CULTIVATING THE FUTURE: DESIGNING AND CONSTRUCTING A DIDACTIC GARDEN

GARDEN ENTRANCE

ADA PLANTERS LOOKING TOWARDS DEMONSTRATION AREA

FARMBOT DEMONSTRATION BEDS

"WHAT IS GROWING IN THE GARDEN" SIGNAGE

RAISED PLANTERS WITH CIRCULAR TRELLIS

GATEWAY ARBOR

Program Statement:

Designed to be a laboratory for learning. The Didactic Garden is a sustainable space for teaching, research, and outreach in support of local food. Designed and built using an integrated project delivery methodology with students of architecture, landscape architecture, and graphic design, the garden highlights the best of what each discipline can contribute to a collaborative design process.

The garden has a simple but thoughtful design that works with the existing site to create a series of "rooms" associated with four terrace levels. A central walk and stair tie the rooms together creating a central axis for service and accessibility.

Numerous educational elements are incorporated into the garden including Farmbots, a classroom space, and educational graphics. Incorporating technologies typically reserved for larger applications, the garden minimizes potable water consumption and maximizes efficiency through an automated water recovery, collection, filtration, and distribution system. Overall, the garden is an innovative landscape that has serves as a model for what urban agriculture could become as it is intentionally integrated into communities. Scope and Size

Garden by the numbers:

Area: 8,000 sq. ft.

Storage: 320 sq.ft.

Storage and Arbor: 750 sq.ft.

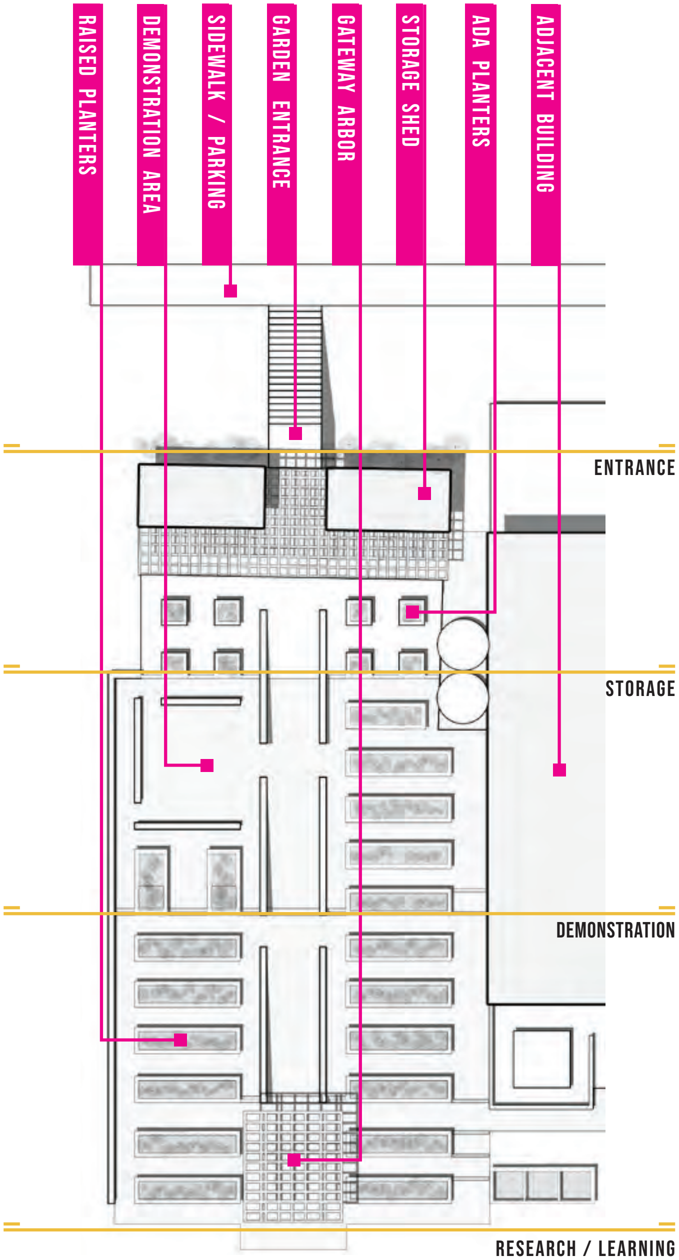
4'x16' Standard Beds: 17

5'x10' Farmbot Beds: 2

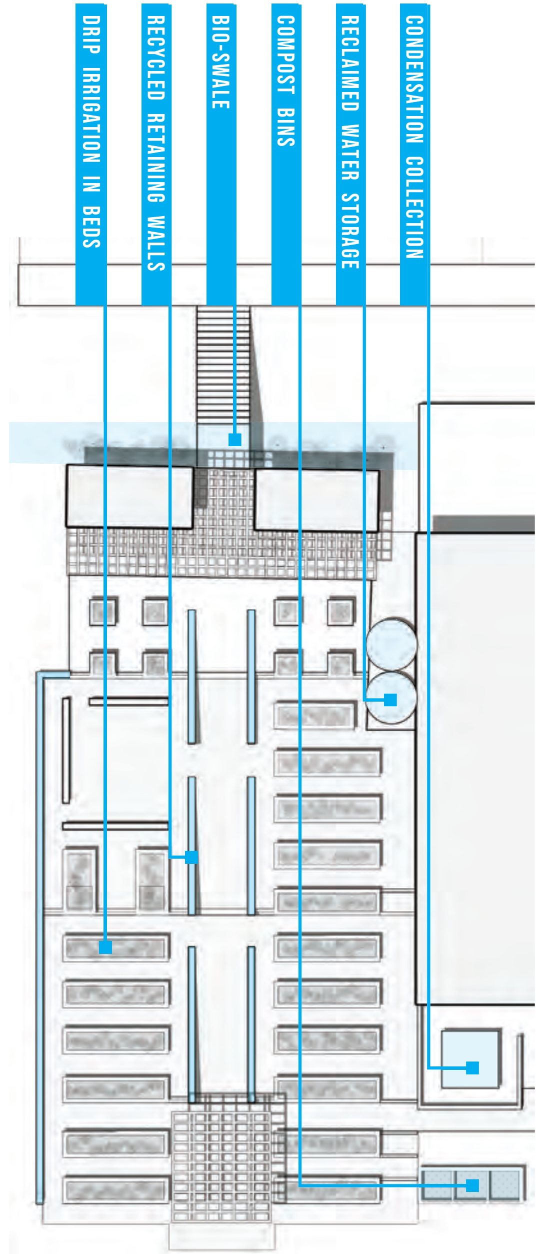
4'x4' Accessible Beds: 8

4'x4' Compost Bins: 3 Stages

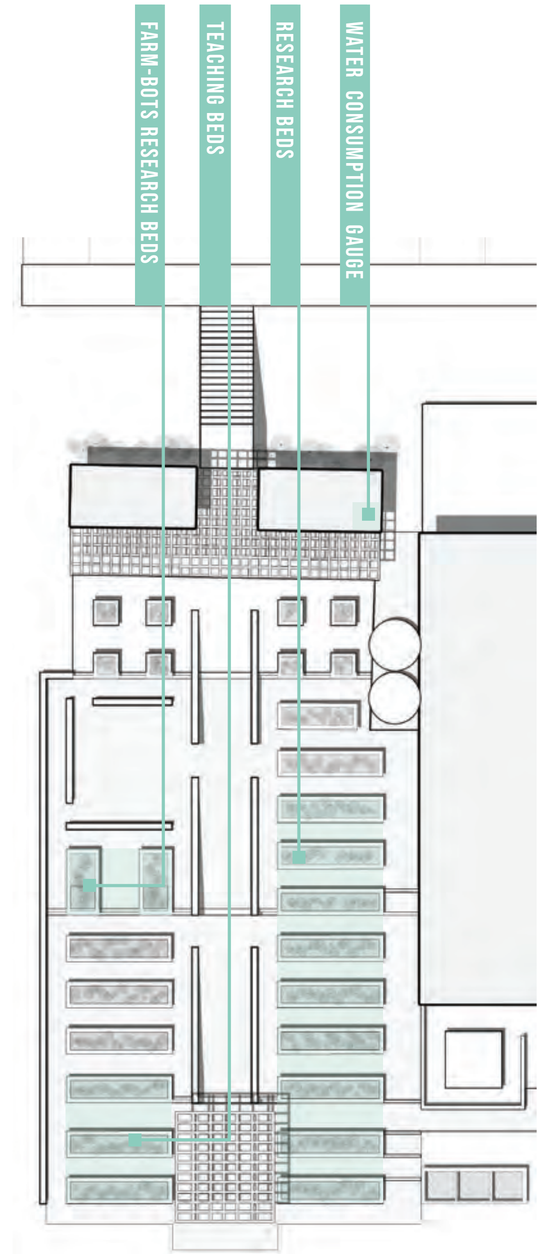
Cistern Storage: 4,000 Gallons



DESIGN ELEMENTS



SUSTAINABLE STRATEGIES



RESEARCH OPPORTUNITIES

Project Location:

Located in one of the most obese states in the U.S., the garden sits on the edge of a university campus. An adjacent parking lot to the north, an accessible parking lot to the east, and a nearby transit route make the garden easily accessible to anyone in the community. As a lab for teaching and learning about urban agriculture, the garden is a unique tool for combating issues related to food, nutrition, and health in the region.

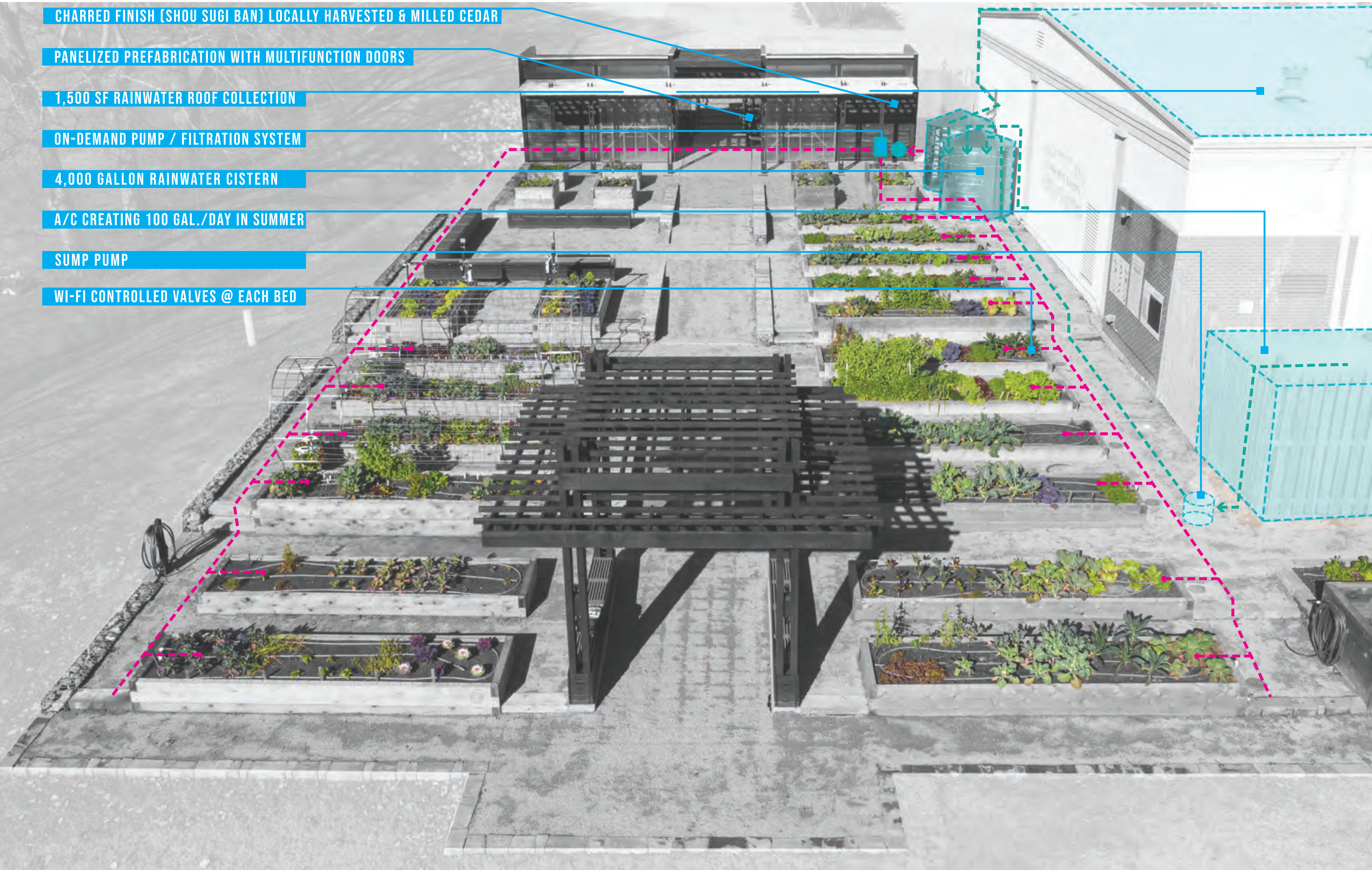
Design Logic:

The site aerial illustrates the current, built condition of the garden along with images of key components for reference. The didactic garden serves as a multifunctional landscape that is used by primary, secondary, and university students along with adult members of the community wishing to rent a bed. The garden has several different types of raised planters. All of the accessible planters incorporate a sub-surface, wicking system that allows plants to be watered from below, reducing evaporation and watering intervals.

Designed for maximum flexibility and water conservation, the garden collects both rainwater and condensation; filters it; and then re-distributes it to each bed with a 24 zone wi-fi connected controller tied into the local weather station.

Site Diagrams:

The three site diagrams highlight features of the plan that contribute to the design, sustainable strategies and research opportunities, which make the garden a unique learning environment.



SUSTAINABLE WATER STRATEGIES

Influences:

With subtle Japanese influences, the gridded layout of the structures and garden is evident vertically and horizontally as the garden transitions through four terraces. A central, accessible walk slopes up the terraces forming a central axis through the garden.

Gardening:

Managed by a student garden club, the garden is actively used for outreach, classroom education, and research. However, most of the beds are reserved for “rental” to the community which organizes social events in the space.

DESIGN ELEMENTS

Designed to Teach:

The garden includes a dedicated gathering space for teaching and demonstration of garden practices. Additionally, wall signage and a communal chalk board provide suggestions for seasonal planting while subtle design elements like tick marks guide plant spacing.

Significance:

As an intentional community garden space, the learning garden offers an unprecedented combination of innovations and technologies in a beautifully refined and detailed landscape that is both sustainable and easily maintainable.

Measuring Success:

Over 300 community members engaged or were active in the garden in its first full year. Its success can be seen in the love and care the garden has received from everyone that has taken ownership and contributed to its continued development.

DESIGN ELEMENTS

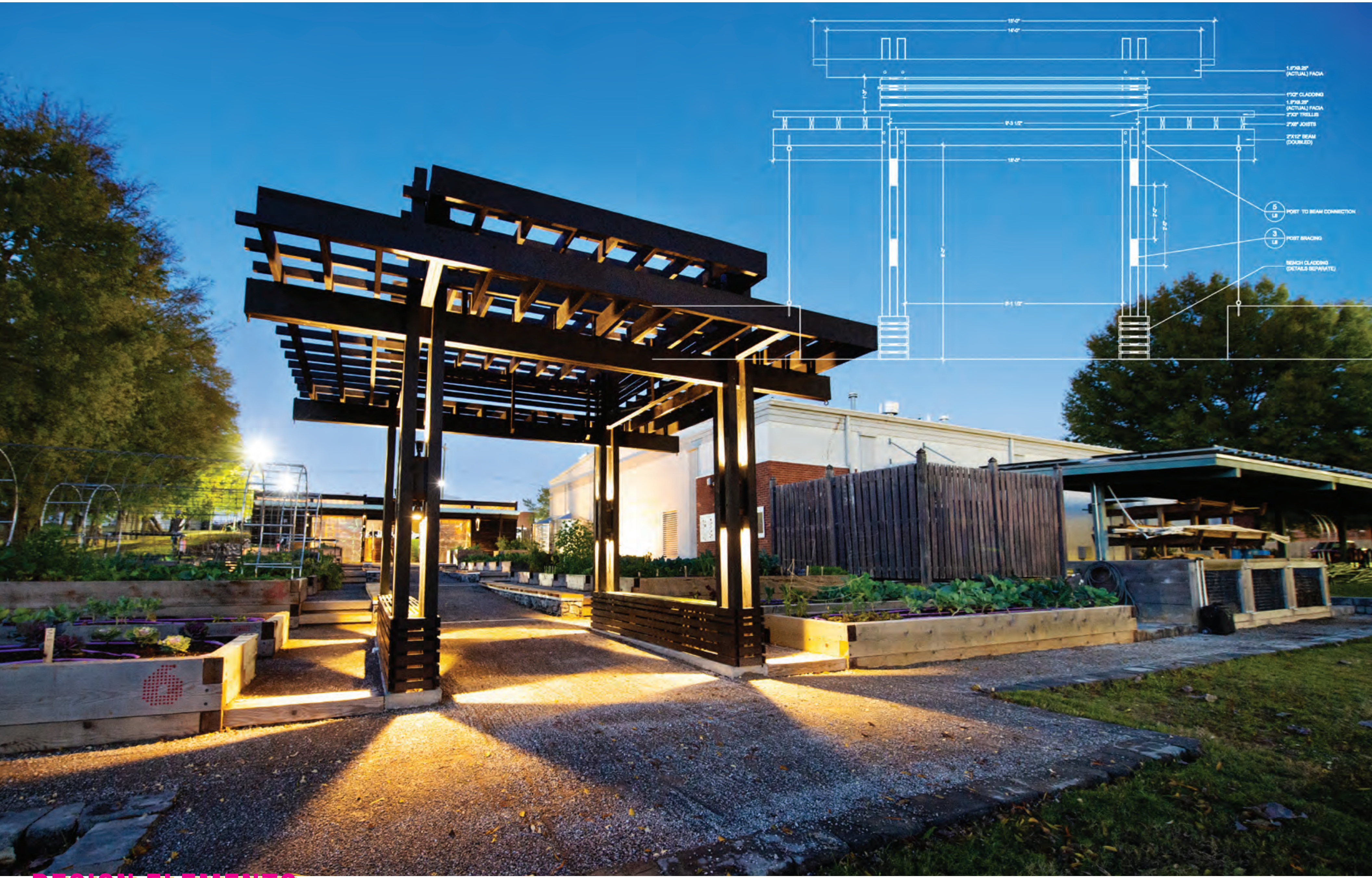
Flat-Pack Stair:

A collaboration between architecture and landscape architecture students, the entry stair bridges over the steep terrain rolling down from the adjacent parking lot. The stairs are supported by truss / handrails that was laser cut from two sheets of 5/8" plate steel. Cedar boards float from the trusses to create each tread and serve as the lateral bracing, saving material by placing all elements into a multifunction role as structure and serviceable surface.

Details that Teach:

The handrails of the entry stair are built of plate steel, angle iron and milled cedar. The design incorporates numerous reveals, some fitted with LED lighting to accent the floating character of this unique architectural element while providing safety and reducing energy usage.

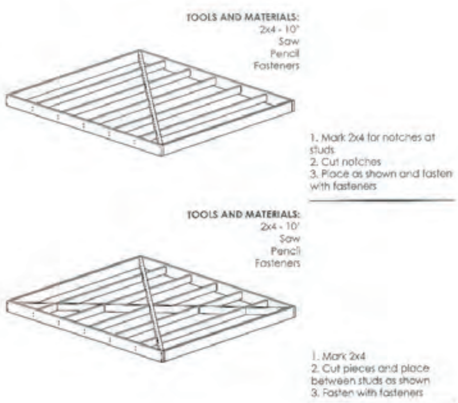
This stair utilizes a Flat Pack design and fabrication methodology to achieve increased material and machining efficiency. The cut-offs "truss webbing" will eventually be used to build movable benches/ seating. The stair treads and kicks are constructed of a locally harvested and milled cedar to again minimize embodied energy while promoting the local forestry industry.

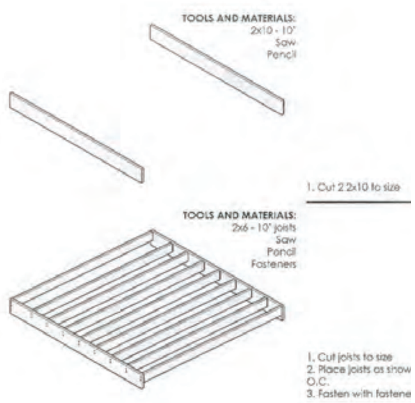


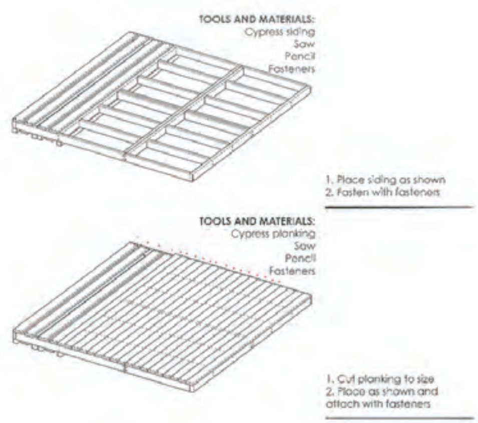
DESIGN ELEMENTS

LED Lighting:

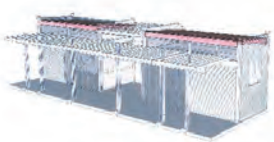
The entire garden incorporates low-voltage LED accent lighting with numerous controls allowing the system to be operated on a timer or remotely via a smart phone application. The lighting design and installation was completed by students as a way of learning about basic electrical usage while comparatively analyzing the efficiency of LED fixtures vs. traditional.







1S.2



1J.1

1I.3

DESIGN & ASSEMBLY

Materials & Methods Matter:

The Potager Sheds were designed a prototype unit for visitors to be able to reproduce on their own at home should they wish. The sheds are intended to be built on the ground and erected as kit of parts. Construction guides, including materials list and construction sequencing are available upon request.

Here students of Architecture and Building Construction Science review the daily tasks and safety concerns. The panelized construction system was built, moved and installed in 3 weeks meeting both time and budget. Each student generated an instruction booklet based on his/her 3D model. The study of the construction in this way worked to increase productivity and predictability, with students having a clear picture of the tasks and sequence.

BUILD | design:

This pedagogy utilized orthodox construction and materials as the means of materials and methods introduction in the design studio. The 2nd year students worked to realize a form with known methods and materials which they then used to define a form in a later individual project that term. By working with a system, they were taught how to manipulate and translate that system to meet their individual concepts.

DESIGN & ASSEMBLY

Materials & Methods Matter:

Locally grown and harvested cedar, a traditional material choice for our region was used in conjunction with the all-natural Japanese charred wood finishing method known as Shou Sugi Ban. Students used roofing torches to create a 1/8" deep carbon casing to encrust the cedar and protect the wood from UV and pest damage without the use of harmful chemical finishes.

Cedar was also chosen as the planter material for its longevity. Local limestone and reclaimed pavers are used on all walk surfaces.

DESIGN & ASSEMBLY

Three-2-One:

Working to develop a flexible set of teaching, task, and storage spaces, the faculty and students fitted the Potager Labs with a unique set of cable and pully operated bi-folding gullwing doors. The doors may be hinged and locked at the waist to provide an ADA compliant work surface or they may be fully folded and raised on pivots to open both labs to the center bay, thus making three spaces into one.

The lower sections of the door are sheathed with expanded metal while the upper portions are clad in polygal to function as light transmitting walls and minimizing the need for artificial lighting.

A hand crank winch system allows for operation, but the system is also fitted with a custom designed receiver that enables the doors to be rapidly lifted with a common battery operated drill/driver.

CONSTRUCTION OF CIRCULAR TRELLIS

CONSTRUCTION OF RECYLED RETAINING WALLS

CONSTRUCTION OF RECYLED RETAINING WALLS

CONSTRUCTING THE GARDEN

Realization:

Individual students were responsible for the design, refinement, costing, material acquisition and construction of individual elements. Shown here, the circular trellis was custom designed from raw materials to make the 6' diameter circle.

The entire garden was built as a collaborative design/build studio with architecture, landscape architecture, and graphic design students contributing over two semesters. Students organized service days to allow community members to contribute to their garden.

Installation Methods:

Initial site grading was donated by a construction crew. Everything else in the garden was made by hand using wheelbarrows, shovels, and power hand tools. Each element was conceptually designed then mocked up using various techniques. Designs were refined in the field and detailed as the designs were finalized.

CONSTRUCTION OF RAISED PLANTERS

ROUTED NUMBERS USED TO IDENTIFY PLANTERS

CONSTRUCTING THE GARDEN

Installation Methods:

Initial site grading was donated by a construction crew. Everything else in the garden was made by hand using wheelbarrows, shovels, and power hand tools. Each element was conceptually designed then mocked up using various techniques. Designs were refined in the field and detailed as the designs were finalized.

DRIP IRRIGATION

ON DEMAND PUMP AND FILTRATION

WATER FLOW METER ON CISTERN

SUSTAINABLE WATER STRATEGIES

Environmental Impacts and Concerns:

As vegetable gardens consume high volumes of water, water reclamation strategies were put into place to capture A/C condensation and rainwater from the adjacent building in two, two-thousand gallon cisterns that are used for garden irrigation. All water is filtered through a five-stage filtration system before being delivered to the garden.

Each input point has a flow-meter, and the cisterns have a graphic volume scale so that data can be collected, and the system refined.

Irrigation to each bed is controlled by a Wi-Fi enabled controller connected to the local weather station so that irrigation needs are adjusted based on local weather conditions. Each bed has its own valve so that they can be turned off when not in use and adjusted to meet specific growing needs. Water that cannot be captured for reuse is directed through a bioswale before leaving the site.

SOIL PERCOLATION EXPERIMENT

HARVEST YIELD RESULTS

RESEARCH PLOT

RESEARCH OPPORTUNITIES

Project Location:

Located in one of the most obese states in the U.S., the garden sits on the edge of a university campus. An adjacent parking lot to the north, an accessible parking lot to the east, and a nearby transit route make the garden easily accessible to anyone in the community. As a lab for teaching and learning about urban agriculture, the garden is a unique tool for combating issues related to food, nutrition, and health in the region.


6

Site of Opportunity:

The didactic garden is situated on a remnant site straddling a steep slope coming down from the adjacent parking lot to the north, a drainage wash from Bully Blvd. to the west, and the back wall of a Food Processing laboratory facility to the east. Building upon the potential of the remnant site, the garden was designed to incorporate the terrain shifts into demonstrative water management features while given a sense of enclosure and turning awkward residual spaces into an outdoor classroom environment. While the spatial planning addresses large scale issues, the structures are laced with a clear sense of multipurpose thinking.

The image to the left illustrates how the stairs may be used as seating for students when the gullwing doors are fully opened to provide an informal stage for a speaker or large scale presentation/demonstration.


COMMUNITY GARDEN


COMMUNITY GARDEN












MEASURING SUCCESS