MOD Food: Design of Semi-Permanent Modular Food System for Educational Innovation

A thesis submitted in partial fulfillment of the requirements for graduation
with Departmental Honors in the Program of Environmental Design

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ABSTRACT

Food is the one consistent variable between cultures and communities that unites people. In the last 80 years, as a result of the shift from locally owned family farms to the industrial scale production of cash crops, consumers have become isolated and alienated from where food comes from and how it is grown (Ferdman, 2014) This lack of understanding is due to an absence of education about food production, raising the question: How can food production be reimagined and presented in a way that is eye catching, promotes a healthy diet, and fosters an excitement about and fundamental understanding of how food grows? As defined in my thesis, urban agriculture is a contemporary response to some of these problems, aiming to re-educate and re-connect people to food in a hands on way. MOD Food aims to advance this example by sparking a discussion about, and responding to, these questions to provide a system that is functional, adaptable, and educational for a multitude of ages, demographics, and communities. I create a new mobile food installation to fill the gaps in the existing and innovative modular food systems. The design responds to themes in existing mobile food systems. MOD food accomplishes an integration of multiple production methods, drawing from a list of programatic and educational components to provide awareness and education about healthy foods.

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DEFINING URBAN AGRICULTURE

Urban agriculture (UA) can be generally defined as a food-producing or animal-raising operation within a city, with paid or volunteer employees and helping hands who grow and raise products for the betterment of the community, and who often sell these products at local markets (Thompson, 2014). There are two prominent categories of small scale urban agriculture that fit into this definition: community gardens and school gardens (Thompson, 2014). Community gardens aim to provide opportunities for individual people or families to grow food for their personal use but not for sale at local markets (Thompson, 2014), whereas school gardens focus on youth participation and education about food, often located on or nearby school property. These spaces connect children to the source of the food they are eating, encourage healthy diets for both school staff and students, and promote environmental understanding and stewardship (Thompson, 2014). These two categories of UA are typically located on land either permitted or zoned for urban farming and are permanent in nature, moving minimally if at all over the course of their lifetime. In both categories, the main goal and objective is to connect individuals to the source of food and encourage healthy eating habits which can be a fundamental step in an overall healthy lifestyle. UA also aims to make healthy, locally grown foods easily accessible for people living in the urban environment (Smit, 2001).

In the last decade, as population growth continues at an exponential rate and land becomes more scarce, people are seeking innovative solutions to where and how food can be grown. Urbanites have taken it upon themselves to reimagine growing food. Thinking beyond the confines of school gardens and community gardens, they have been

fabricating containers that allow food to grow vertically, year round, indoors, on roofs, and in multifunctional ways (for example, producing food while also providing heat insulation) (Graff,2009). As a result, 15-20% of the world's food is produced through urban agricultural methods as of 2014, with an estimated 800 thousand participants worldwide producing their own food (Koscica, 2014).

ISSUES THAT URBAN AGRICULTURE ADDRESSES

The urban environment is becoming increasingly more polluted each day due to the effects of cars and vehicle emissions, the excessive consumption of fossil fuels for many products, and the refinement of minerals for energy (EPA, 2013). The industrial farming practices used today in the midwestern United States also play a major role in resource consumption and the continual pollution of the environment, contributing to environmental habitat collapse, loss of land and fertile topsoil, and even poor food quality due to pesticide use and mono crop planting (Kimbrell, 2002).

Many of these problems arose as a result of urban sprawl during the middle of the century, which pushed people into rural neighborhoods and into a lifestyle requiring resources such as gasoline, and roads to make living and commuting possible (Frumkin, 2002). Vehicle miles traveled became a major concern during this period of urban sprawl, as a vehicle was required to accomplish most, if not all, tasks (Frumkin, 2002). This dependency on the vehicle increased pollution and set a precedent for energy consumption. However, people soon began to move back to revived city centers as a result of overall dissatisfaction with the time required to access amenities, a desire to be

closer to services and jobs, and a lack of finances for rising gasoline prices (Sturtevant, and Yu Jin. 2011). Upon arriving in city centers, current and new residents within the urban fabric were greeted with a lack of green-space, food desert conditions, and an overall disconnect to food in general (Sturtevant, Lisa, and Jung, Yu Jin. 2011).

Urban agriculture gave hope and relief to city dwellers coping with the realities of the changing urban environment by attempting to re-connect people to food and where and how it is grown. However, the urban fabric still contains isolated "food deserts." These areas are primarily low income parts of the city with a poverty level equal to or great than 20% and have a travel distance of over one mile to the closest grocery store or supermarket (Dutko et al., 2012). In these communities, many residents consistently fail to meet daily intake requirements of fruits and vegetables as their access to these foods is extremely limited. In fact, as of 2007 less than 10% of Americans meet the 2005 US department of Agriculture's *Dietary Guidelines* for fruit and vegetable intake (Cassady et al., 2007). The income level of individuals living in these communities directly impacts the food selection available to them as low income neighborhoods have higher food prices than high income neighborhoods (Kaufman, 1997).

BENEFITS OF URBAN AGRICULTURE

The benefits of UA span beyond simply providing edible products for a community and its residents; they also help build community and foster human well-being. UA creates a commonality among residents, helping promote conversation and interaction between community members, while also helping to build trust and engagement within an urban

environment (Campbell and Wiesen. 2009). Through UA cultures can be brought together, multicultural neighborhoods are created, and encouraging community environments are established (Armstrong, 2000 and Fitzgerald, 1996). UA efforts help a variety of participants from low income families, the elderly, at-risk community members, children with no after school programs, and middle class families, be part of their local community and common effort (Mougeot, 2005). To urban gardeners, UA provides a place for "the development of friendships, learning, sharing, and helping other people, exchanging plants is common, and people to help each other in cleaning and building the plot boxes…" (Salvidar-Tanaka, and Krasny, 2004). New urban farms have become a vehicle through which communities come together to transform underused spaces into vibrant representations of the cities they are situated in as well as the communities who tend to them (Campbell and Wiesen. 2009).

Youth participation is another major benefit of urban agriculture projects, as it engages and educates future generations of environmental stewards. Studies suggest that an early attachment to growing food fosters good eating habits and an excitedness about food (Lineberger and Zajicek, 2000). If a child participates in the growing and eating of fruits and vegetables at a young age, they are more likely to maintain a healthy diet throughout their lifetime (Albright. 2014). Participation in gardening or school-based agricultural programs has also been shown to increase maturity, self-understanding, ability to work in group situations, positive feelings about nature later in life, scores on tests in math and science classes, communication skills, and self confidence (Robinson and Zajicek, 2005; Klemmer, Waliczek, and Zajicek, 2005). These programs also empower

youth by enabling and promoting them to become immersed in something simple and therapeutic while nurturing and growing something of their own (Dziedzic and Zott, 2012).

UA also positively affects the local economy. In low-income communities, urban agriculture can be an important contribution to the livelihoods of its farmers. The "Slow Food" and "Slow Money" movements can drastically improve the health and economy of a community. The1989 Slow Food movement is aimed at making food "Good, Clean, Fair, For All" (SlowFoodUSA. 2015). Their mission is to make food seasonal and local, affordable for all people regardless of income, produced in a manner that is sustainable for humans and the earth, and considers animal welfare (SlowFood. 2015). Many UA farms apply the same principles to their operations by using organic matter, materials, and seeds; utilizing greywater for irrigation when permitted; and selling excess products at local markets to local people (Dziedzic and Zott, 2012).

Meanwhile the "Slow Money" movement is aimed at continually circulating money from the community back into the community, by supporting local businesses and reducing the dependence on big corporation (SlowMoney. 2015). Working alongside UA, these principles are capable of producing a system that is independent from the global economy and food supply.

Lastly, UA significantly benefits the environment by allowing regenerative properties and processes to occur, improving both air quality and soil fertility (Dziedzic and Zott, 2012). During the process of UA or organic food production, nutrients and resources are recycled in a more holistic and sustainable way, replenishing the soils and making them

fertile for the next growing season unlike conventional farming practices which have to add fertilizers to accomplish the same conditions. In addition, the use of compost and naturally decomposing materials such as leaves, animal waste, and food scraps, natural processes are able to break down and recycle these products allowing nutrients to re-enter the topsoil and create a usable and nutrient-rich medium for new plantings (Lehr. et al. 2013).

PRECEDENTS

Precedent studies are often used in design to understand the existing condition of a specified topic. In this case, they are used to understand the types of innovative urban agriculture systems that exist today. Within this section, eight case studies will be explored and dissected to understand what current producers of food systems are doing and if the goals of these projects are successfully being implemented. The projects identified are categorized into four groups of food producing systems: 1) Collapsible Containers, 2) Containers on Wheels, 3) Food-Producing Containers and 4) Installations for Education. Each category contains two precedents that will be used to identify similarities and differences among the systems. Many projects across categories use a modular design in which systems are comprised of sub components that make a whole. The projects will be compared to identify a list of common themes and gaps in the larger urban food production system. Through a design iteration process, MOD Food will integrate these common themes and respond to the gaps identified. Table 1 outlines the precedents selected and the characteristics that each design satisfies.

Precedent	Educational	Collapsible	On Wheels	Food Producing	Recycled Materials
The Incredible Edible House		✓		✓	
The Vertical Garden	✓				✓
miLES Streetfront Transformer		✓	✓		
Hive Inn City Farm				✓	✓
Volkertmarkt Greenhouse		✓		✓	✓
Truck Farm	✓		✓	✓	✓
Toronto Good Food Market		✓	✓		

Table 1: Precedent attributes

Collapsible Containers

The aim of a collapsible container is to be modular, semi-permanent, and capable of moving if needed. *The Incredible Edible House* is one example of a multi-functional, collapsible, and portable food-growing system that functions as a home. The project was created for a design competition held by the Wall Street Journal and was intended to become "the most energy-efficient home for the future" (Philips, 2013). It utilizes three prefabricated shipping containers that are stacked to create a narrow but compact home. With global climate change and resource scarcity, there is an increasing demand for more eco- friendly design that utilizes natural resources and consumes less non-renewable energy. The design takes a holistic approach to sustainability by utilizing renewable resources such as wind, solar, and food production for energy and thermal insulation rather than traditional utility systems (DiscoverMagazine.2014). The use of photovoltaic (pv)

panels for energy collection and shading, a living wall which reduces heat gain in the home and provides insulation, and wind turbines alongside a stormwater catchment basin to provide cooling in the warmer months, highlight the ability to take traditionally singular sustainable design components and use them together to create a more complete system (Meinhold, 2009). To obtain the collapsible effect, the design folds the project's main components (including stairs, pv panels, green walls, piping, and windows) neatly and compactly into a single box which can then be transported by truck and assembled on-site (Gorgolewski et al., 2011). Modularity is another key theme of this design, as the system is adaptable and can include a variety of different green components and design configurations based on the occupants and their needs. For example, the living wall panels are small components that are assembled to make an edible skin for the home. Figure 1 highlights the major sustainability components of the system and how the containers stack to reach the installed height.

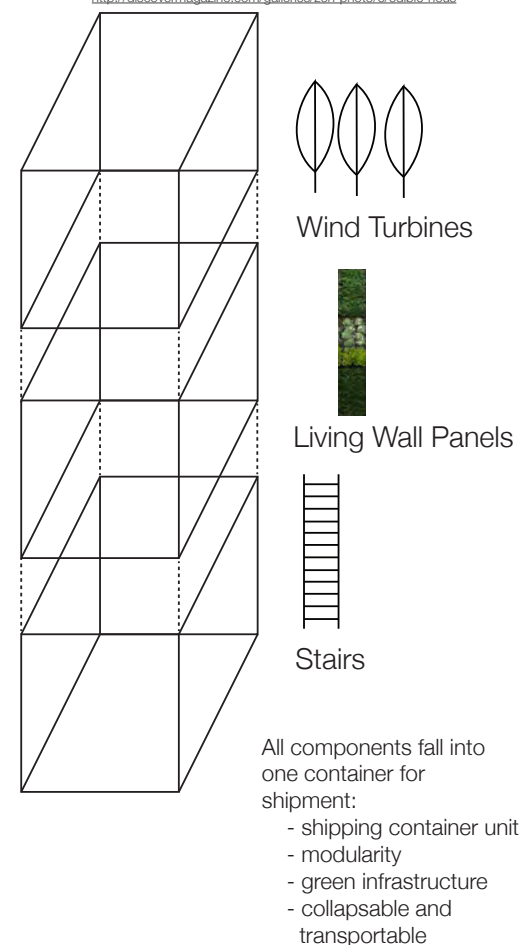Another project that demonstrates functions as a

http://discovermagazine.com/galleries/zen-photo/e/edible-hous

Wind Turbines

Living Wall Panels

Stairs

All components fall into one container for shipment:
- shipping container unit
- modularity
- green infrastructure
- collapsable and transportable

Figure 1

collapsible container is The *Volkertmarkt Greenhouse for Vienna Design Week 2011.* The

project was designed as part of a larger movement

to reimagine and rejuvenate the dilapidated and

underused Volkertmarkt Square in Vienna (Anger,

2013). For designers Richard Mahringer, Anna

Rosinke, and Maciej Chmara, the use of the shipping

container served primarily as a nod to the area's

shipping industry history while also highlighting the

ease and efficiency of using such a widely available

recycled material to create an innovative food

growing solution (Anger, 2013). The concept

embraced the shipping container, leaving its

corrugation and dimensions and adding a green

house on top. Successful in its approach to growing

food and in bringing life to the Vienna Square, this

design wastes space by leaving the interior of the

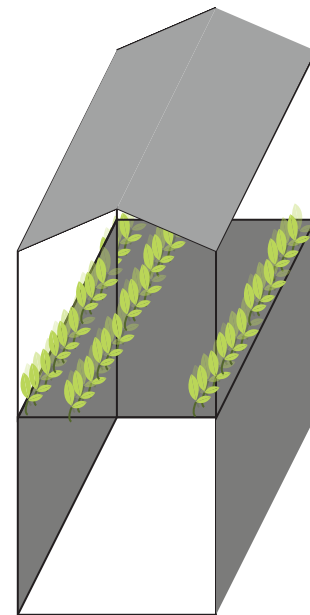container empty and non-occupiable. The designers

did so to provide the space needed for the

installations components to collapse for

transportation. When up, the container provides

space for a growing system in the greenhouse and storage on the

bottom, but the greenhouse can be broken down and folded into the container for

- collapsability
- interior space allows for interaction
- productivity in the greenhosue
- storage and occupiable space in the container

Figure 2

transport. Figure 2 highlights what the installation looked like in place and the productive greenhouse space.

Containers on Wheels

Containers on wheels are becoming increasingly popular as people become more aware of healthy and conscious eating habits. The aim of these designs is to make food accessible on wheels whether the system is actually growing food or just bringing fresh food directly to the consumer. An example of one such innovative container on wheels is the *Toronto Good Food Market*, part of the FoodShare movement in Toronto, Canada. This vehicle is one of a fleet of drivable healthy food grocery stores that is filled with fresh fruits and vegetables, which moves to a community and sells produce to residents. Aimed to provide culturally appropriate and affordable produce to low-income, geographically-isolated, and insufficiently-served communities, the *Good Food Market*, is not only inventive but effective in providing access and awareness about healthy eating (FoodShare.net, 2015).

Constructed from an old school bus, this design utilizes pop-out grocery baskets that hold
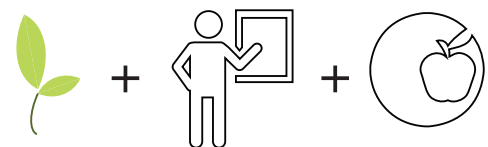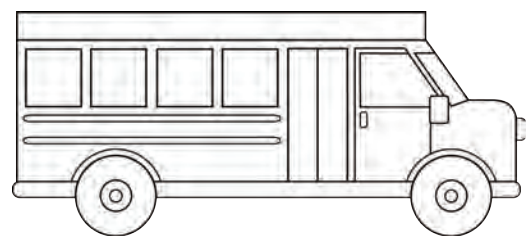
- accessible food
- brings the food to the people
- pop out market windows
- fresh food market promotes a healthy diet
- portability

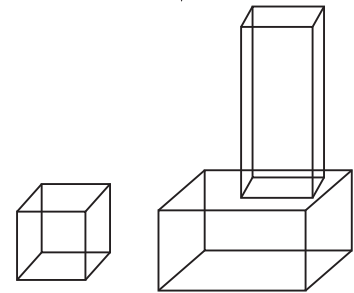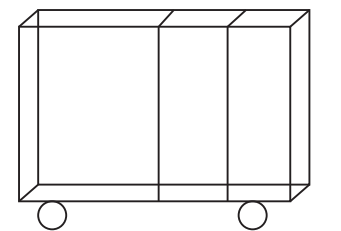**Figure 3.**

the produce at a level comfortable for people to access, highlighting design strategies of both modularity and collapsibility as seen in Figure 3.

This approach brings the food to the people that need it most and provides a friendly and knowledgeable face to consumers. Supported by larger stakeholders such as the City of Toronto and the Toronto Food Strategy, this project provides healthy options and education about food to Toronto's lower income neighborhoods.

The *miLES Streetfront Transformer* in Manhattan, NY is another example of a container on wheels that aims to take vacant spaces and make them usable and occupiable for people by inserting collapsible, modular containers for a variety of activities as driven by the user (SFTF, 2014). miLES (made in the Lower East Side) works with residents, landlords, sponsors, and donors to discover how empty storefront spaces can be adapted to meet the needs of the community (SFTF, 2014). One of the organization's main prototypes exemplifies modularity and its approach to adaptability. Using a vacant store as

- all smaller boxes fit into larger box
- customizable to user preferences
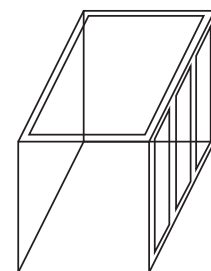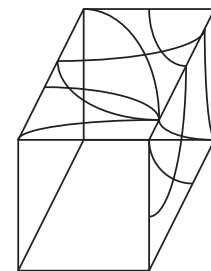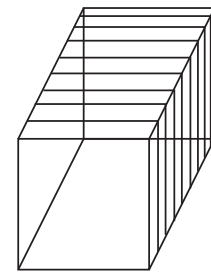- modularity
- wheels allow for movability

Figure 4

a pop-up library, miLES takes one mass of shelving and separates it into multiple

bookshelves on wheels. Users are able to reconfigure the

space based on the experience they want to create (SFTF,

2014). Whether creating reading cubbies for retreat or

creating a social circle for multiple people, the design is

adaptable to needs and wants of its users. Figure 4

showcases the different "puzzle pieces" that fit into rollable

containers.

Food Producing Containers

     Food-producing containers are systems that aim to

grow food in repurposed containers. An example of a food

producing system utilizing a shipping container is the *Hive*

Inn City Farm concept by OVA Studio which hopes to

construct a skyscraper out of productive shipping

containers. Each of the stacked containers houses a

different type of urban production, stacking to the height of

nearby skyscrapers (OVAStudio. 2015). This concept utilizes

a series of shipping containers stripped to the frame, and

covered in permeable envelopes (differing based on interior

program), then stacked to create an urban farm. This

concept is the first of its kind and aims to provide food in a reimagined

way. Intended for New York City, this design integrates multiple modes of growing and


Different "skins" adapt for different programs

- modularity
- green infrastructure
- each component adds to the system as a whole
- transformable
- shipping container

Figure 5

raising food including aquaponics, hydroponics, beekeeping, and raising chickens (Inhabit.

2014). In a less obvious way, this concept also represents

the possibilities of vertical growing through modularity,

allowing for containers to be added or removed for service,

harvest, or changing needs. Each compartment of this

design fits into a supportive framework (similar to a drawer)

providing strength and access to different levels of the

system. The resulting overall system operates much like a

natural ecosystem, with different organisms (in this case,

container ecosystems) influencing and connected to each

other. Figure 5 highlights the vision for the system and

possible different "skins" that each container could have

depending on interior function.
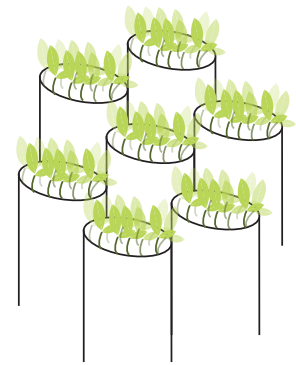
- Levels of production and type of crop
- sculptural food production
- multifunctional
- program spaces underneath provide activity
- V shape allows access and usable
  space beneath
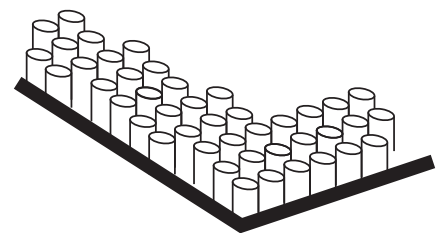
    Public Farm 1 showcased at the PS1 Contemporary

Art Institution located next to the Museum of Modern Art

(MoMA) in NYC is another example of a non-traditional

food-producing container. This art exhibit/urban farming

project utilizes prefabricated cardboard construction tubes

as a container for food production (Gorgolewski et al.,

2011). The designers aimed to create a space that was

Figure 6

occupiable on all sides as well as underneath and had a non-traditional

shape to fit its context next to the MoMA. The project organized the construction tubes in

a slanted grid pattern to form a system that was both functional and avant-garde for the

MoMA courtyard as seen in Figure 6. Different spaces are created as the system slopes resulting in spaces below the "farm" for a variety of educational programming uses such as the Kid's Grotto and the Funderneeath zone (Gorgolewski et al., 2013).

Installations for Education

The hope for many UA projects is to provide awareness and involvement for a community via hands-on interactions. The precedents in this section provide examples of education about food through installations. *Vertical Garden* by the Seattle Urban Farm Co. was developed as an installation for the Seattle Design Festival of 2013, and aimed to raise awareness about growing local food as well as the local food movement for Seattleites through visibility (Seattle Design Festival Vertical Garden, 2014). This installation, measuring ten feet tall and twenty feet wide, reused materials such as shipping pallets and trash cans to create a literal "box of knowledge." The project represents food in an eye-catching and new way, showcasing the importance of local food, and promoting a healthy

shipping pallets

- installation
- recycled materials
- interactive
- education and awareness
- take home plants
  translate ideas
  from the public into
  the home
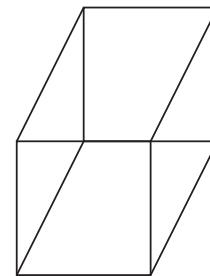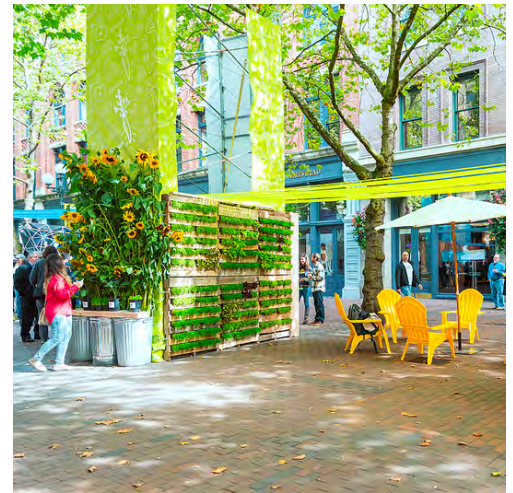
garbage cans

take away potted
plants

Figure 7

lifestyle among Seattleites (*SeattleUrbanFarmCo.com*. 2014).

The design integrated seating and interaction points alongside the installation to encourage people to sit, ponder, converse, and enjoy the design for more than just its aesthetic quality. This "stretching out" approach made the project goals of awareness and education more impactful and apparent as people who lingered thought more about their own food choices and had more questions about how to change their habits (Seattle Design Festival Vertical Garden, 2014). Figure 7 highlights some of the recycled materials that were used and the goals of the installation.

Another project that aimed to educate people about food is The *Truck Farm* designed by Colin Mccrate and Brad Halm (A Wickedly Delicate Film. 2011). This project took a different approach to food production, using the bed of a truck to produce and deliver food directly to the consumer. The design team wanted to determine if growing food would be possible in the bed of a truck and if people would be responsive to food grown in this way (Mccrate and Halm. 2012). This project is the epitome of portable food, highlighting how food can be grown just about anywhere with the right care and conditions. The team took a fully
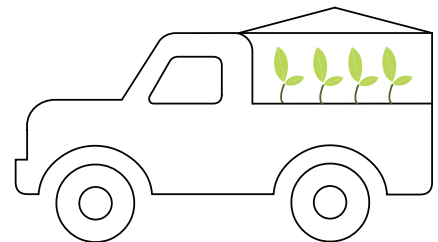
- cars for growing
- detachable greenhouse to extend growing season
- creates awareness in the city about how to grow food

Figure 8

functioning truck and converted it into a new kind of urban farm that is eye-catching and provides education to students and residents about growing food. The truck is also seasonally conscious and adapts when the weather changes, permitting a greenhouse to be attached on top (as seen in Figure 8) and also becoming dormant in the middle of winter, just like a food system would be if planted in the ground (A Wickedly Delicate Film. 2011). The design is especially educational in that it is moved to schools often and used as a hands-on tool for elementary students to learn more about food and making healthy eating choices (Klemmer. et al. 2005).

A COMPARISON OF PRECEDENTS

Each precedent study took the fundamental principles of urban agriculture and adjusted them in new and abstract approaches to food production for modularity and semi-permanance. Through exploring these precedents, I have determined that any UA project is aimed at raising awareness about food and where it comes from, even if not directly. Education through demonstration and visibility are two key attributes needed to expand the scope of people invested and interested in the cause of locally-farmed, sustainably-produced foods. Common themes that I identified in my precedent research were 1) recycled materials are often less expensive, more interesting to work with, and preferred when creating an innovative urban agriculture system, 2) the more hands-on opportunities an UA project provides, the more successful and impactful it will be, 3) portability is necessary for a successful semi-permanent UA project, and 4) seasonality is

key and must be considered when designing to create a system that is sustainable and healthy in a temperate climate.

However, there are still many gaps in the current urban food production system that need to be addressed in order to accommodate and produce enough food for the growing populations in cities. Some of these gaps include: isolation between methods of urban agriculture, a lack of description about the processes occurring and the "why's" of an existing system, and minimal modularity of existing systems which prohibits the potential for adaptation and accommodation of new needs or programatic demands. Other considerations for a successful design are: 1) make food visible in an eye catching way, whether the system becomes extremely tall like the *Vertical Garden* or transparent like the *Hive Inn City Farm* productive containers, 2) make food tangible, whether that means providing tactile opportunities with plants in the second floor greenhouse as seen on the *Volkertmarkt Greenhouse* or make foods interactive with a game or toy as in the *Public Farm 1* project, and 3) make food accessible, whether moving it to a school to show kids what it looks like to grow food like the *Truck Farm* or making healthy options available for purchase like the *Mobile Good Food Market.*

DESIGN RESPONSE

MOD food aimed to address the issues of 1) making food accessible, 2) connecting community members to urban food production and 3) creating interest and understanding of where and how food is grown. In addressing these issues, MOD food fills the gaps in current urban food production practices by integrating multiple growing methods such as a living wall, "drawer-like" planter containers, bees, and a chicken coop to provide a

complete food production system for education in the Civic Center of Boulder Colorado.

The following diagrams and drawings show MOD food in this context. Highlighted are

system components, explanatory diagrams, and experiential renderings that showcase the

key themes I adapted and combined from my precedent research into MOD food.

Following these diagrams, photographs of the MOD food physical model are presented as

a secondary representation of the system.

CONCLUSIONS

Throughout the exploration of modular systems I generated this design. The design integrates multiple methods of production including plants, bees, and chickens. MOD food also has broad goals of providing educational opportunities and access to healthy food and healthy food production. Utilizing recycled, locally sources materials such as the beetle kill wood, the design highlights locality and sustainability. MOD food is also a precedent study, open to adjustments and refinement based on community response and functionality. Future designs may be adjusted to utilize other local materials, integrate alternative production methods, or scale according to demand or need. I would also be interested in pursuing funding for this project to construct the designs and further observe responses and functionality of MOD food as an effective semi-permanent, modular food growing system.
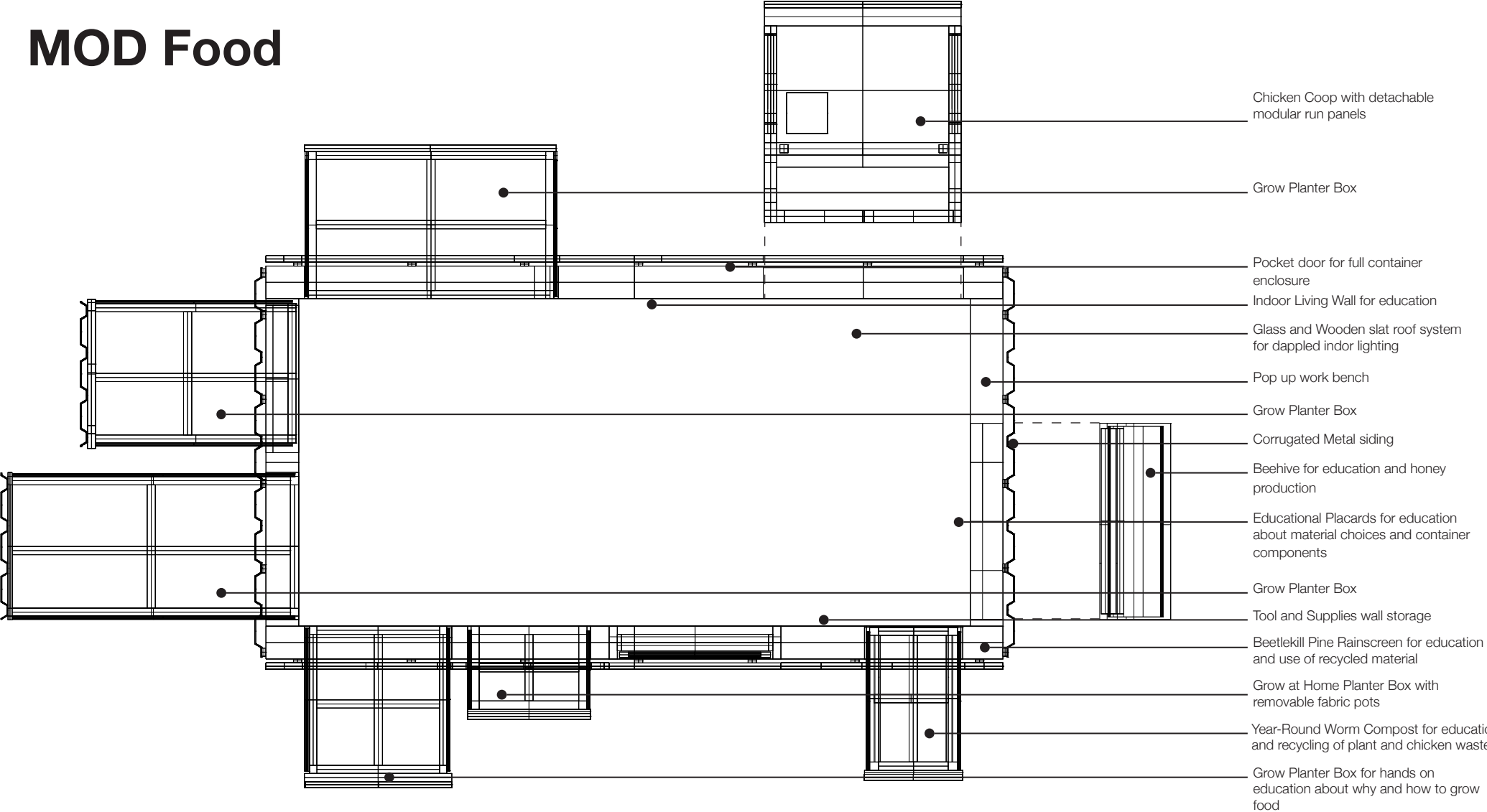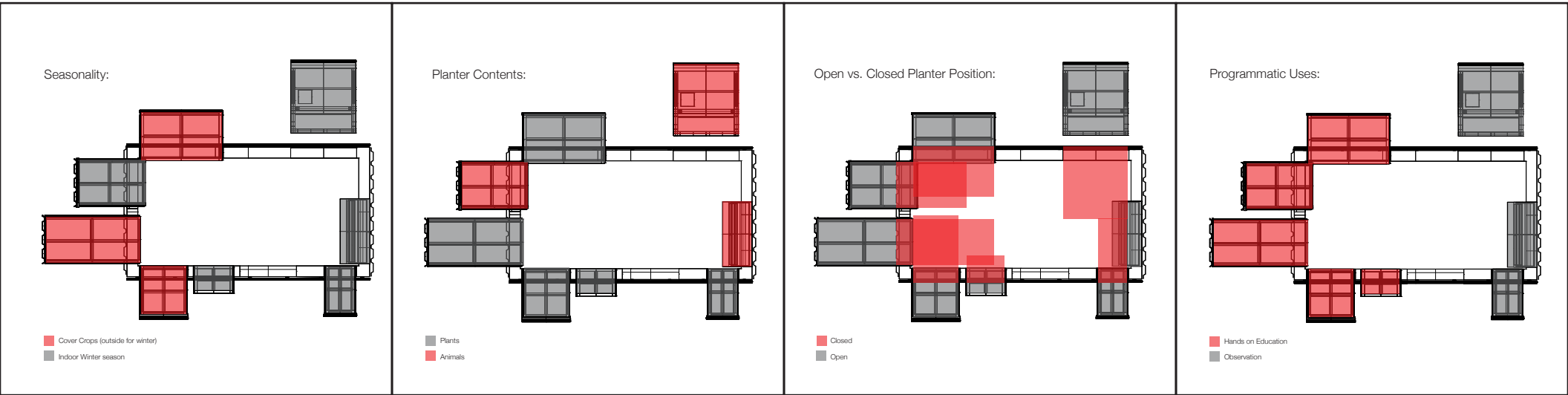
MOD Food

Chicken Coop with detachable modular run panels
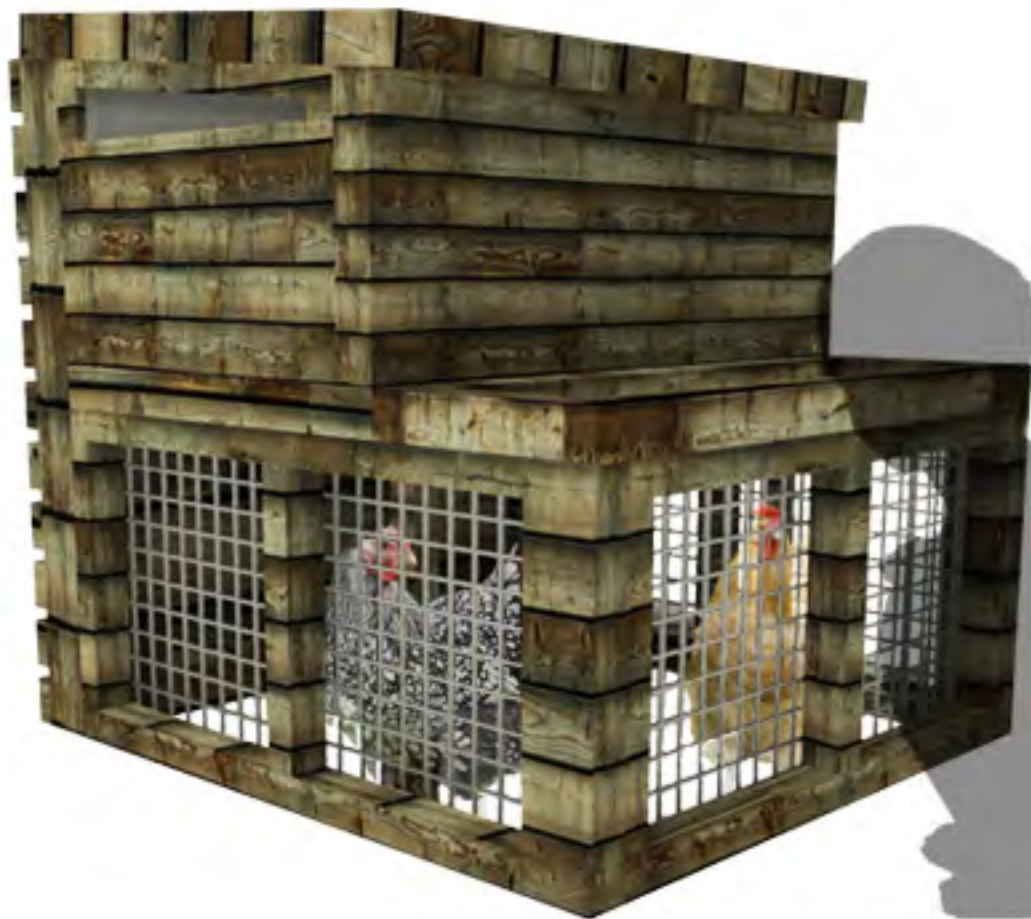
Grow Planter Box

Pocket door for full container enclosure

Indoor Living Wall for education

Glass and Wooden slat roof system for dappled indor lighting

Pop up work bench

Grow Planter Box

Corrugated Metal siding

Beehive for education and honey production

Educational Placards for education about material choices and container components

Grow Planter Box

Tool and Supplies wall storage

Beetlekill Pine Rainscreen for education and use of recycled material

Grow at Home Planter Box with removable fabric pots

Year-Round Worm Compost for education and recycling of plant and chicken waste

Grow Planter Box for hands on education about why and how to grow food

Plate 2: Program Diagrams

Seasonality:

Cover Crops (outside for winter)
Indoor Winter season

Planter Contents:

Plants
Animals

Open vs. Closed Planter Position:

Closed
Open

Programmatic Uses:

Hands on Education
Observation

Plate 3. Chicken Coop

Plate 5. Interior Green Wall and Beehive
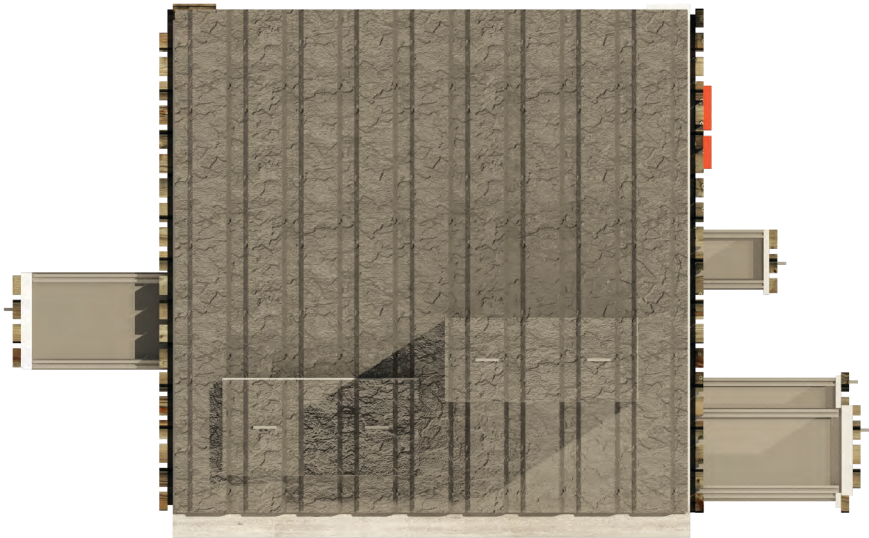
Plate 7. Longitudinal Elevations

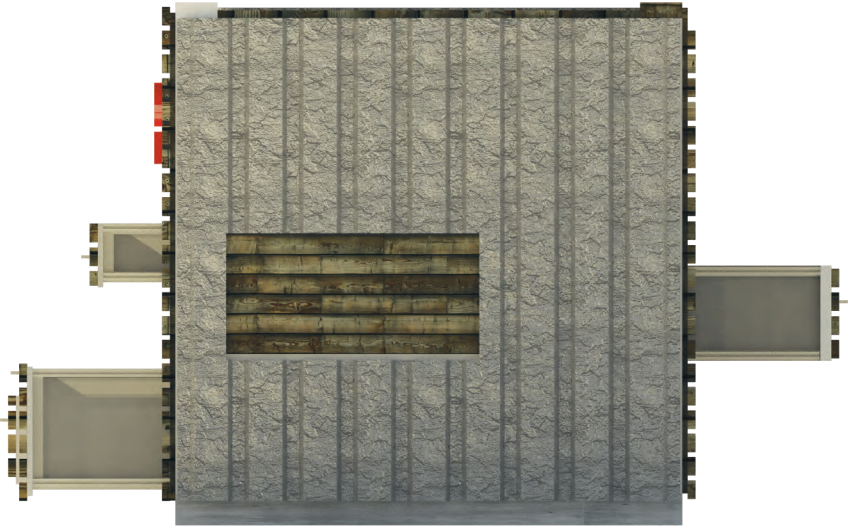Front Elevation

MOD
Food

Back Elevation

Plate 8. Latitudinal Elevations

Left Elevation

Right Elevation

Plate 9. Interior Model Perspective

Plate 10. Interior Model Perspective 2

Plate 11. Exterior Model 1

Plate 12. Exterior Model 2

Plate 13. Exterior Chicken Coop

MOD FOOD

How can food production be re-imagined and presented in a way that is eye catching, promotes a healthy diet, and fosters an excitement about and fundamental understanding of how food grows?

MOD Food aims to spark a discussion about, and respond to, these questions to provide a system that is functional, adaptable, and educational for a multitude of ages, demographics, and communities. MOD food accomplishes an integration of multiple production methods, drawing from a list of programmatic and educational components to provide awareness and education about healthy foods.

Shipping Container

Highlighting reuse and recycling principles, a basic shipping container provides a prefabricated structure for the system to be housed in. The doors also permit interior occupiable space.

Lexicon of Sustainability

Connecting consumers to farmers and production processes, the lexicons could be changed monthly or sooner to highlight new ideas. It also provides interest and signage during transportation.
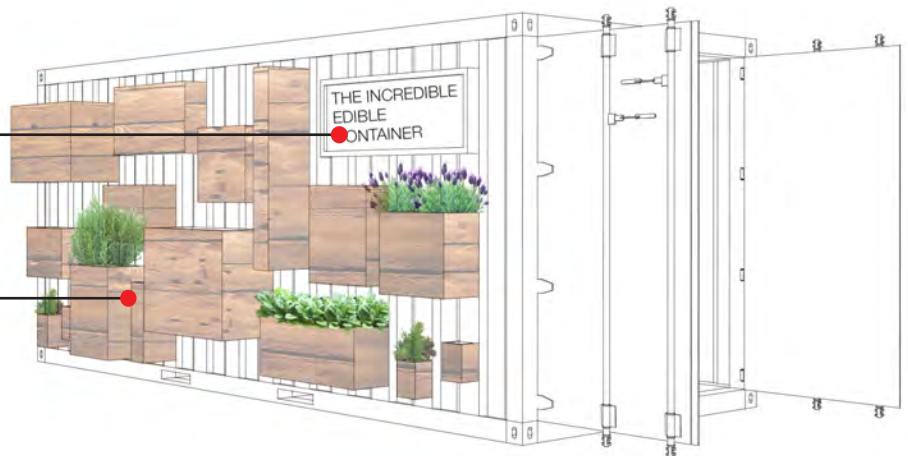
Living Walls

Swiveling out of the container, this concept was intended to make growing year round inside feasible. The living wall also provides a tactile growing component for education.
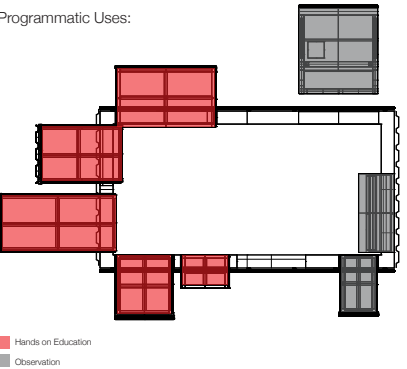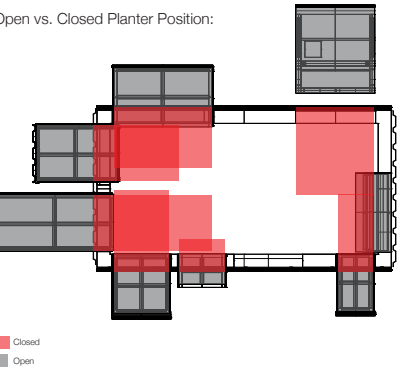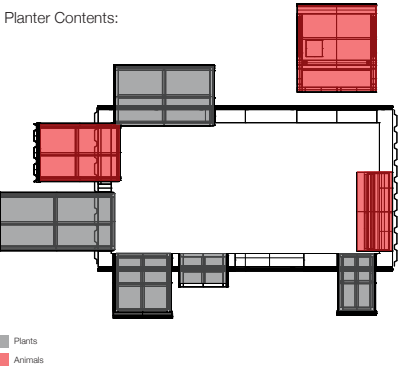
Box Branding

Signage that makes the container known wherever it is placed. Intended to be a pop of color and eye catching sign to attract users.

GROW Box

Pop out planter boxes that function as "drawers" in which plants can be grown. Intended to be a variety of sizes and shapes to accommodate different plants and productive functions.

Seasonality:

■ Cover Crops (outside for winter)
■ Indoor Winter season

Planter Contents:

■ Plants
■ Animals

Open vs. Closed Planter Position:

■ Closed
■ Open

Programmatic Uses:

■ Hands on Education
■ Observation

GROW Box

Constructed of steel frame boxes, these planter beds are closed off using modular side panels that allow for light and sight into the root system of vegetation. Fixed on a track system, the planters move in and out of the container system for transportation and food production.

Reclaimed Corrugated Metal Siding

Utilizing reclaimed corrugated metal sheets as a covering and protection for the container, this siding is reflective and textural on the exterior. Also covering the outermost faces of the garden planter boxes to create a seamless facade for shipping.

GROW and GO

Aimed at bringing the production of food to the home, this planter box is constructed with the same steel frame but alternatively is filled with fabric grow bags. Visitors or students can take the bags after they are established with plants and continue the process of growing at home.
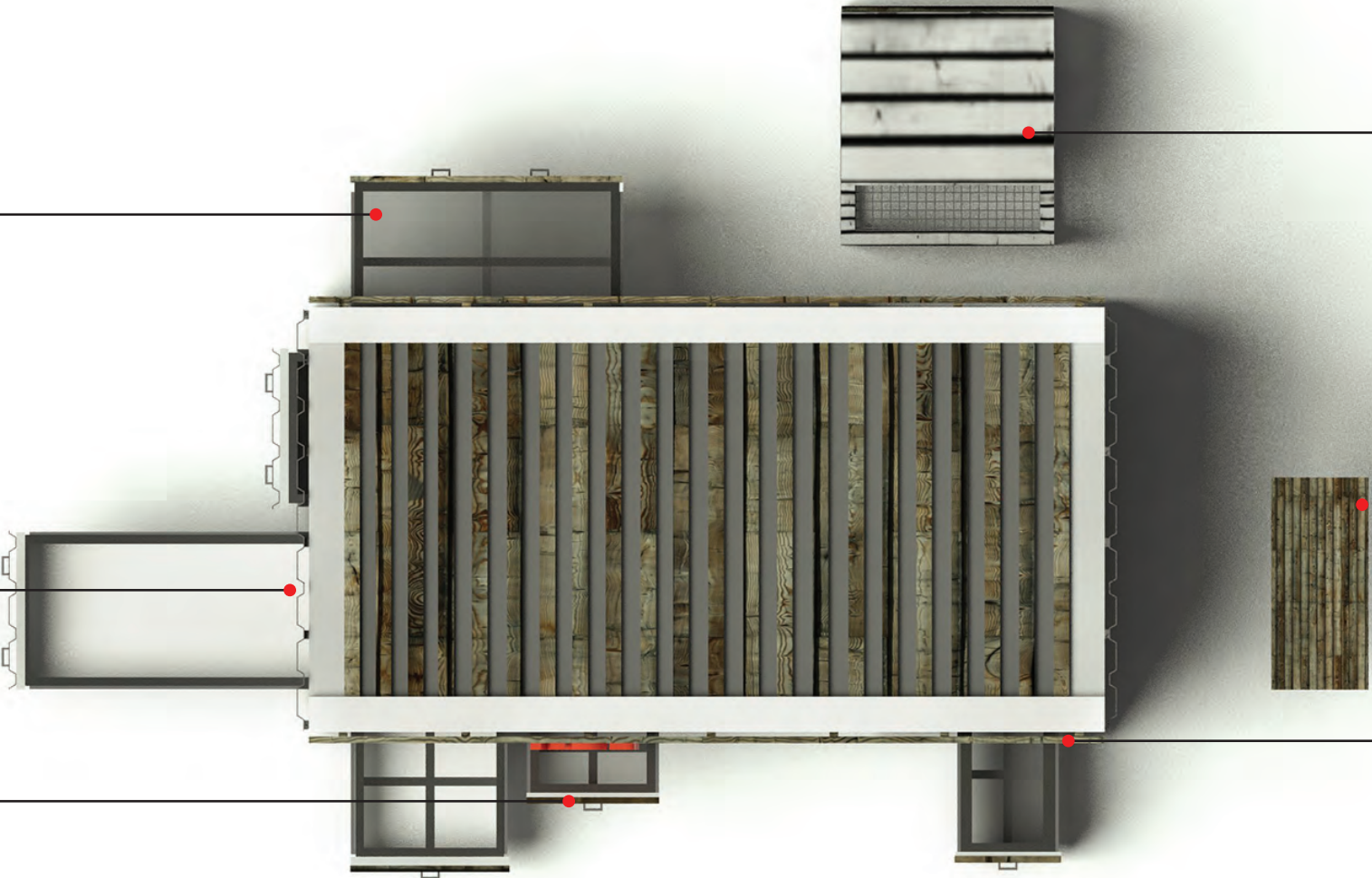
Chicken Tractor/Coop

Taking urban production to the next level, this chicken coop functions as a chicken tractor that can be rolled onto adjacent lawn space, providing the birds with new vegetation each day. The panels are removable and collapsible to accommodate transportation of the system and highlight the theme of modularity.

Indoor Beehive

With goals of education and honey production, the beehive is permanently fastened to the interior of the structure for winter warmth and visibility of the bees for visitors. Integrating a full-side viewing window and hinging lid for maintenance and honey extraction.

Beetle Kill Rainscreen Siding

The rain screen is intended to provide education about locally sourced materials (in this case Colorado beetle kill pine) and provide visual interest on the front and back faces of the container. Again the material is used on the outermost faces of the planter boxes to create a seamless facade for the container.
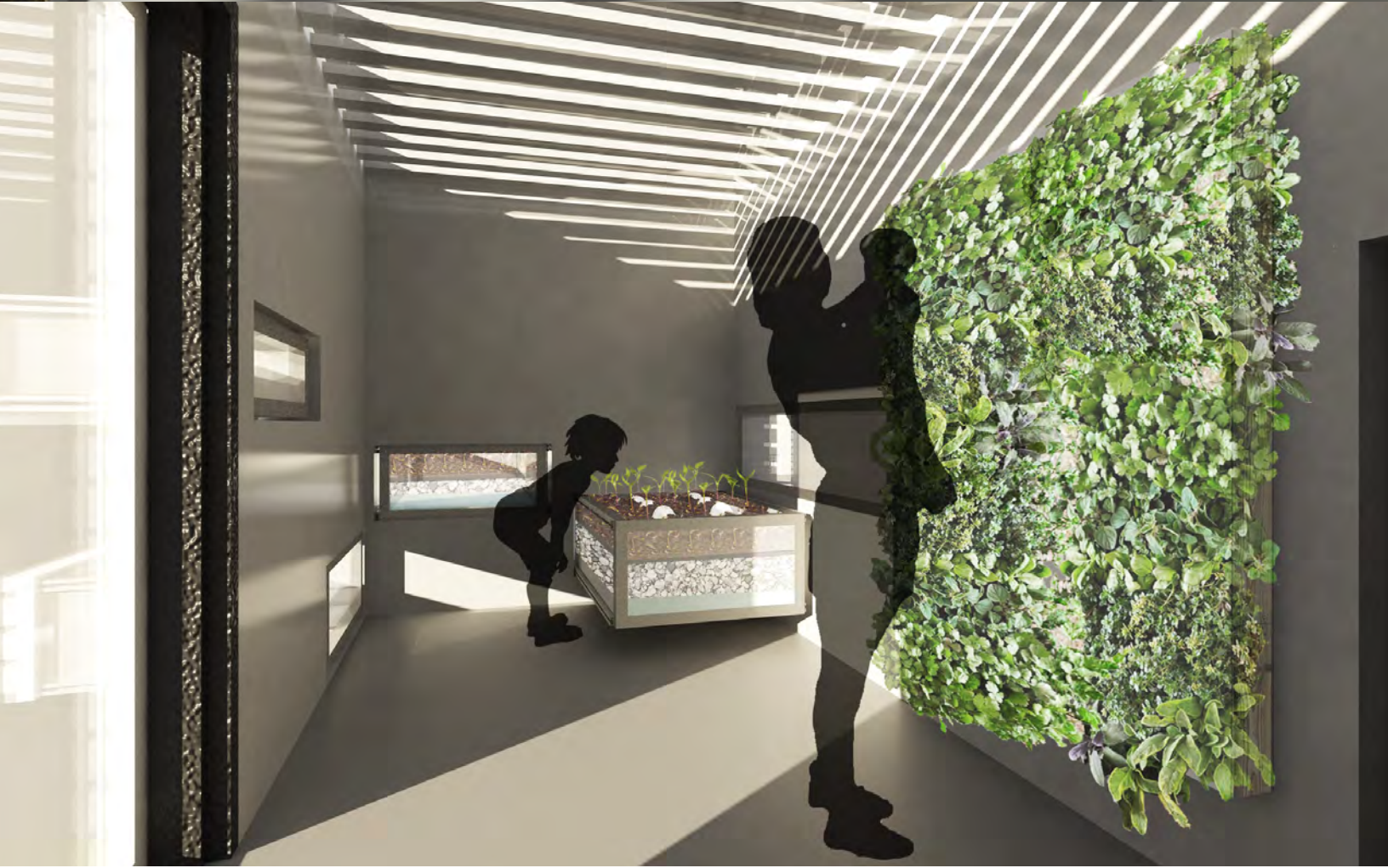
WORKS CITED

A Wicked Delicate Film and food project. 2011. "Truck farm." [Motion Picture] NYC: bullfrog films.

Albright, Mary Beth. 2014. "Getting Kids Excited About Food – The Plate." Last modified September 29,2014. http://theplate.nationalgeographic.com/2014/09/29/getting-kids-excited-about-food/.

Anger, Judith. 2013. *Edible Cities: Urban Permaculture for Gardens, Yards, Balconies, Rooftops and beyond*. East Meon: Permanent Publications.

Armstrong, D. 2000. "A survey of community gardens in upstate New York: Implications for health promotion and community development," Health & Place 6(4): 319-327.

Campbell, Lindsay, and Wiesen, Anne. 2009. *Restorative Commons: Creating Health and Well-Being Through Urban Landscapes.* Newton Square, PA. U.S. Department of Agriculture

Cassady, Diana, and Jetter, Karen, and Culp, Jennifer. 2007. "Is Price a Barrier to Eating More Fruits and Vegetable for Low-Income Families?" Journal of the American Dietetic Association.

Discover Magazine. 2014 "A House You Can Eat, Drink, & Transport." Last modified October 7,2010. http://discovermagazine.com/galleries/zen-photo/e/edible-house.

Dutko, Paula, and Ploeg, Michele, and Farrigan, Tracey. 2012. "Characteristics and Influential Factors of Food Desserts." United States Department of Agriculture.

Dziedzic, Nancy G., and Lynn M. Zott. 2012. *Urban Agriculture. Opposing Viewpoints*. Detroit: Greenhaven Press.

EPA. 2015. Policy Information: Highway Performing Monitoring System. http://permanent.access.gpo.gov/lps79552/epastat.cfm.htm

Ferdman, Roberto. 2014. "The Decline of the Small American family farm in one chart." Last modified September, 16,2014. http://www.washingtonpost.com/blogs/wonkblog/wp/2014/09/16/the-decline-of-the-small-american-family-farm-in-one-chart/

Fitzgerald, K. (1996). Growing Together: Community Gardening and Food Security. Austin, TX: Sustainable Food Center, 35 pp.

FoodShare. 2015. Toronto Mobile Good Food Market. http://www.foodshare.net/mobilegoodfoodmarket

Frumpkin, Howard. 2002. "Urban Sprawl and Public Health." Public Health Reports. Vol. 117.

Gorgolewski, Mark, Komisar,June, and Nasr, Joe. 2011. *Carrot City: Finding Places for Urban Agriculture*. 1st ed. Vol. 57. New York: The Monacelli Press.

Graff, Gordon. 2009. "A Greener Revolution: An Argument for Vertical Farming." Plan Canada 49 (2): 49-51.

Inhabit. 2014. "OVA Studio Transforms Shipping Containers into Modular, Jenga-Like Urban Farming Ecosystem." Accessed October 14,2014. http://inhabitat.com/ova-studio-proposes-jenga-like-modular-farming-structure-to-bring-fresh-greens-to-urban-centers/ova-studio-urban-farm/.

Kaufman Phil, and Lutz, Steven. 2014 "Competing forces affect food prices for low-income households." Food Rev. 1997:8-12.

Kimbrell, A. (2002). *The fatal harvest reader: The tragedy of industrial agriculture.* Island Press

Klemmer, C. D., Waliczek, T. M., & Zajicek, J. M. (2005). Growing minds: The effect of a school gardening program on the science achievement of elementary students. HortTechnology,: 448-452

Koscica, Milica. 2014. "Agropolis: The Role of Urban Agriculture in Addressing Food Insecurity in Developing Cities." Journal of International Affairs. vol. 67, No. 2.

Lehr, Christian B., Jörn-Henrik Thun, and Peter M. Milling. 2013. "From Waste to Value – a System Dynamics Model for Strategic Decision-Making in Closed-Loop Supply Chains." International Journal of Production Research 51 (13): 4105–16.

Lineberger, S. E. & Zajicek, J. M. (2000). School gardens: Can a hands-on teaching tool affect students' attitudes and behaviors regarding fruit and vegetables? HortTechnology: 593-597

Mccrate, Colin and Halm, Brad. 2012. *Food Grown Right in Your Backyard*. Seattle: Mountaineers Books.

Meinhold, Bridgette. 2009. "The Incredible Edible House." Inhabitat. Last modified April 30, 2009. http://inhabitat.com/the-incredible-edible-house-of-the-future/

Mougeot, Luc J. A., 2005. *Agropolis: The Social, Political and Environmental Dimensions of Urban Agriculture. Ottawa, Canada:* London; Sterling, VA: International Development Research Centre; Earthscan.

OVAStudios. 2015. Hive City Inn Farm: Modular Farming Structure, New York. http://www.ovastudio.com/works/hive-inn%E2%84%A2-city-farm

Philips, April. 2013. *Designing Urban Agriculture: A Complete Guide to the Planning, Design, Construction, Maintenance, and Management of Edible Landscapes*. Hoboken, New Jersey: Wiley.

Robinson, C. W. & Zajicek, J. M. (2005). Growing minds: The effects of a one-year school garden program on six constructs of life skills of elementary school children. HortTechnology,: 453-457.

Salvidar-Tanaka, Laura, and Krasny, Marianne. 2004. "Culturing Community Development, Neighborhood Open Space, and Civic Agriculture: the Case of Latino Community Gardens in New York City". Agriculture and Human Values. Vol. 21. Issue 4. 399-412.

Seattle Urban Farm Company. 2015. Accessed September 18,2014. http://www.seattleurbanfarmco.com/.

SlowFoodUSA. 2015. About Slow Food. http://www.slowfoodusa.org/about-us

SlowMoney. 2015. About Slow Money. https://slowmoney.org/vision

Smit, Jac. 2996. "Urban Agriculture: Food Jobs and Sustainable Cities." Virginia. United Nations Development Publications.

Storefront Transformer (SFTF). 2014. "miLES STOREFRONT TRANSFORMER". Accessed September 18,2014. http://storefronttransformer.com/prototype/.

Sturtevant, Lisa, and Jung, Yu. 2011. "Are We Moving Back to the City? Examining Residential Mobility in the Washington, DC Metropolitan Area. Growth and Change. Vol. 42, Issue 1. 48-71.

Thompson, Tamara. 2014. *Urban Farming. At Issue. Social Issues*. Farmington Hills, Mich: Greenhaven Press.