmental change and inescapably take action to mitigate that change through sustainable design and specification.

The spatial interventions and program hope to create an educational experience and gallery setting to teach climate change, provide easy access to the steps that can mitigate that change, and explore the interaction between objects and space through showcasing eco-conscious materials, finishes, and objects. Programing intends to expose ideas of repair, reduction of waste, and the repurposing of materials, while the architectural intervention aims to teach through example.

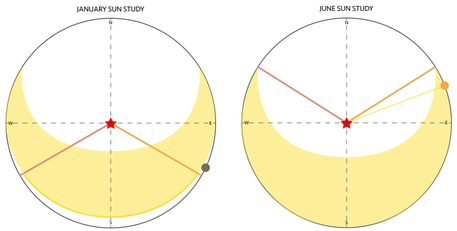
Diagram depicting spatial planning



Intervention Overview

The architectural interventions applied to the existing building aim to maximize the programmatic impact of the gallery, library, and studio spaces as well as to demonstrate green and sustainable design practices through example. Thus, the interventions are guided by necessity and avoid excess. The architectural interventions increase natural light infiltration, allow for greater air flow, and provide improved circulation, while also supporting the program. Furthermore, materials from demolition are repurposed within the space.

The site is approximately 8,000 square feet and four levels, the gallery and library will likely each utilize approximately 3000 square feet, while the remaining space is devoted to a designer's studio and an office space for the administrative staff.



Sun study to guide subtraction and insertionn

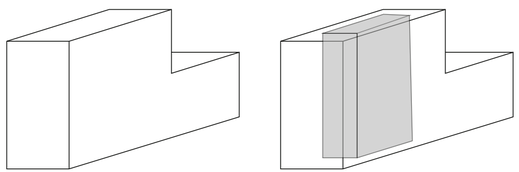


Diagram illustrating subtraction

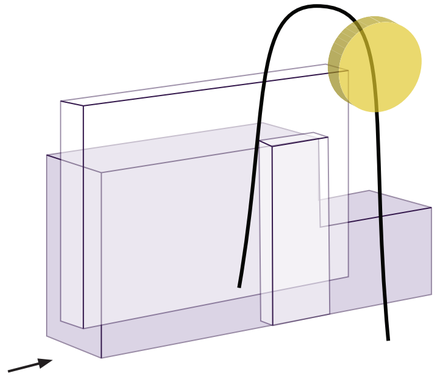


Diagram depicting sun's path influencing subtraction actions

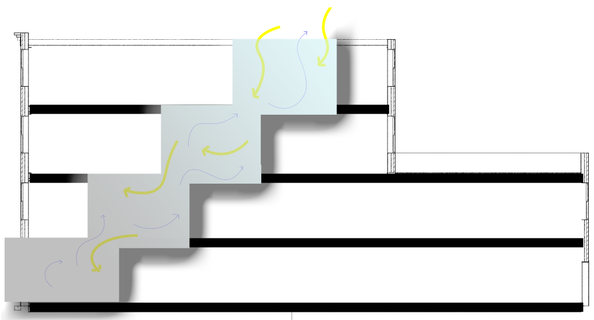


Diagram showing subtraction increasing natural light infiltration and air flow

Interior Strategy

The ground level houses the gallery space in which sustainable design is showcased and educational lectures and sessions are held. A portion of this level is also devoted to material storage. When entering the space, a visitor has the option to either visit the gallery or ascend the main staircase, which leads directly to the material and finish library. Upon further ascent, one reaches the designer's studio. The studio not only provides equipment and workspace, but it also supplies the designer with reclaimed materials from local demolition sites and other recycled items. Finally, the top level, which is acessed by the emergency staircase or main elevator, is designated office space for administrative purposes.

Strategic renovations, based on site analysis, introduce improved circulation, natural light, and air flow. All interventions are dictated solely by site-specific needs. Acts of subtraction and insertion not only solve existing issues, but they also increase the overall aesthetic and experience of the space. A primary staircase connects the first, second, and third floors. The footprint of the staircase is subtracted from each level (floor and ceiling), including the roof, which allows for natural light to illuminate the space from an above skylight. To support the subtraction of material from the floors, ceiling, and roof, hidden beams, disguised in a safety wall surrounding the atrium, are be inserted into the building.

Wood from the demolition is repurposed as beams through a custom glue laminate process [see image on page 73]. A column supports the new skylight.

The spaces are interconnected through circulation. The combination of subtration and insertion allows for the open staircase to connect the levels both visually and physically. The opening of the floors and roof simultaneously increases air flow and natural light infiltration, improving the overall health implications of the interior space. Furthermore, all materials removed from the site from acts of subtraction are repurposed during insertion phases. Ideally, nothing goes in, nothing goes out [see calculations and graphic on page 84].

For code purposes, an emergency staircase is inserted into the space as well. This placement is guided by the need to maximize gallery exhibition square footage and is supported by the existing joist system. An elevator is also inserted into the building for accessibility and utility purposes. The elevator shaft further increases natural light infiltration with its transparent walls. An additional example of environment-influenced intervention is that the space depends on renewable energy; a photovaultaic system is installed on the roof and the building relies on a geothermal energy system.

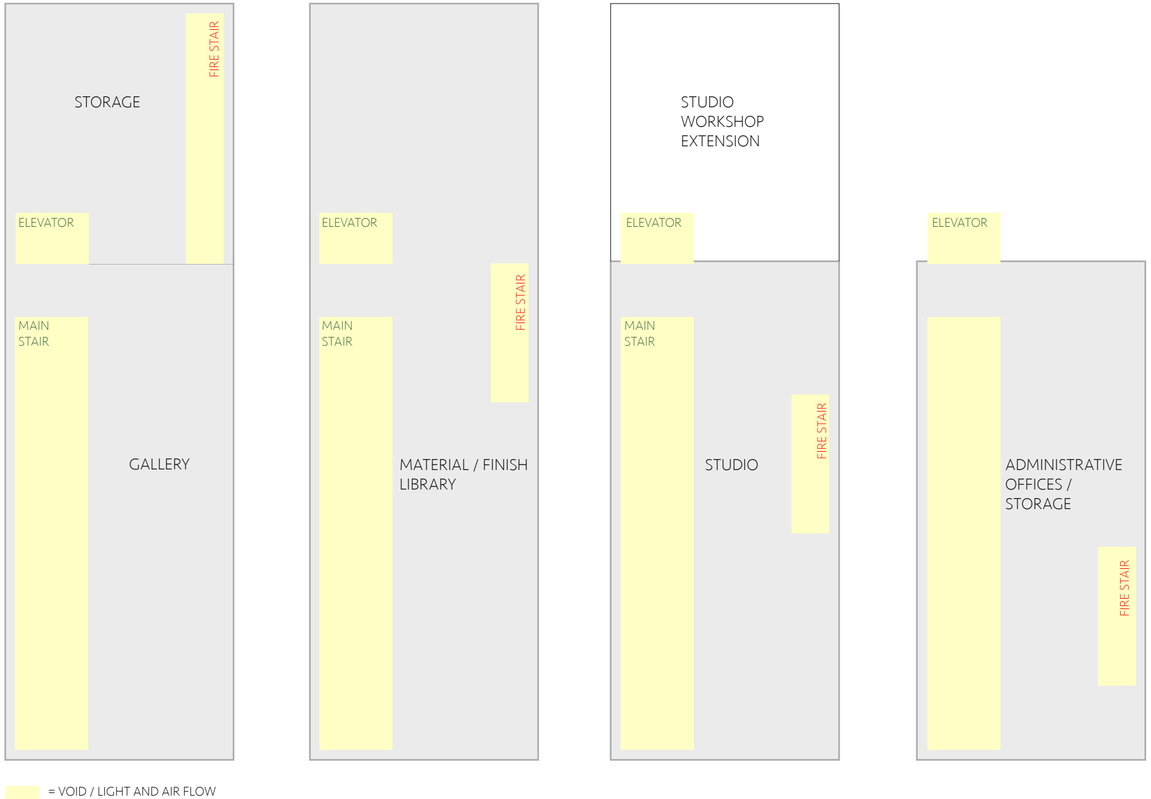
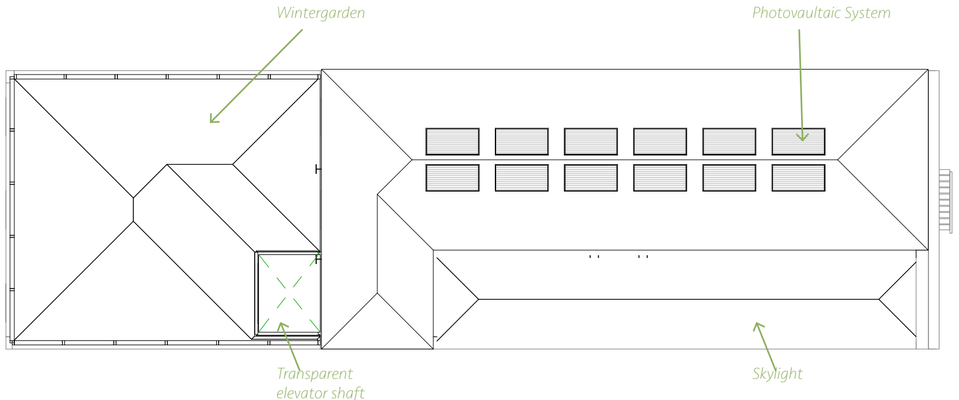
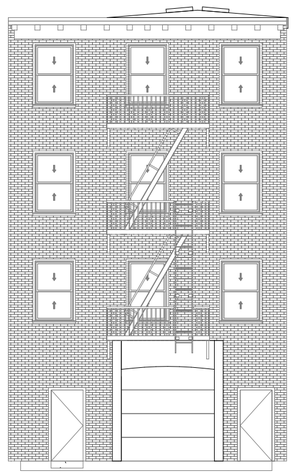


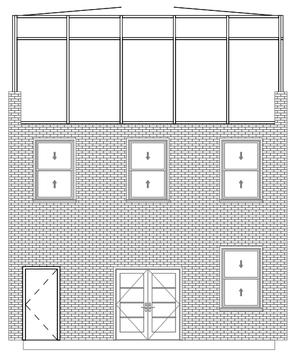
Diagram
Program / Spatial Allocation



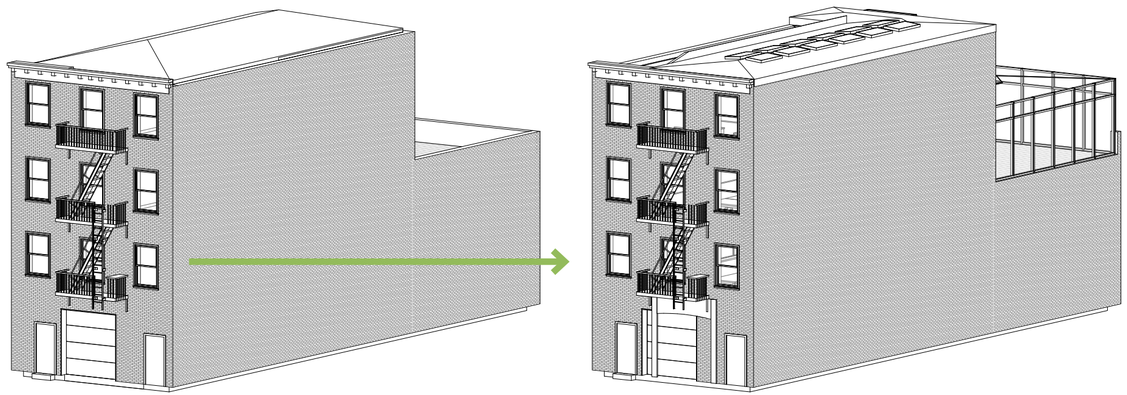
Site plan

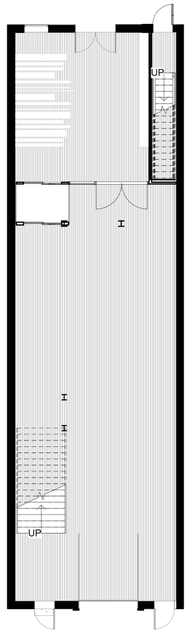


Front elevation

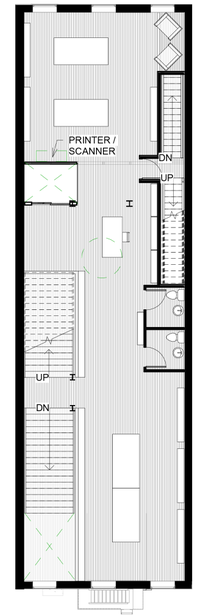


Back elevation

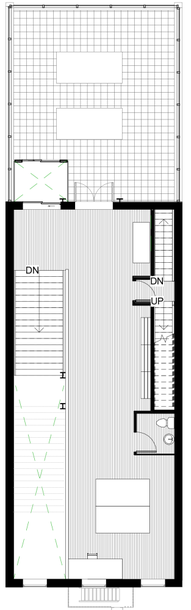




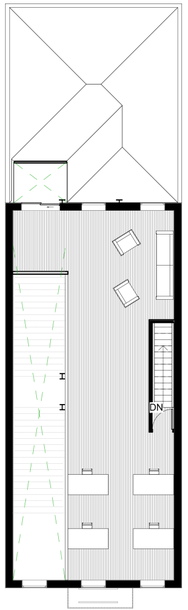
Floorplan: Level 1



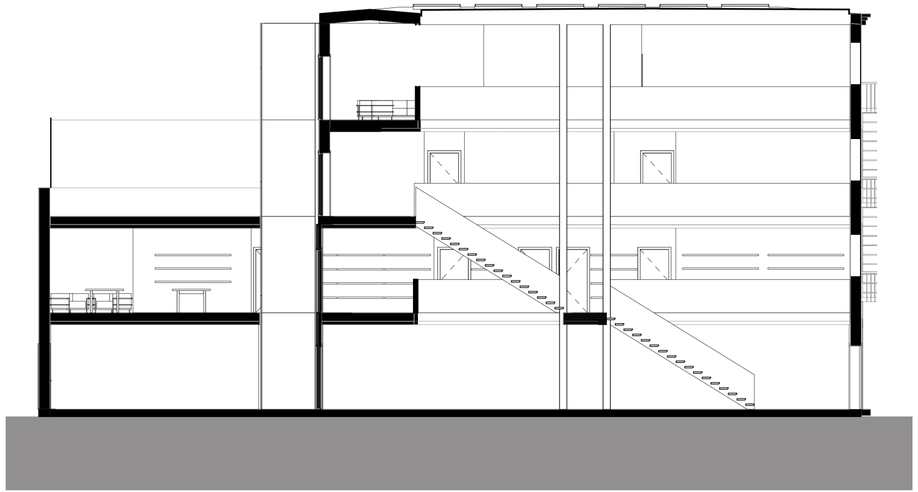
Floorplan: Level 2



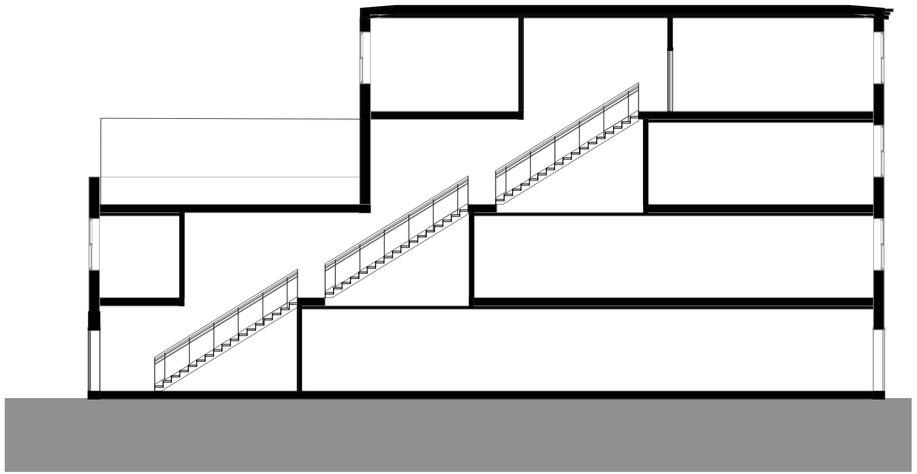
Floorplan: Level 3



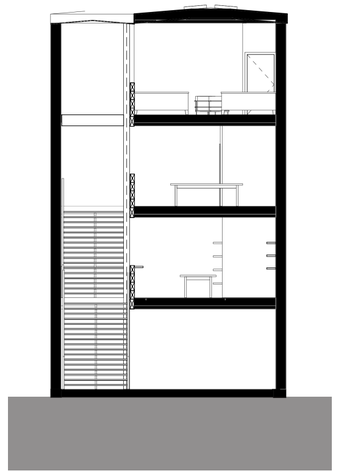
Floorplan: Level 4



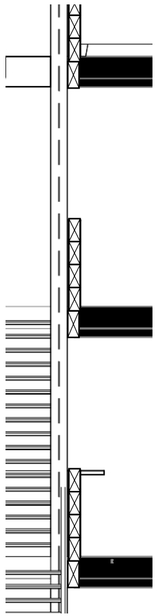
Long Section (East Facing)



Long Section (West Facing)



Transverse Section (North Facing)



Detail showing glue laminated reclaimed wood for intervention support and column supporting skylight

Program

The gallery space allows for the resident studio designer to showcase his or her work in a prime location. Given that Chelsea is home to high-end galleries and showrooms, Re-Source places sustainable design on the same map by showcasing eco-design in the same setting as other reknown and prominent art. Architects and designers visit the gallery space and see furniture which can be specified for projects. Towards the back of the gallery, a transparent partition seperates the gallery from material stroage. Visitors peak into the storage space and witness the qualities of salvaged materials prior to adaptation. The stark contrast between the before and after, the not yet repurposed materials and the finished items in the gallery, highlights the power design has to completely and radically transform salvaged materials into furniture, art, and other *new* items.

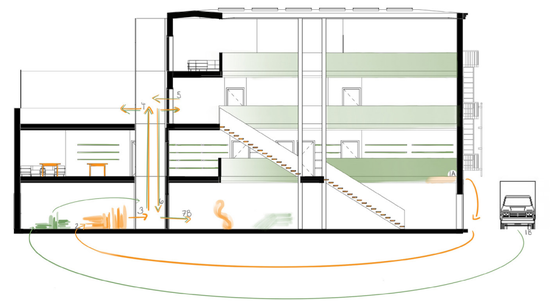
Furthermore, the gallery space transforms into a lecture or seminar space where repair workshops and other sessions are held. Additionaly, some site demolition materials are repurposed as items assisting with gallery displays; for example, wood from beams are transformed into pedestools for displays. Through example, visitors gain an understanding of how recycled materials can meet new needs and demands when combined with creative and design thinking.

The material and finish library exposes designers and architects to sustainable products that are aestheticaly and quality comprable to usual interior specifications, encouraging industry professionals to specify the 'better' option. The library also catalogs sustainable makers and existing furniture designs and designers [see object list on page 93] to further increase impact. The use of reclaimed materials from demolition are implemented into the library design as well; for example, steel repurposed as shelving or wood constructed into a table.

The third level, home to the designer's studio, provides equipment and workspace to innovative and sustainable-thinking designers. Programmatically, designers are given workspace in return for creating beautiful furniture and objects from reclaimed demolition materials. The original patio space is enclosed with transparent walls and roofing, like a winter garden, and contains larger tools, like table saws, and allows the designer to finish and paint objects in a space with increased air flow and ventillation that is detached from the rest of the building. The designer's work can then be displayed in the gallery, which generates exposure for the designer and encourages other industry folk to specify sustainably and learn about eco-conscious design.

Finally, the top level is dedicated office space for site and program administration. Repurposed demolition materials are also applied to the construction of the desks, chairs, and other peices in this space.

Ultimately, intervention, guided by necessity, improves interior comfort and connects the space through unified circulation and visual links. The architectural intervention implements subtraction and insertion actions and follows the mantra: 'nothing in, nothing out'. Re-Source not only creates a space for designers to design sustainably and for others to gain access to eco-design, but it also pushes boundaries. Use what already exists. Beleive in the power of the circular economy. Re-Source is asking creative thinking to do more than 'create something from nothing'. Rather, create from something.

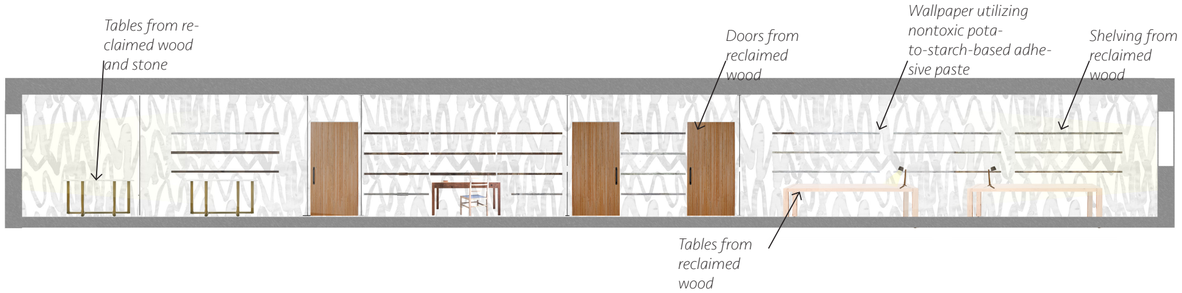


Concept Graphic: Circular System

Salvaged material from site

Salvaged material from local demolition sites

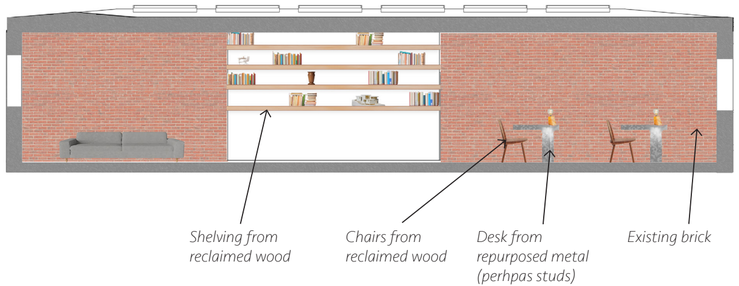
2


Tables from reclaimed wood and stone
Doors from reclaimed wood
Wallpaper utilizing nontoxic potato-starch-based adhesive paste
Shelving from reclaimed wood
Tables from reclaimed wood

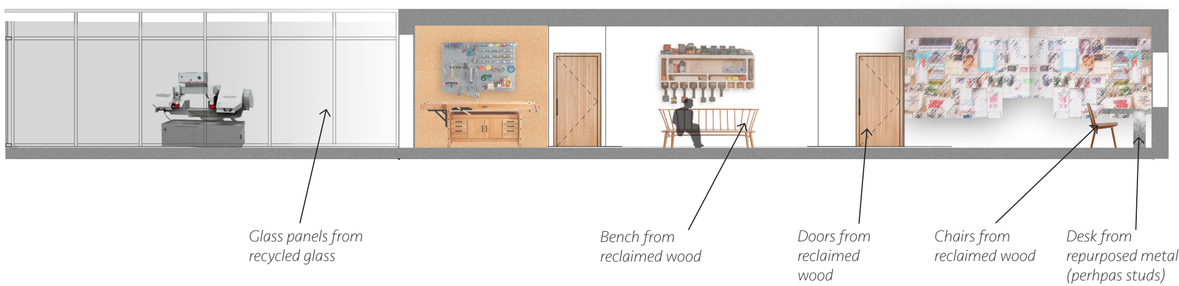
1


Gallery pedestals from repurposed materials

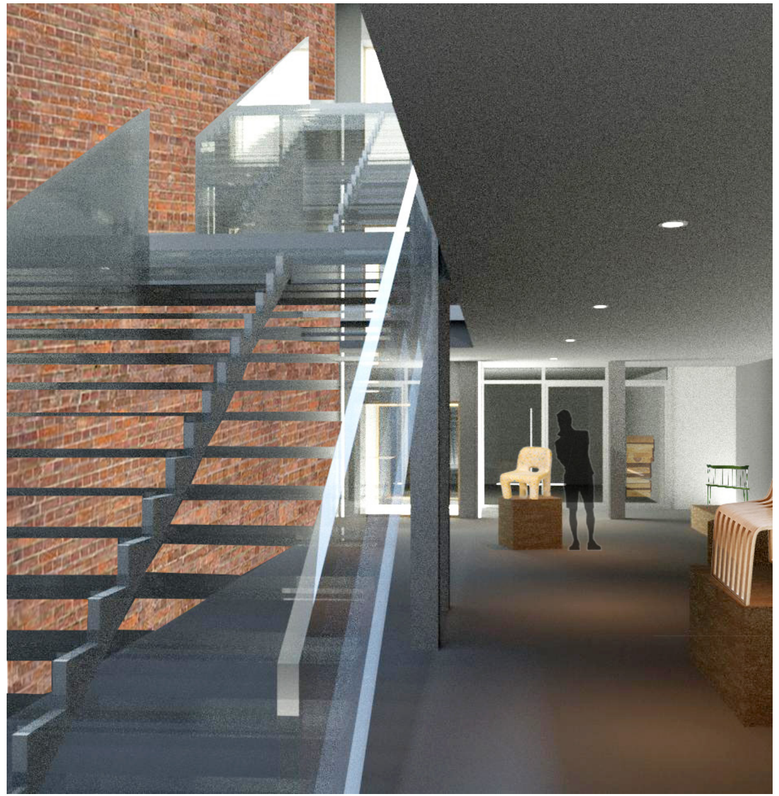
4


Shelving from reclaimed wood
Chairs from reclaimed wood
Desk from repurposed metal (perhpas studs)
Existing brick

3


Glass panels from recycled glass
Bench from reclaimed wood
Doors from reclaimed wood
Chairs from reclaimed wood
Desk from repurposed metal (perhpas studs)

Illustrated section



Interior perspective rendering: entry

Interior perspective rendering: material and finish library

Energy and Systems

Much attention is applied to building and system details in order to maximize efficiency. Windows utilize low-e glazing technology and the eastern windows on the south-facing facade have window shelves that carry natural light further into the building through reflection. The skylight also maintains low-e glazing technology to allow for light infiltration while simultaneously prevent-ing over-heating. To further avoid excess thermal loads, the skylight is semi-opaque and has openings at both the south and north ends to allow for old air to escape and new air to enter. This represents a dual-purpose skylight that operates similarly to a solar chimney.

The third floor patio requires unique ventilation given the equipment housed within. The wintergarden walls and roof maintains a similar operating system to the dual-purpose skylight, in that opeingings between the walls and roof systems encourage the release of old air and infiltration of new air.

The building relies on a geothermal system that uses ground temperatures to heat and cool the building. Geothermal heat pumps, set underground, reduce the building's heathing and cooling mechanical reliance by about 25%-50% (WBDG.org). The Geothermal Energy System Diagram [page 83] illustrates the system, which includes a ground loop, heat pump, and air-delivery system. This geo-exchange process will "circulate water... through a liquid-to-refrigerant heat exchanger and a series of buried thermoplastic piping" to heat and cool the building (WBDG.org).

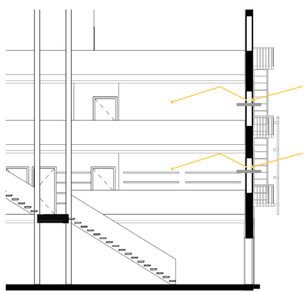
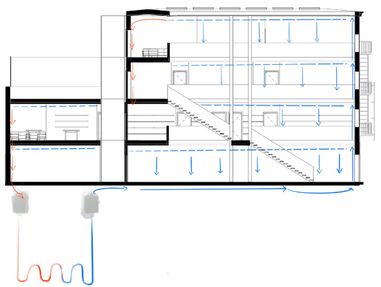


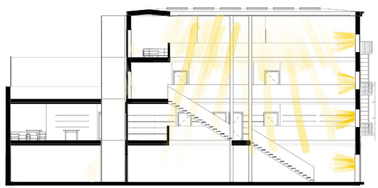
Diagram depicting light shelves

Airflow Diagram

Geothermal Energy System Diagram



Natural Light Diagram



Demolition Material Catalog:

Wood: [(40' x 6') x 4] +[(21' x 3')x4] =
1212 cubic feet
Metal: [(40 x 12)/16] + [(21 x 12)/16] =
45.75 cubic feet

Materials to be used for:

Gallery:
- Display
- Seating (qty: 4 benches + 40 seats for workshops)

Library:
- Table (qty: 2-3)
- Shelves (qty: ~80' worth of wall space)
-Seating (qty: 15)

Studio:
- Table (qty: 1)
- Desk (qty:1)
- Seating (qty:2)
- Shelves: (qty: ~20' worth of wall space (remaining
wall space for pin up))

Office/storage:
- Desks (qty: 4)
- Seating (qty:4)
- Shelves (qty: ~10' wroth of wall space

Sample of Material Required:

Table
Assume each table is 8' x 3.5'
=5 (8'x3.5') tables
= 140 cubic feet

Shelving
110' worth of wall space (about 10' H)
Assume shelf is 10' long and 8" deep
Assume 4 shelves stacked per 10ft
=11x4= 44 (10'x 8") shelves
= 293 cubic feet

Desk
Assume 4'x2'
=4(4'x2') desks
= 32 cubic feet

Additoinal materials:
- Glass for skylight
- Elevator
- Photovaultaic panels
- Walls for patio enclosure

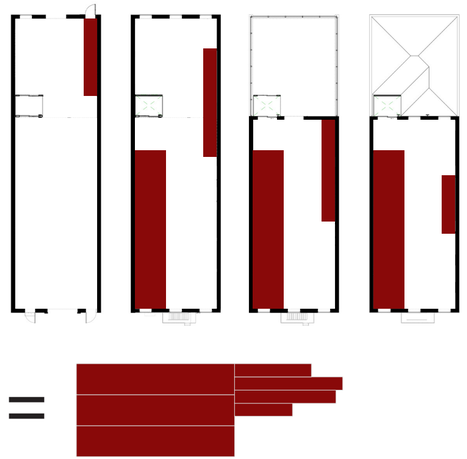


Diagram illustrating quantity of material subtracted from building during demolition

The numbers on the previous page, under 'demolition material catalog,' quantify, through approximation, the amount of reusable materials, such as wood and steel, from the site's demolition. The following group, 'materials to be used for,' represents interior items that can be built out of the salvaged materials, like chairs, tables, and desks. The final category, 'material required' quantifies how much material is needed for interior components.

All reusable materials from the site's demolition will be recirculated into the building through reuse and repurposing. Any addional materials will be sourced from neighboring New York demolition sites. All new is created from existing materials. The site's programming teaches the circular economy, while experiencing the renovated space provides a living example.

CONCLUSION

Summary & Analysis

Through exercising sustainable practices, designers can reduce waste, salvage resources, and promote healthier lives. Millions of tons of raw materials, simply put, should not be used to produce wallpaper, especially when beautiful, high-quality alternatives exist and can be designed. Though design inherently and unavoidably uses resources, designers must commit to asking the right questions when selecting products, materials, and finishes. Sourcing and producing locally, reusing existing pieces, and investigating each part of the production process to guarantee responsibly created materials and products, can significantly reduce the built world's carbon footprint, improve indoor air quality, and lead to greater health for humankind and our planet. This thesis and design proposal aim to proliferate this message and to provide easy and tangible steps for for people to practice sustainable design, as well as to further the point that adaptive reuse and renovation must be guided by necessity and not gluttony.

To conclude, as mapped out in the previous writings, the built world, including interior design, greatly contributes to climate change and directly impacts human health. Proven methods exist to reduce the industry's negative footprint, but what lacks, is the access to interior products under the umbrella of green design. As designers, it is our responsibility to plan environments with our collective environment in mind. Thus, accessibility is key. Once sustainable interior design products, practices, and knowledge become more accessible and understood, there will be no excuse and eco-conscious design will grow in popularity and practice.

- [x] Energy
  - *Natural light infiltration*
  - *Large, light-colored surfaces*
  - *Skylights, light shelves, atriums*
  - *Energy-efficient lighting*
- [x] Materials
  - *Flexible / diverse / modular design*
  - *Specify eco-conscious materials and equipment*
  - *Reduce waste*
- [x] Water
  - *Recollection and reuse of water*
  - *Rainwater harvesting*
  - *Specify energy-efficient appliances*
- [x] Health
  - *Improve indoor air quality*
  - *Thermal comfort*
  - *Visual comfort*
  - *Acoustic comfort*
  - *Specify non-toxic an dnon-harmful materials and finishes*

A Forever Growing Library

To maximize the positive impact of interior design and architecture, materials, finishes, and objects must be aesthetically and quality comparable to their non-sustainable equivalents. Consider, for a moment, an analogy: if you want Western populations to reduce their meat consumption, meat alternatives must taste just as good, if not better. Similarly, for people to design sustainably, the reality is, that the products must uphold a certain standard. Conscious design requires significant research to find appropriate designers and pieces to achieve its goal. In the hope that change-makers will keep innovating, material and product research will be forever ongoing and continue to contribute to Re-Source's forever growing library beyond the duration of this thesis project.

Design by Them, Confetti Coffee Table 11

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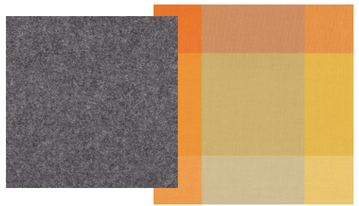
Emeco, Navy Arm Chair



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Maharam, Brushed Cashmere, Tabby Check

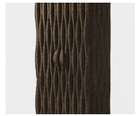
OBJECT LIST

Object List

	Category	Title	Brand / Maker	Dimensions	Description
 34	Bed / lounge	Lounger	Molo Design	16” x 74”	Material is paper made from a blend of new and recycled fibre. 100% recyclable.
 35	Bed	Essential	Auping		Bed has solid aluminium frame made of 40% recycled aluminium. Frame can also be completely disassembled (down to raw materials) and reused. Upholstery options are either from renewable sources or recycled materials.
 36	Bed	Mills Upholstered Bed	BDDW	84 L x 64 W x 54 H	Use of only FSC certified wood products and locally sourced and produced.
 37	Bench	Colt Low-back Sette	O & G Studio	60.5” W x 20.5” D x 32” H	Built from FSC certified wood products and locally produced and manufactured, and compnay treats workers fairly.
 38	Chair	Think	Steelcase	22” W x 28.5” D x 37.25” H	Cradle to cradle certified.

	Category	Title	Brand / Maker	Dimensions	Description
 39	Chair	Navy Chair	Emeco	15.5” W x 19.5” D x 34” H	Bult from repurposed and FSC certified wood.
 40	Chair	Slice Chair	Gray Pants		Uses FSC certified wood and locally produced.
 41	Chair	Logan Accent Chair	Greenington Furniture	28”W x 33.5”D x 33”H	Constructed responsibly of bamboo (a highly renewable material).
 42	Chair	Windsor Rocker	Katie Walker	28¼” W x 40¼” D x 32” H)	Made from locally sourced sustainable wood and finished with natural oils.
 43	Chair	DL Lounge Chair	Design by Them	25.6” D x 23.2” W x 27.4” H	Design includes organic and renewable materials and upholstery.

	Category	Title	Brand / Maker	Dimensions	Description
 14	Chair	Armchair	Unknown Studio Craftsman	47” H x 27” H x 28.75” D	Vintage chair locally produced in 1980s America from local materials.
 15	Coffee Table	Ovo Coffee Table	Benchmark Furniture	47” H x 27” H x 28.75” D	Product has Red List Free Declare Labelling, which explains source, materials, and end of life potential. Red List Free is that the product is free of harmful toxic chemicals.
 16	Credenza	Walnut Credenza	Arrowhead NC	63” W x 25” D x 11.6” H	Wood is locally sourced and product is locally designed and constructed.
 17	Coffee Table	Confetti Coffee Table	Design by Them	16.3” Dm	Made from trash repurposed into new materials.
 18	Desk	Jasmine Writing Desk	Greenington Furniture	48” W x 24” D x 30” H	Built from highly renewable bamboo and has no stain applied (the color is achieved with heat and pressure)

	Category	Title	Brand / Maker	Dimensions	Description
 19	Desk	Sage Sit-Stand Desk	Benchmark Furniture	71” W x 35.4” D x 28.3” H	Built with sustainably sourced wood and upholstered with renewable and biodegradable materials.
 20	Dresser	Cork Dresser	Campanas	63” H x 31.5” W x 15.75” D	Constructed of cork, a highly renwable material.
 21	Lighting	Capello	Molo Design		Base built of repurposed marble and lamp is energy efficent LED bulb.
 22	Lighting	Hexia	Studio Endo		Use of energy efficent LED light and locally manufactured and assembled.
 23	Lighting	Scraplights	Gray Pants		Product made from 100% post-consumer paper product and are 100% recyclable.

	Category	Title	Brand / Maker	Dimensions	Description
 24	Lighting	Popcork	Tania da Cruz		Made from highly renewable cork.
 25	Side Table	Horseshoe Side Table	Charlotte Jonckheer		Built from recycled paper.
 27	Sofa	Bolia	Lomi	17.25” W x 14” L x 25” H	FSC certified wood. Upholstery fabric made with 32% made from recycled cotton in a weaving mill uses solar power for a large proportion of its production to reduce CO2 emissions.
 26	Stool	Loll	Norm	17.25” W x 14” L x 25” H	Made with 100% recycled high-density polyethylene (HDPE), primarily from milk jugs because of there lack of pigment allowing for customization.
 28	Stool	Rope Stool	Yoav Reches		Made from responsibly sourced wood, recycled plastic, and natural rope.

	Category	Title	Brand / Maker	Dimensions	Description
 29	Storage	Bioplastic Componibili	Kartell	23” H x 12.65” W x 12.65” D	Material is created by fermenting farm waste, which produces natural polyesters called linear polyhydroxyalkanoates.
 30	Table	Ovo High Table	Benchmark Furniture	126” W x 34” D x 42.13” H	Product has Red List Free Declare Labelling, which explains source, materials, and end of life potential. Red List Free is that the product is free of harmful toxic chemicals.
 31	Table	Planter Dining Table	Knoll	53.75” W x 53.75” D x 27” H	Clean Air Gold certified, meaning that it emits no toxins or VOCs.
 32	Wastebin	Pedal Bin	Barbanita	33.5 cm D x 43.0 cm W x 66cm H	Cradle to cradle certified.
 33	Vase	Hammered Copper Jardiniere	Jos Heinrichs	15.75” H x 10.25” Dm	Antique product locally produced in early 20th century America.

GLOSSARY

Business and Institutional Furniture Manufacturers Association (BIFMA): a not-for-profit trade association for business and institutional furniture manufacturers that advocates for green practices and provides a standard and guides for members (bifma.org)
Biodegradable: a substance that can be broken down by a living organism into simple compounds
Climate change: change to weather patterns and often synonymous with global warming, although climate change also refers to natural occurring changes
Declare Lable: a lable that promotes transparency of materials used in material production and explains where a product originated, what it is made of, and its end-of-life potential
Eco-conscious design: design that aims to integrate physical and mechanical built forms and infrastructures with the ecosystem while also considering resource depletion, human-rights during production, and end-of-life cycle (interchangeable with sustainable design, environmentally friendly design, green design)
Embodied carbon: the carbon dioxide produced during the manufacturing, transportation, or construction phase of a product or material
Environmentally friendly design: design that aims to integrate physical and mechanical built forms and infrastructures with the ecosystem while also considering resource depletion, human-rights during production, and end-of-life cycle (interchangeable with sustainable design, eco-conscious design, green design)
Forest Stewardship Council (FSC): organization that promotes environmentally sound, socially beneficial and economically prosperous management of the world's forests (fsc.org)
Green design: design that aims to integrate physical and mechanical built forms and infrastructures with the ecosystem while also considering resource depletion, human-rights during production, and end-of-life cycle (interchangeable with sustainable design, environmentally friendly design, eco-conscious design)
Green Globes: the Canadian assessment and rating system for green building construction, design, and operation
green house gases: gases that trap heat lower atmosphere (some are naturally occurring, while others are solely the result of human activity)
Integrated approach: from the start of the design process, everyone, including contractors, architects, and designers, discuss the best approach to creating a sustainable structure
Leadership in Energy and Environmental Design (LEED): a guide for green design, construction, and operation of high-performance buildings, established by the US Green Building Council (USGBC) that focuses on water conservation, energy efficiency, site development, material choice, indoor quality, and innovation
Level: the sustainability standard and third-party certification program for the furniture industry (bifma.org)
Living Building Challenge: a building standard that emphasizes the importance of creating beautiful and healthy environments through light, air, food, nature, and community
Recyclable: materials that can be repurposed after original use
Recycle: to save and reuse materials from waste products for a new or similar use
Red List: list of worst chemicals present in many building materials and finishes
Renewable energy: energy resources that cannot be depleted, like biomass, hydrogen, geothermal, wind, solar
Reuse: to use a product after its original use-case
Repurpose: to apply a new purpose to an existing product or material
Sustainable design: design that aims to integrate physical and mechanical built forms and infrastructures with the ecosystem while also considering resource depletion, human-rights during production, and end-of-life cycle (interchangeable with eco-conscious design, environmentally friendly design, green design)

(Yeang; livingfutures.org)

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Photos

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Interviewees

Chiong, Wai Yee
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