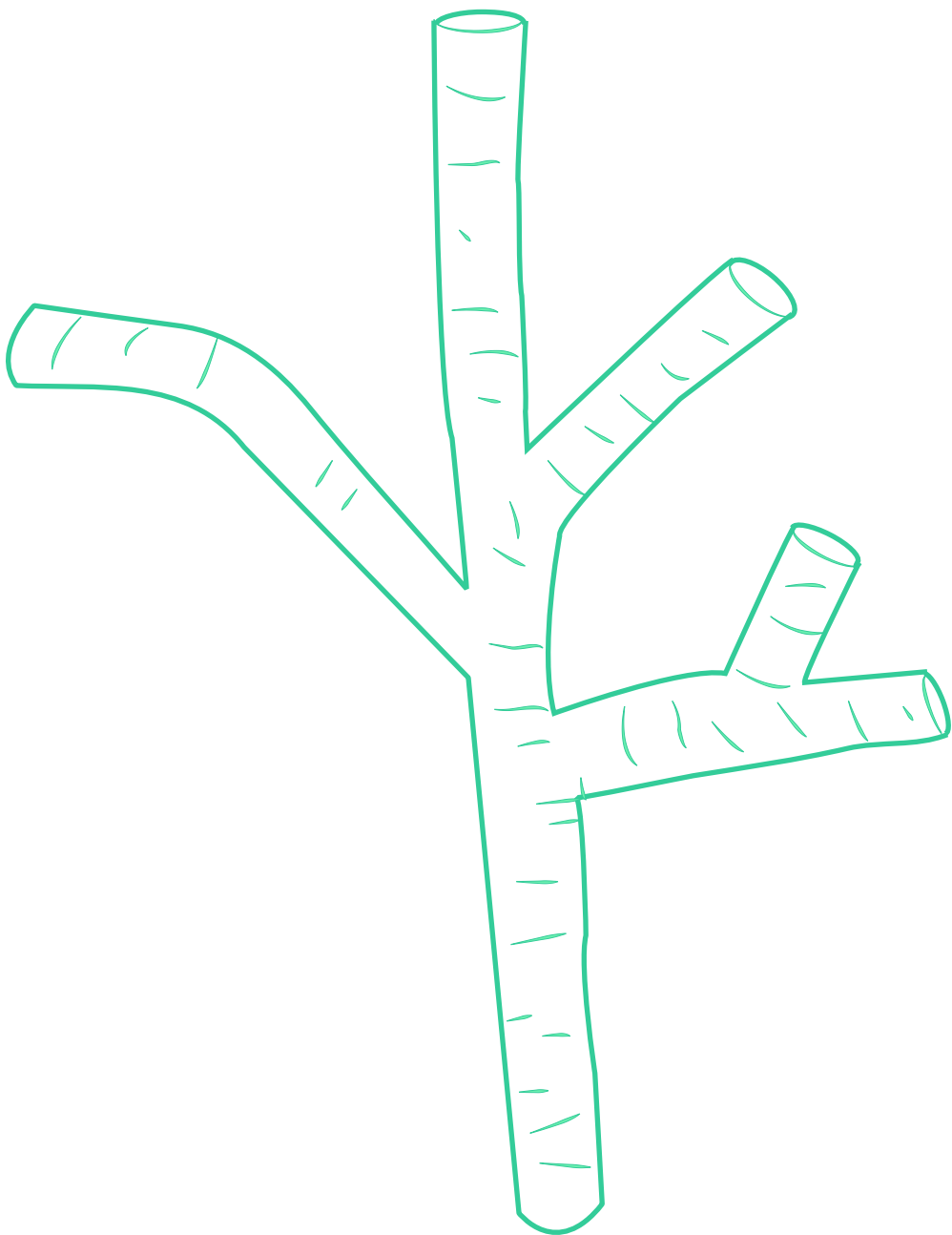


RACHAEL  
SHIELDS

PORTFOLIO  
2021



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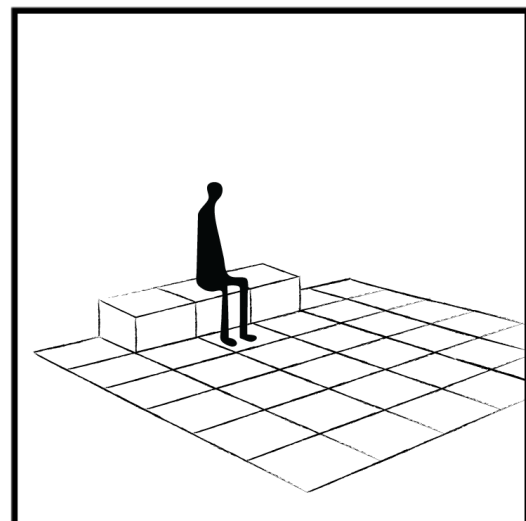
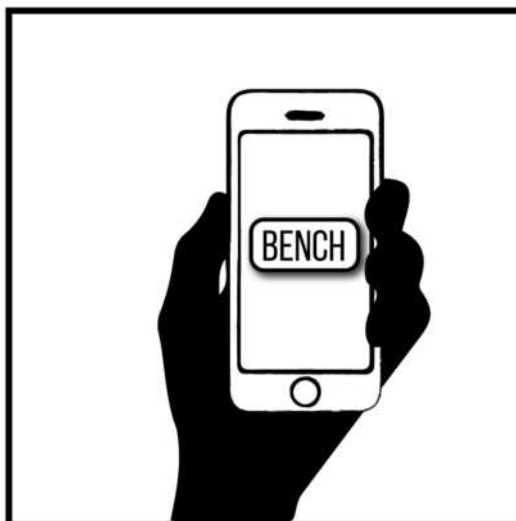
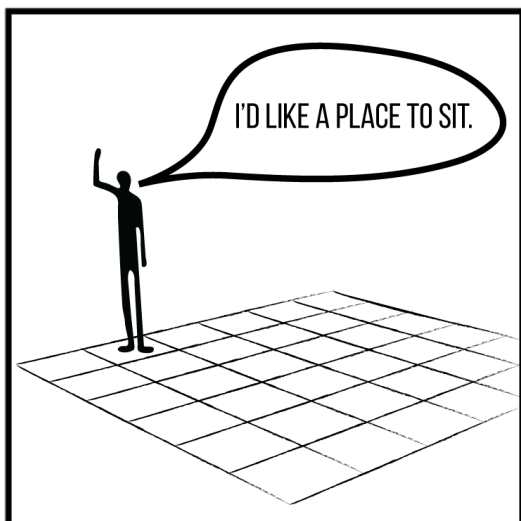
## RESEARCH OBJECTIVE:

Investigate using Arduino as a method to prototype and demonstrate kinetic landscapes.

## WHY PROTOTYPE MOVEMENT?

- 01 Motion adds a more complicated dimension to design. A 3D model is not enough to design moving parts.
- 02 Digital models make it difficult to take into account environmental or user inputs. Arduino offers this.
- 03 Animated digital models lack realistic movement, materials, and fabrication methods needed to accurately engineer such ideas.
- 04 Errors can be minimized before it becomes a financial or safety concern.
- 05 Prototyping is key to test out parameters like speed, actuator type, or any sensors involved.
- 06 A physical prototype strengthens the validity of complex, seemingly science fiction concepts like a kinetic environment for the client/user.
- 07 The act of prototyping can be used as a method of design.
- 08 Prototyping puts design into the landscape architect's hands instead of a mechanical engineer's.

## WHAT WILL IT LOOK LIKE?



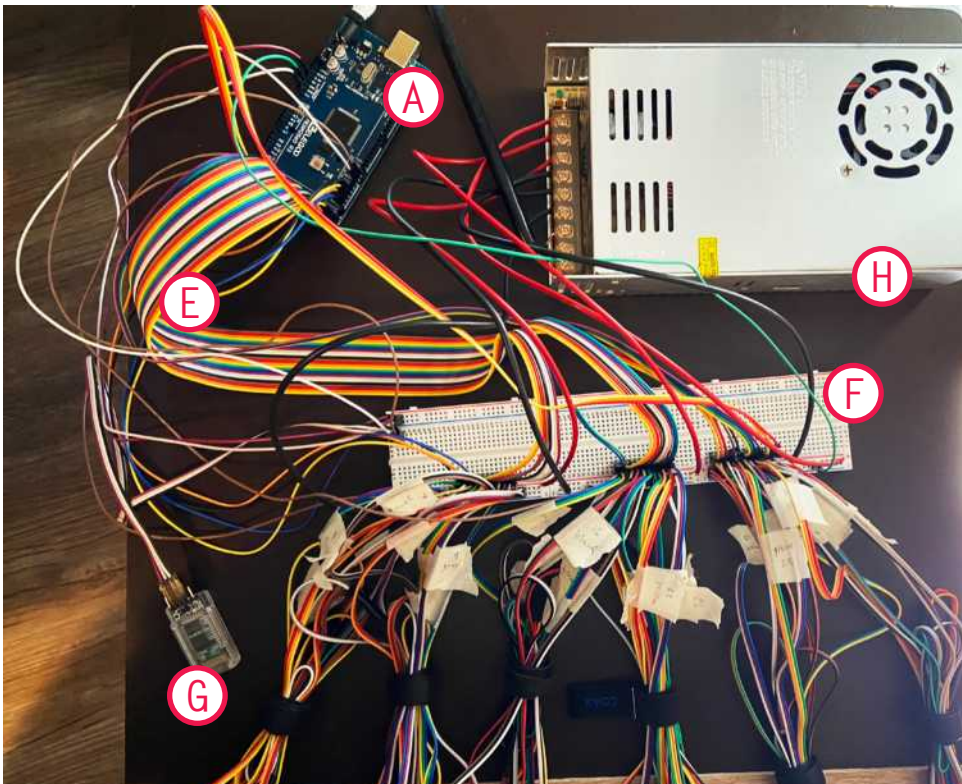
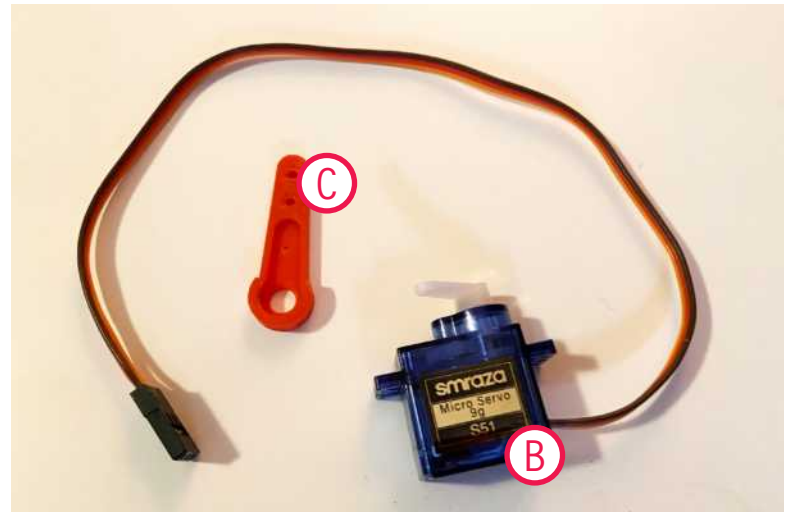
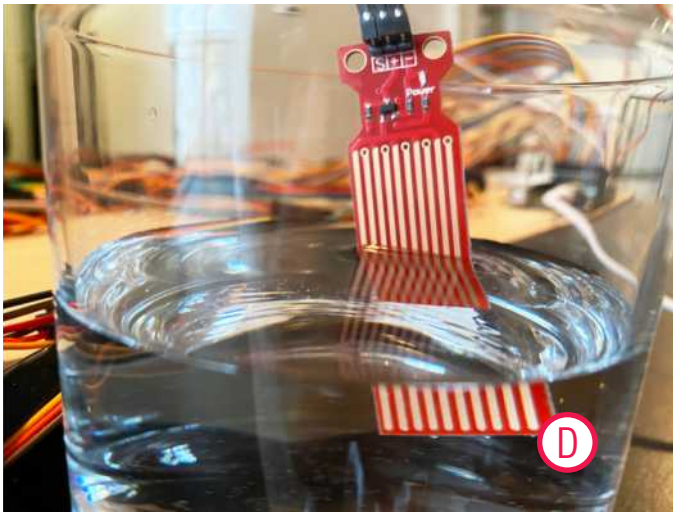
# 01...KINETIC TOPOGRAPHY

PROTOTYPING MOVEMENT WITH ARDUINO

RESEARCH COMPETITION - 1ST PLACE

## HOW?

The prototypes become adjustable and movable by using an Arduino Controller, Sensors, and Servo Motors. C++ is used to program the desired tasks to the Arduino Board.



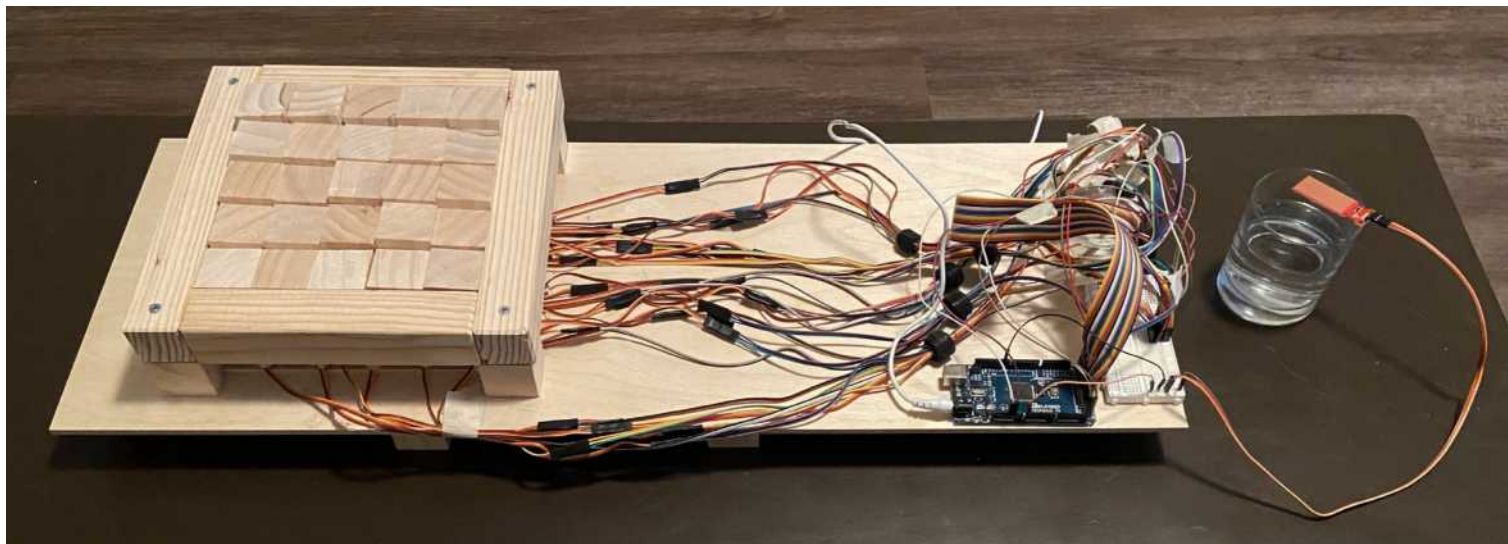
- A* ARDUINO BOARD
- B* SERVO MOTOR
- C* 3D PRINTED MOTOR ARMS
- D* WATER LEVEL SENSOR
- E* JUMPER WIRES
- F* BREADBOARD
- G* BLUETOOTH MODULE
- H* POWER SUPPLY



# PROTOTYPE 1

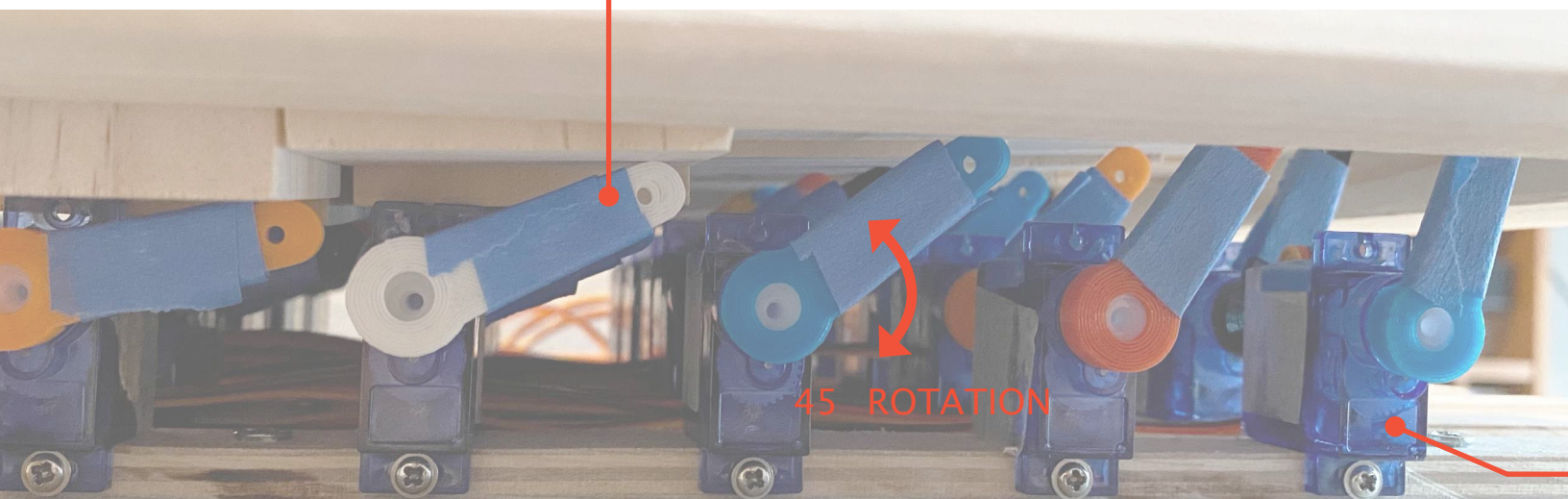
## BLOCK SURFACE - WITH WATER LEVEL SENSOR

Imagine this as a water-front plaza. Maybe during a normal day it has a few blocks up for casual seating. Maybe during an event a stage is created and tiered seating is pushed up. And maybe during a storm the blocks automatically react and rise up to create a flood barrier.



WATER LEVEL SENSOR

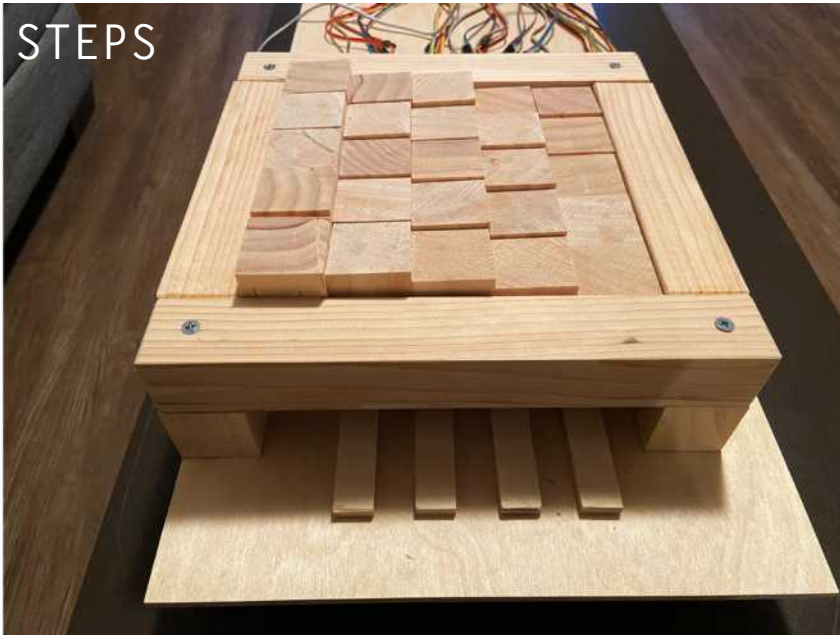
3D PRINTED ARMS



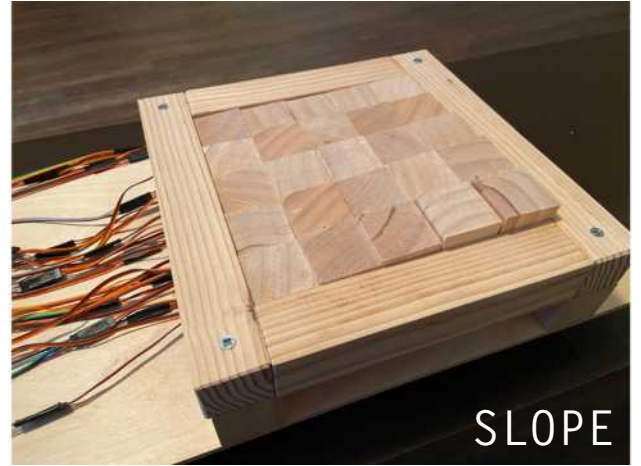
45° ROTATION



STEPS



EXAMPLE CONFIGURATIONS



SLOPE

X



MOUNTAIN



INVERTED



MOUNTAIN SERIES

— SERVO MOTORS

YOUTUBE LINK: <https://youtu.be/daMVpNQ7z8o>

# PROTOTYPE 2

## MEMBRANE SURFACE - WITH BLUETOOTH SENSOR AND APP

Imagine this as an active play surface. Maybe it's a park that is modifiable to a user's desires with a new form of interactive play or exercise. Maybe it's a one-hole golf course with endless configurations. Or maybe it's a futuristic way to combine the landscape and architecture into one unit.

YOUTUBE LINK: <https://youtu.be/6nVXO4o4lwk>

### STRETCHABLE FABRIC

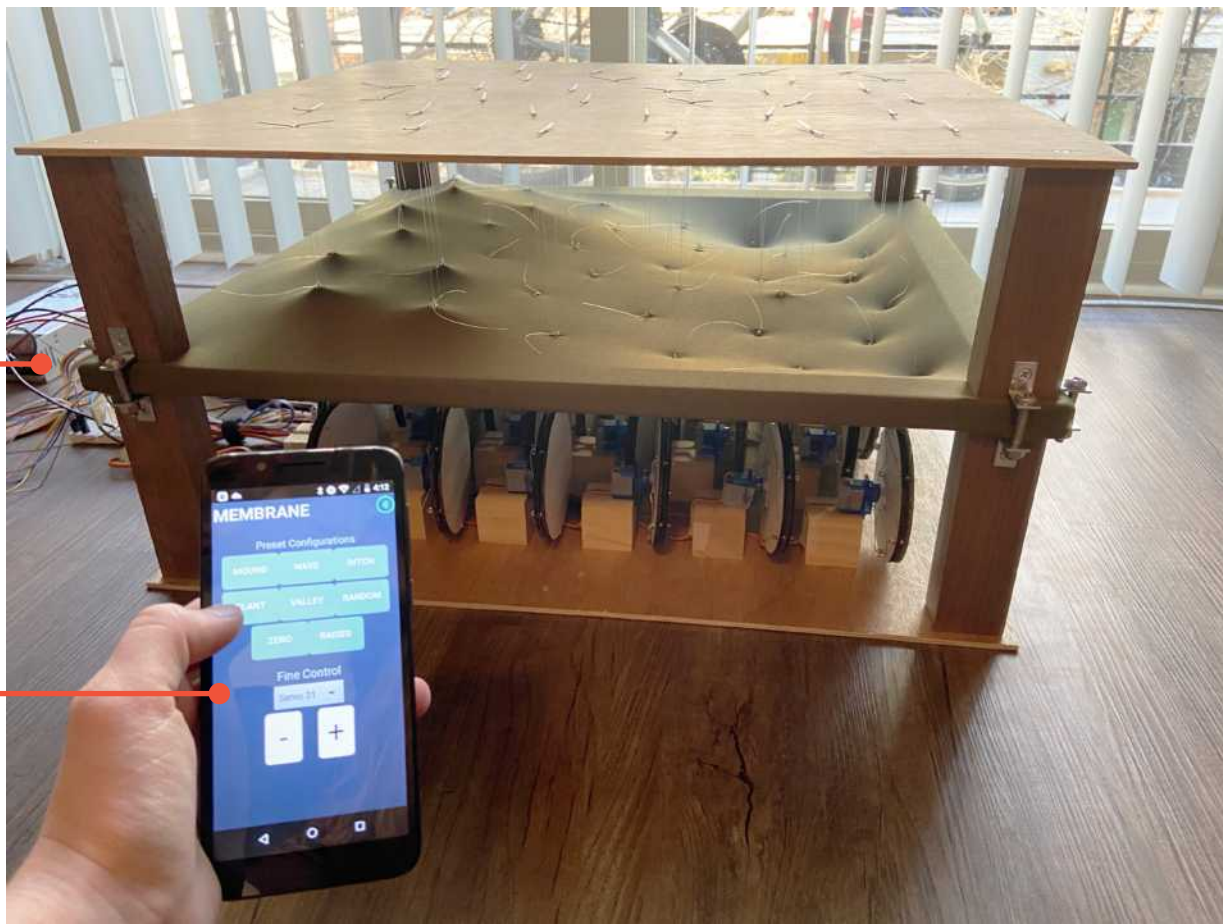
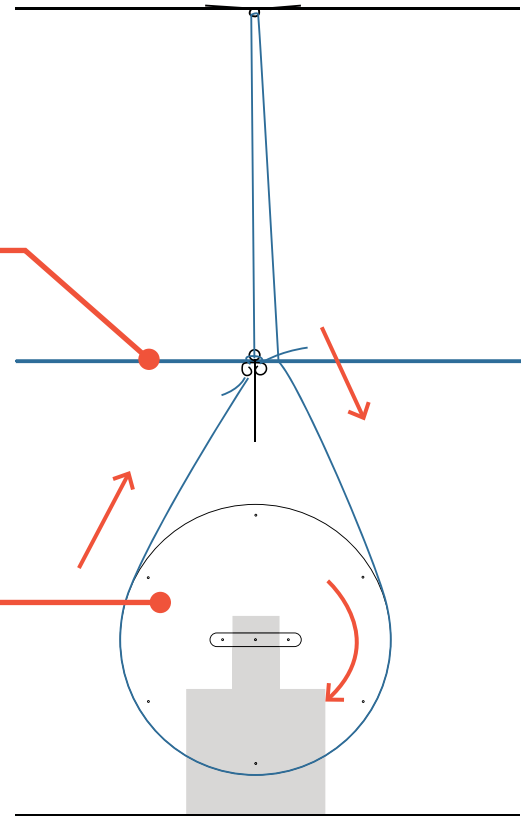
AS THE MOTOR TURNS THE FABRIC IS PULLED UP OR DOWN.

### LASER CUT WHEELS

ADDED TO INCREASE RANGE OF MOVEMENT

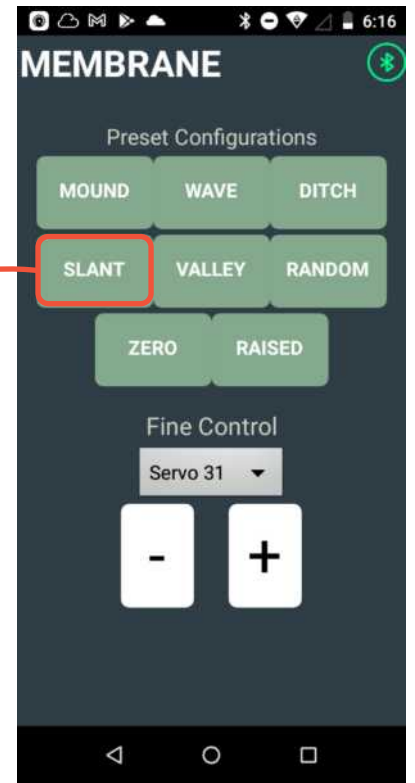
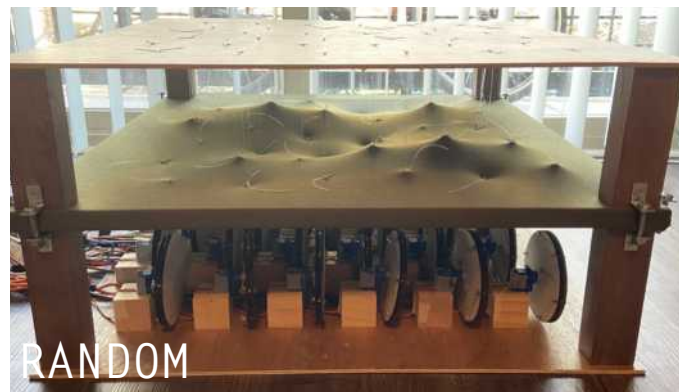
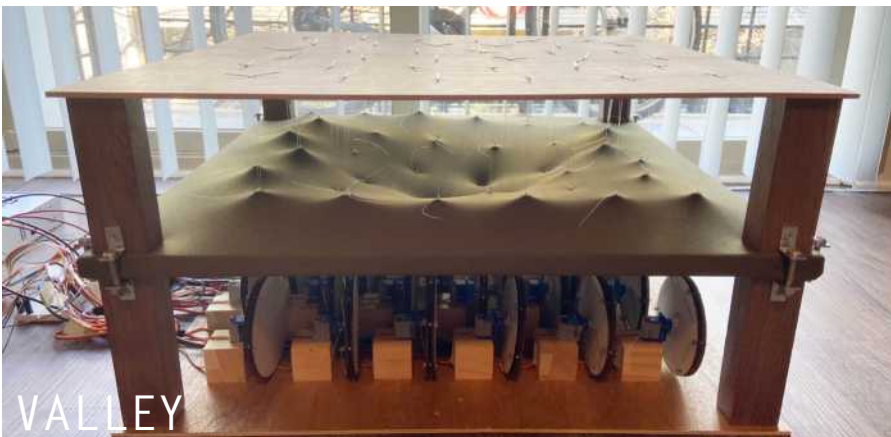
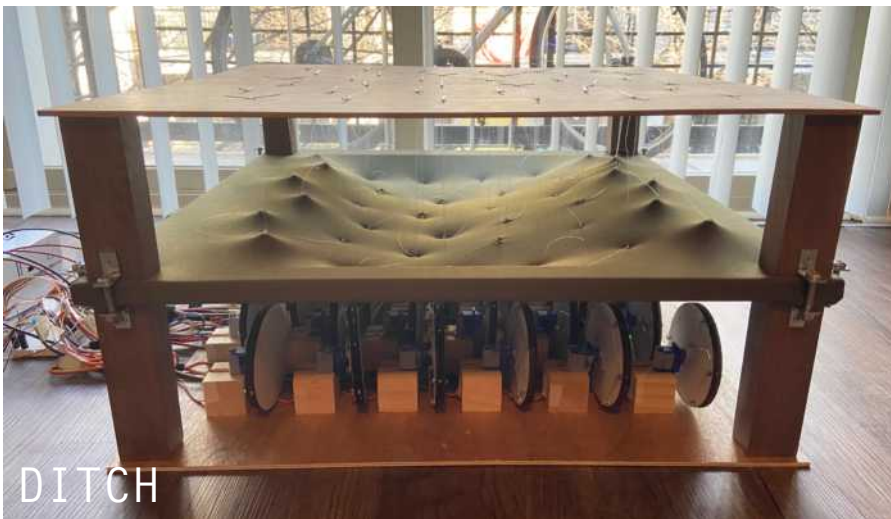
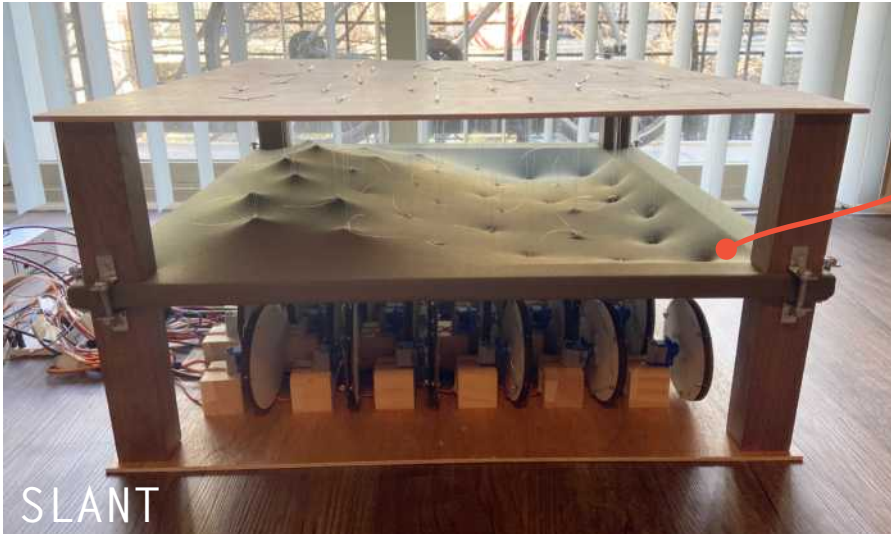
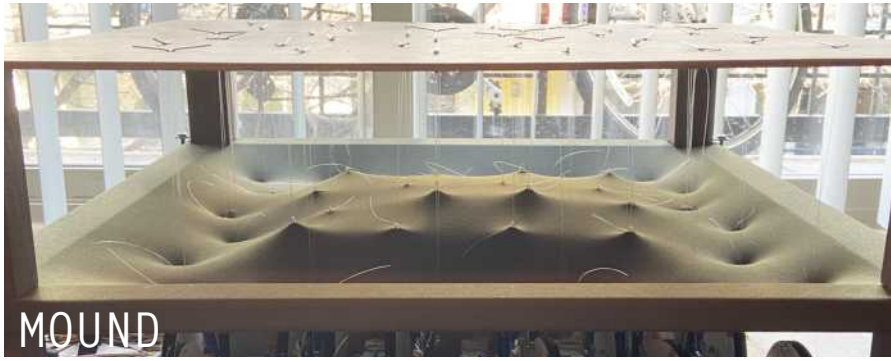
### APP + BLUETOOTH SENSOR

THERE ARE PRESET CONFIGURATIONS AS WELL AS THE OPTION TO CONTROL INDIVIDUAL MOTORS.





# EXAMPLE CONFIGURATIONS



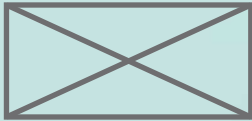
APP  
CREATED WITH MIT APP BUILDER

## ON STREET DIGITAL DISPLAY GRAPHICS



### warning circles:

safety mechanism for sensing elements that have entered the traffic lanes



### interactive crosswalks:

crosswalks appear with the gestural swipe of a foot



### modifiable lanes:

change lane direction, size, or type as needed.



### digital street signs:

all street signs are digital to remove visual clutter and allow for optimal adjustability.

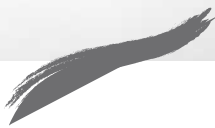


### interactive activities

@1PM

### event notifications:

what is going on in the area?



### directional pathways:

directions to nearby locations can be displayed directly on the street



### custom parking spots and indicators:

get directions to available spaces that adjust to each car size to minimize wasted space

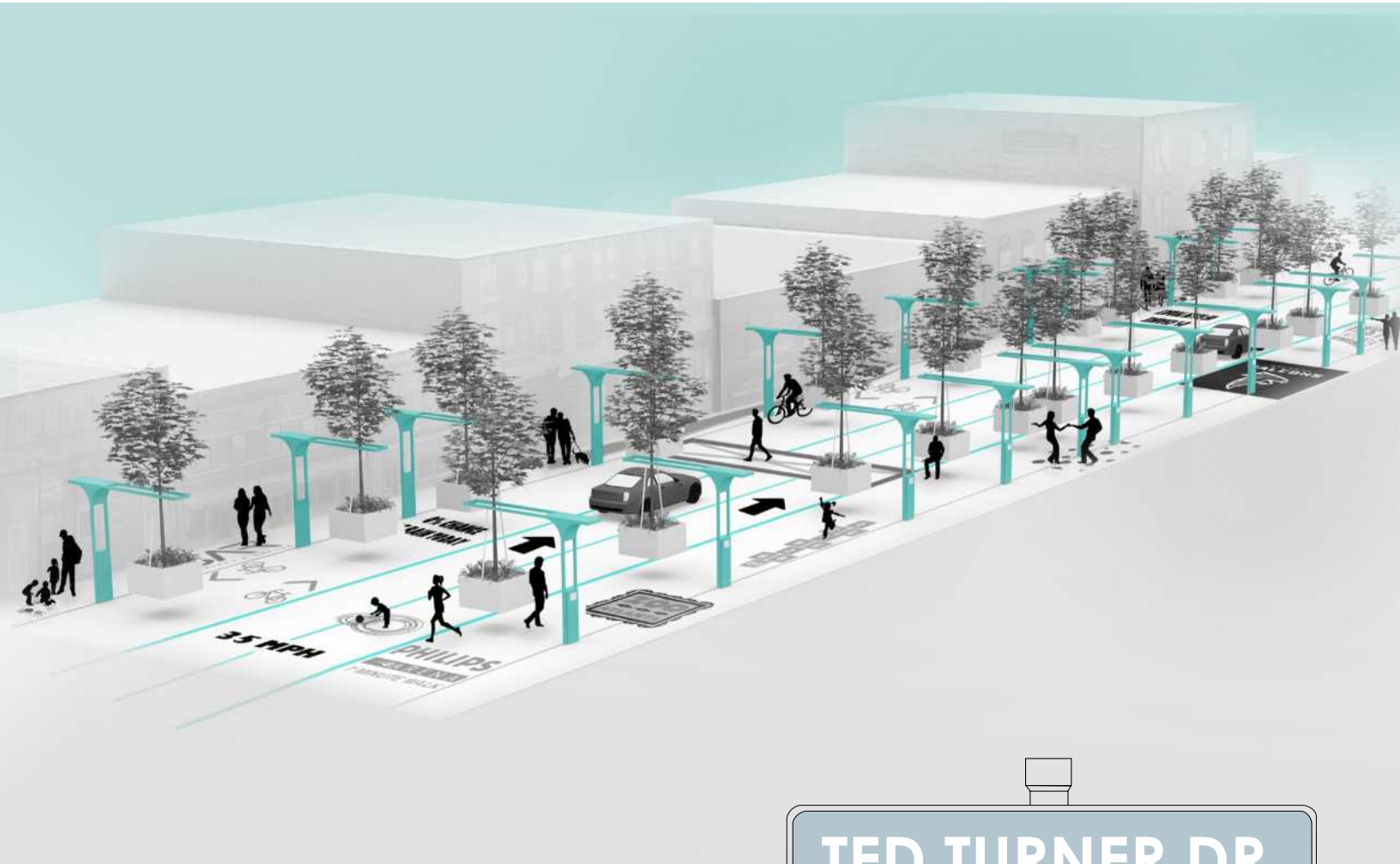


### smart transit:

bus stops or ride share spaces appear where needed

## 02...OPEN SOURCE STREET

MODIFIABLE STREET WITH DIGITAL LANES, INTERACTIVE STREET GRAPHICS, AND MOVABLE TREES



TED TURNER DR.

### CONTEST PROMPT:

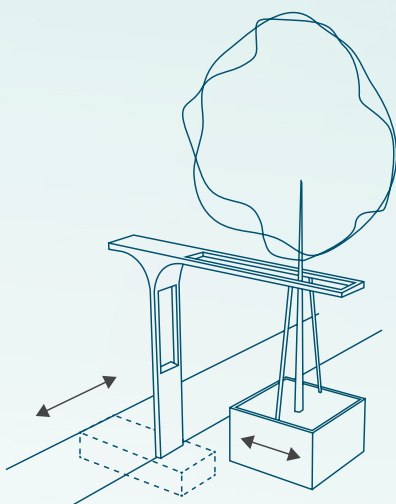
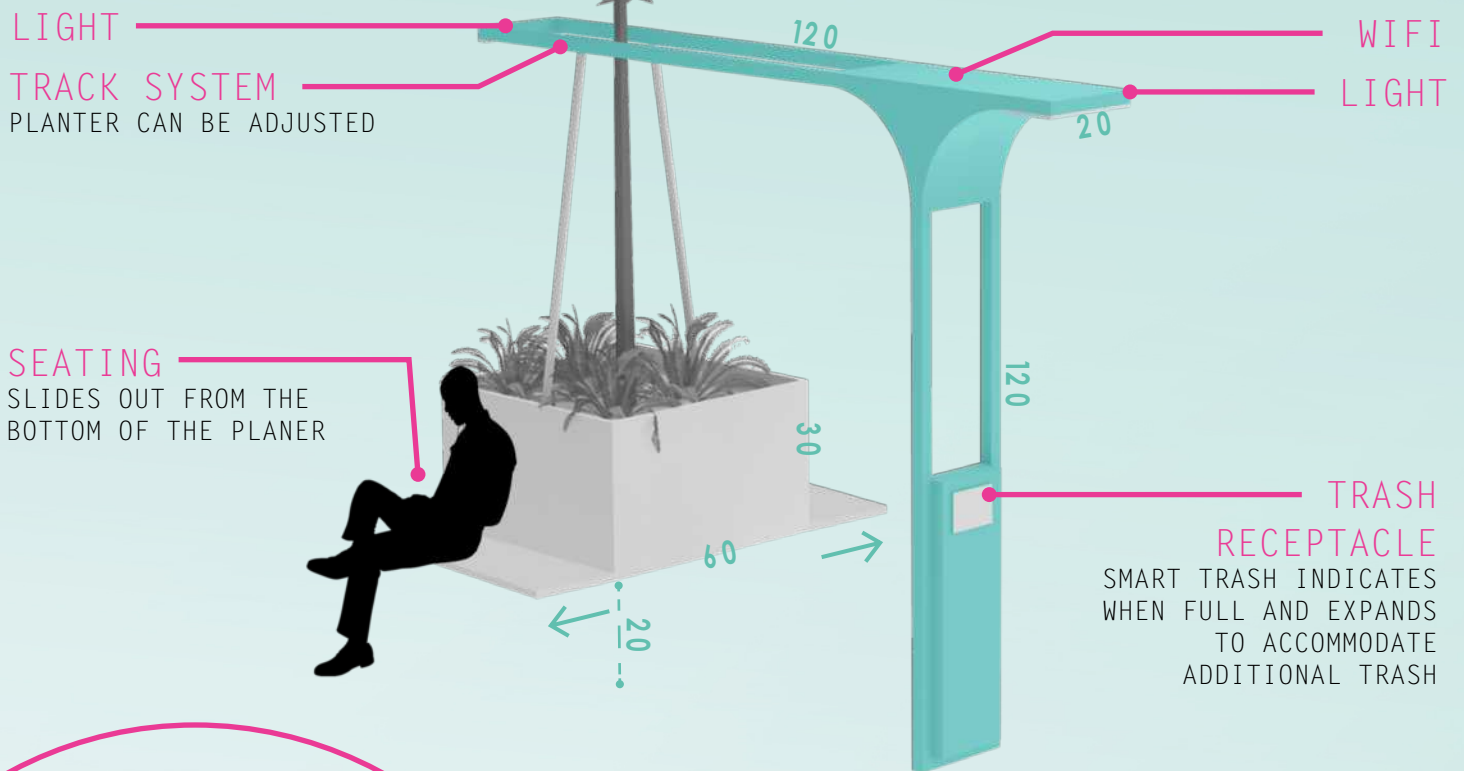
Design a streetscape for a section of Ted Turner Dr. in Atlanta, GA. How can it be resilient to the future?

Proposed Solution: Make the street modifiable.



## TREE ARMATURE:

A STRUCTURE TO COMBINE THE CLUTTER OF STREET FURNISHINGS INTO A SINGLE ADJUSTABLE ELEMENT (INCLUDING THE TREES) FOR THE PURPOSE OF A TRULY MODIFIABLE STREETScape.

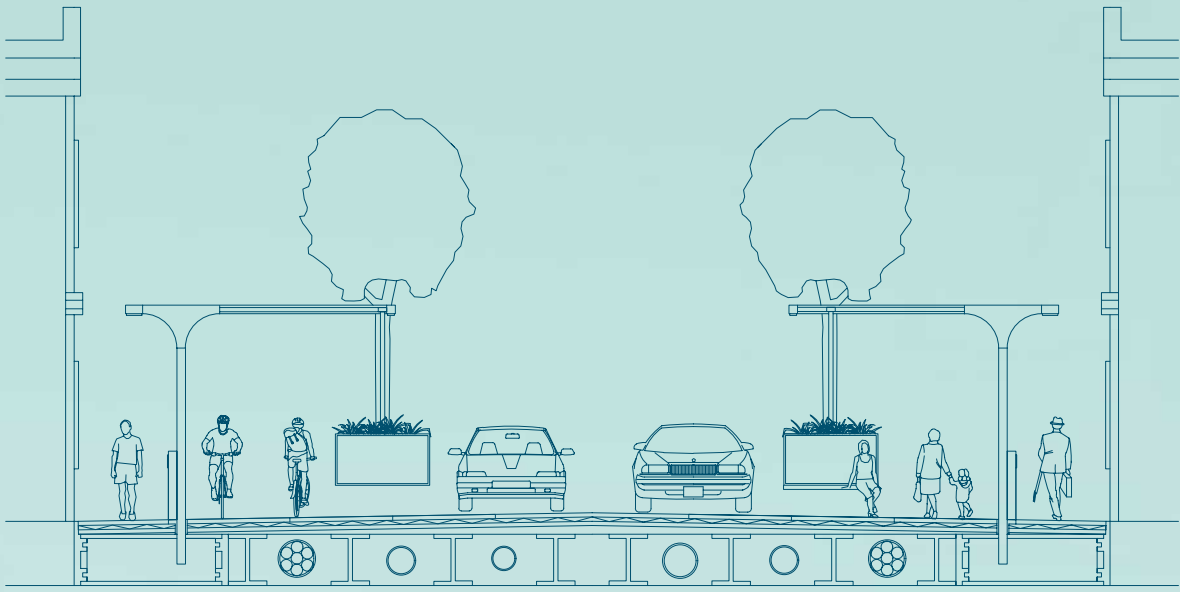


TREE MOVEMENT  
BY TRACK SYSTEMS

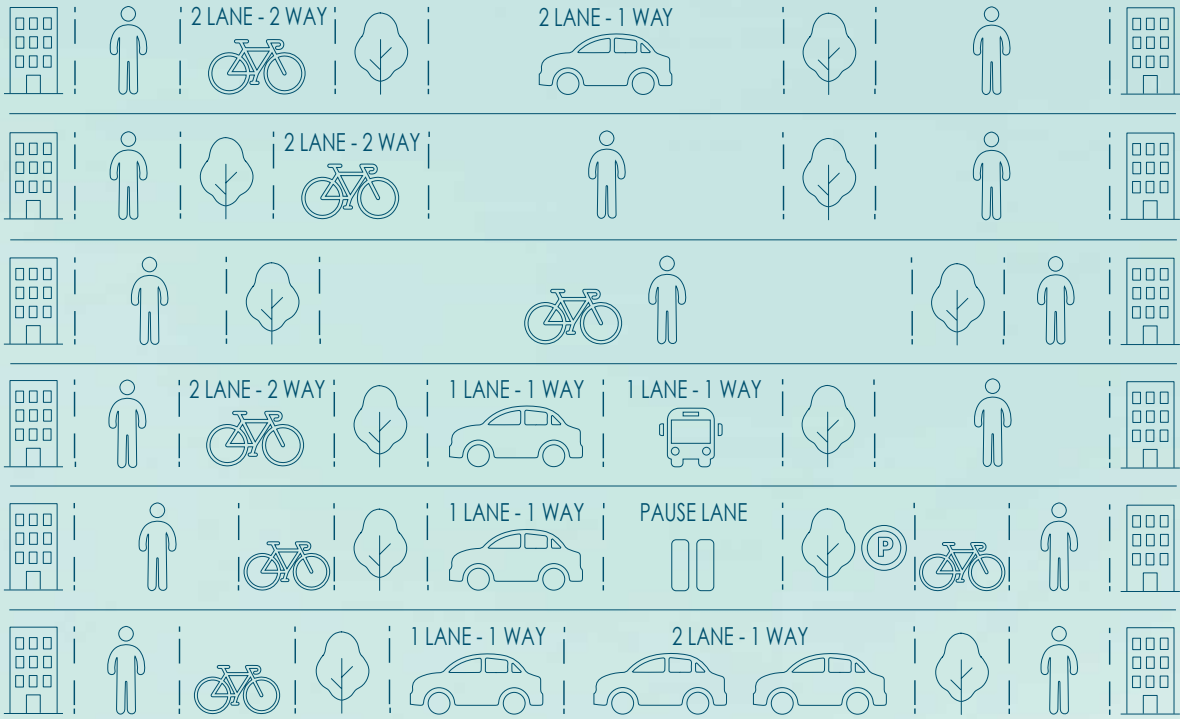
## PLAN DIAGRAM

- 1 cluster trees for group seating
- 2 tensile attachment
- 3 parking spaces adjust to different sizes
- 4 planters can create a protected bike lane
- 5 open-source public digital space
- 6 commercial digital space for rent
- 7 table and chair supplements

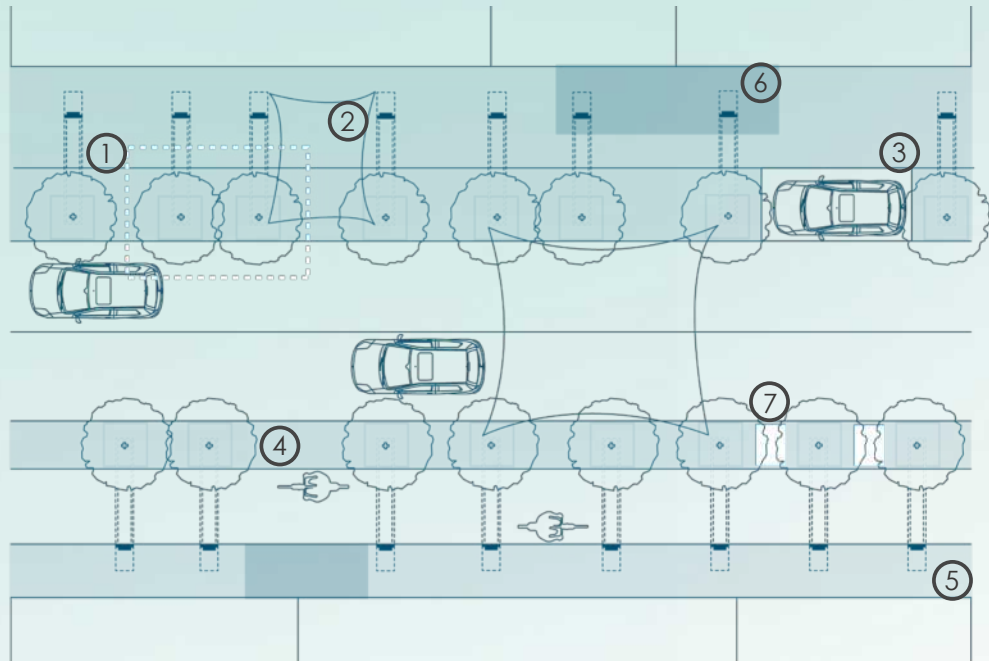
STREET SECTION



LANE CONFIGURATIONS



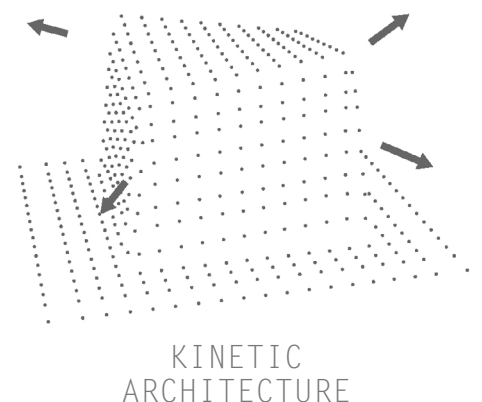
PLAN DIAGRAM





**INTRO:** A truly innovative innovation district innovates not just individual elements, but design at a system level. Possessing a goal to question even the most standard elements of a city, this conceptual example of an innovation district questions the possibility of the entire district being formed from one surface - a surface that can be pushed and pulled for different uses. What if there was one continuous unit that structures can form from? The surface is adjustable and kinetic to help future-proof the infrastructure of the area. I wanted to explore an alternate district size space unbound by the typical city restrictions - a space where nothing gets in the way of a good idea for innovating the built environment.

MODIFY THE SURFACE WITH THE PROGRAMMING WALL





### INNOVATION DISTRICTS SHOULD BE: MINIMALLY RESTRICTIVE

In most situations, innovation at the city or district level is held captive to building restrictions and zoning laws. An Innovation District should be a place to negotiate these rules for the purpose of improvement. Rules are often restrictive to novelty and something needs to be done to speed up the process of built environment innovation.

### ADJUSTABLE

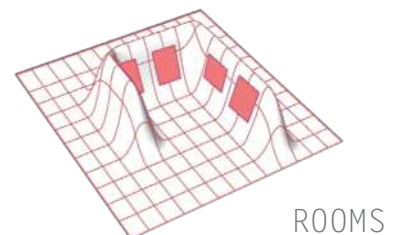
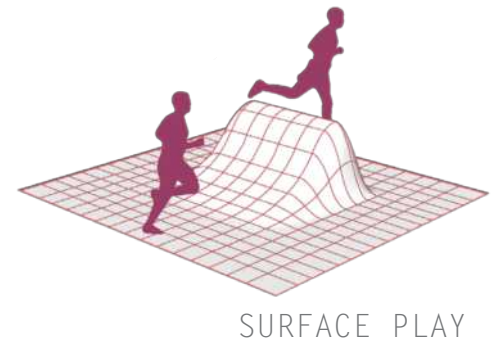
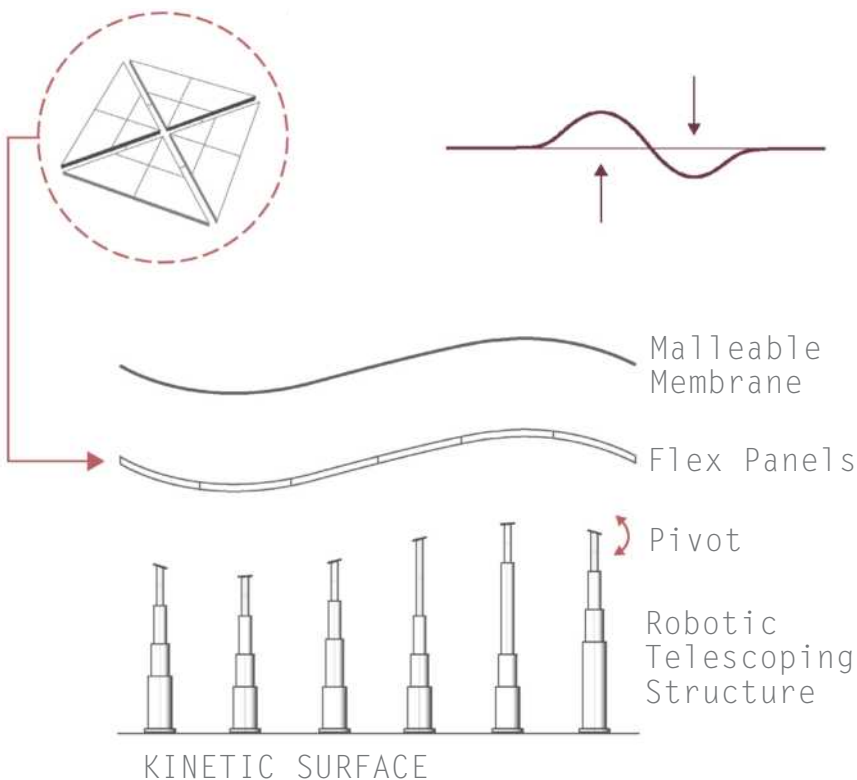
Having a flexible, temporary, and adjustable structure encompassing the district allows for continual change without the implications of being stuck with a change for 10 years. Without this principle, an innovation district becomes a static element in time, much like Disney's Epcot. Entities taking part in the innovation district must agree to have business plans that implement constant change.

### INNOVATIVE AT ALL LEVELS

An innovation district has to encourage innovation in a diverse range of possibilities. It's innovating the design of the architecture and interactive elements, but also perhaps encouraging a new format for the organization of a business or a novel restaurant concept. Innovation takes place in many forms that are often not marketed by innovation districts.

### INTERACTION ORIENTED

An innovation district has to be designed in a way to encourage social interactions in as many places and as often as possible. Knowledge spillover and innovation are born from diverse interactions.



SECTION MODELS



EXISTING TREES AND PROPOSED PLANTING BEDS



POND LEVEL CAFE SEATING



VIEWING PLATFORM



## 04...CONFIDENTIAL CORPORATE CAMPUS

3D VISUALIZATION (MODELING AND RENDERING).  
CURRENTLY UNDER CONSTRUCTION.

### LIGHTING PLAN



### PROJECT ROLE:

To speed up the delivery of the project, design and construction processes are happening simultaneously. My design role involves 3D modeling and rendering that occurs on a near-weekly basis to keep designing the project throughout this multi-phase and multi-year corporate campus construction.





**WAYFINDING**  
XL GROUND SIGNAGE  
PAINTED ON THE  
PLAYGROUND RUBBER  
AND BOARDWALK

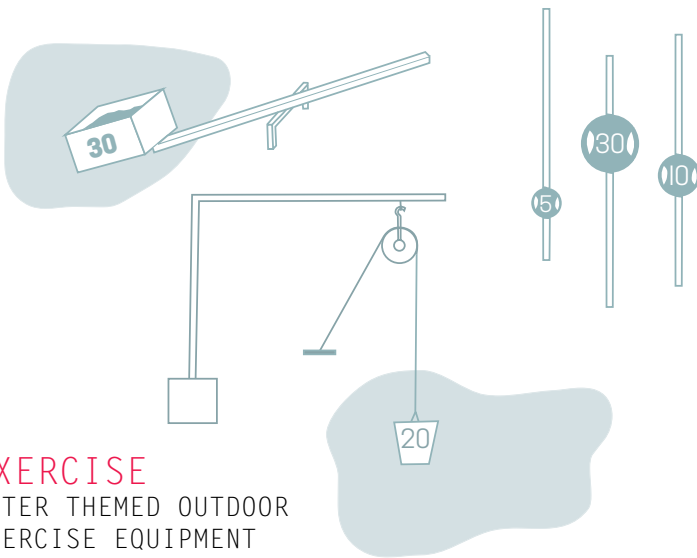
**STRUCTURE**  
ENJOY VIEW POINTS OF  
DIFFERENT HEIGHTS  
WITH AN UNDULATING  
BOARDWALK THAT IS  
ACCESSIBLE FOR ALL

**HIGHLIGHTED**  
STORMWATER FEATURES

**VIEWING LOCATIONS**  
VIEWING PLATFORMS AND THE  
ARCHITECTURE WERE DESIGNED  
FOR VIEWING RAIN EVENTS

# 05...ATHENS, GEORGIA RAIN

A PARK TO EXPERIENCE IN THE RAIN



## EXERCISE

WATER THEMED OUTDOOR EXERCISE EQUIPMENT



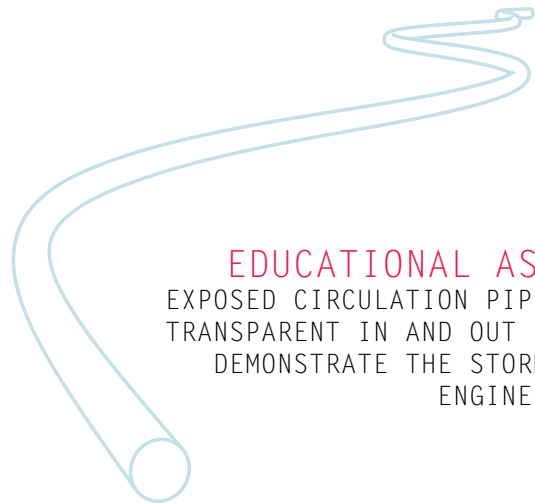
## VIEWING

VIEWING PLATFORMS AND UMBRELLAS FOR WATCHING THE RAIN



## ENTRANCE CANALS

SUNKEN WOOD PATHWAYS LEAD INTO THE BOARDWALK STRUCTURE THAT SNAKES THROUGH THE ENTIRE SITE

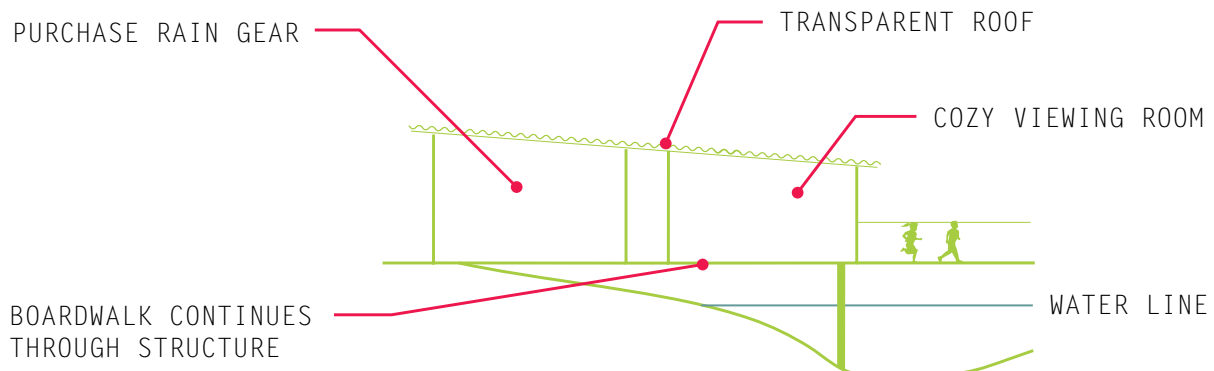


## EDUCATIONAL ASPECT

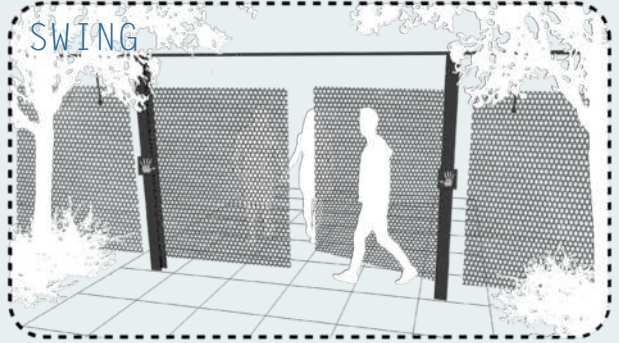
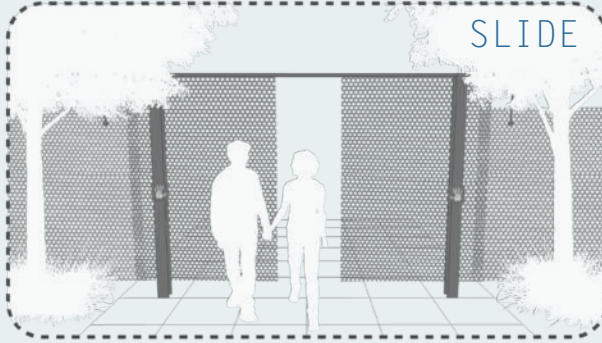
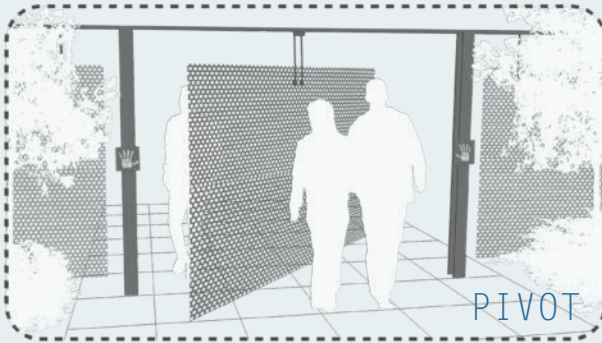
EXPOSED CIRCULATION PIPES AND TRANSPARENT IN AND OUT BOXES. DEMONSTRATE THE STORMWATER ENGINEERING.

## ARCHITECTURE

THE MAIN PATH GUIDES GUESTS TO AND THEN THROUGH THE RAIN CENTER AS A STARTING POINT FOR THEIR VISIT TO THE SITE







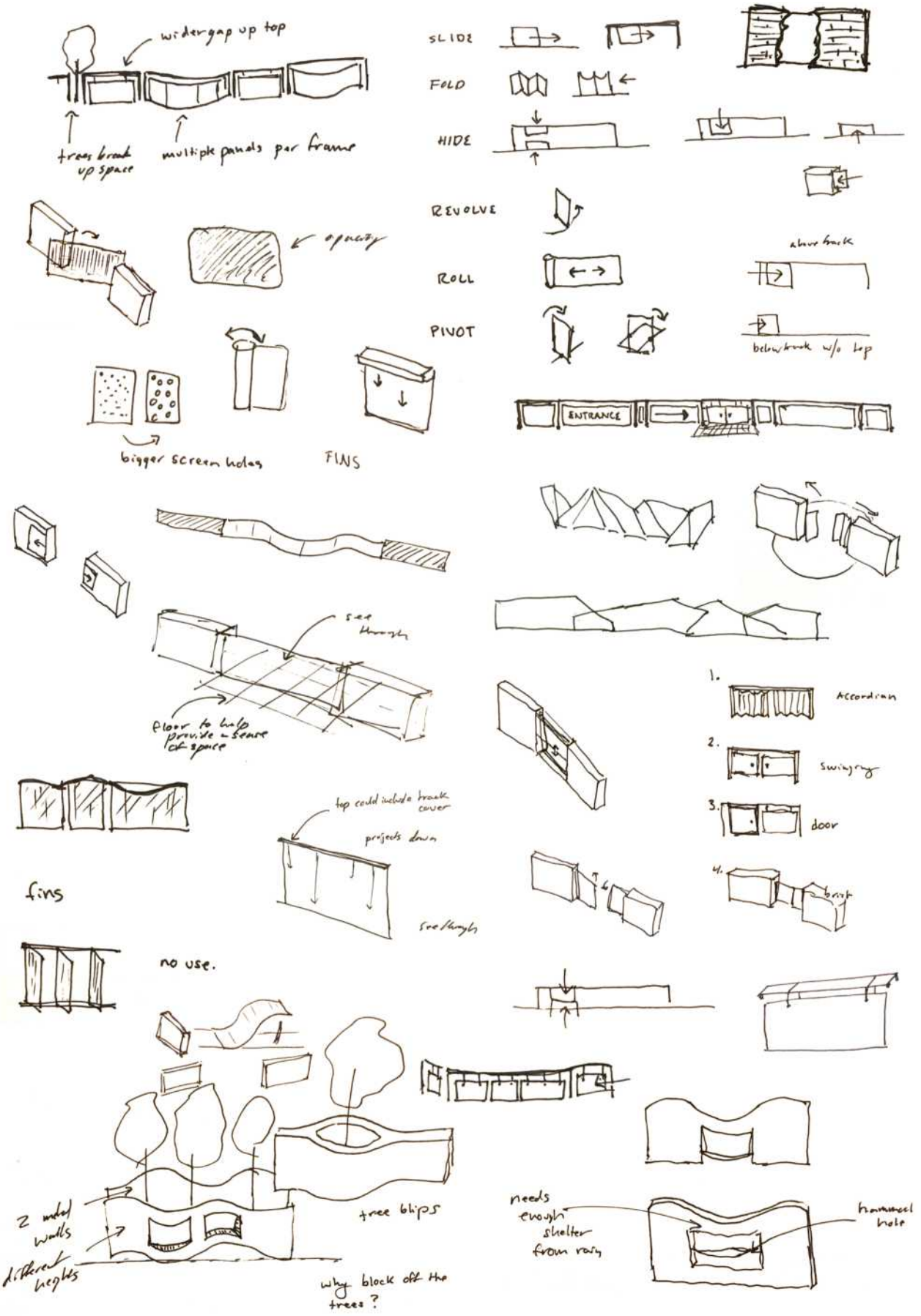
# PERMEABLE EDGE

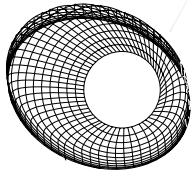
[solving the static divide]



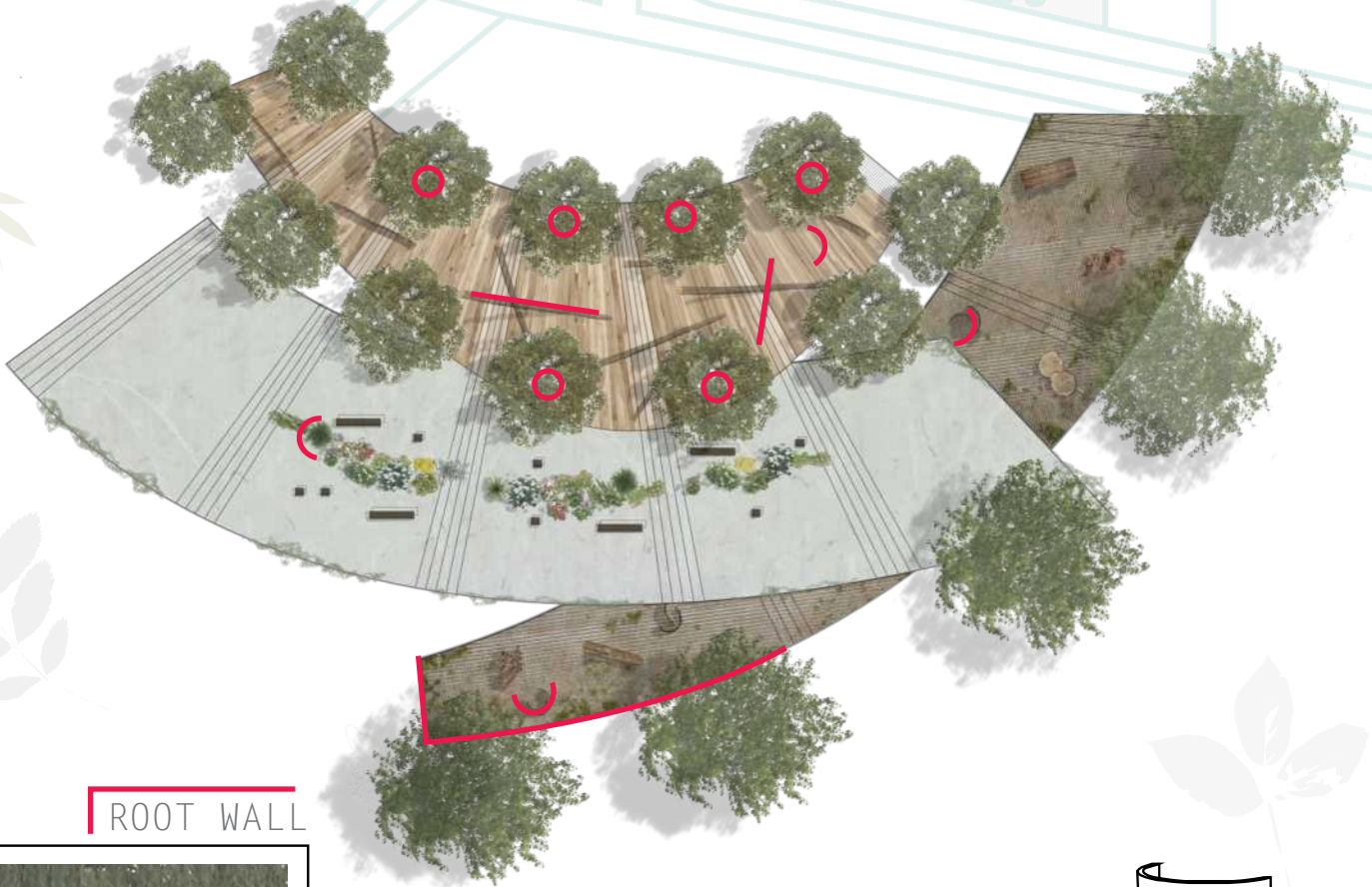
# 06...PERMEABLE EDGE

KINETIC ITERATIONS FOR SOLVING THE STATIC DIVIDE OF A GATED CAMPUS

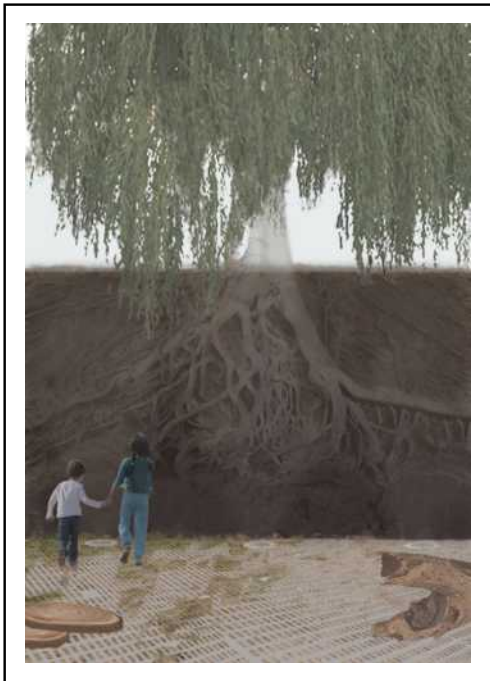




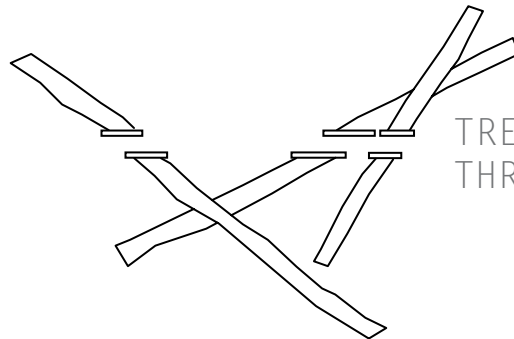
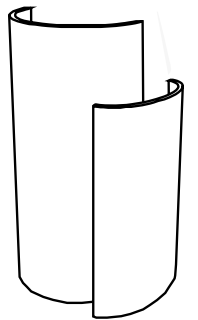
TREE TO PATH DETAIL   
NETTING BASKETS FOR SEATING



ROOT WALL



 SIGNAGE DISPLAYED  
ON BARK LAYERS

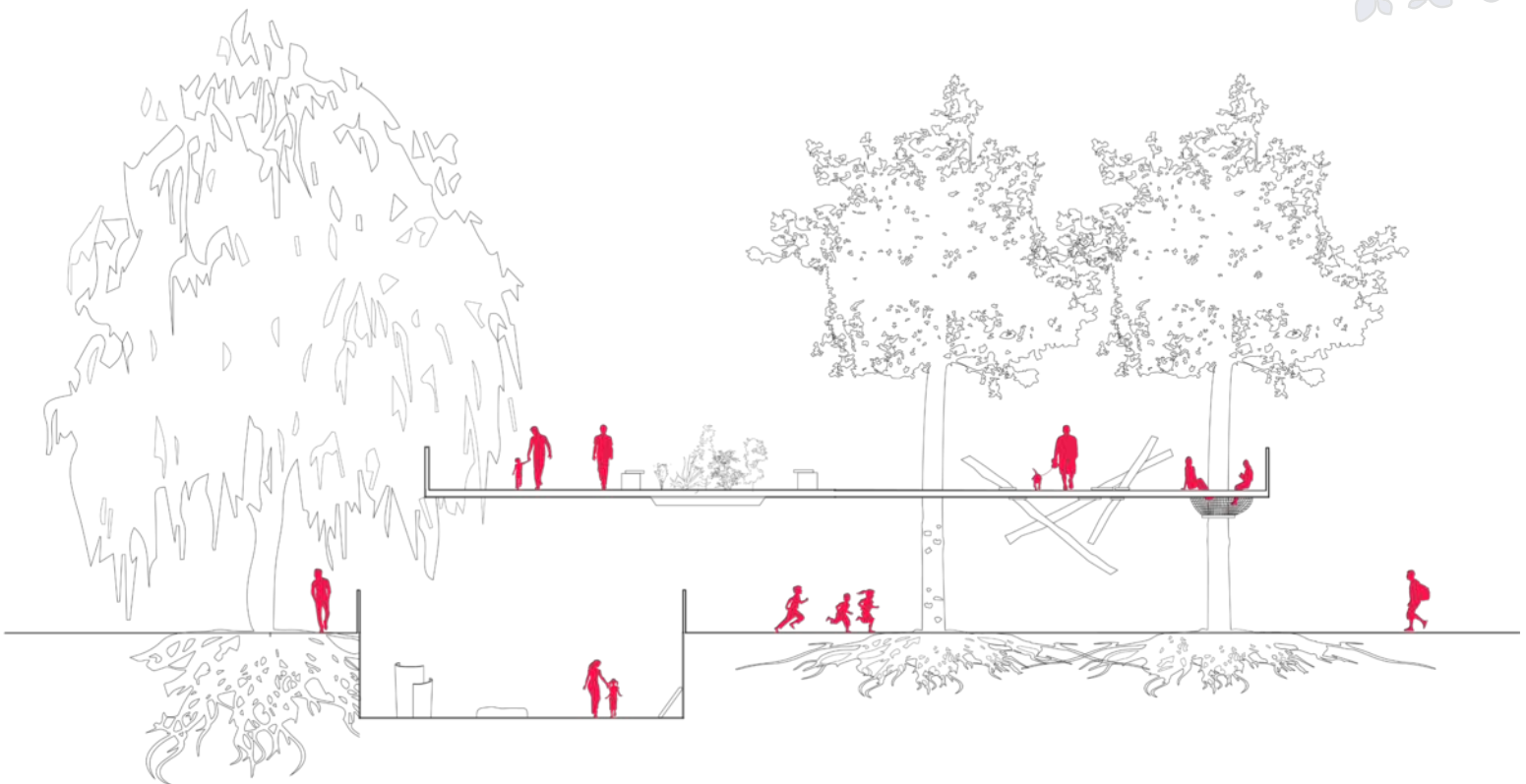


TREE TRUNKS SUSPENDED  
THROUGH STRUCTURE 

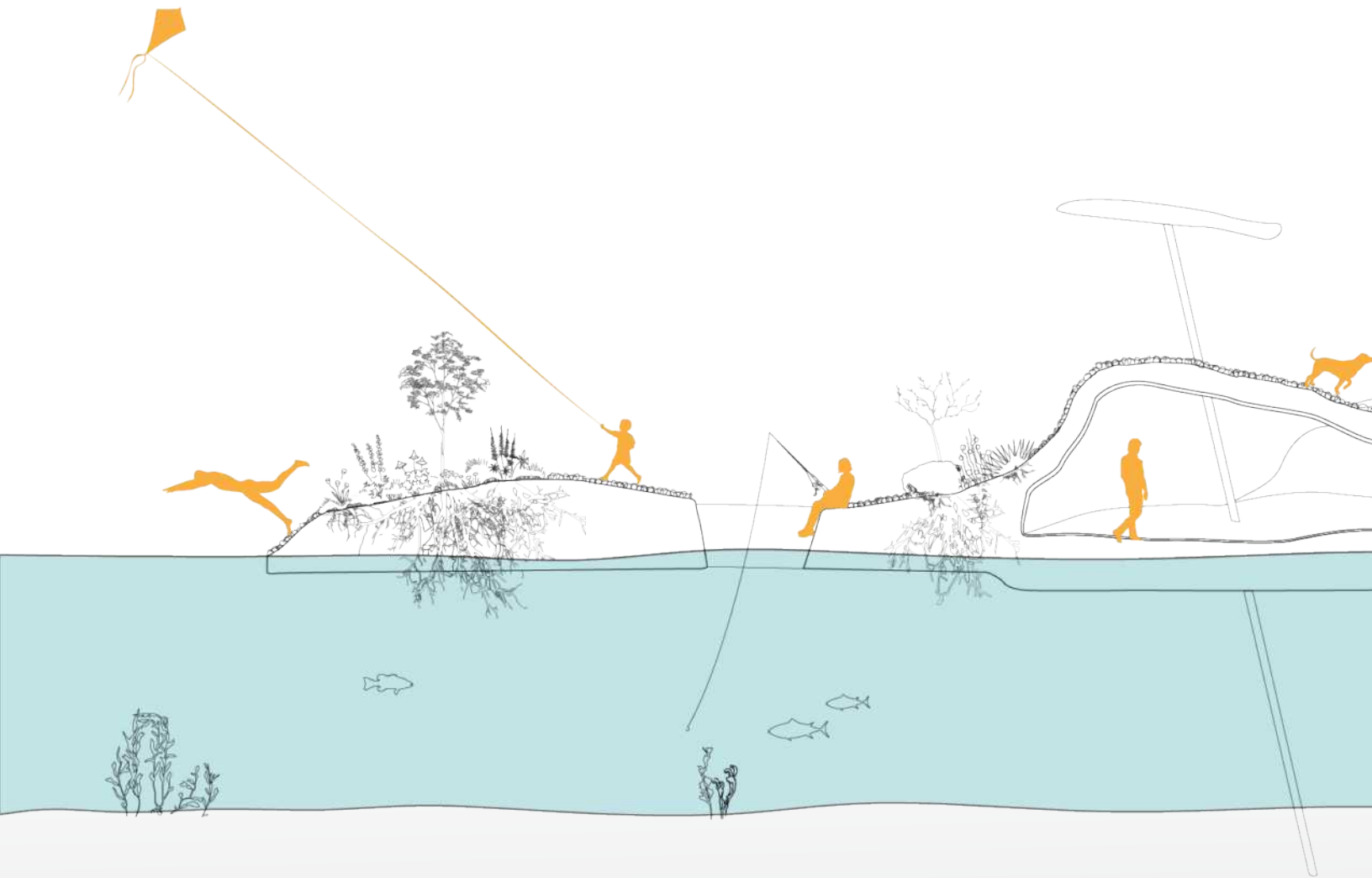


# 07...URBAN TREE MUSEUM

A PARK TO EXPLORE ALL PARTS OF A TREE





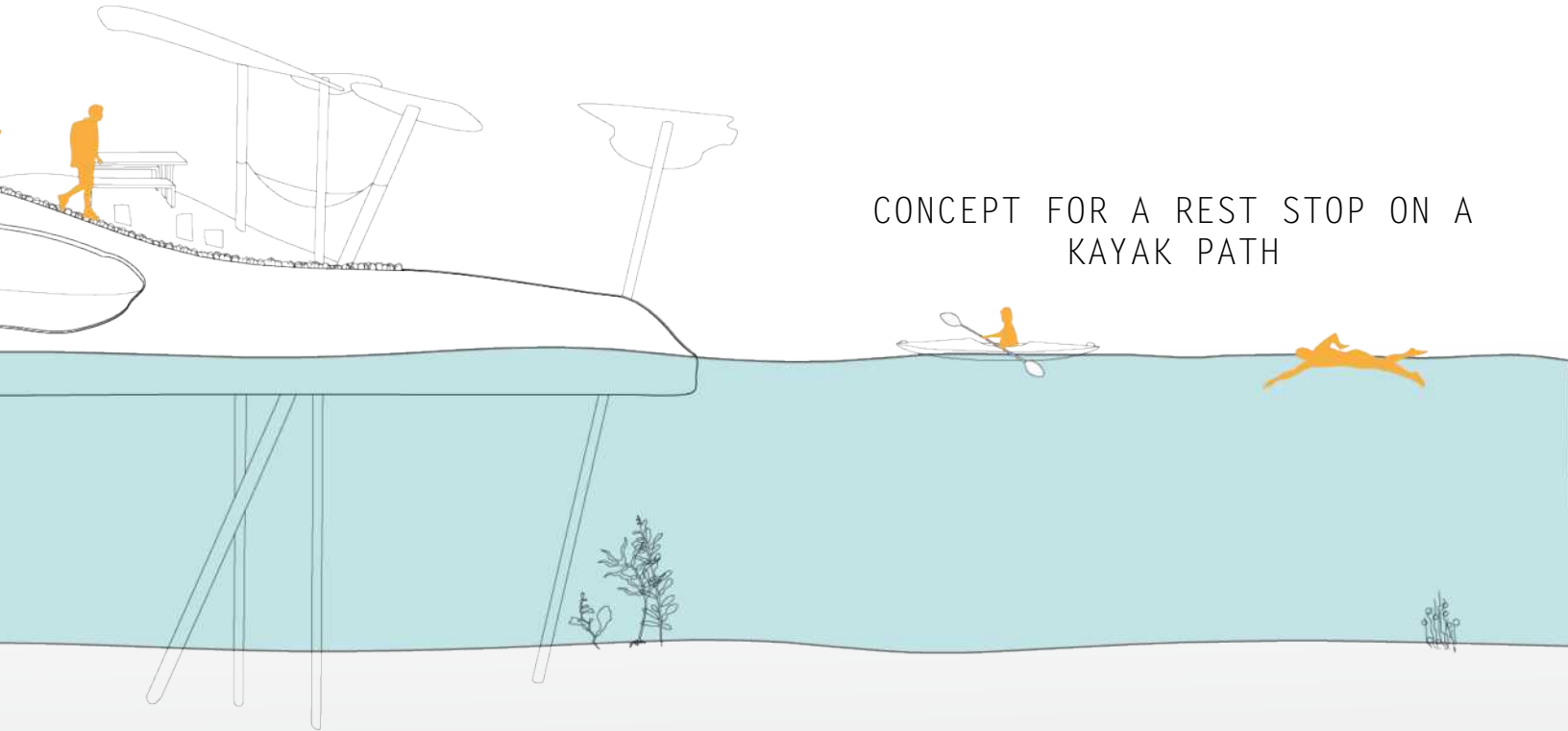


FLOATING PHYSICAL MODEL



# 08...FLOATING ISLANDS

MOLDING SPACES OUT OF BIOHAVEN®



CONCEPT FOR A REST STOP ON A  
KAYAK PATH

DESIGN BASED ON BIOHAVEN® FLOATING  
ISLAND TECHNOLOGY







A HAND WASHING STATION SIGN

LOGO AND LANDING PAGE



A SPICE PACKING COMPANY  
IN CLEARWATER, FL



SOCIAL BUZZ - A LOCATION  
BASED SOCIAL MEDIA





SOMM SCORE - A WINE RATING APP

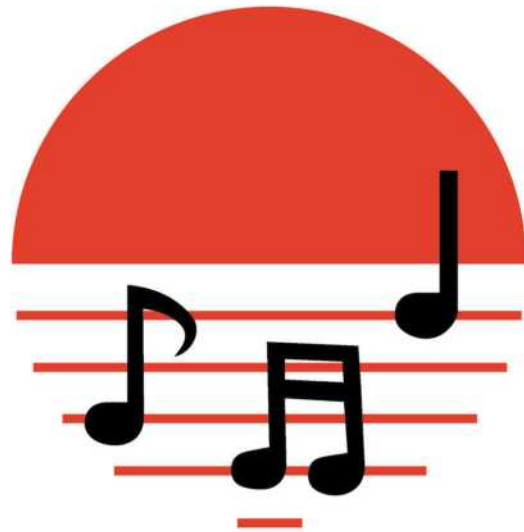


WRAPP WEARABLES

LOGO CONTEST



SUNCOAST SYMPHONY

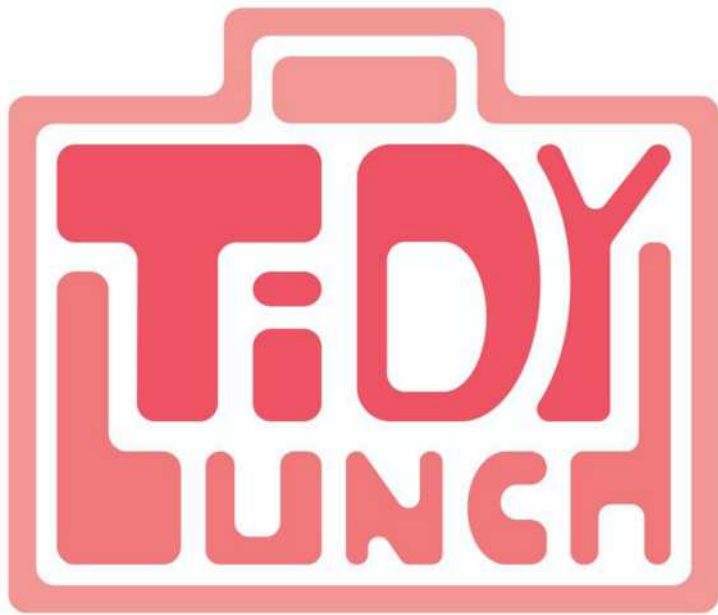


MUSH! - A MUSHROOM COMPANY WITH A CIRCULAR ECONOMY FOCUS





CONCEPT LOGO FOR THE RE-BRANDING AND UNIFICATION  
OF LOOKOUT MOUNTAIN TN AND LOOKOUT MOUNTAIN GA

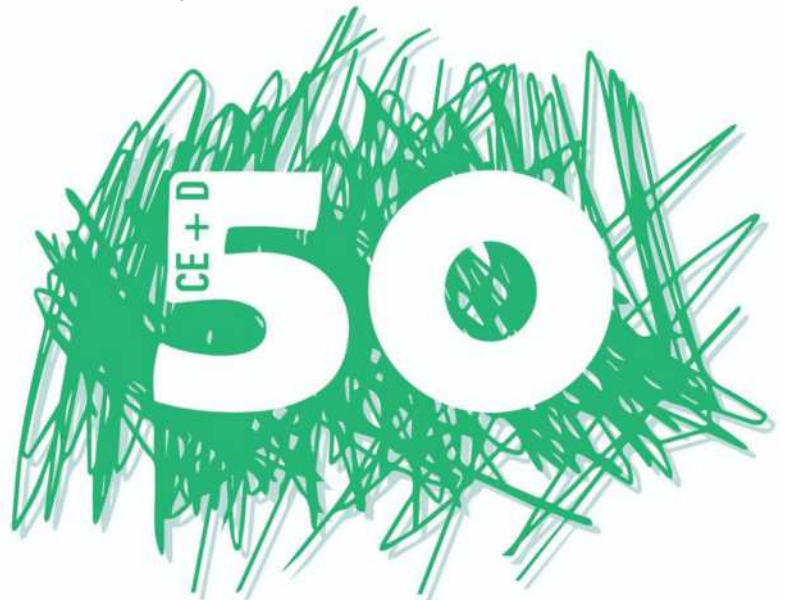


LUNCH SUBSCRIPTION SERVICE

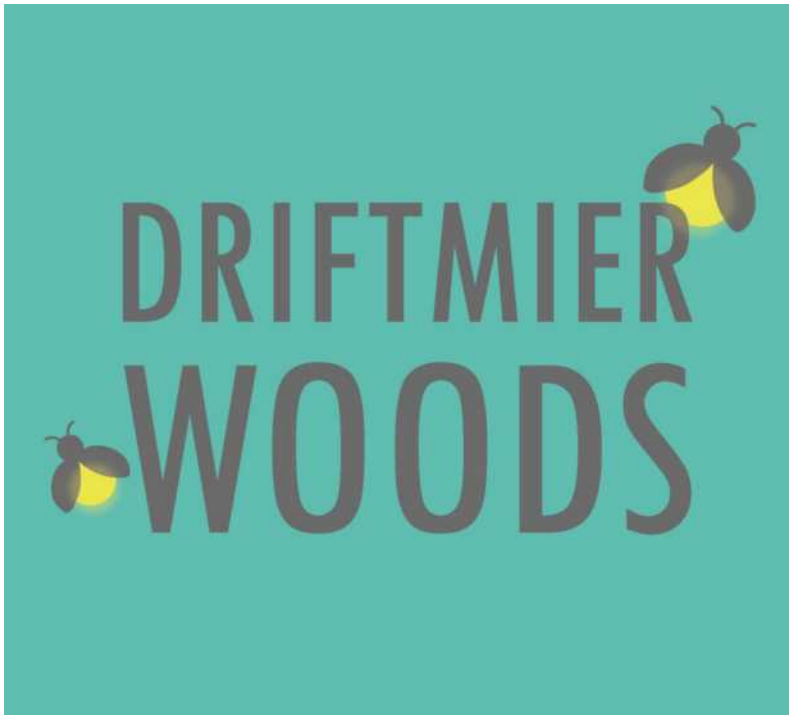
JUST FOR FUN.



COLLEGE OF ENVIRONMENT AND  
DESIGN 50TH ANNIVERSARY LOGO

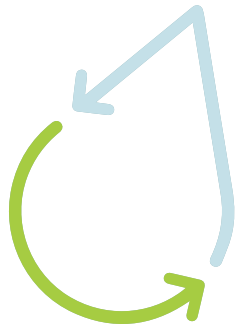


INSPIRED BY THE RARE FIREFLY UNIQUE  
TO DRIFTMIER WOODS

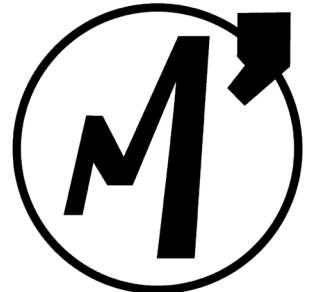
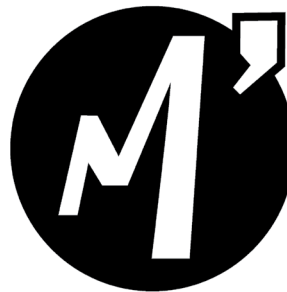


LOGO CONTEST

ATHENS RAIN PARK



A STARTUP CLOTHING LINE  
LOCATED IN CINCINNATI, OH





RACHAEL SHIELDS  
rachael@rmshields.com  
616-610-3562

FOR MORE WORK EXAMPLES  
PLEASE VISIT  
[WWW.RMSHIELDS.COM](http://WWW.RMSHIELDS.COM)