



# *The LivingRoom:* **prototype** outdoor classroom + learning gardens

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The LivingRoom project is an ongoing study that is attempting to redefine what an outdoor classroom learning garden looks like and how it functions by aligning teacher needs with food, health, and nutrition education goals. The community-based project highlights the creative potential of a collaborative process integrating expertise from multiple disciplines including education, architecture, graphic design, material science and landscape architecture to generatively combine ideas into a unique and dynamic space type. With a focus on instruction and cost-effective replication, the LivingRoom provides a flexible, expandable, and maintainable approach to giving students the experience of seeing nature at work.

4 DIFFERENT PROJECTS

COVERING AREAS OF  
3000, 5500, 15,000 sf

STRUCTURES COST  
\$18.00 to \$62.00 / sf

CONSTRUCTION COST  
\$25,000 - \$135,000.00

COMPLETION  
Oct. '20, May + July 2021

## PROGRAM STATEMENT

Designed to be a laboratory for learning, The Living Room is a sustainable space for teaching, research, and outreach in support of food security and healthy living. Designed and built with students of architecture, landscape architecture, and graphic design, the LivingRoom prototype system highlights the best of what each discipline can contribute to a collaborative design process. Intended to be easily replicated to accommodate various site conditions and/or size restrictions, the modular system is endlessly customizable. Incorporating formwork saving 3D printed concrete site furnishings, low-cost recyclable steel fence components, and water saving raised planters the design minimizes potable water consumption and maximizes growing efficiency. The structures are designed to provide a space for gathering and instruction while also serving as growing supports, green houses for cultivation and storage for teaching supplies and tools. The LivingRoom is an innovative system that is serving as a model for what early childhood educators might one day come to use across the state of Mississippi and beyond.





V3+4

THE LELAND, MS (#3) &  
LEFLORE, MS (#4)  
LIVINGROOMS

COVERING AREAS OF  
3000+/- sq/ft

STRUCTURES COST  
\$18.00 / sf

CONSTRUCTION COST  
\$25,000

COMPLETION  
#3 July 2021, #4 July 2022



## U.S. HEALTH AND NUTRITION

- 18.4% OBESITY AMONG SCHOOL CHILDREN
- OBESITY RATES ARE 3 TIMES WHAT THEY WERE 30 YEARS AGO
- 23 MILLION PEOPLE LIVE IN A FOOD DESERT
- HALF OF PEOPLE LIVING IN FOOD DESERTS ARE LOW INCOME

## MS HEALTH AND NUTRITION

- 25.4% OBESITY AMONG SCHOOL CHILDREN - HIGHEST IN US -
- 14.3% RATE OF CHILDHOOD DIABETES - 3RD HIGHEST IN US -
- \$4,951 SPENT PER CHILD ON EDUCATION - 5TH LOWEST IN US -

## BENEFITS OF SCHOOL GARDENS

- HANDS-ON EXPERIENCES PROMOTE KIDS' CONNECTION TO PLANTS AND FOOD.
- GARDENS CREATE A CONSISTENT VENUE FOR TEACHING NUTRITIONAL EDUCATION.
- GARDENS CAN EXPAND NUTRITIONAL EDUCATION IN AN ACADEMIC YEAR BY UP TO 10X.
- PROLONGED EXPOSURE TO GARDENS CAN BUILD AN EMOTIONAL CONNECTION TO FOOD, ALLOWING THEM TO FEEL PROUD OF THE FOOD THEY GROW AND MORE OPEN TO TRYING NEW FOODS.
- AT SCHOOLS WITH A GARDEN/ EXPERIENTIAL FOOD LEARNING PROGRAMS, KIDS EAT UP TO 3X AS MUCH FRUIT AND VEGETABLES DURING SCHOOL LUNCH.
- KIDS WHO ARE PART OF REGULAR SCHOOL GARDEN PROGRAMS ARE MORE LIKELY TO HAVE HEALTHY FOOD OPTIONS AT HOME.

HARVARD, GRADUATE SCHOOL OF EDUCATION, LET IT GROW PROGRAM

## PROBLEM STATEMENT

- CREATE A SCHOOL LEARNING GARDEN THAT IS:
- DESIGNED FOR ELEMENTARY EDUCATION.
  - FOCUSED ON INSTRUCTION.
  - DESIGNED TO PROMOTE OWNERSHIP BY A CLASS AS WELL AS INDIVIDUAL STUDENTS.
  - FOR USE IN A RANGE OF INSTRUCTION IN SEVERAL DIFFERENT CLASSROOM SUBJECTS.
  - FOR GROWING A VARIETY OF PLANTS WITH VARIOUS NEEDS.
  - EASY TO MAINTAIN BY TEACHERS AND INEXPERIENCED GARDENERS.
  - INEXPENSIVE AND MADE FROM READILY AVAILABLE MATERIALS.
  - FLEXIBLE TO ALLOW FOR EXPANSION AND INCREASED PLANTING AREA WITH TIME AND INTEREST.



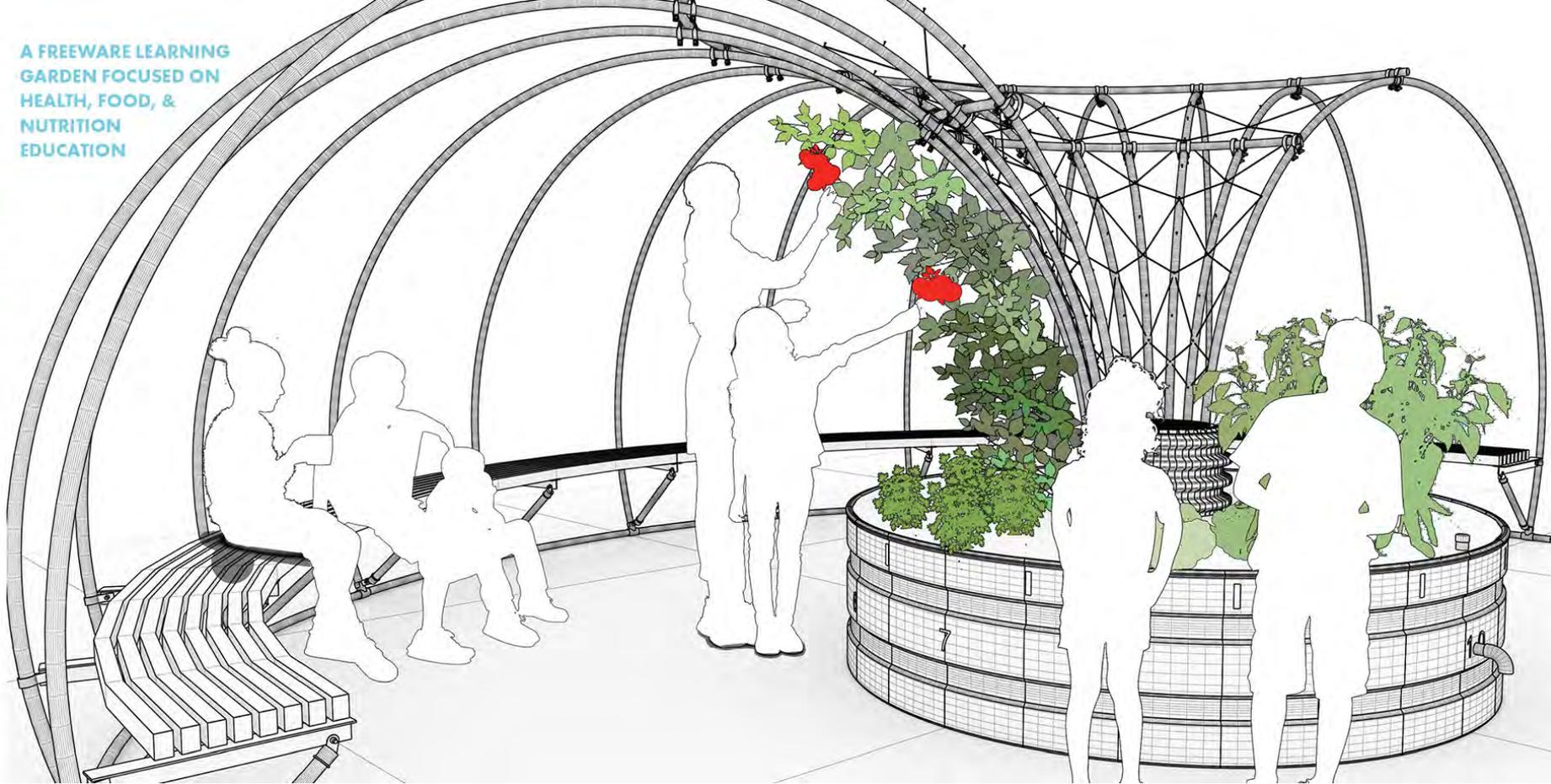
## SCHOOL GARDEN USE RESEARCH

SCHOOL GARDEN FUNCTION	PLANTS GROWN IN GARDENS	SUBJECTS TAUGHT IN GARDENS	NUMBER OF SUBJECTS BY AGE	BARRIERS TO USING GARDENS	BARRIERS TO CREATING GARDENS	SUMMARY
Academic Instruction 89%	Flowering Plants 90%	Science 95%	K to 8th 4-5	Time Constraints 88%	Lack of Funding 60%	Teachers have limited time to care for gardens. Teachers have limited resources to create gardens. Gardens are most effectively used in elementary education. Science, environmental studies, and nutrition are most often taught in gardens. Gardens need to support flowering plants, edible produce, and herbs. Academic instruction is the primary function of gardens.
Extracurricular Activities 60%	Edible Produce 77%	Environmental Studies 70%	High School 1-2	Lack of Instructional Material 74%	Time Constraints 50%	
Food Production 39%	Herbs 53%	Nutrition 66%		Lack of Teacher Interest/Training 70%	Lack of Supplies 49%	
		Language Arts 60%				
		Math 59%				
		Agricultural Education 46%				

Graham, H., Beall, D. L., Lussier, M., McLaughlin, P., & Zidenberg-Cherr, S. (2005). Use of school gardens in academic instruction. *Journal of Nutrition Education and Behavior*, 37(3), 147-151.

### Overview:

This dynamic, community service design project began with exploring the potential for an outdoor classroom and learning garden at Galloway Elementary School in Jackson, MS. As work commenced and the design took shape the scope evolved to become a prototype design exercise focused on health, food, and nutrition education. Through research into learning gardens' physical, pedagogical and administrative needs, the team determined that there was a major divide between the way gardens were used and how they were being built. Most applications envision a type of hope garden or miniature farm, designed for production where kids are active "farmers" cultivating the garden throughout the year. While this model has been successfully executed, it is an extremely resource intensive and therefore often financially beyond the reach of most struggling schools. Our team decided to design a learning garden which would focus on being outdoors and on the science of cultivation and nutrition rather than large-scale production, thus minimizing the need for on-going garden maintenance.



Overview continued:

The LivingRoom learning garden attempts to redefine what a learning garden looks like and how it functions by aligning teacher needs with food, health, and nutrition education goals. Materials for the base model (pictured above) are readily available for under \$1,500.00 and can be implemented at any school by volunteers using the simply to follow installation guide. Focused on instruction, the garden provides a flexible, expandable, and maintainable approach to giving students the experience of seeing seeds grow into food they can eat. The system may be expanded over time as funds and needs grow. In a similarly practical way, components may be easily disassembled and relocated as schools' experiment with the classroom type and how it fits, or does not fit, into their unique pedagogical agendas.

# PROJECT PROCESS



**PRECEDENTS**  
 Author Ashe, Nola  
 PS-216, Brooklyn  
 Big Green-Memphis  
 King Middle, Berkeley  
 PS-7, Manhattan  
 MSU Community Garden

**FUNCTION**  
 Watering Simplicity  
 School Season Appropriate  
 Vertical Growing  
 Horizontal Growing  
 Instruction Focused  
 Classroom Scale



**SYSTEMS**  
 Planter  
 Sub-Surface Wicking  
 Vertical Trellis and Stem  
 Sealing

**COMPONENTS**  
 Cattle Trough  
 Pool Paint  
 PVC Pipe  
 Depth Gauge  
 Culvert Pipe  
 High-Tunnel Hoops  
 High-Tunnel Hardware  
 Treated Pine



**METRICS**  
 350 Students  
 K to 5th Grade  
 1 Garden  
 5 Planters  
 Funded by:  
 The Bloomberg Foundation  
 Completion:  
 Fall 2020

**PROCESS**  
 Student:  
 Conceptual Design  
 Typology Refinement  
 Garden Layout  
 Drawings  
 Documentation  
 Fabrication  
 Deployment



**DRAWING SET**  
 L1 Garden Layout  
 L2 Planter Details  
 L3 Bench Details  
 L4 Sub-surface Watering  
 L5 Cold-frame Details  
 L6 Materials List

**BROCHURE**  
 Arrangement Options  
 Construction Process  
 Material List  
 Cost Estimate  
 Student Capacity  
 Alternative Components



## RESEARCH



## RESEARCH/ PROBLEM DEFINITION



## CHALLENGES

**COMPONENTS**  
 Low Cost  
 Off-the-shelf  
 Replication  
 "Plug-in & Grow"  
 Durable  
 Low Maintenance

**FUNCTION**  
 Watering Simplicity  
 School Season Appropriate  
 Vertical Growing  
 Horizontal Growing  
 Instruction Focused  
 Classroom Scale



## ELEMENTS



## GARDEN TYPOLOGY DESIGN



## REFINEMENT

**PROCESS**  
 Component Research  
 Alternatives  
 Modeling  
 Fabrication  
 Prototyping  
 Detailing

**METRICS**  
 180 Planter  
 43x4 ft. of Growing  
 371 ft. of Seating  
 43 cu ft. of Soil  
 12 Bgal. of Water Storage  
 13, 20" Trellis Hoops



## GALLOWAY ELEMENTARY



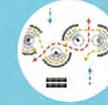
## PROOF OF CONCEPT



## PARTNERSHIP SCHOOL

**METRICS**  
 1,200 Students  
 6th & 7th Grade  
 4 Garden "Pods"  
 6 Planters Per Pod  
 24 Total Planters  
 Funded by:  
 Blue Cross/Blue Shield  
 of Mississippi  
 Completion:  
 Summer 2020

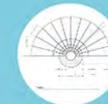
**PROCESS**  
 Student:  
 Programming  
 Schematic Design  
 Typology Refinement  
 Garden Layout  
 Professional:  
 Drawings  
 Documentation  
 Contractor:  
 Construction



## DOCUMENT



## DOCUMENT AND DISSEMINATE



## DISSEMINATE

**DEVELOPMENT KIT**  
 Scaled Models  
 Drawing Set  
 Brochure

**FUTURE**  
 Website  
 Lesson Plans

## PROJECT SCHEDULE



### Prototype Design & Development Process:

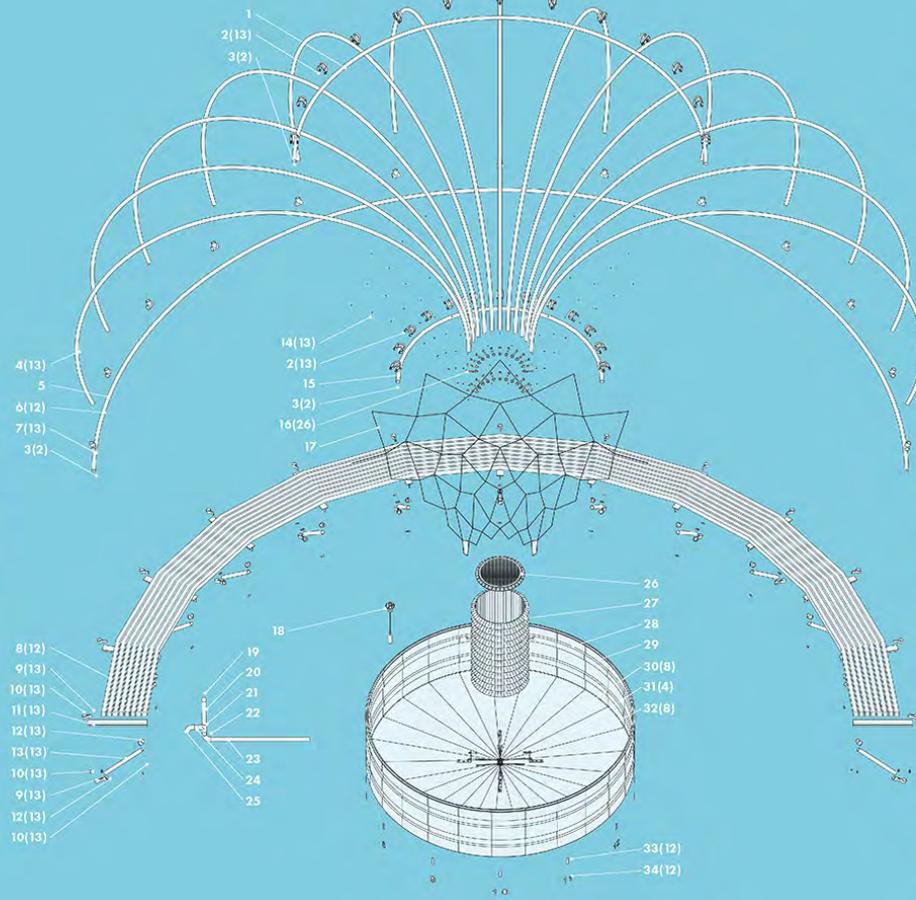
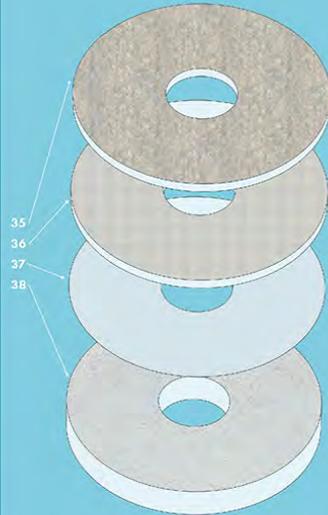
1. Design of a prototype learning garden that meets all the defined objectives.
2. The adaptation of the design for two proof of concept gardens.
3. Refinement and documentation of the prototype for dissemination.

Two proof of concept site designs explore various ways the LivingRoom could be scaled, adapted, and refined. The Partnership School Living Room demonstrates a more formal composition of the components, executed at a grand scale for a large and newly constructed school. While the Galloway Elementary School LivingRoom follows an approach that is more spatially independent and self-referential in composition. Both examples highlight the creative potential of a collaborative process to include local educators with architects, landscape architects, farmers, master gardeners and involved community members.

# GARDEN COMPONENTS

## MATERIALS LIST

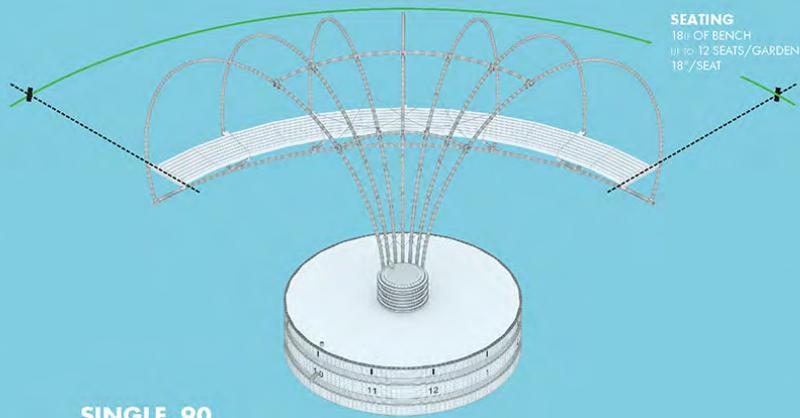
Fencing Materials		
1	1-3/8" Top Rail with 12' d Arc	-
4	1-3/8" Top Rail with 12' d Arc (1, 20' Lengths)	-
5	1-3/8" Top Rail with 24' d Arc (2, 20' Lengths)	-
13	1-3/8" Top Rail, 18"	-
15	1-3/8" Top Rail with 12' d Arc (1, 20' Length)	-
18	Total 1-3/8" Top Rail Pipe, 20' Lengths	18
9	1-3/8" Top Rail Brace Band	26
12	1-3/8" Top Rail End Cap	26
High-Tunnel Materials		
2	1-3/8" Pipe Clamp	26
3	1-3/8" Pipe Cap	6
7	1-3/8" Tee	13
	6' d Arc Bender	1
	12' d Arc Bender	1
	24' d Arc Bender	1
Farm Equipment		
26	18" Corrugated Culvert Cap	1
27	18" Corrugated Culvert, 36"	1
29	8" Cattle Basin	1
37	Filter Fabric, 50 sq ft.	1
Hardware		
6	1/4" x 4.5" Anchor Bolts (for attachment to hard surfaces) (ask for 1/2" x 2 3/4" stakes on sd4 surfaces)	12
10	3/8" x 1" Galvanized Casing Bolt	39
11	3/16" x 1.5" x 1.5" Aluminum Angle, 8'	6
14	#12x1" Sheet Metal Screws, Box	1
16	1/4" x 2.5" Stainless Steel Bolt Assembly Lock Nut, Flat Washer	26
17	3/16" Galvanized Cable, 25'	1
28	Latex Pool Paint (1 gal)	1
30	1/4" x 2.5" Stainless Steel Bolt Assembly Lock Nut, Flat Washer	8
31	6" Galvanized Corner Brace	4
32	1/4" x 1" Stainless Steel Bolt Assembly Lock Nut, Flat Washer	8
33	Vinyl Autonoilve Tape for Ticks, 1 Roll	1
34	Vinyl 3" Numbers, 1-12	1
Piping		
20	1.5" PVC, 12'	-
24	1.5" PVC, 2'	-
23	1.5" PVC, 45'	-
	Total 1.5" PVC Pipe, 5'	1
18	Cistern Depth Gauge	1
19	1.5" PVC Pipe Cap	1
21	1.5" PVC Tee	1
22	1.5" PVC Street 90	1
25	1.5" PVC 90	1
Lumber		
8	Wood Bench Assemblies	12
	2" x 4" Pine or Similar (16' Lengths)	20
	2" Exterior Wood Screws (box)	1
Earthwork (cubic feet)		
35	Handwood Mulch	7.5
36	Flamer's Mix	45
38	Washed Gravel	45



## Phase 1:

The design process began with meeting with educators and farmers to understand how much space is required to teach about food. A land parcel of approximately 500 square feet per class year level was established through these meetings.

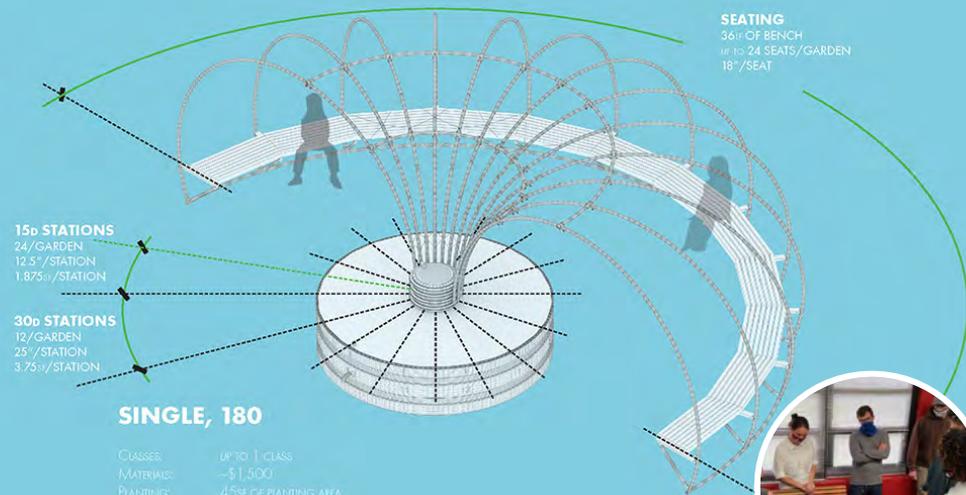
The next step was to explore what off-the-shelf resources were available to meet the growing and classroom meeting needs. An 8' diameter agricultural trough was selected as the bases for the planting beds because of the inherently ideal height, durability, national availability, minimal cost, visual quality and size for gardening. Looking to high-tunnel food production greenhouse design, the team developed a plan for using readily available materials to create a rotated trellis and bench system around the agricultural trough planter. A sub-surface irrigation system was added to the bottom to reduce watering needs and the likelihood of mess and associated maintenance.



## SINGLE, 90

Classes: up to 1 class  
 Materials: ~\$1,100  
 Planting: 45sf of planting area  
 Seating: 12 / garden  
 Stations: 12 @ 30 degree stations  
 24 @ 15 degree stations

**SEATING**  
 18" OF BENCH  
 UP TO 12 SEATS/GARDEN  
 18"/SEAT



## SINGLE, 180

Classes: UP TO 1 CLASS  
 Materials: ~\$1,500  
 Plantings: 45SF OF PLANTING AREA  
 Seating: UP TO 24 SEATS/GARDEN  
 Stations: 12 @ 30 DEGREE STATIONS  
 24 @ 15 DEGREE STATIONS

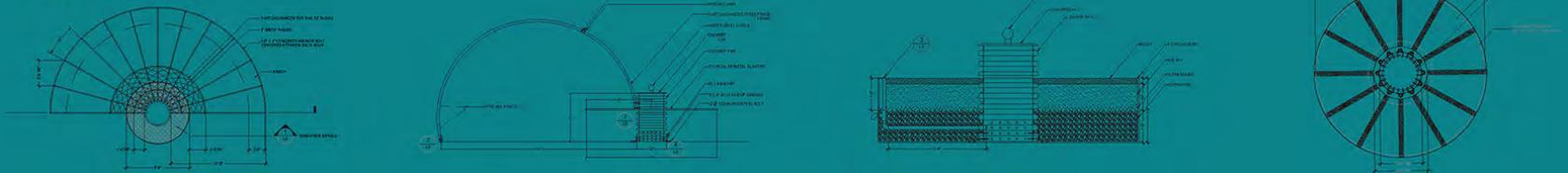
**15° STATIONS**  
 24/GARDEN  
 12.5"/STATION  
 1.875"/STATION

**30° STATIONS**  
 12/GARDEN  
 25"/STATION  
 3.75"/STATION

**SEATING**  
 36" OF BENCH  
 UP TO 24 SEATS/GARDEN  
 18"/SEAT



## CONSTRUCTION DETAILS



## Phase 2:

The original LivingRoom development partner was Galloway Elementary School in Jackson, MS. With plans to execute the design and installation of this first example the team was unsuspectingly approached to consider the installation of a second LivingRoom during the same semester. The new Partnership Middle School in Starkville, MS had recently been awarded a grant through Blue Cross Blue Shield authored in part by the faculty working on the LivingRoom (v1) and so the team took up the design and planning for the LivingRoom (v2). Within a few months the team was again approached to design a LivingRoom (v3) and shortly there after (v4), this time for a significantly reduced cost on a small site in Leland, MS and later in LeFlore, MS. For all four projects, the team developed a scaled model to facilitate workshops with stakeholders to understand the spatial arrangements of multiple gardens. These gameboard models allowed project partners and end users to collaboratively explore layout and size options. Lessons learned from these exercises are now being applied to a future Living Room installation.

**PROOF OF CONCEPT  
PROJECT 1**

**COLLABORATION**

Design Students:  
Programmatic Organization  
Typology Refinement  
Schematic Layout  
Design Professional:  
Construction Documents  
Contractor:  
Construction  
Funding:  
Blue Cross-Blue Shield

**SCHEDULE**

FEBRUARY 2020  
Stakeholder Workshop  
MARCH 2020  
Programmatic Organization  
Typology Refinement  
Schematic Layout  
APRIL TO MAY 2020  
Construction Documents  
Bidding  
SUMMER 2020  
Construction  
FALL 2020  
Grand Opening of School  
and Livingroom Garden



The Partnership Middle School:

The 6th and 7th grade Partnership School opened in the spring of 2021 and is arranged based upon a “learning pod” system. Each learning pod is home to up to 125 kids.

To facilitate the design of the gardens, the team held a workshop with school district teachers, administrators, and the professional design team for the school. Using scaled models on plan and elevation drawings, multiple alternatives were developed to create four separate garden pods with six garden typologies each. In this iteration the university PI’s and students worked with the professional design and construction teams to realize the project. Upon conclusion of the schematic design phase a preferred, “formal plan” was chosen by the school district and then turned over to the design team to detail, bid and construct.



## Participation & Individualization:

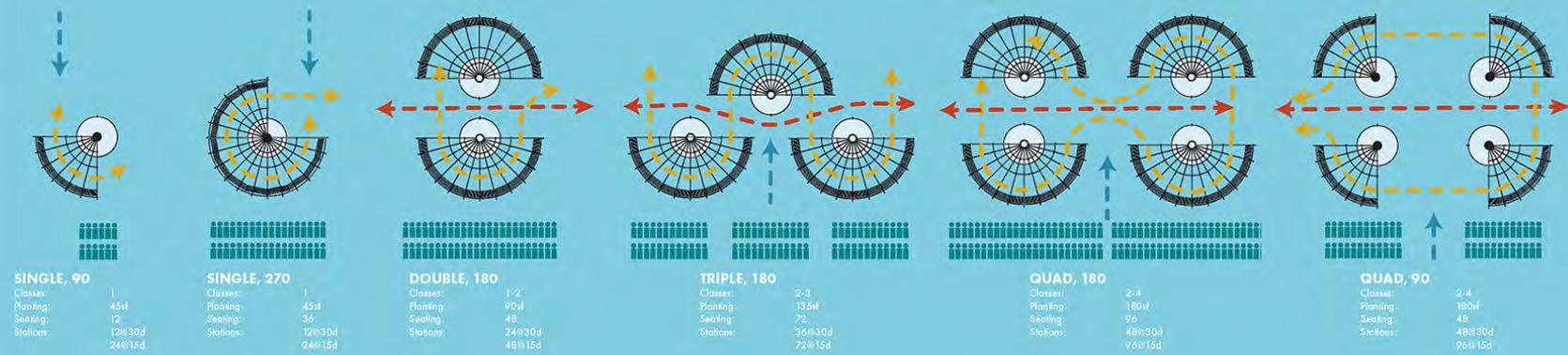
The system allows for formal and informal arrangements and spatial definition. Using a kit of 3D printed garden pieces, participants may easily locate and visualize the flow and form of the would-be spaces. With basic instructions and layout options provided, design team participants may explore issues of path and place, edge and center while getting real-time feedback about the relationship of the learning garden to the classrooms and/or building interiors they are meant to service.



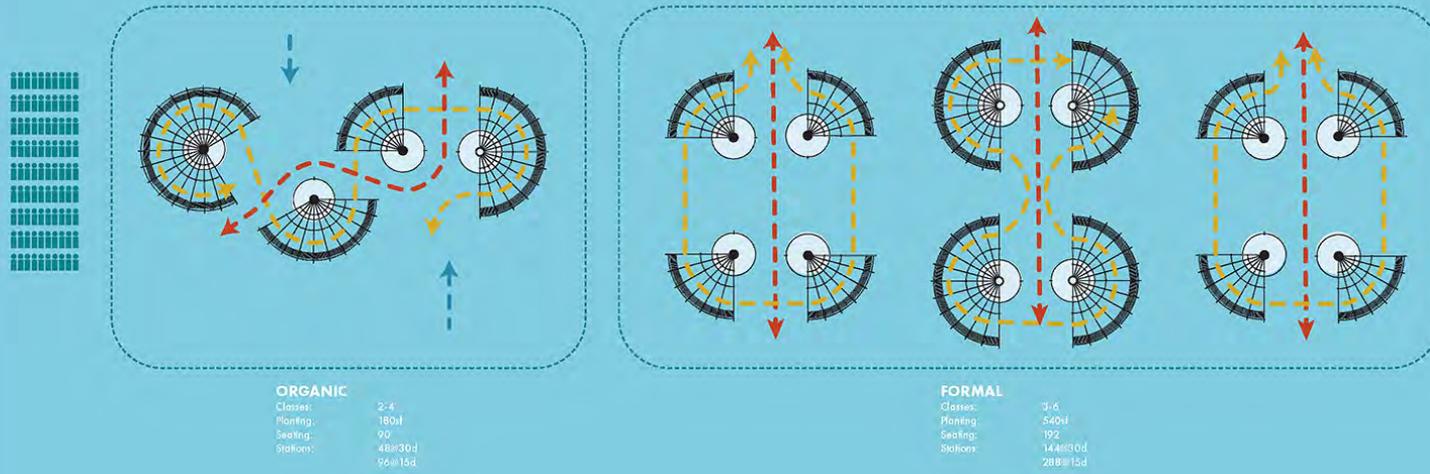
By varying the hoop diameter, a sense of hierarchy and directionality is easily achieved without significant cost increases or construction complication. The result is a participatory design process that emphasizes design and experience over concerns of cost and schedule.

# GARDEN ARRANGEMENTS

## SIMPLE GARDEN LAYOUTS



## COMPLEX GARDEN LAYOUTS



In the case of the Partnership Middle School, design students were able to collaborate with the school’s professional design team to develop the layout and The LivingRooms to be professionally built and installed. Site-specific criteria were applied, and the game-board models were again used to facilitate workshops with stakeholders to explore potential spatial arrangements of multiple gardens. The needs of the various schools and their associated pedagogical programs were considered in association with the physical context to deliver an individualizable design whose costs and installation could still be easily estimated.

This version of the project will be further studied once complete to better understand the costs associated with professional fabrication and installation of the system components.

## PROOF OF CONCEPT PROJECT 1

### SCHOOL METRICS

Total Students: 1,000  
Grades: 6th & 7th

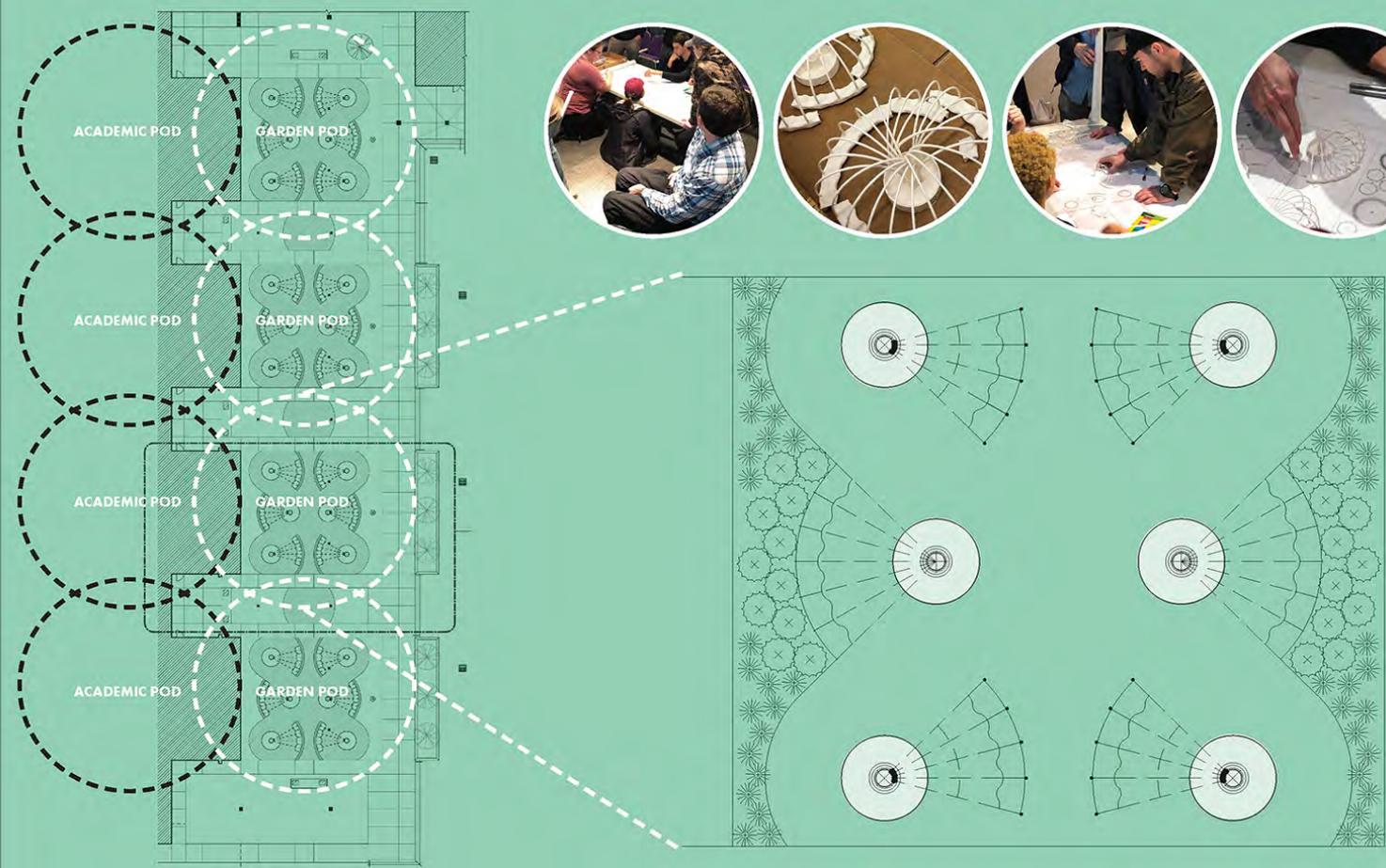
Garden Programmed for 6th Graders  
Students: 500  
Students / Academic Pod: 125

Pod Metrics:  
Gardens Per Pod: 6  
Planting: 270sf  
Seating: 64  
Stations: 72@30d  
144@15d

Total Metrics:  
Gardens Per Pod: 48  
Planting: 1,080sf  
Seating: 256  
Stations: 288@30d  
576@15d

### MODIFICATIONS

- Concrete Seating
- Concrete Receiver
- Upgraded Steel Tubing
- Drip Irrigation System
- Prep Stations



The Partnership Middle School:

In the case of the Partnership Middle School four classroom pods will be served by four Living Rooms. The pedagogy called for a layout which would allow for the individualization of the spaces for competitive growing. While each pod follows a centralized layout pattern the four pods also work to generate a central axis which links the spaces as an allée running parallel to the school.

The six-planter LivingRooms are designed to support small group-based activities during the day while also offering a space of repose and rest during afterhours events or while students are waiting to be picked-up.

**PROOF OF CONCEPT  
PROJECT 2**

**COLLABORATION**

*Design Students:*

- Programmatic Organization
- Typology Refinement
- Schematic Layout
- Construction Documents
- Assembly
- Deployment  
(delayed due to COVID 19)

*Funding:*

- Fertile Ground - Jackson, MS
- The Bloomberg Foundation

**SCHEDULE**

*January 2020*

- School Workshop
- Stakeholder Workshop
- Design Concept

*February 2020*

- Typology Refinement
- Schematic Design

*March 2020*

- Element Production
- Surface Painting
- COVID 19 Delay

*APRIL TO MAY 2020*

- Construction Documents
- Documentation

*FALL 2020*

- Deployment (if allowed)
- Grand Opening of  
Livingroom Garden



Galloway Elementary School  
Jackson, MS:

The K through 5th grade Galloway Elementary school is located within a USDA classified food desert, surrounded by fast-food chains in a historically underserved part of Jackson, MS. The existing school has extremely limited funding and resources, so this LivingRoom was designed to minimize ongoing expenses while offering the teachers a supplemental space to bring classroom activities outside and engage students in experiential learning. With a \$35,000 budget from a related Bloomberg Public Art Challenge Grant, the team started the process by engaging the 5th graders in a creative workshop on food nutrition to generate inspiration for the design. An abandoned asphalt playground adjacent to the gym provided the perfect platform for the garden.

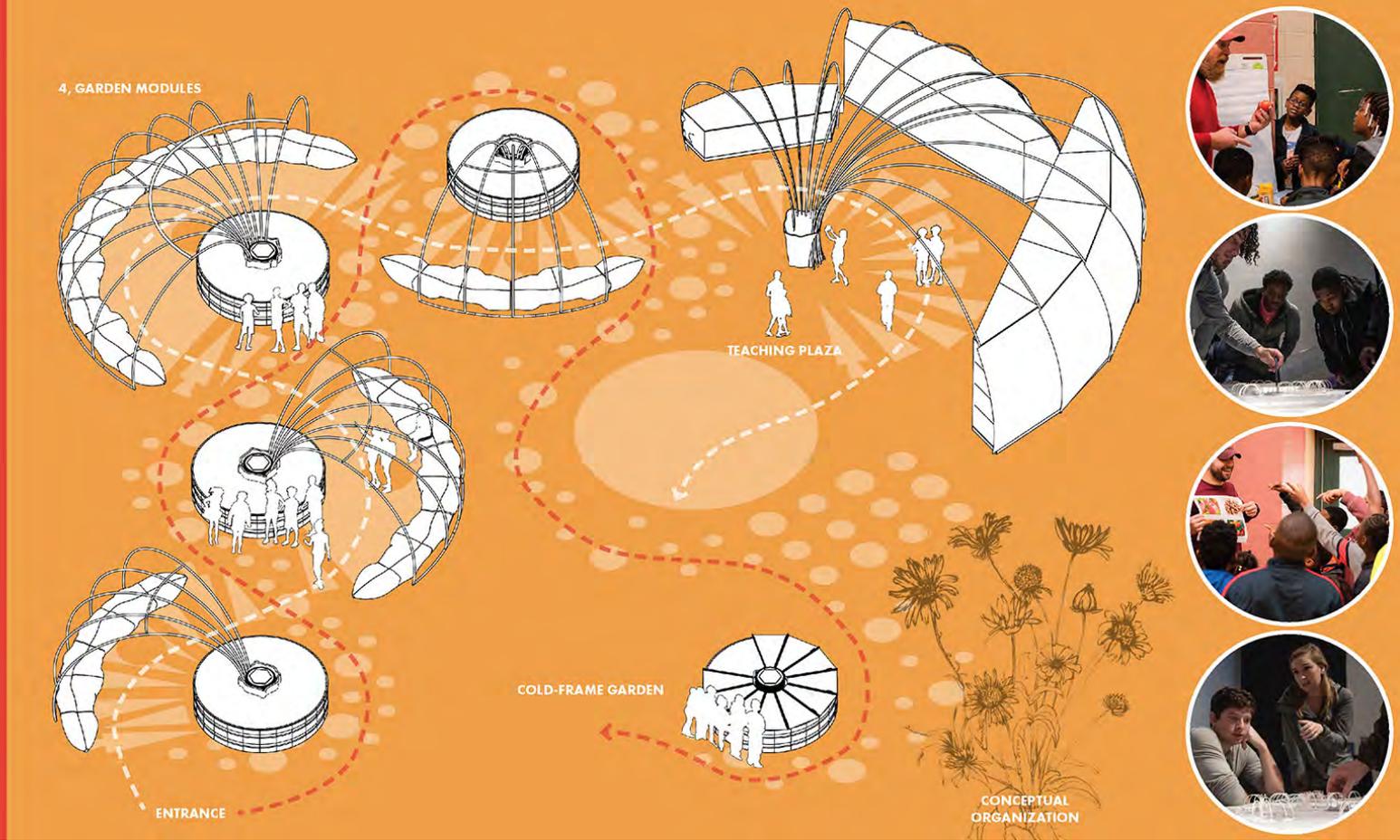
**PROOF OF CONCEPT  
PROJECT 2**

**SCHOOL METRICS**

Total Students:	340
Grades:	K to 5th
Garden Programmed for 5th Graders	
Students:	60
Metrics:	
Gardens:	5
Planting :	225sf
Seating:	64
Stations:	72@30d 144@15d

**MODIFICATIONS**

- 3d Printed Concrete Elements
- Instructional Graphics
- Teaching Space/ Structures



Customization & School-based Identity Development:

The Living Room system is meant to be customized as a way for school districts/teachers/children to be directly involved in the design process. The goal, as with many such initiatives, is for the community to take pride and ownership of the space in order for it to be well maintained and productive. In the case of the Galloway Elementary Living Room, because the age group/year levels using the space were younger the design team worked to generate a more playful and lively composition which also focused the students toward a central classroom space rather than the four-pod decentralized axial arrangement used at the Partnership School.

The concrete furnishings were developed to exaggerate a sense of movement and physical association with the plants and vermiculture teaching aids intended to be used on-site.



### 3D Printed Concrete:

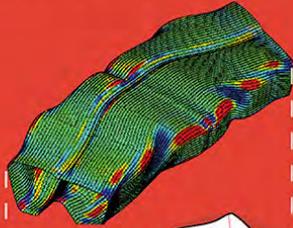
Working with an alumnus of the school of architecture who is now the lead research and development person for Pikus Concrete & Construction, students were introduced and taught the work methods associated with the company's proprietary 3D concrete printing technology.

Exploring the potential of this method of fabrication, students worked to develop a set of forms that could be produced and transported over 1,700 miles without concern of breakage. The resulting benches, planter stems, and a large 6' tall 1,000 lbs. vase-like structure referred to as the project's "tree of life", are entirely unique. The components of the bench system are modular allowing for a variety of lengths which correspond to the hoop and planter structures.



MODIFICATION:  
3D PRINTED  
CONCRETE ELEMENTS

3D PRINTING DESIGN ANALYSIS



CURVATURE ANALYSIS



CROSS-SECTION DESIGN

PRINTING PROCESS CONSTRAINTS

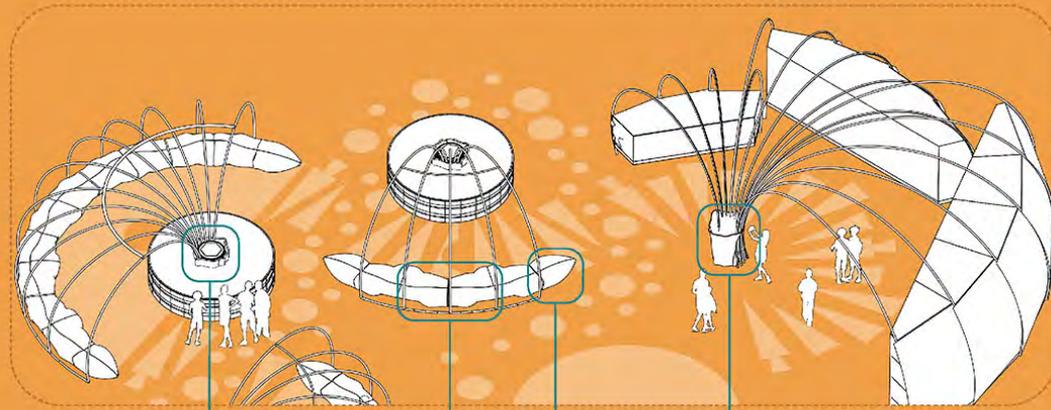


MINIMUM TURN RADIUS

NO OVERHANGS

LAYER DIMENSIONS

MAXIMUM SLOPE



"STALK"  
RECEIVER COVER



"PETALS"  
BENCH MODULES



"TREE OF LIFE"  
CLASSROOM SCULPTURE



Customization of Site Furnishings:

The rapid concrete printing technology, which allowed for a 5'-0" section of bench to be printed in under 1 hour, afforded the students an opportunity to tune their designs, balancing comfort, aesthetics and durability. Issues of water drainage, structural stability, weathering and ergonomics were all considered with the final design taking on the character of a plant. Learning from forms in nature, students discovered the potential of biomimicry and this will hopefully become a component of the elementary school's pedagogy.

These concrete site furnishings are the first execution of the new technology in the U.S. and use the unprecedented flexibility of the technology to make organic surfaces that turn the planters into giant flowers, where students sit on leaves and petals. The potential of this collaboration is an endlessly customizable, or school specific, theme development that allows design participants to build classroom, school or even district identity into their new LivingRoom learning garden.



## Graphic Identity Development:

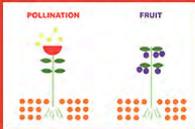
Instead of simple ticks and numbers to delineate teaching stations, the team developed a set of complex lesson plans built on a 12 learning-station organization pattern.

Working with an elementary school educator and members of the Graphic Design faculty and student body, the team developed five unique themes that offer lesson plans on time, color, math, biology, and seasons. These themes allow teachers to use the garden for almost every subject and ensure that the gardens will be used for not just food education, but as an integral part of the classroom.



MODIFICATION:  
INSTRUCTIONAL  
GRAPHICS

PLANTER INSTRUCTIONAL THEMES



Theme	1	2	3	4	5	6	7	8	9	10	11	12
LIFE CYCLE	Seed	Seedling	Sapling	Young Tree	Adult Tree	Old Tree	Decaying Tree	Compost	Seed	Seedling	Sapling	Young Tree
COLOR	Red	Orange	Yellow	Green	Blue	Purple	Pink	White	Red	Orange	Yellow	Green
FRACTION	1/2	1/3	1/4	1/5	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13
TIME	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00
SEASONS	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter

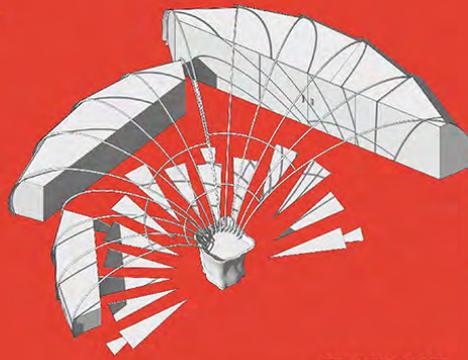


Graphic Identity Development & Instructional Themes Continued:

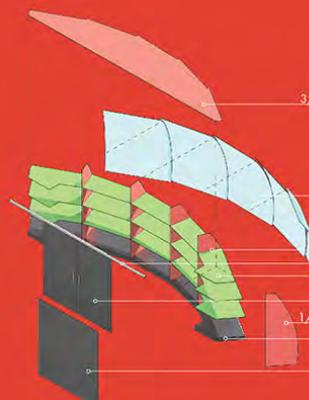
In the case of Galloway Elementary School inspiration was drawn from a workshop event as well as the work of an artist who created a mural painting on the side of the school building. The team worked to build upon these visual and conceptual guides to bring linkage and an age-appropriate character to the project.

To support the educational agenda of the school a system of vinyl tick marks and numbers were planned for the sides of the planter to create 12 growing stations that could be used by one or two students. The resulting design is flexible, adaptable, and easily maintained within a limited budget of under \$1,500 in materials. A plan for a cold-frame alternative was also developed which allows classes to start plants from seed and create a mini greenhouse in winter months.

MODIFICATION:  
TEACHING PLAZA



**TEACHING PLAZA**  
WORKBENCH, STORAGE, AND CHALKBOARDS



3/4" PRESSURE TREATED PLYWOOD TOP

POLYGL SHEATHING

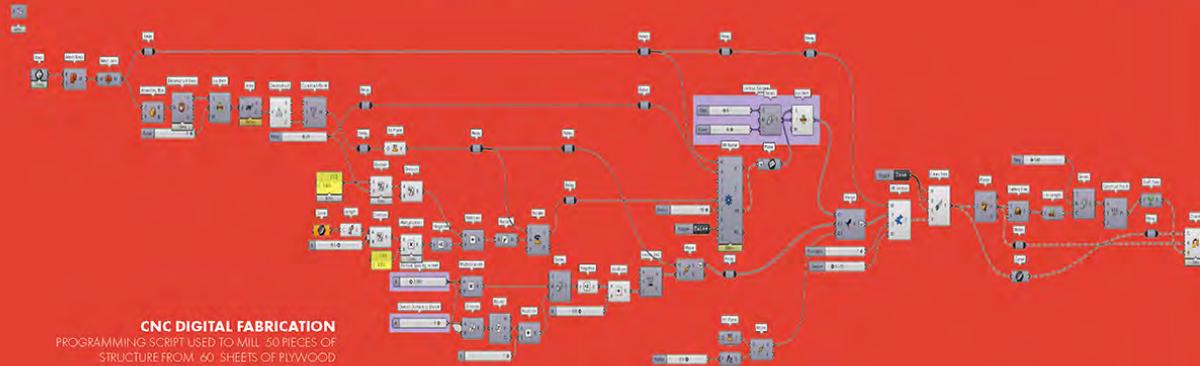
BOWERBIRD SLOTTED JOINT  
STEEL BOX RAIL  
3/8" PLYWOOD FIN SHELVING

BARN DOOR W/ CHALK PAINT

1/2" PRESSURE TREATED PLYWOOD CAP  
4X4 STUD BASE

3/8" PLYWOOD W/ CHALK PAINT

**EXPLODED AXON**  
STORAGE



**CNC DIGITAL FABRICATION**  
PROGRAMMING SCRIPT USED TO MILL 50 PIECES OF  
STRUCTURE FROM 60 SHEETS OF PLYWOOD



Outdoor Classroom & Storage Structures:

To expand the garden, the overall design explored a large teaching space that could also create storage. A unique, plywood eggcrate assembly-based structure was developed to facilitate ease of volunteer-based unskilled labor assembly. In addition, the system allowed for a flat-pack shipping/transportation model to be used to help reduce cost and environmental impact. The system, reliant on a Bowerbird plug-in and Rhinoceros/Grasshopper software, was used in conjunction with a CNC milling machine for fabrication of basic elements. This approach allowed the structures to easily take on a curvilinear form befitting of the emerging design theme. The result is an outdoor classroom composed of three free-standing units. One serves as a workbench, the next a small tool storage space, and largest a green house and large tool storage space. The units are painted with chalkboard paint on interior faces framing the seating area.



**THE JACKSON, MS LIVINGROOM**

COVERING AREAS OF  
5,500 sq/ft

STRUCTURES COST  
\$25.00 / sf

CONSTRUCTION COST  
\$35,000

COMPLETION  
October 2020 (Iteration #1)

**Getting Ready for  
Spring Replanting 2022**