AgroEcology Innovation District

Designing Agricultural Urbanism at the University of Maryland

SCHOOL OF ARCHITECTURE, PLANNING & PRESERVATION

STUDIO REPORT

ARCH 407: Architecture Design Studio

Instructor: Michael Ezban RA, ASLA

SPRING 2022

Acknowledgements

Many thanks to the nine talented students enrolled in ARCH 407 in Spring 2022 for the many hours of work they put into their projects: Kiara Clark, Katherine McClure, Nick Majka, Dylan Spanier, Joe Tannir, Paul Abel, Maha Almari, Emily Clark, and Liam Jones.

Course Information

ARCH 407 is a 6-credit design studio that is focused on urban design. The course was taught by Michael Ezban, RA, ASLA, Clinical Assistant Professor of Architecture.

Contents

01 **Project Summary** 04

02 **Case Study Analysis** 14

03 **Existing Site Analysis** 34

04 **Urban Design Proposals** 48

01
Project Summary

The AgroEcology Innovation District (AID) is a proposed new development initiative at the UMD North Campus that seeks to create and amplify new spatial relationships between agriculture and public space, human and nonhuman ecologies, and campus and urban development.

This design exercise is an exploration in "**agricultural urbanism**," or urbanism in which agriculture, buildings, and infrastructure are developed in tandem, in contrast to "urban agriculture," where agriculture is proposed for derelict areas of pre-existing urbanism.

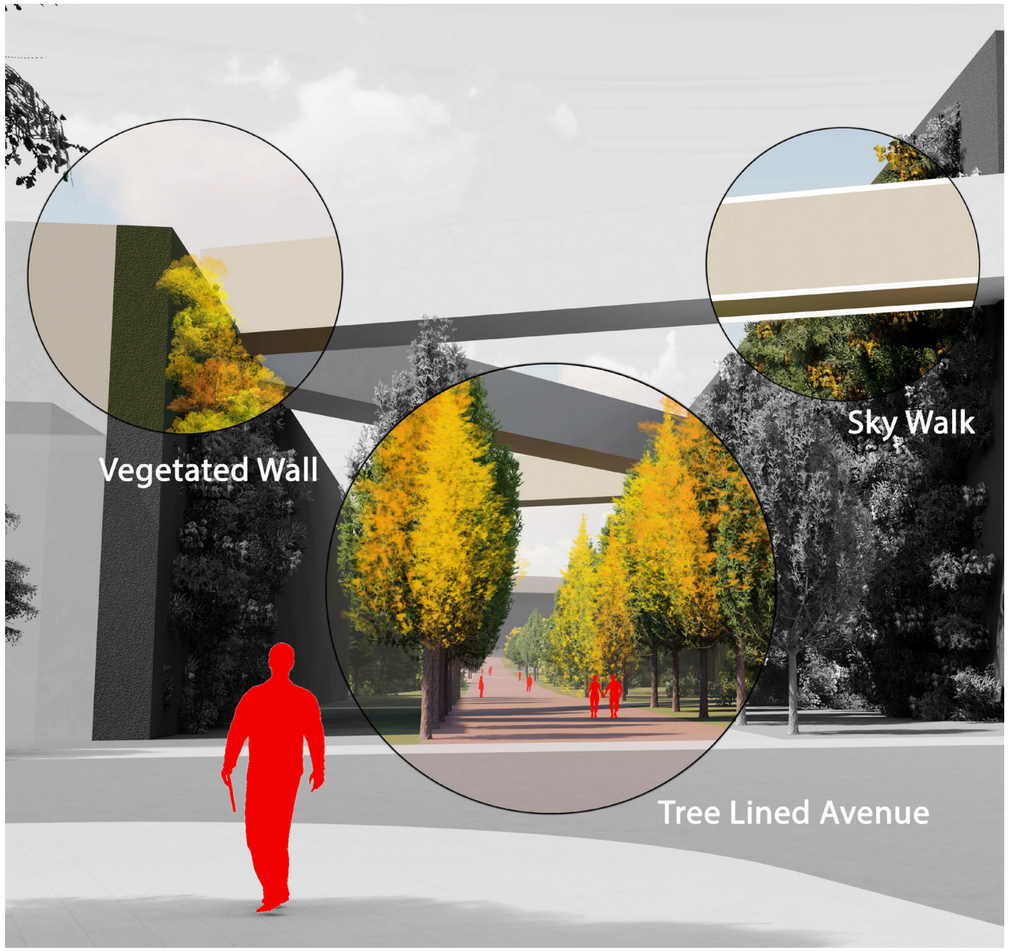
Student design strategies for the AID draw heavily from nine historical and contemporary case studies of Agricultural Urbanism projects by a range of designers.

AID radically reconfigures North Campus through the design of three zones: the Urban Corridor Agriculture Zone; the Campus Agriculture Zone; and Campus Cohabitation Zone.


ZONE 03
ZONE 02
ZONE 01



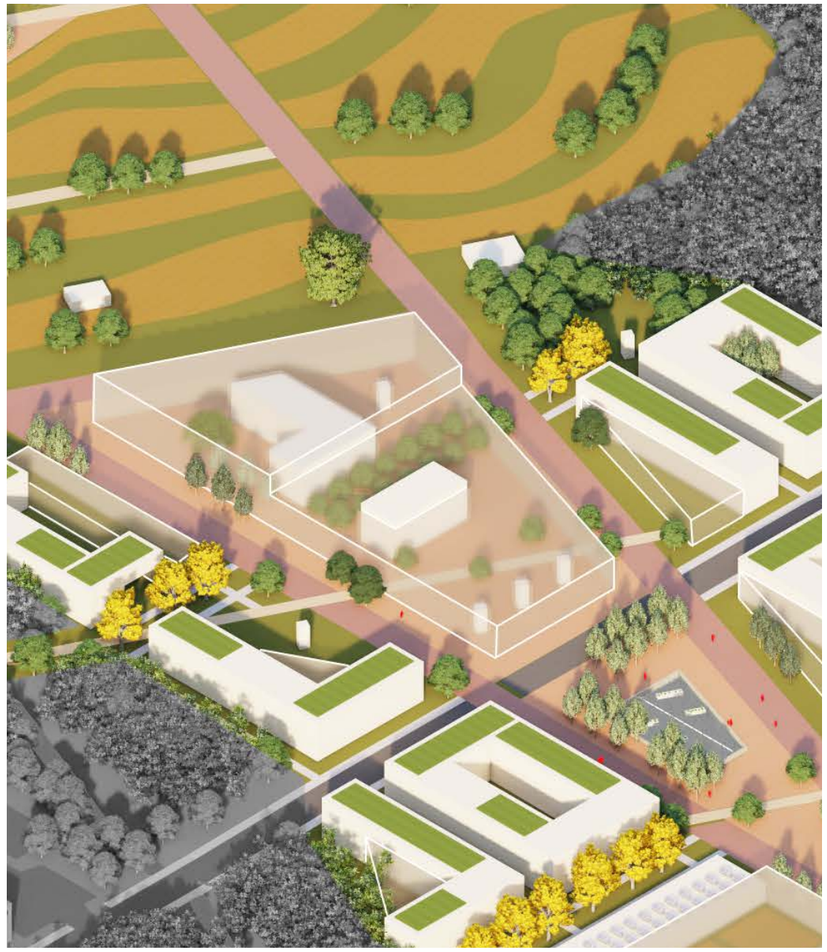
by Dylan Spanier



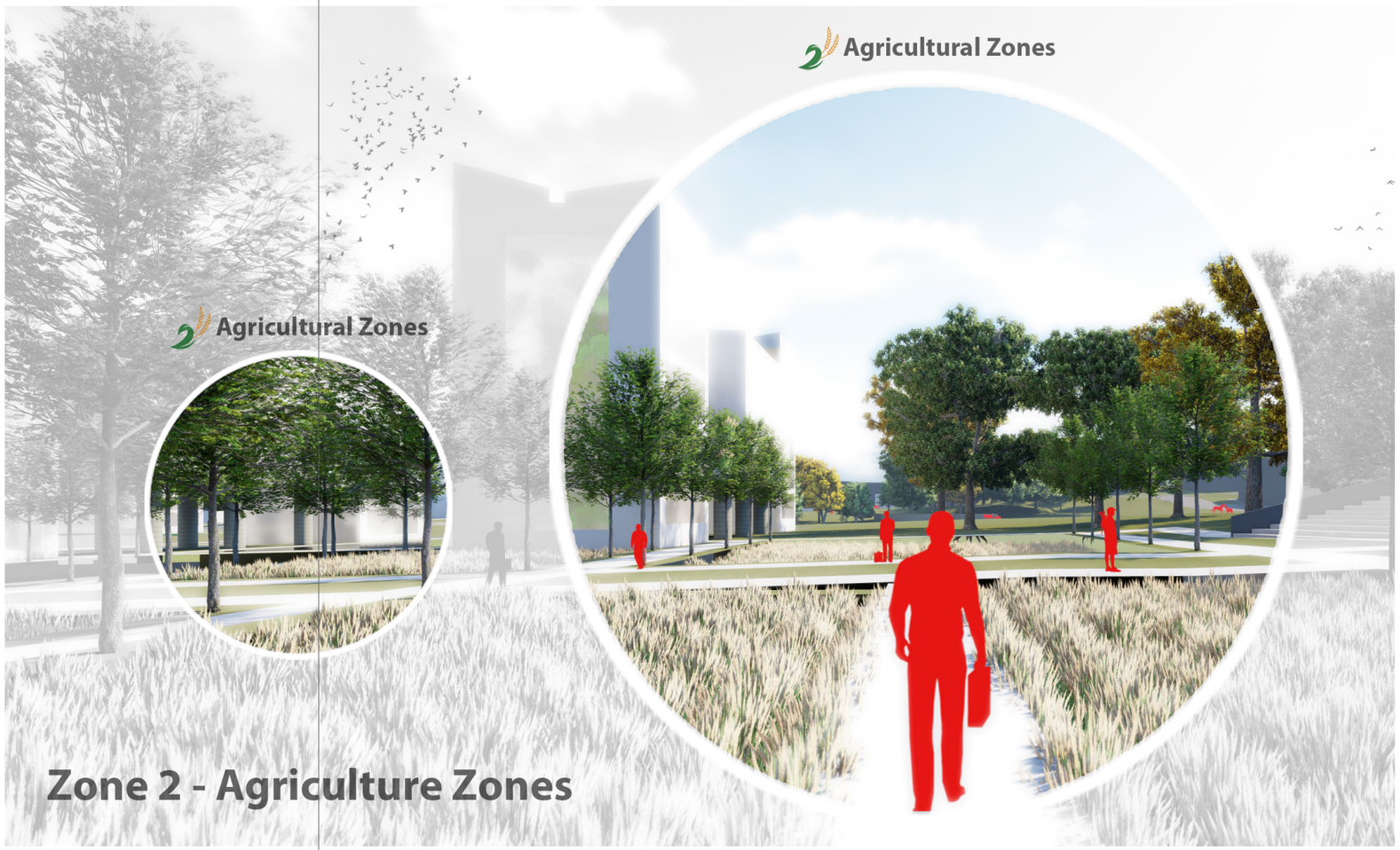
by Liam Jones

ZONE 01: Urban Corridor Agriculture Zone

An area of high-density development, owned and operated by UMD, that mixes student housing, commercial, and agriculture program. The buildings here have a dual responsibility to help create the shape of the increasingly dense Baltimore Avenue urban corridor, while also serving as a new gateway (pedestrian and/or vehicular) from College Park into the UMD Campus and the Paint Branch Stream and Campus Creek Habitat Corridors and trail systems. This zone exhibits to the public how urban life and agriculture can be creatively intertwined.



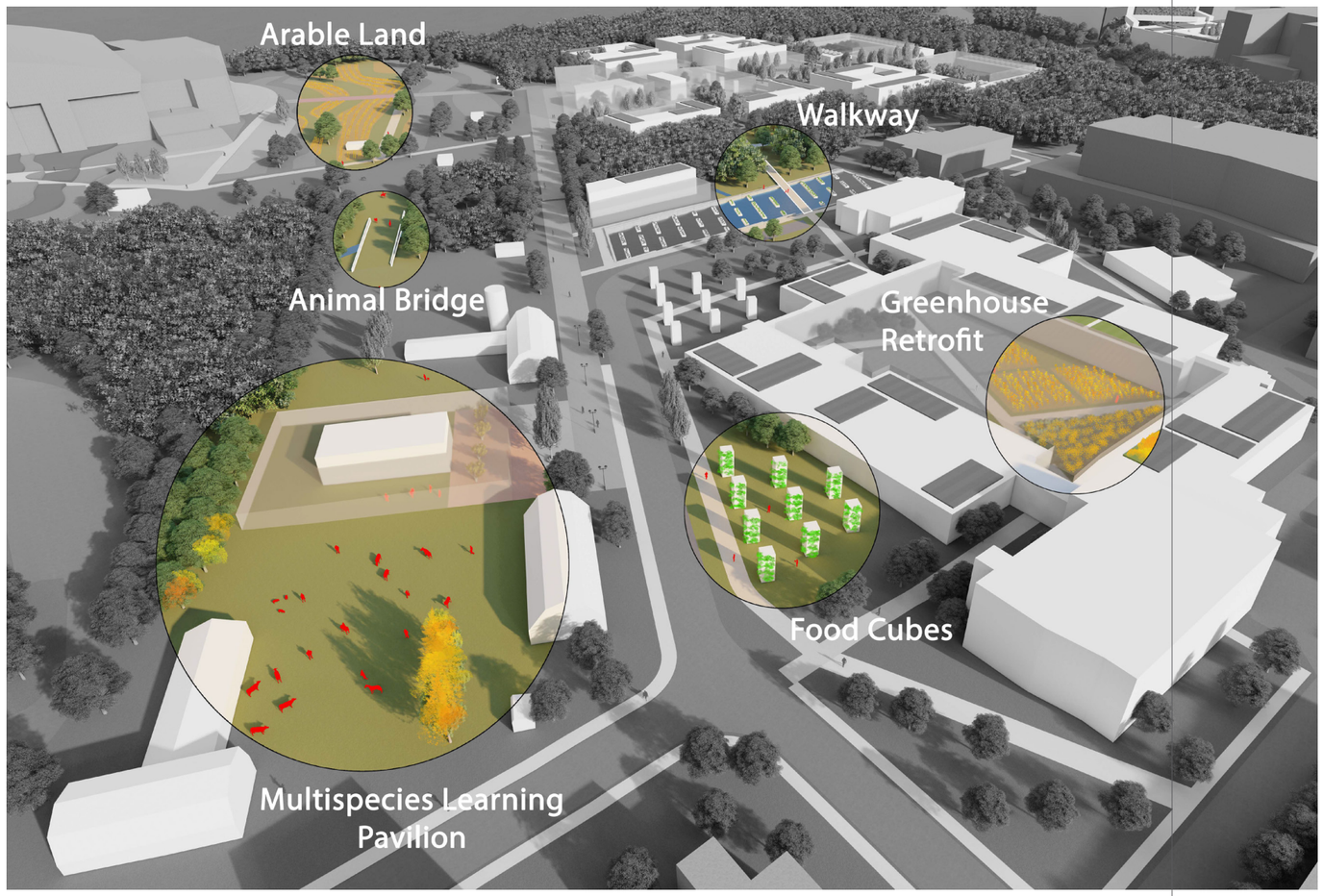
by Liam Jones



by Dylan Spanier

ZONE 02: Campus Agriculture Zone

An area of mid-density development characterized by interrelated buildings and productivelandscapes that take the place of vast surface parking lots and playing fields. This zone features a range of agricultural practices that enable both academic research AND public aesthetic experiences. Buildings here are lower scale than at ZONE 01, and include educational programming, greenhouses, and a public visitor center. This zone generates excitement for the possibilities of sustainable 21st century agricultural practices by showcasing new technologies alongside the wisdom of indigenous practices.



by Liam Jones

ZONE 03: Campus Cohabitation Zone

An area of relatively low density development that fosters a range of multispecies encounters and education at various indoor and outdoor spaces. Outdoor spaces enable agriculture and human interaction with farm animals, and the historic Campus Farm is enlivened by a new building: a 16,000sf Multispecies Learning Pavilion, which will be the new public face of the Campus Farm. This zone also connects directly to the newly restored Campus Creek Habitat Corridor, where further encounters with nonhumans are possible along a new trail system that connects to the Paint Branch Stream trails. By shaping a wide array of embodied experiences with nonhumans, this zone aims to foster a sense of care and responsibility for other-than-human species.



by Dylan Spanier

02
Case Study Analysis

Student design strategies for the AID draw heavily from nine case studies of Agricultural Urbanism projects by a range of designers. The cases are both historical and contemporary, spanning from the early 20th century to today, and they are located in six different countries: the United States, Japan, China, England, Philippines, and Guatemala.

Students were asked to observe and represent how agriculture processes, pattern, and program are generative of urban form in these case studies, and they were instructed to graphically describe the spatial interrelationships between crops, buildings, and infrastructure. Key building and landscape typologies were also identified and scaled.

Case Study 01

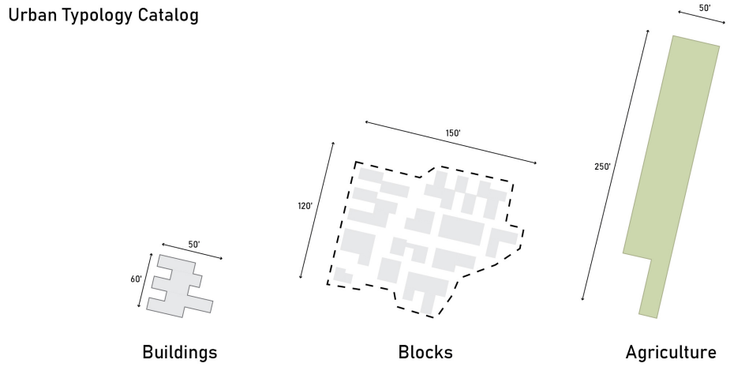
AgroFoodPark | Japan

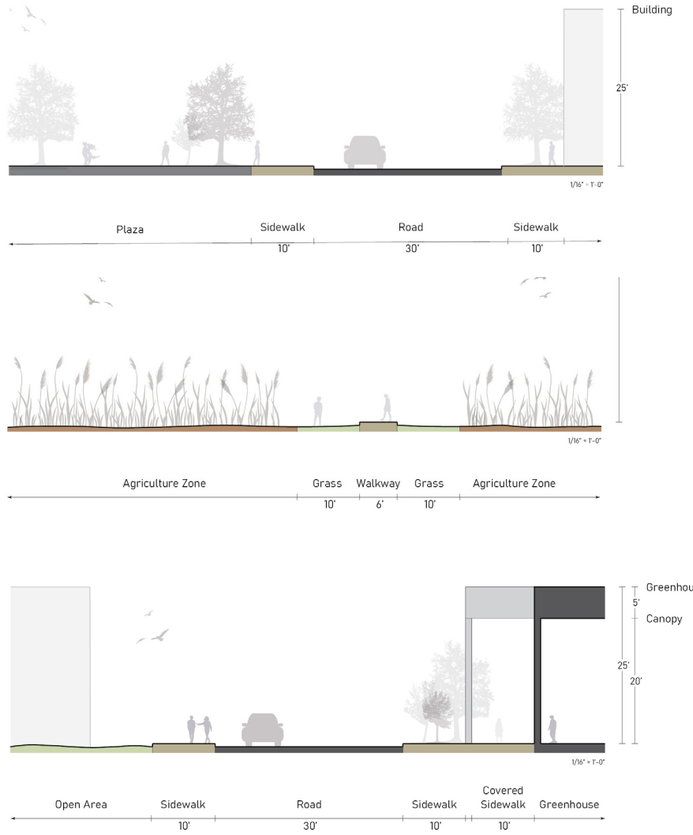
William McDonough + Partners

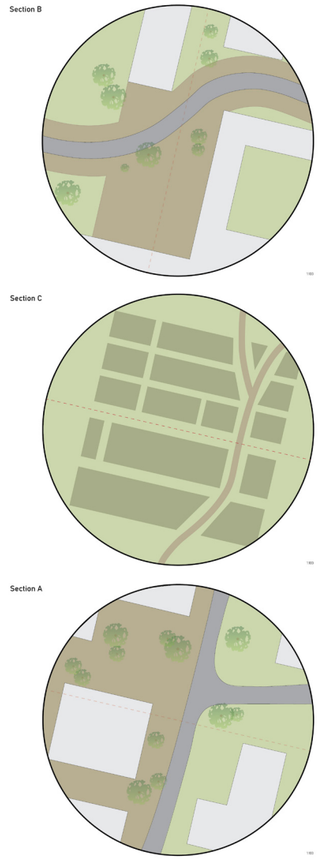




Urban Typology Catalog







by Emily Kelly

Case Study 02

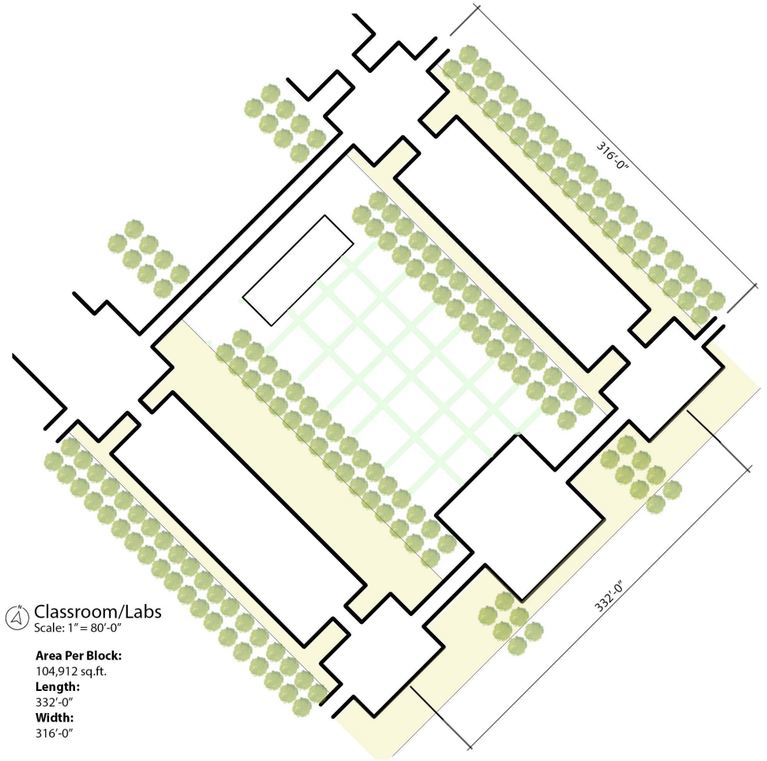
Shenyang Architectural University | China

Turenscape



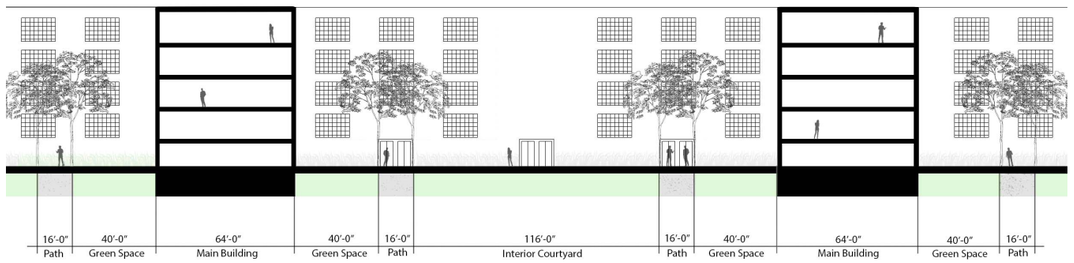


Pattern Diagram
Shenyang Architectural University Campus



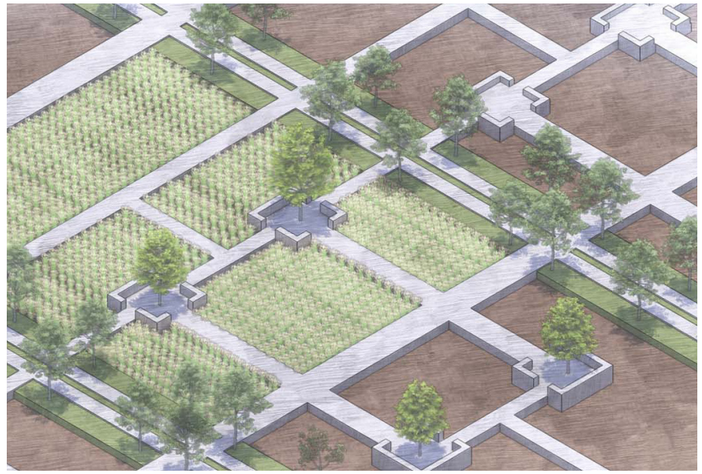
Classroom/Labs
Scale: 1" = 80'-0"

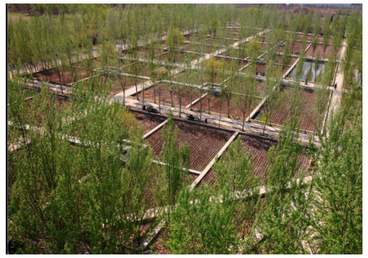
Area Per Block:
104,912 sq.ft.
Length:
332'-0"
Width:
316'-0"

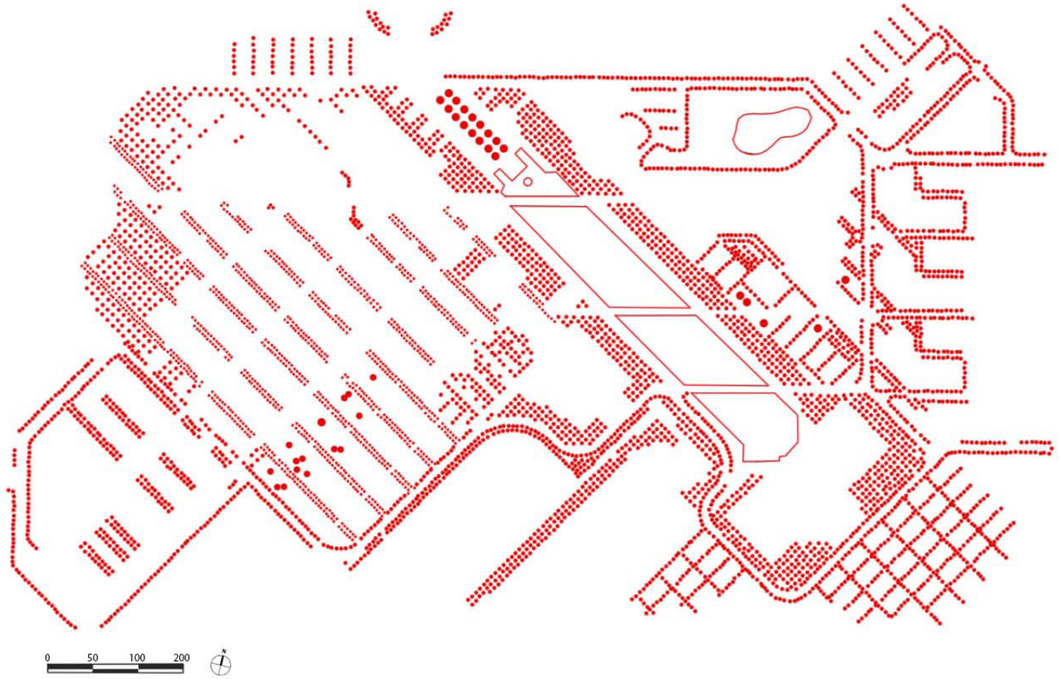


Interior Courtyard Section
Scale: 1" = 60'-0"

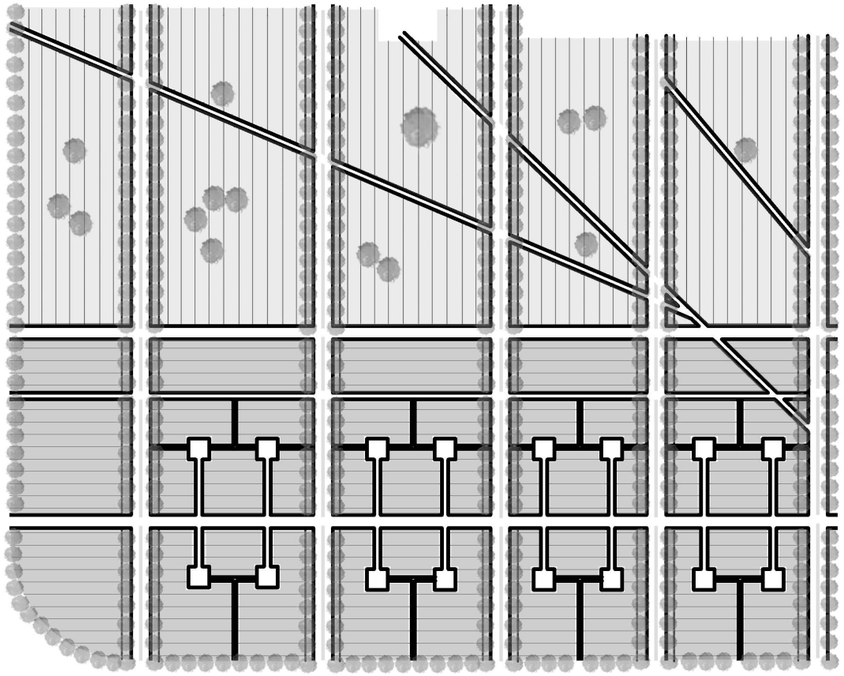
by Dylan Spanier



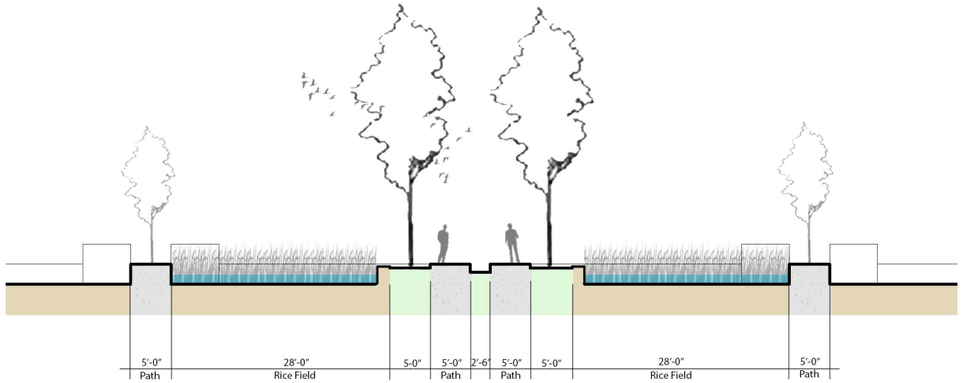




Matrix Diagram
Shenyang Architectural University Campus



Enlarged Figure Ground - Rice Field
Scale: 1" = 80'-0"



Rice Fields Section
Scale: 1/16" = 1'-0"

by Dylan Spanier

Case Study 03

Sunqiao Urban Agriculture District | China

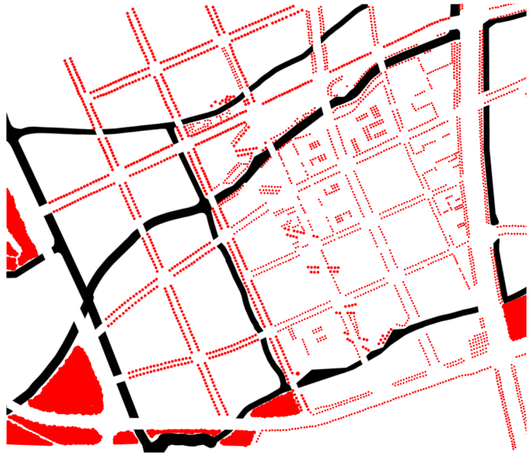
Sasaki





0 50 100 200 400m North

Corridor Diagram
Sunqiao Urban Agriculture District



0 50 100 200 400m North

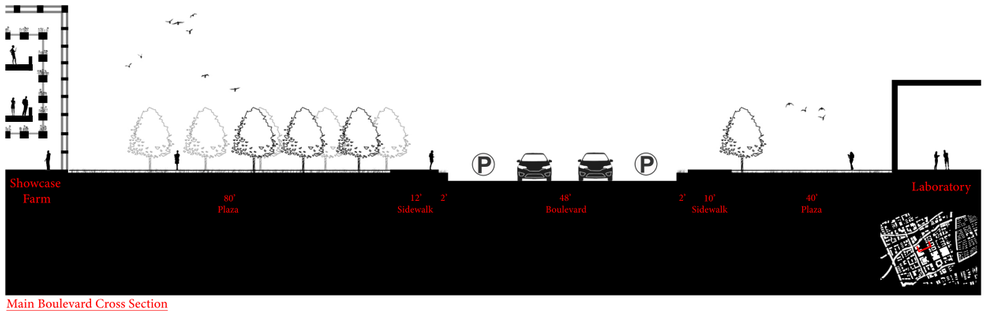
Matrix Diagram
Sunqiao Urban Agriculture District



0 50 100 200 400m North

Agricultural Spaces Diagram
Sunqiao Urban Agriculture District

- Arable Land
- Habitat Reserve
- Aquaponics
- Indoor Farms
- Meadows
- Lawn



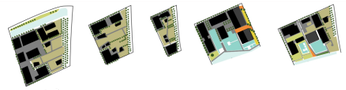
Main Boulevard Cross Section
Scale: 1/64" = 1'-0"

by Liam Jones



Block Key Plan
Sunqiao Urban Agriculture District

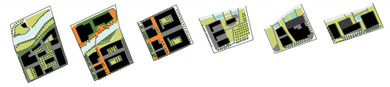
Food Production



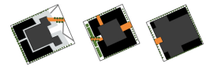
Commercial



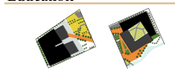
Offices



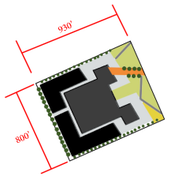
Research



Education

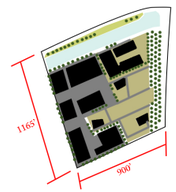


Research - Agriculture Production R+D



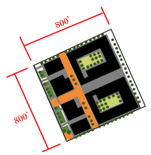
Block Footprint Sqft = 755,000

Food Production - Greenhouse



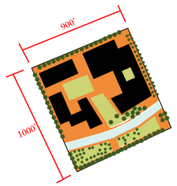
Block Footprint Sqft = 1,195,000

Offices - Business Center



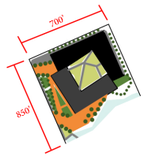
Block Footprint Sqft = 640,000

Commercial - Mixed Use

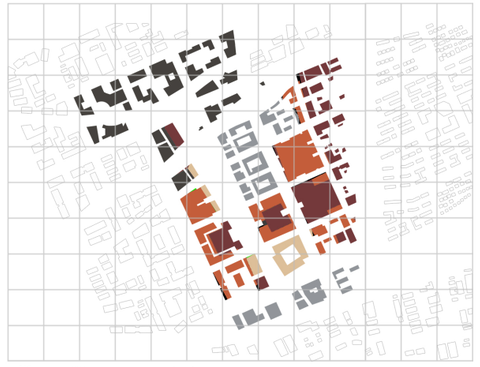


Block Footprint Sqft = 900,000

Educaiton - Science Museum



Block Footprint Sqft = 600,000



Building Key Plan
Sunqiao Urban Agriculture District

Food Production



Commercial



Offices

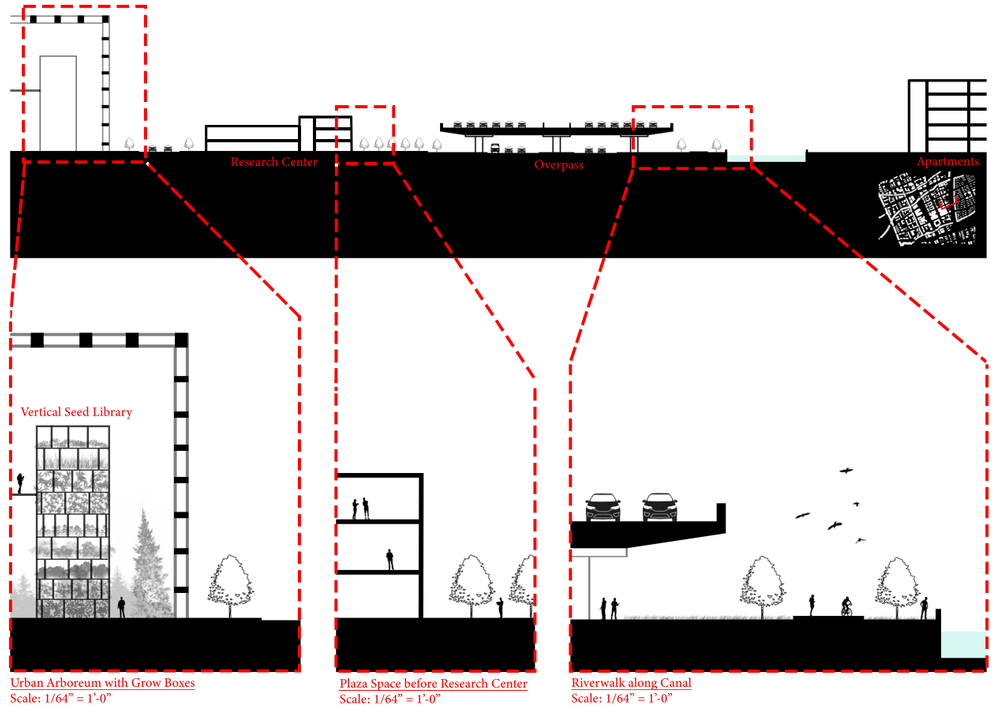


Research



Educaiton





Urban Arboreum with Grow Boxes
Scale: 1/64" = 1'-0"

Plaza Space before Research Center
Scale: 1/64" = 1'-0"

Riverwalk along Canal
Scale: 1/64" = 1'-0"

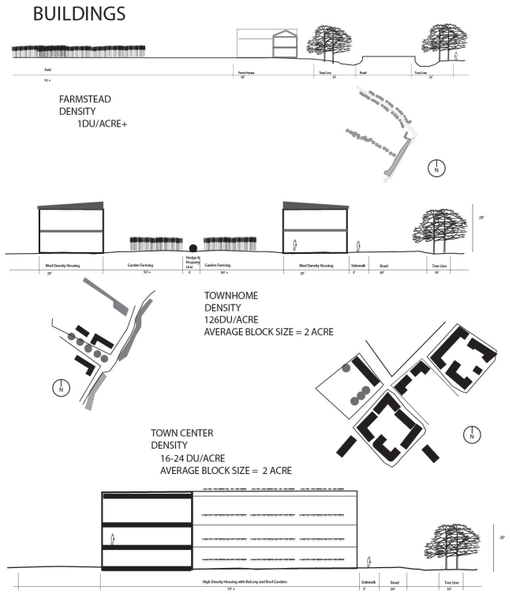
by Liam Jones

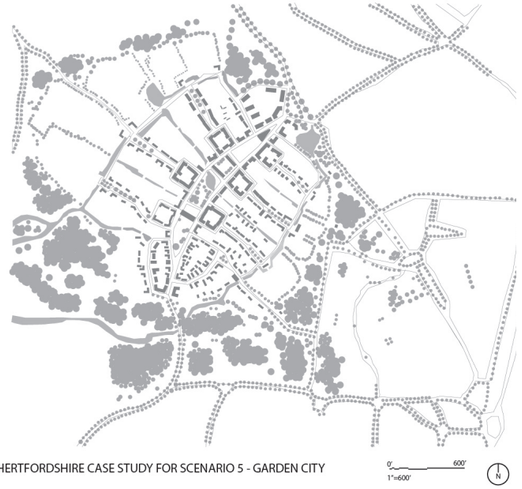
Case Study 04

Agrarian Urbanism | England

Duany Plater-Zyberk









by Joe Tannir

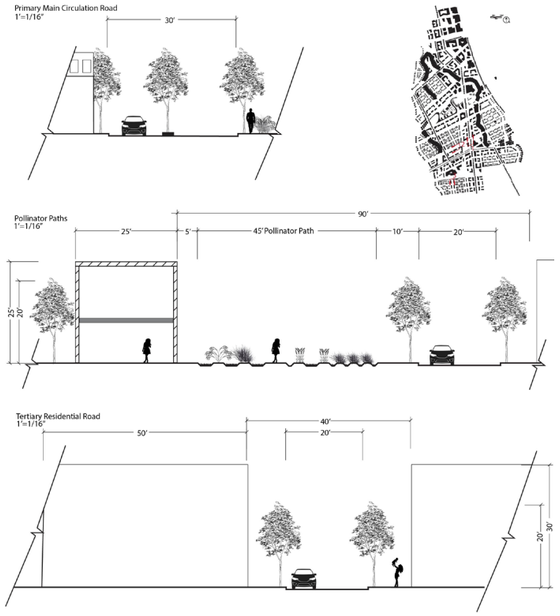
Case Study 05

Ananas New Community | Philippines

Sasaki





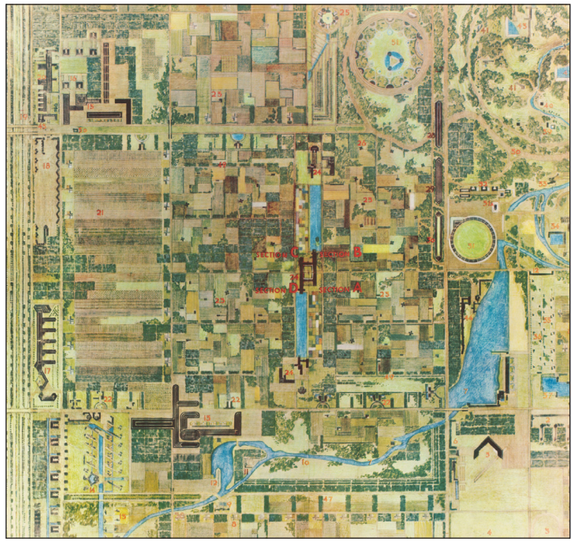


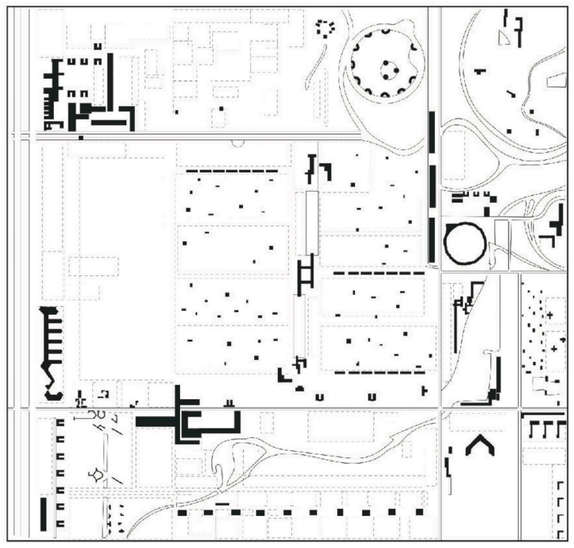
by Kiara Clark

Case Study 06

Broadacre City | USA

Frank Lloyd Wright

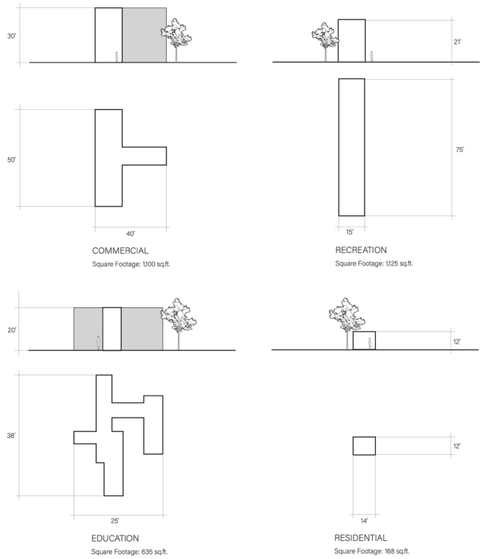


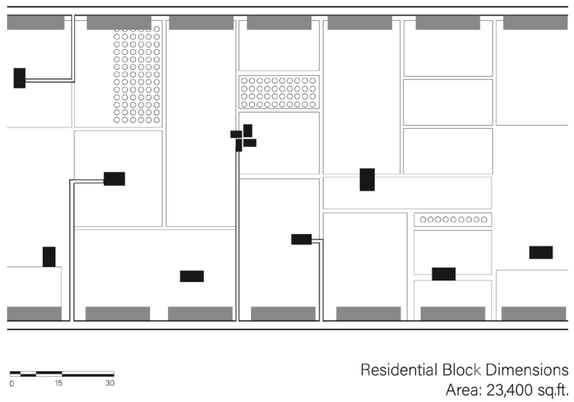


BROADACRE CITY

FIGURE GROUND

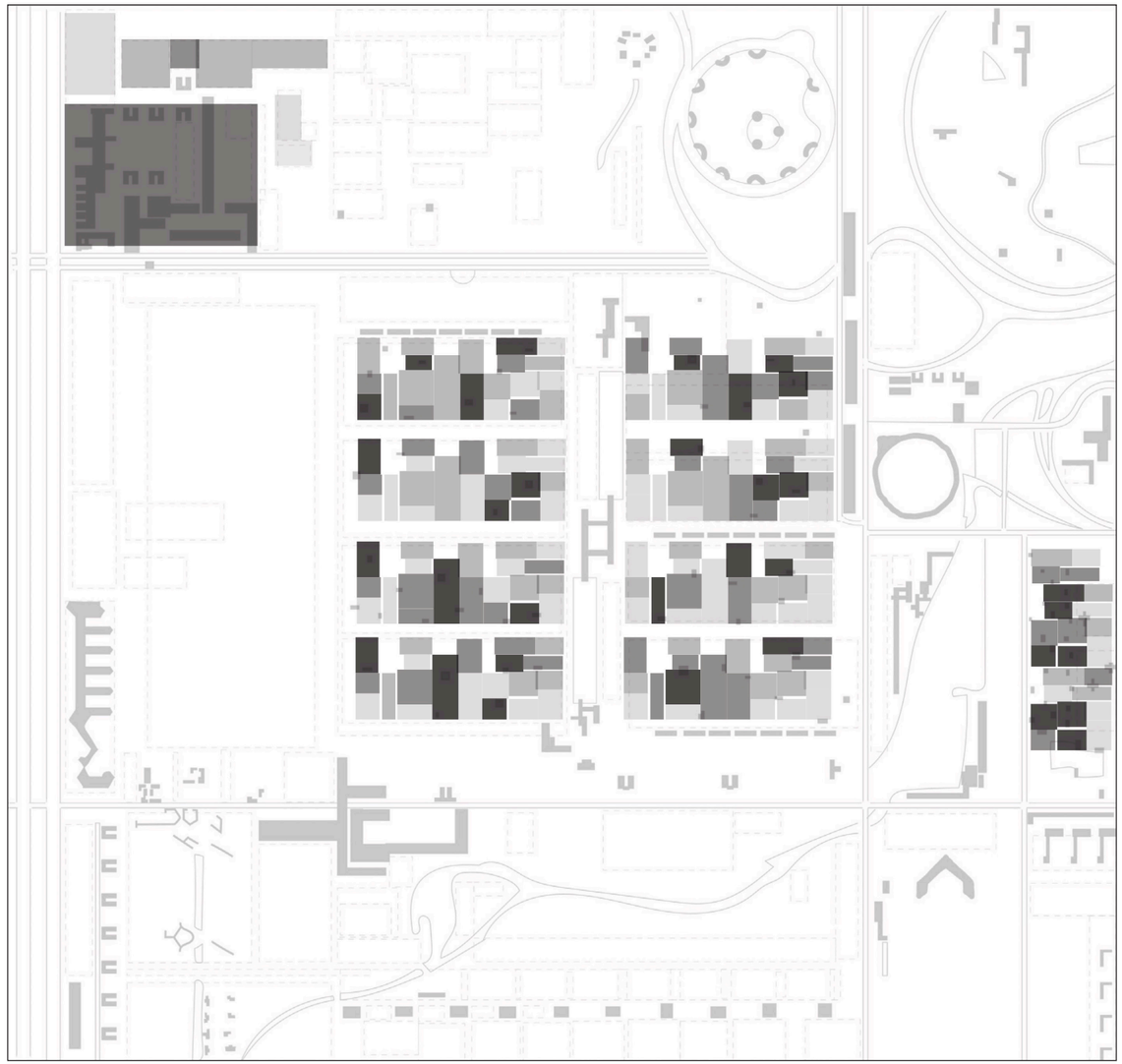
N↑





0 15 30

Residential Block Dimensions
Area: 23,400 sq.ft.
Length: 234'
Width: 100'



0 125 250 500 m

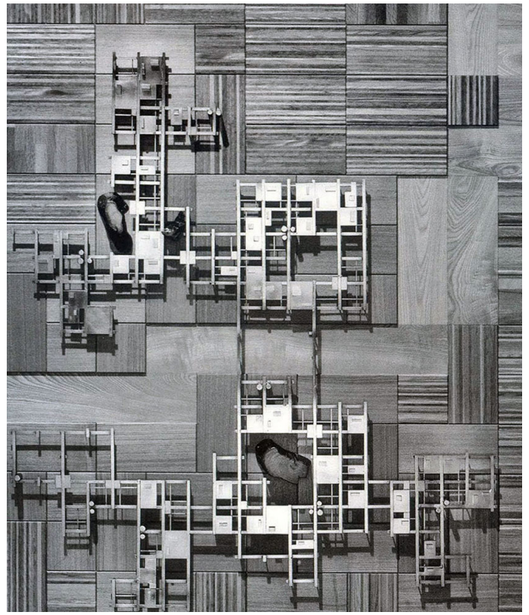
DENSITY

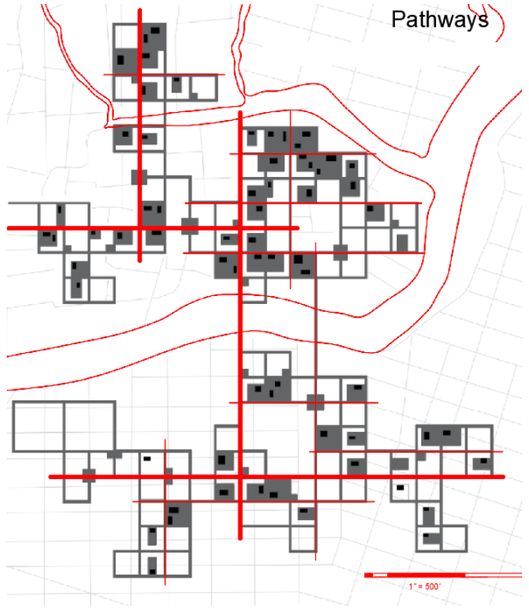
by Katherine McClure

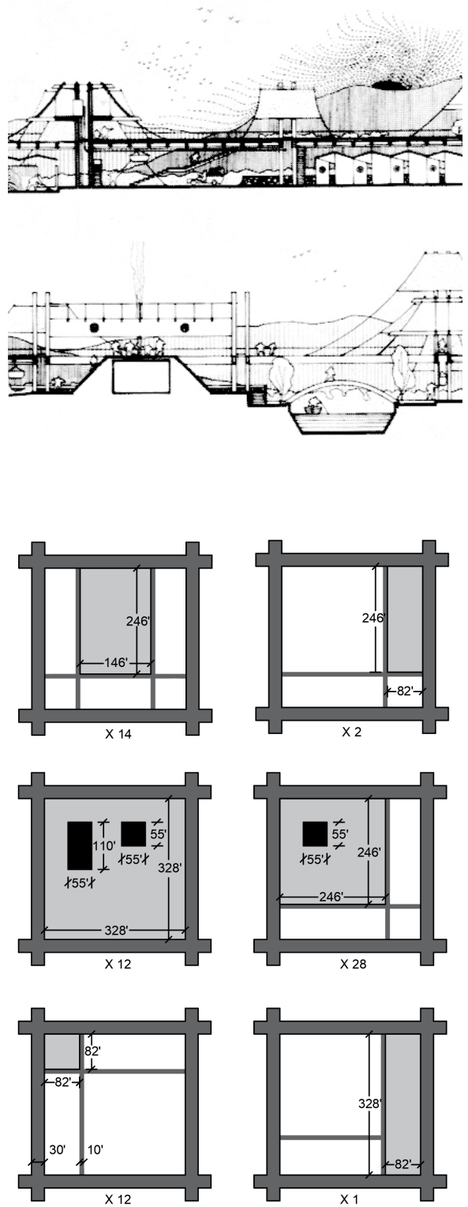
Case Study 07

Agricultural City | Japan

Kisho Kurakawa







Typical Unit Types
Agricultural City - Kisho Kurokawa

by Paul Abel

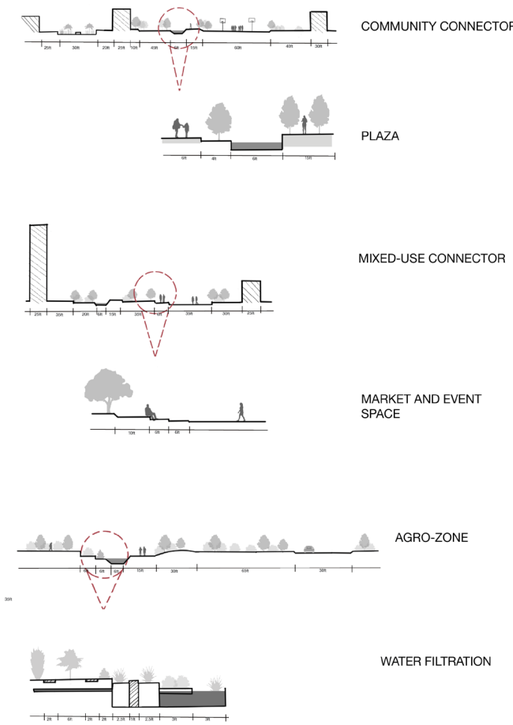
Case Study 08

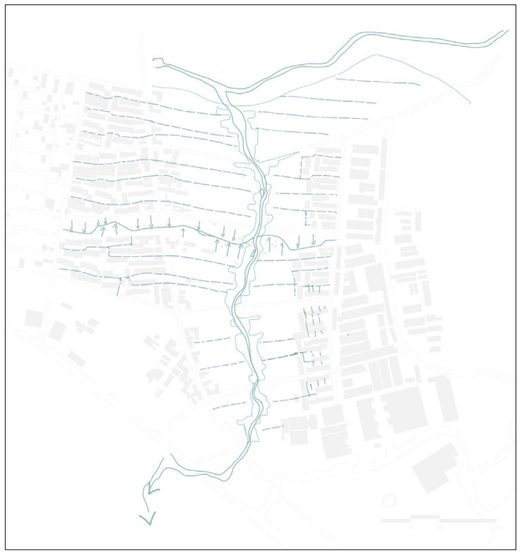
Eco-Agro Urbanism | Guatemala

UPenn









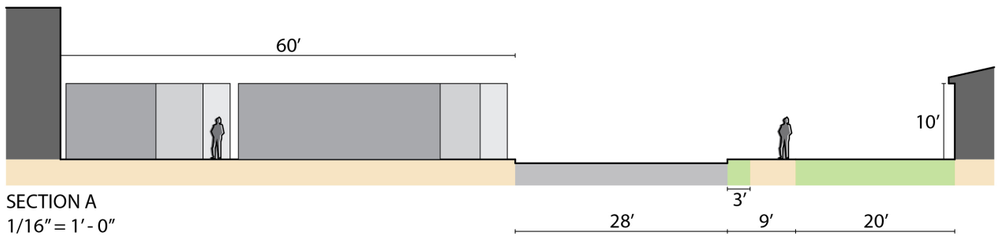
by Maha Alamri

Case Study 09

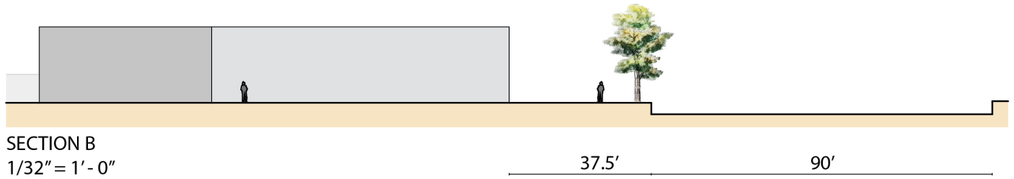
Food Port | USA

OMA





SECTION A
1/16″ = 1′ - 0″



SECTION B
1/32″ = 1′ - 0″

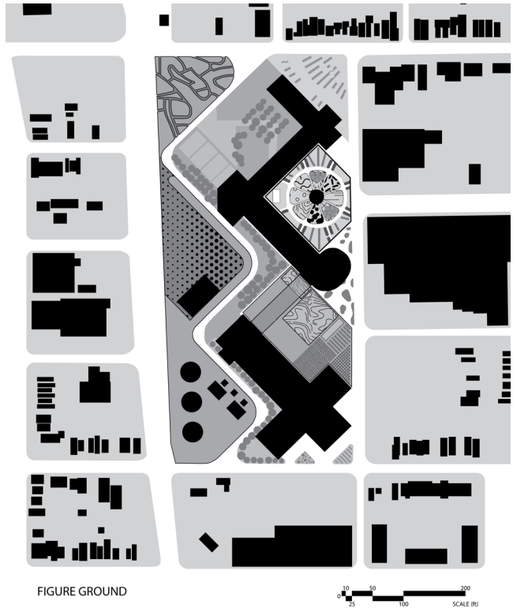
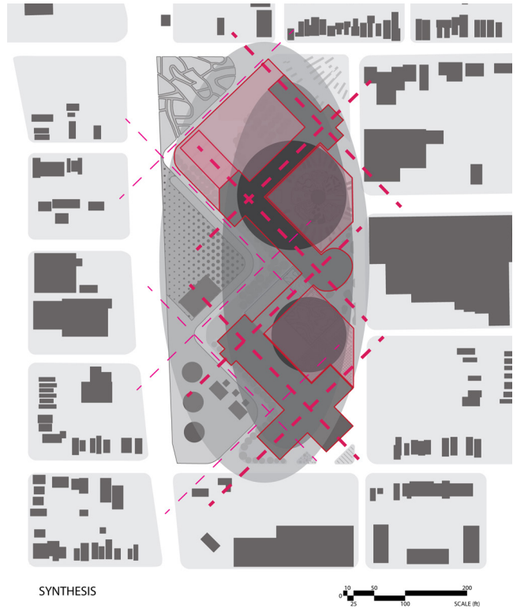
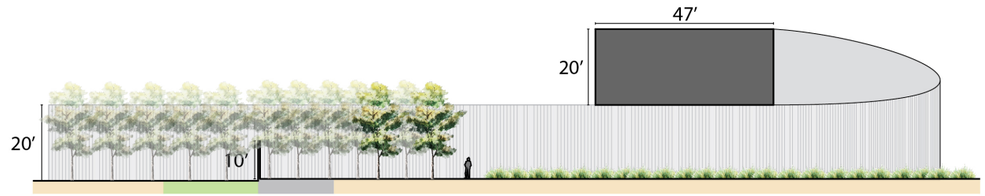


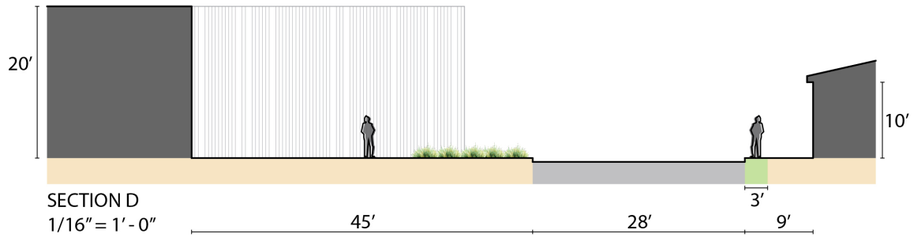
FIGURE GROUND



SYNTHESIS



SECTION C
1/32″ = 1′ - 0″
25′ 19.5′ 38′ 31′



SECTION D
1/16″ = 1′ - 0″

by Nick Majka

03
Existing Site Analysis

Student designs are informed by rigorous analysis of the existing conditions of North Campus, including Baltimore Avenue (Zone 1); the Campus Creek corridor and areas north of the Creek (Zone 2); and the historical Campus Farm (Zone 3).

Plan-based analysis includes building patterns (figure ground as well as dimensioning key buildings and spaces between buildings), vegetation patterns (wooded areas, habitat corridors, and open green areas), hydrologic pattern (surface flows, flood zones, and water ways); circulation (vehicular and pedestrian routes) and regulating lines (key lines that stem from and organize the area).

In addition a series of short and long cross sections are taken across the site to understand elevational relationships and the scale of topographic change.



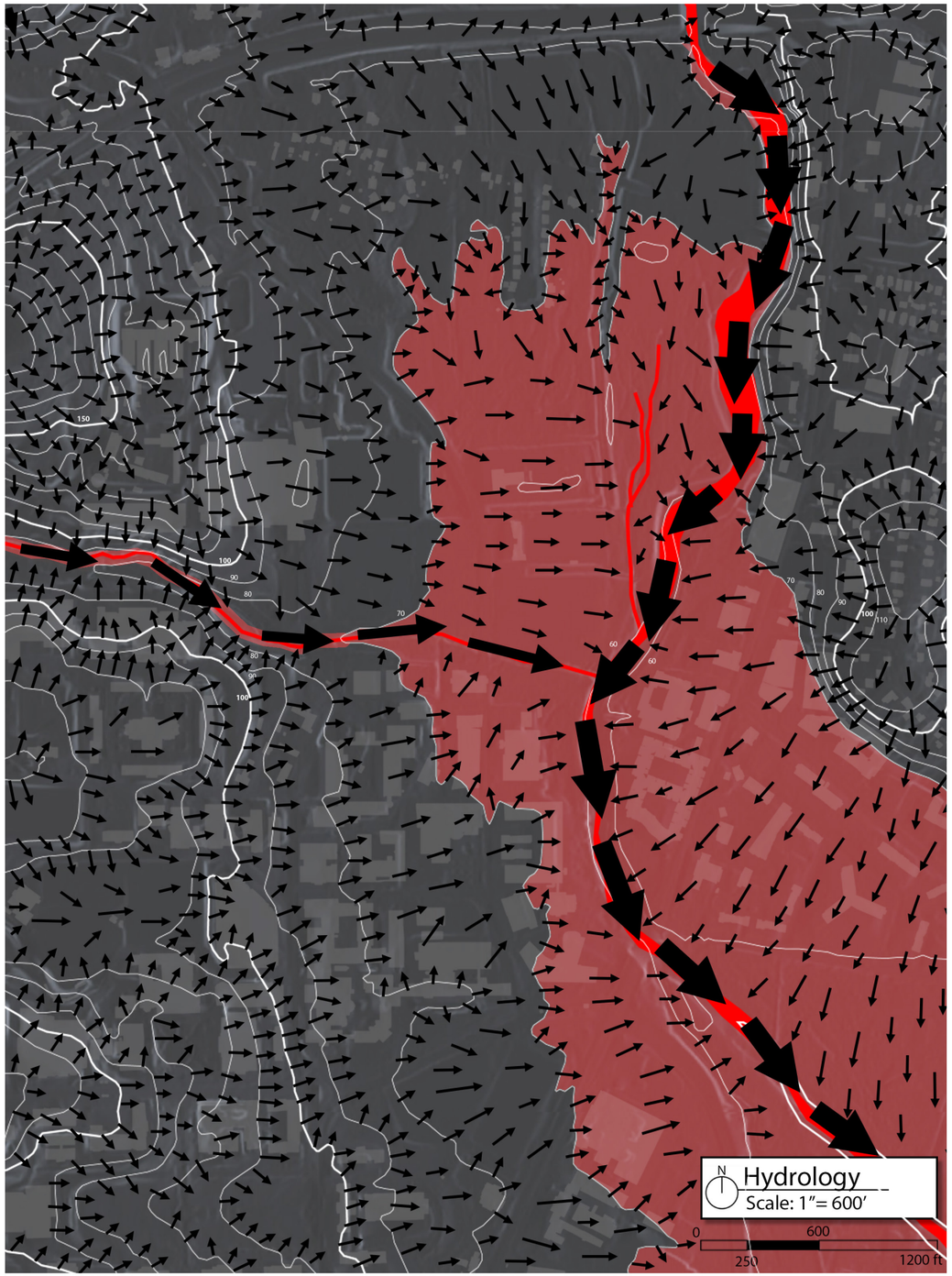
by Liam Jones



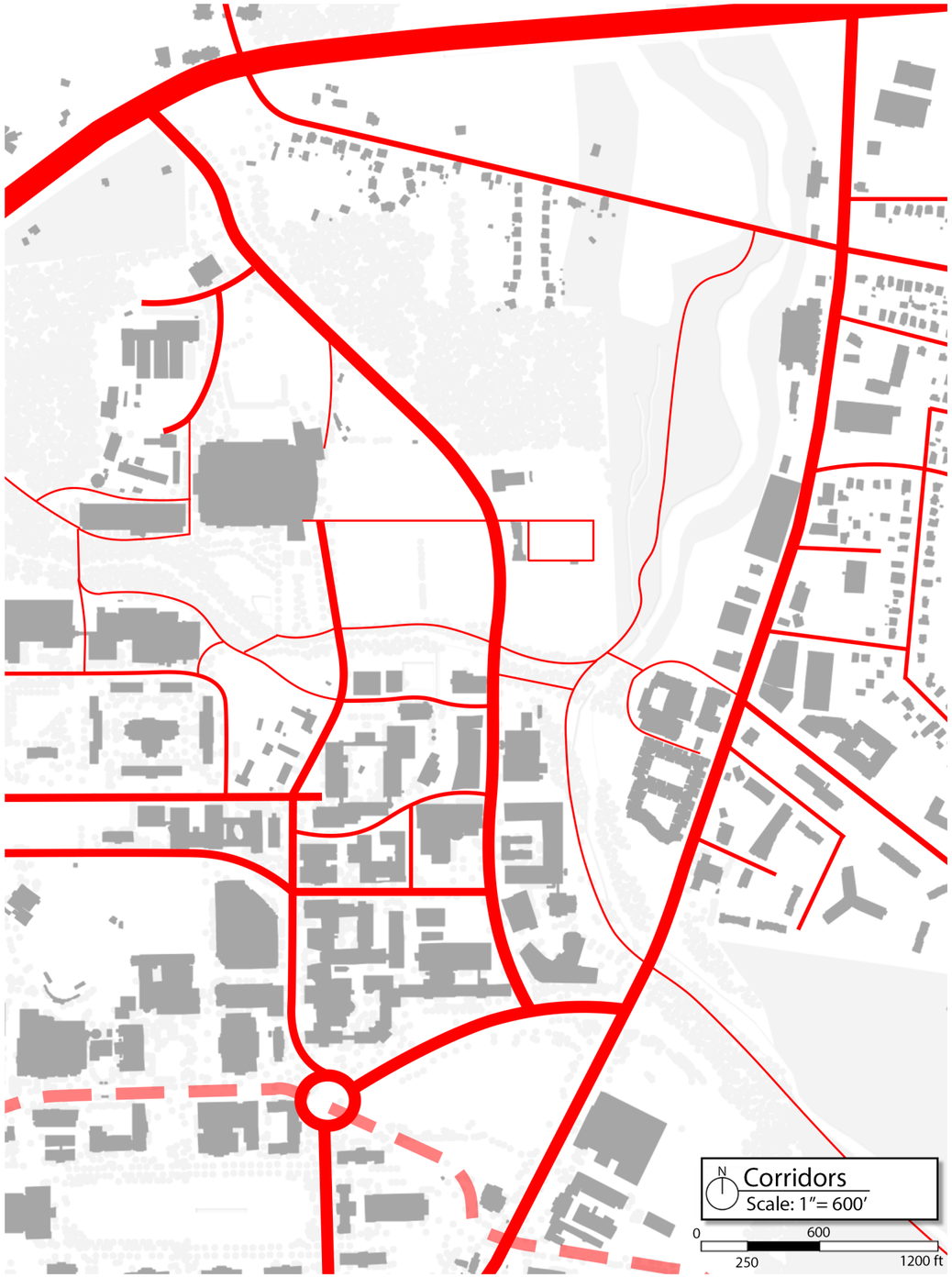
by Liam Jones



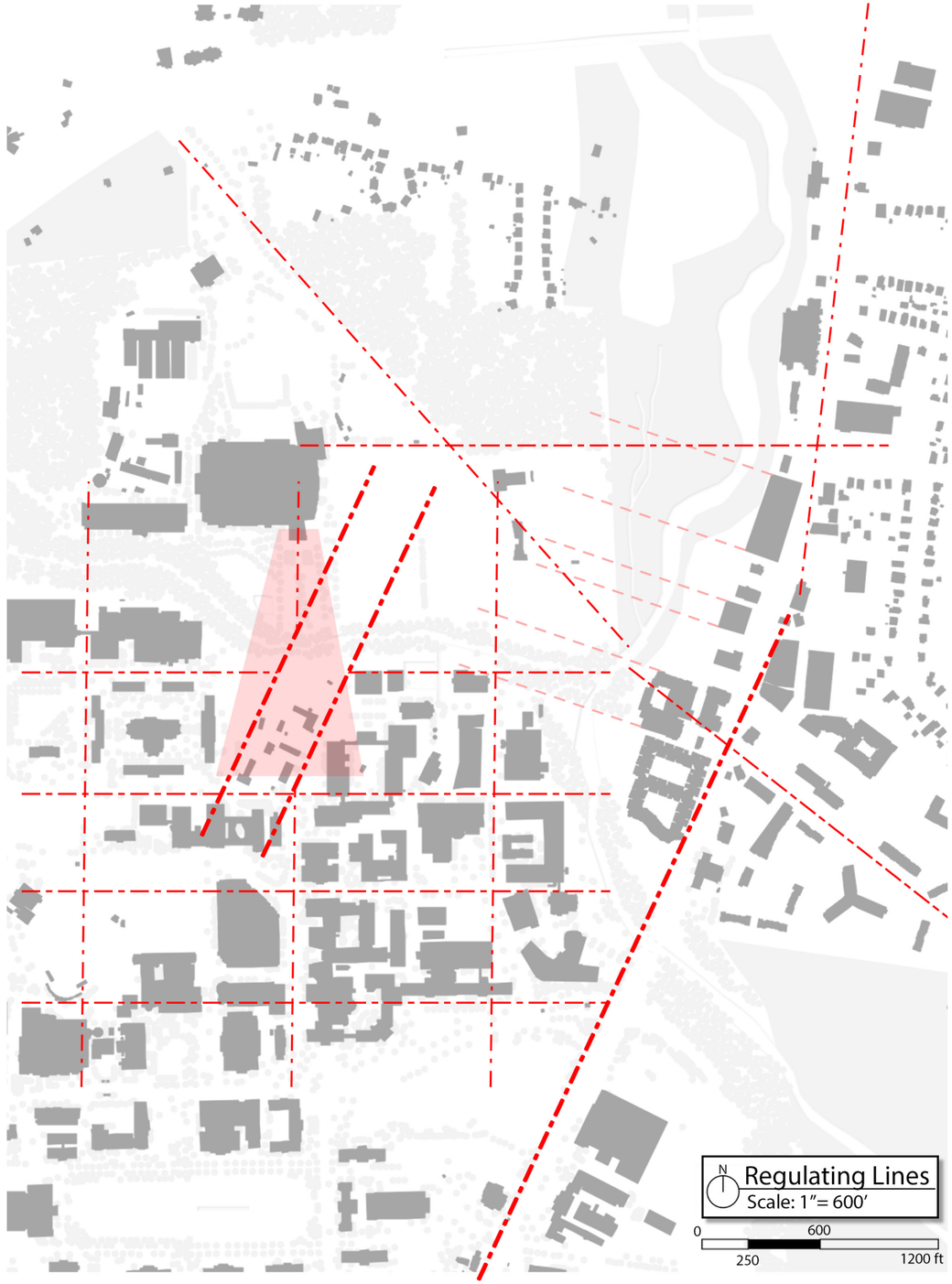
by Liam Jones



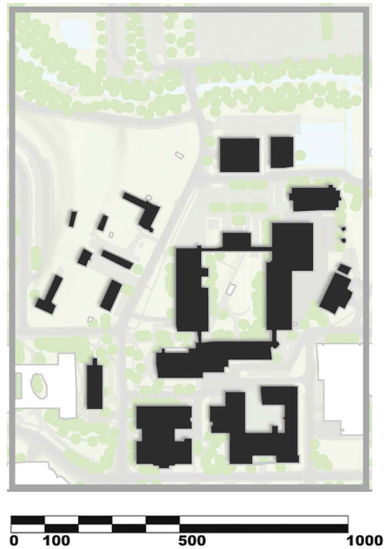
by Liam Jones



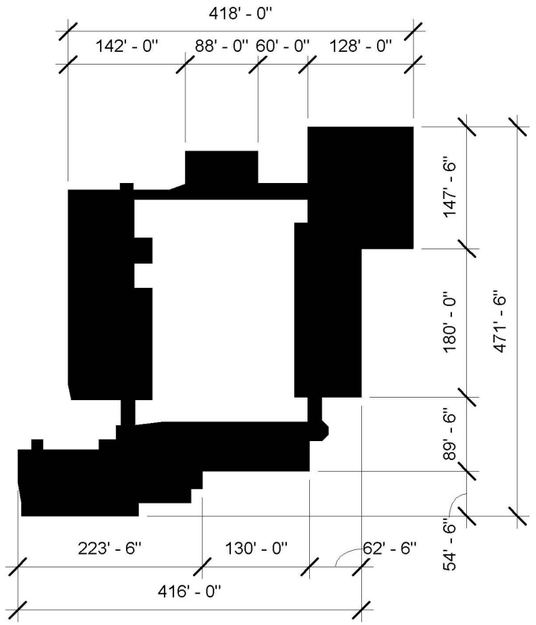
by Liam Jones



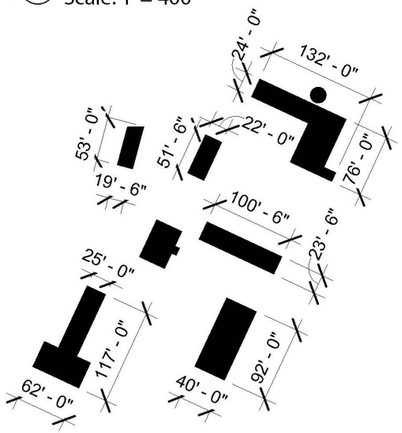
by Liam Jones



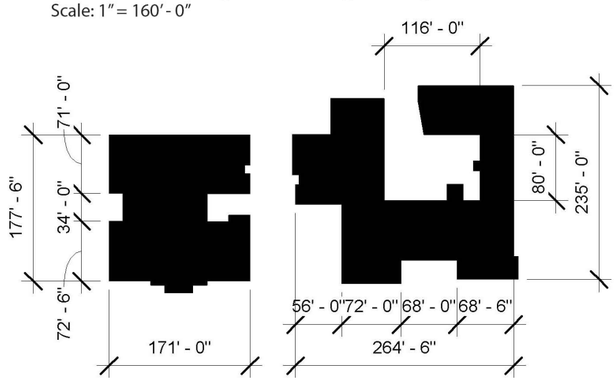
Site Plan
Scale: 1″= 400′



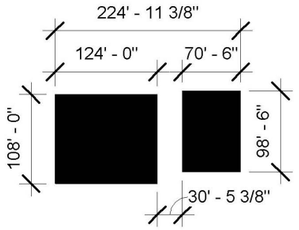
Animal Sciences/Agricultural Engineering
Scale: 1″= 160′ - 0″



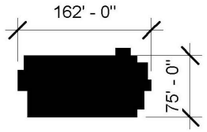
Campus Farm
Scale: 1″= 160′ - 0″



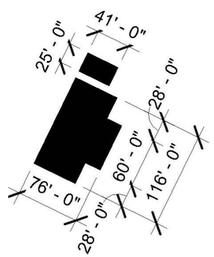
J.M. Patterson & Chemical Nuclear Engineering
Scale: 1″= 160′ - 0″



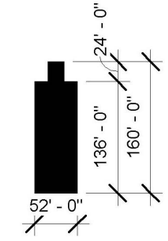
Buoyancy Research Facility
Scale: 1″= 160′ - 0″



Herbert Rabin Technology
Scale: 1″= 160′ - 0″



Animal Resource
Scale: 1″= 160′ - 0″

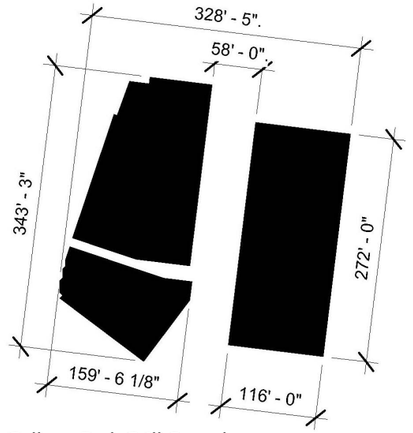


Physical Science
Scale: 1″= 160′ - 0″

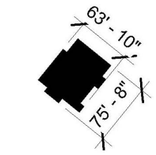
by Liam Jones



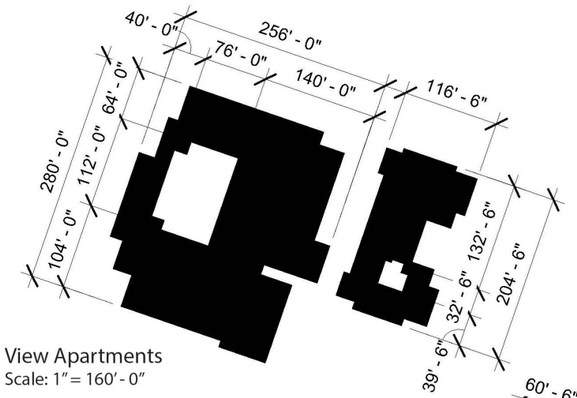
Site Plan
Scale: 1″= 400′



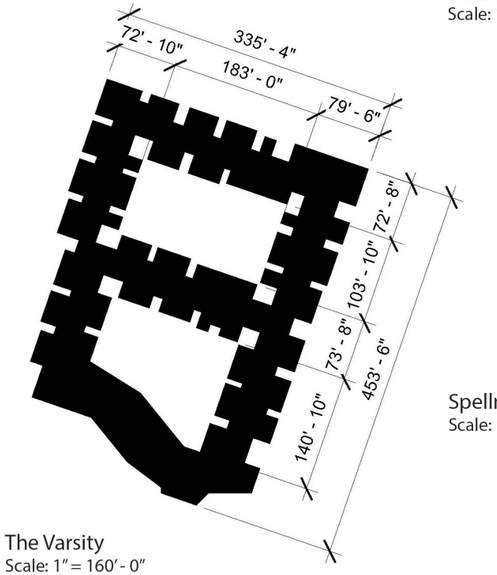
College Park Grill Complex
Scale: 1″= 160′ - 0″



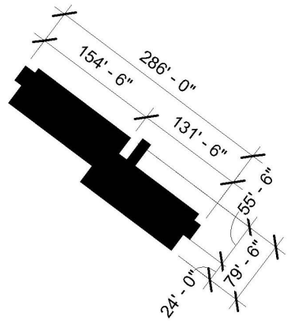
McDonald's
Scale: 1″= 160′ - 0″



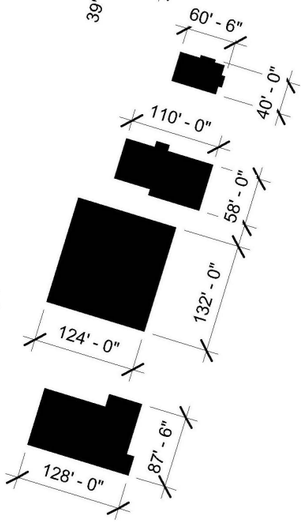
View Apartments
Scale: 1″= 160′ - 0″



The Varsity
Scale: 1″= 160′ - 0″

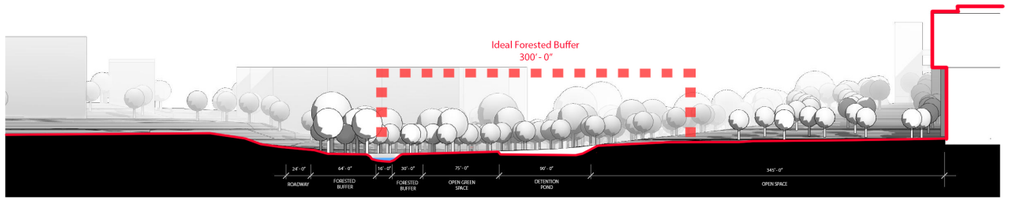


Spellman House Apartments
Scale: 1″= 160′ - 0″

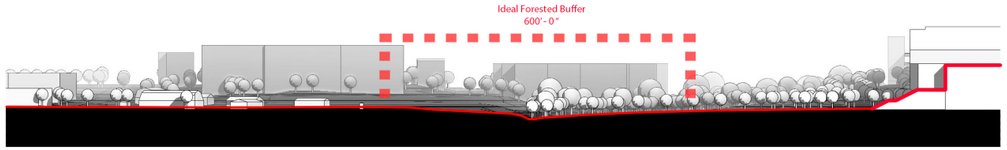


The Cypress Building & Complex
Scale: 1″= 160′ - 0″

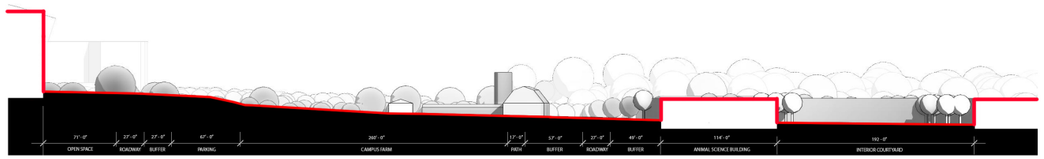
by Liam Jones



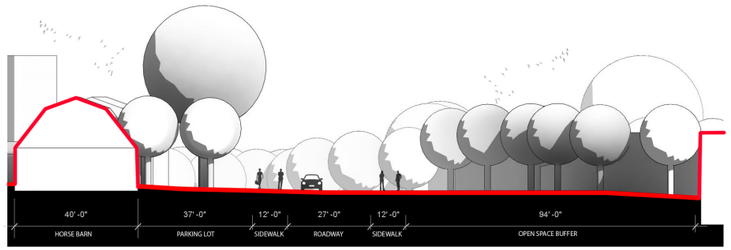
Site Section 1 - 1000' - 0"
Scale: 1" = 120' - 0"

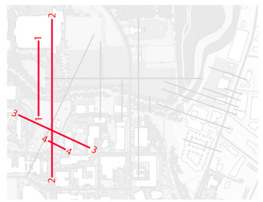


Site Section 2 - 2000' - 0"
Scale: 1" = 200' - 0"



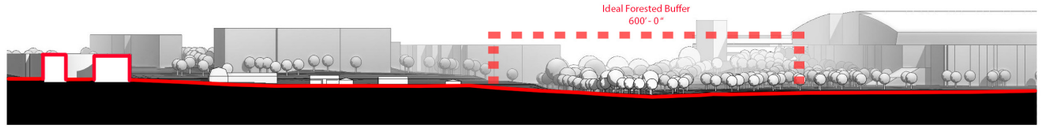
Site Section 3 - 1000' - 0"
Scale: 1" = 120' - 0"



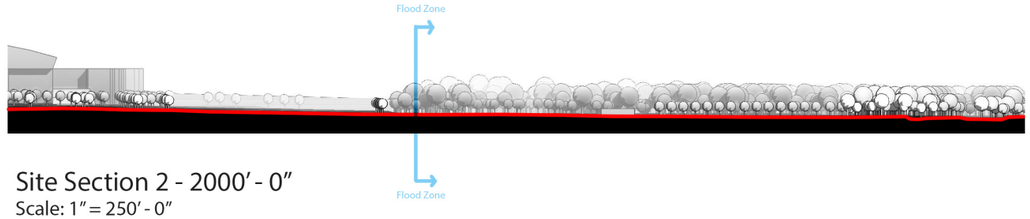


Site Section 4 - 200' - 0"
Scale: 1" = 40' - 0"

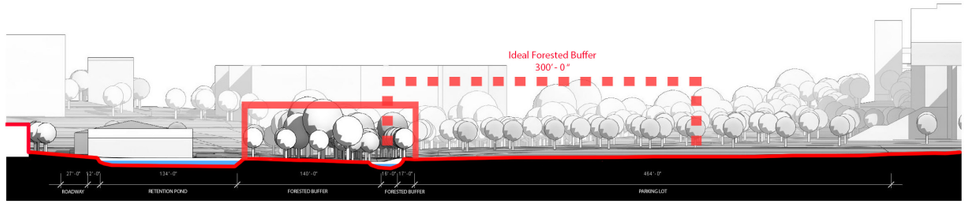
by Dylan Spanier



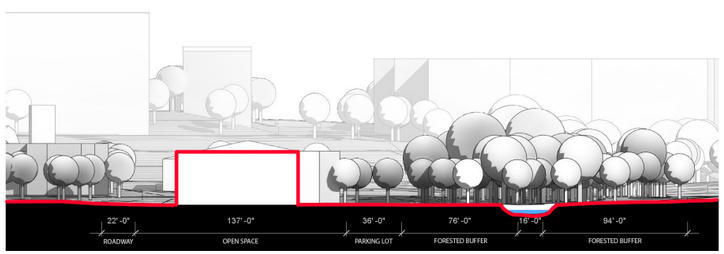
Site Section 1 - 2000' - 0"
Scale: 1" = 220' - 0"

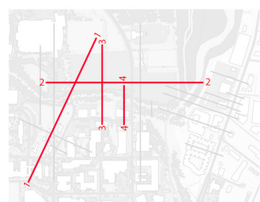


Site Section 2 - 2000' - 0"
Scale: 1" = 250' - 0"



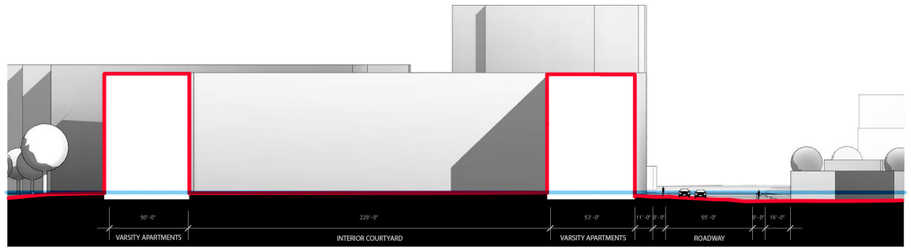
Site Section 3 - 1000' - 0"
Scale: 1" = 120' - 0"



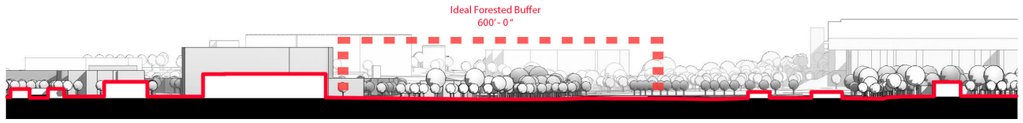


Site Section 4 - 500' - 0"
Scale: 1" = 80' - 0"

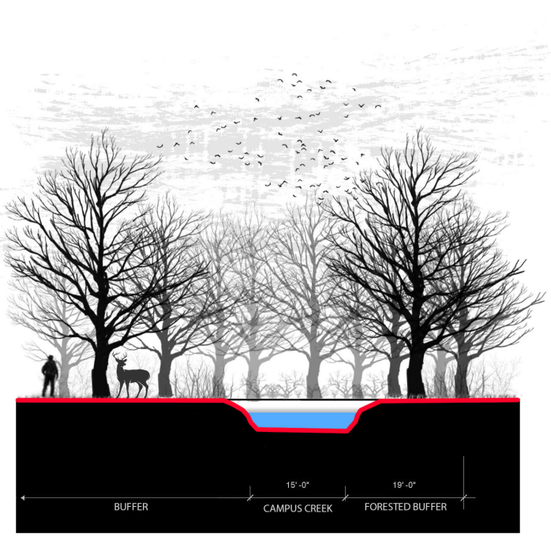
by Dylan Spanier



Site Section 1 - 500′ - 0″
Scale: 1″ = 80′ - 0″



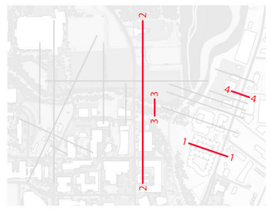
Site Section 2 - 2000′ - 0″
Scale: 1″ = 250′ - 0″



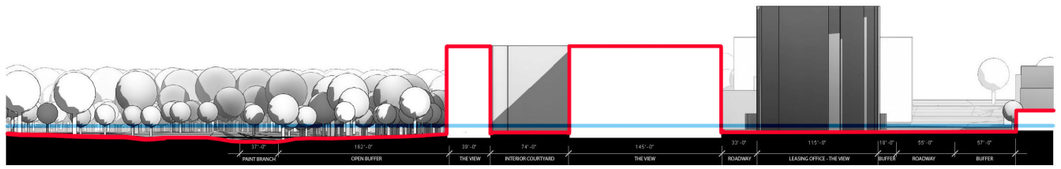
Site Section 3 - 200′ - 0″
Scale: 1″ = 20′ - 0″



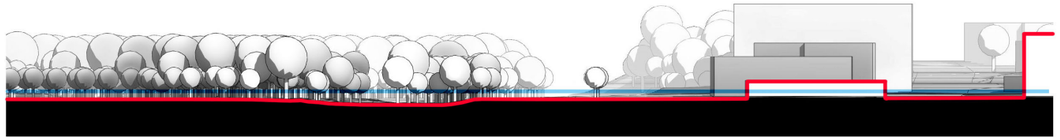
Site Section 4 - 200′ - 0″
Scale: 1″ = 50′ - 0″



by Dylan Spanier



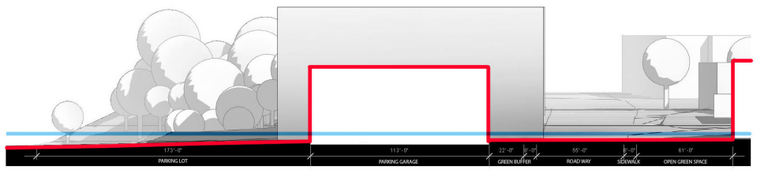
Site Section 1 - 1000′ - 0″
Scale: 1″ = 120′ - 0″



Site Section 2 - 1000′ - 0″
Scale: 1″ = 120′ - 0″



Site Section 3 - 500′ - 0″
Scale: 1″ = 80′ - 0″



Site Section 4 - 500′ - 0″
Scale: 1″ = 80′ - 0″



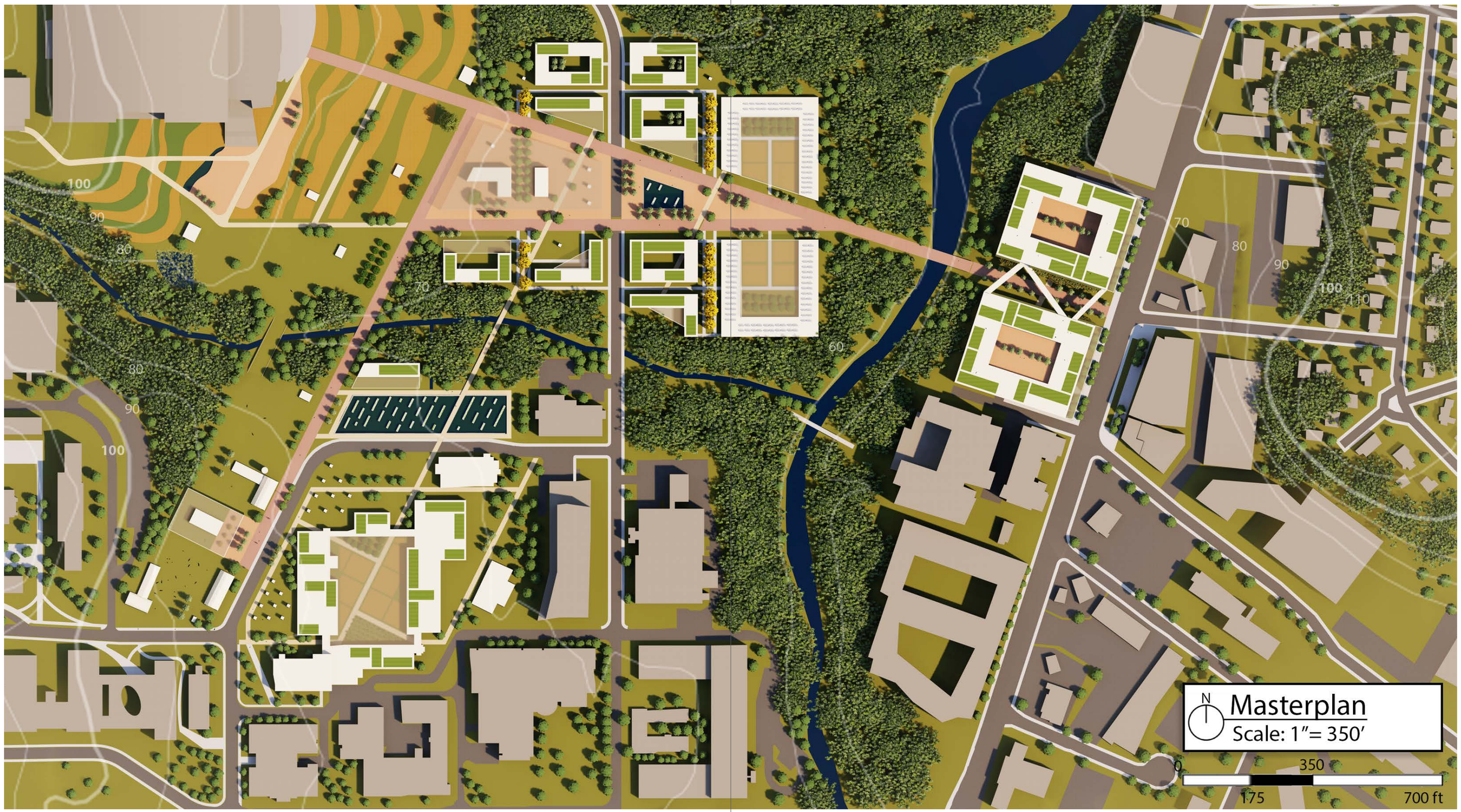
by Dylan Spanier

04
Design Proposals

Two student design proposals for the three zones of the AgroEcology Innovation District are illustrated in this section.

Project 1, by Liam Jones, features a central triangular plaza that serves as a public gathering space that showcases 21st century farming practices. Vertical farming facades front classroom buildings, greenhouse atriums fill courtyards, and outdoor aquaponics animate the plaza. The Xfinity Center is surrounded by an agricultural zone that is accessible to both humans and nonhumans at the Campus Farm via bridges over Campus Creek.

Project 2, by Dylan Spanier, employs vertical farming towers as a typology that organizes a range of public spaces in the AID, and creates efficient food production opportunities. The towers, flanked by educational buildings and agricultural plots, line a new Agriculture Promenade that connects the Xfinity Center and the city. A grid of towers also reorganizes the Campus Farm district and knits its various spaces together.

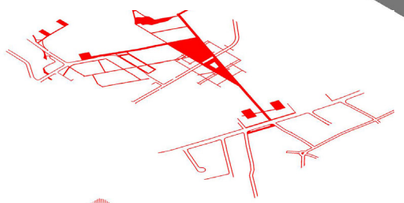


AgroEcology Innovation District

designed by Liam Jones

This design features a central triangular plaza that serves as a public gathering space that showcases 21st century farming practices. Vertical farming facades at classroom buildings, greenhouse atriums, and outdoor aquaponics animate the plaza. The Xfinity Center is surrounded by an agricultural zone that is accessible to both humans and nonhumans at the Campus Farm via bridges over Campus Creek.

Pedestrian Circulation



Habitat Zones



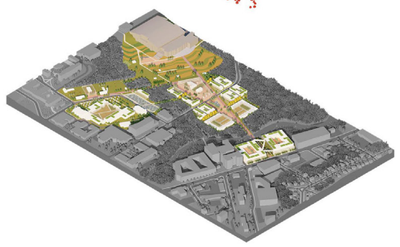
Agricultural Production

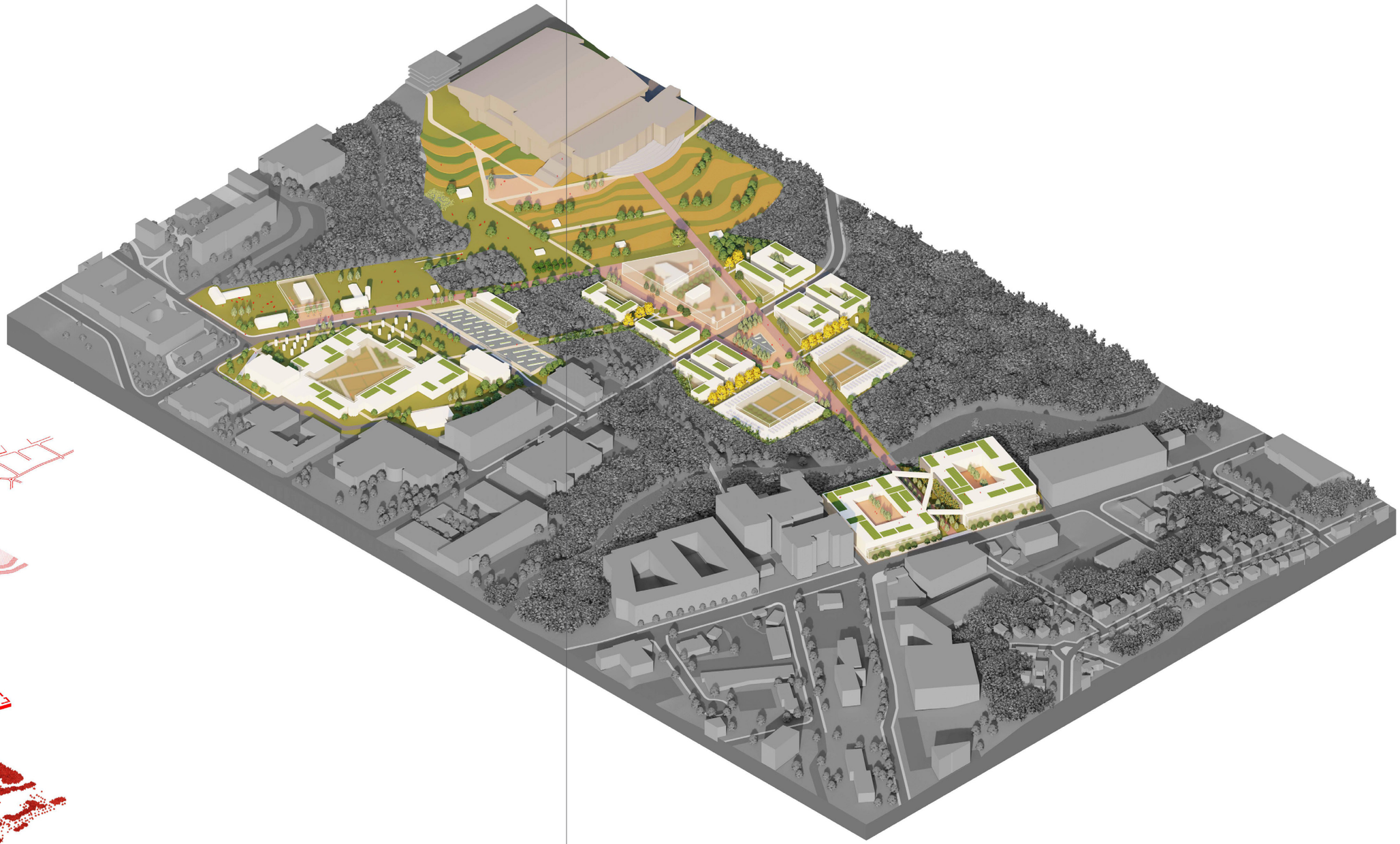


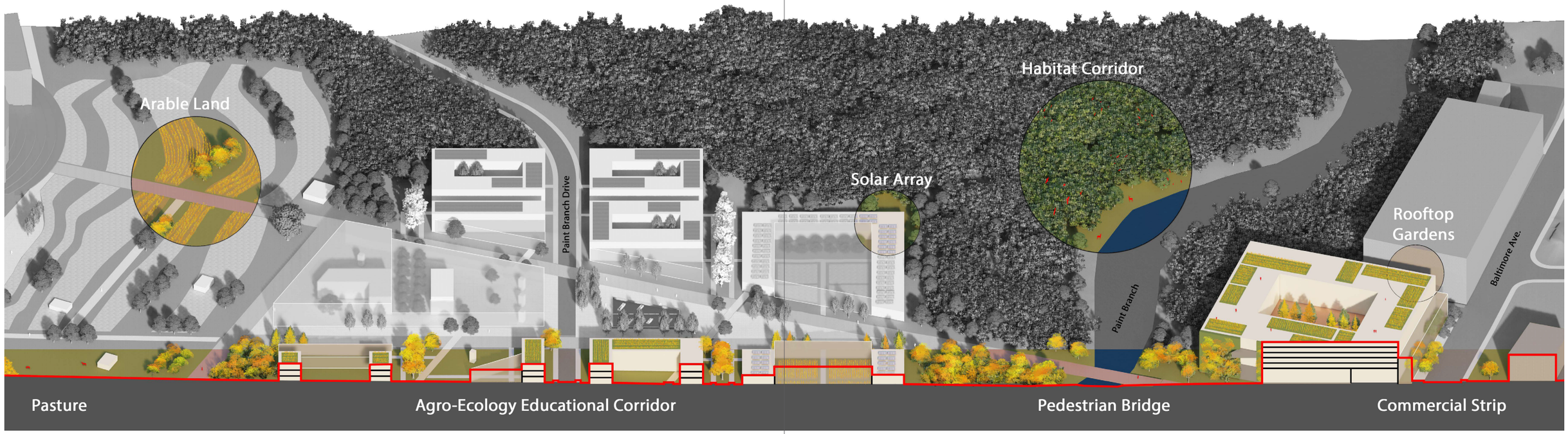
Plantings Study

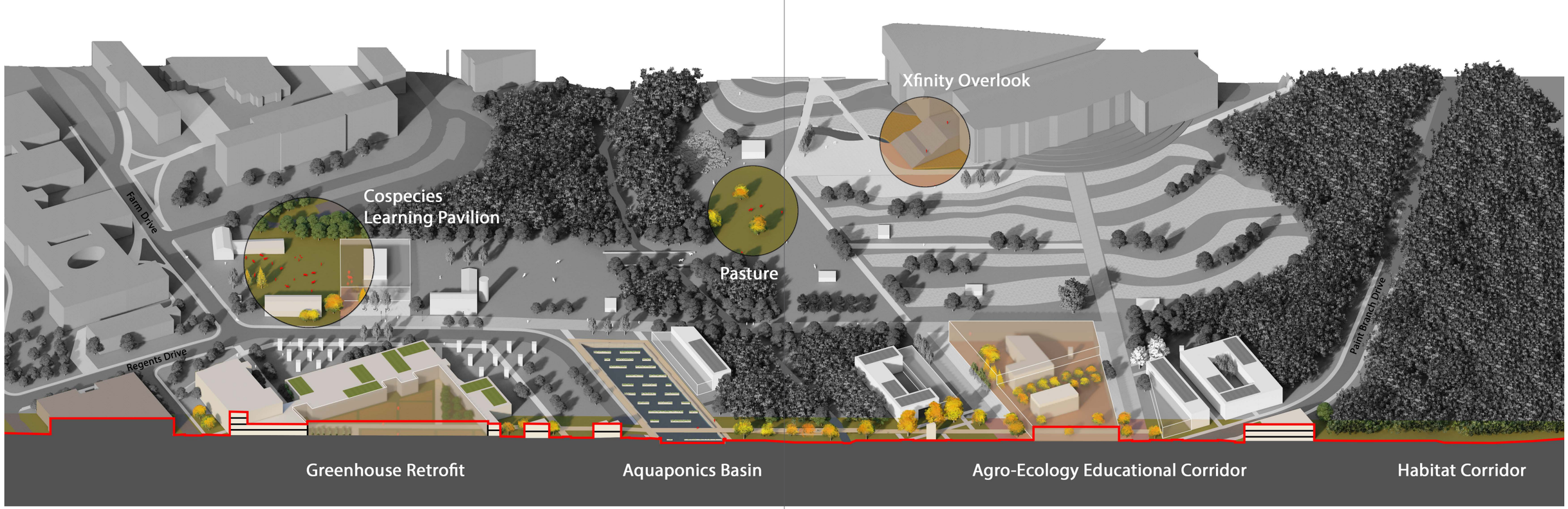


Masterplan

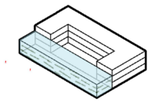




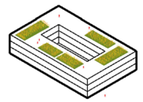

Arable Land
Paint Branch Drive
Solar Array
Habitat Corridor
Paint Branch
Rooftop
Gardens
Baltimore Ave.
Pasture
Agro-Ecology Educational Corridor
Pedestrian Bridge
Commercial Strip


Farm Drive
Cospecies
Learning Pavilion
Regents Drive
Pasture
Xfinity Overlook
Paint Branch Drive
Greenhouse Retrofit
Aquaponics Basin
Agro-Ecology Educational Corridor
Habitat Corridor

Integrated Systems

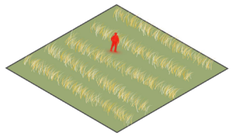


Vertical Agricultural Showcase Wall
- 28,500 sqft / 0.65 Acres



Community Rooftop Gardens
- 108,800 sqft / 2.5 Acres

Airable Land



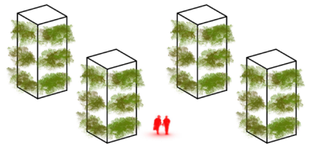
Arable Land
- 355,950 sqft / 8.15 Acres

Orchards



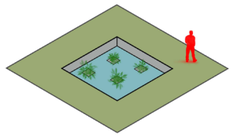
Paw Paw & Chesnut Trees
- 33,900 sqft / 0.75 Acres

Food Cubes



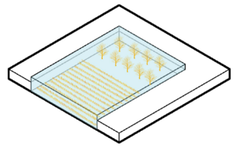
Rotating Leafy Green Crops
- 53,100 sqft / 1.2 Acres

Aquaponics Basins



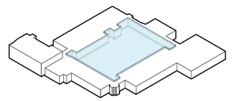
Aquaponics Basins
- 48,750 sqft / 1.15 Acres

Greenhouses

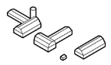


New and Retrofit Greenhouses
- 223,500 sqft / 5.15 Acres

Historic Context

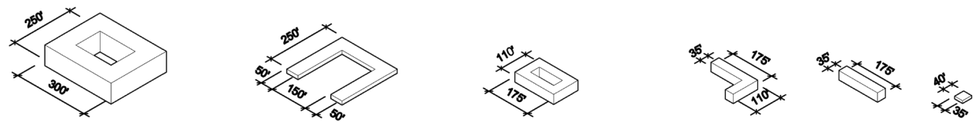


Department of Animal & Agricultural Engineering



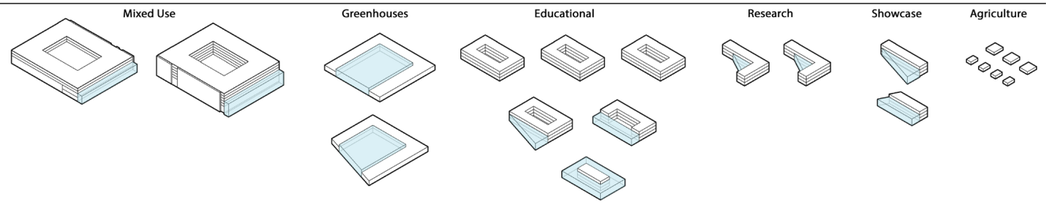
Campus Farm

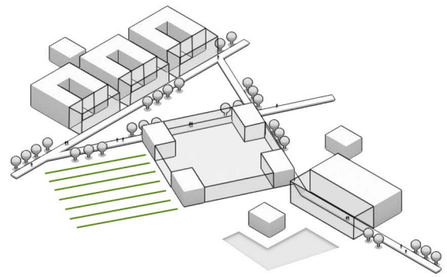
Base Primitives



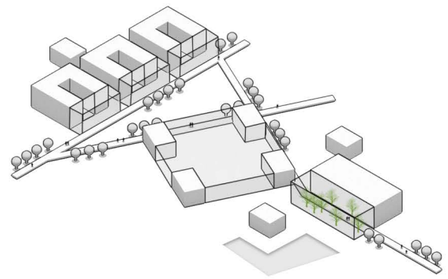
Mixed Use | Greenhouses | Educational | Research | Showcase | Agriculture

Augmentations

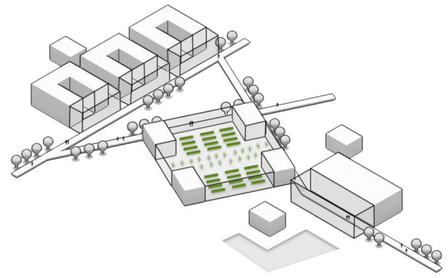




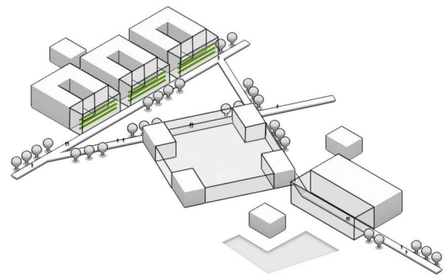
Arable Land
Semi-Public Space



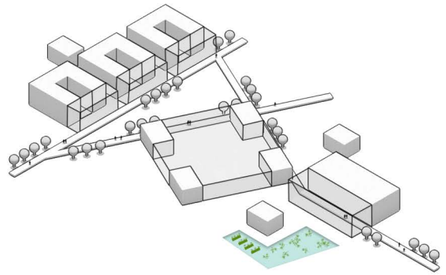
Arboretum & Seed Bank
Public Space



Greenhouse
Private Space

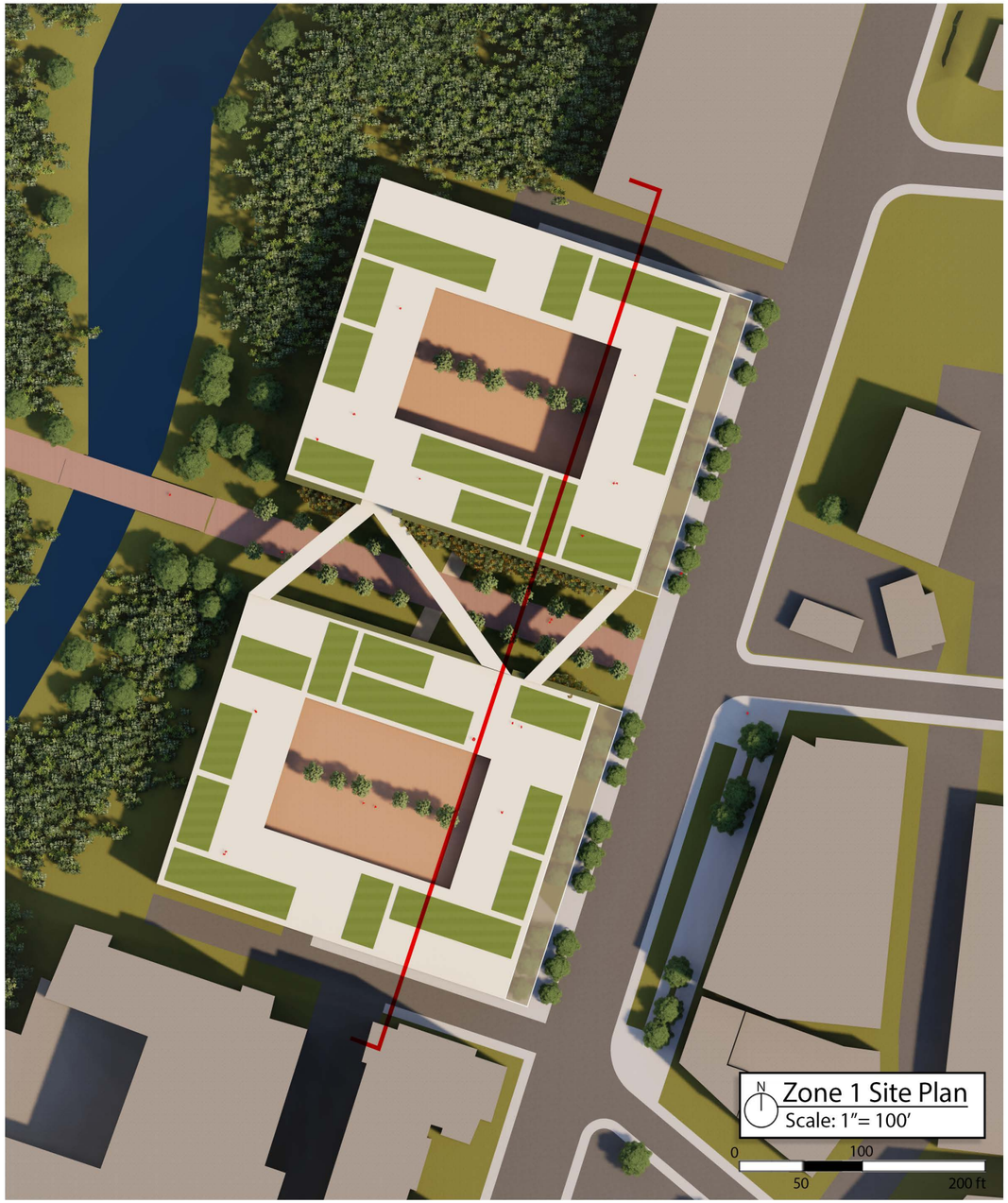


Display Gardens
Public Space

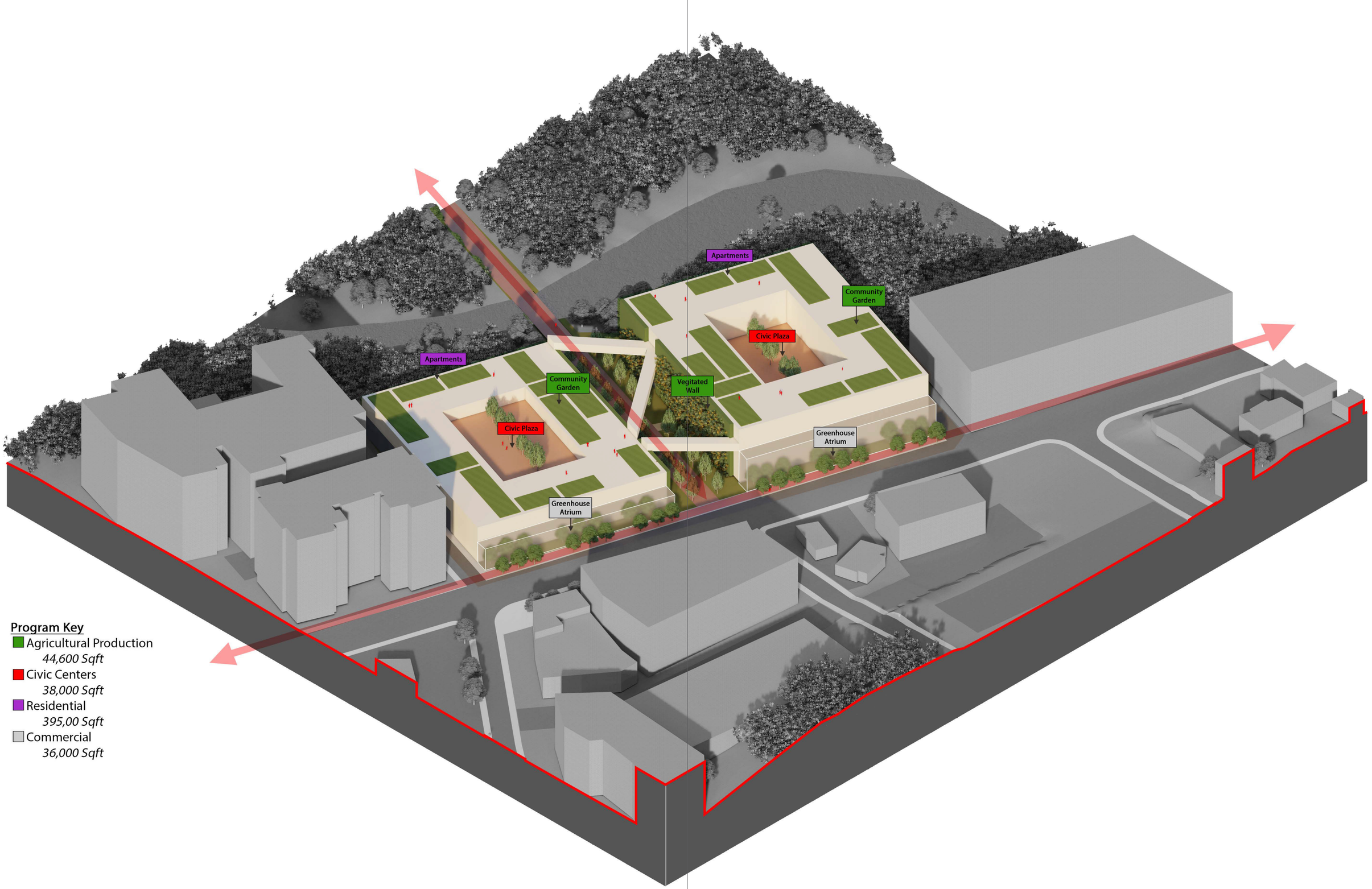


Aquaponics
Semi-Public Space

Agriculture Techniques Diagram

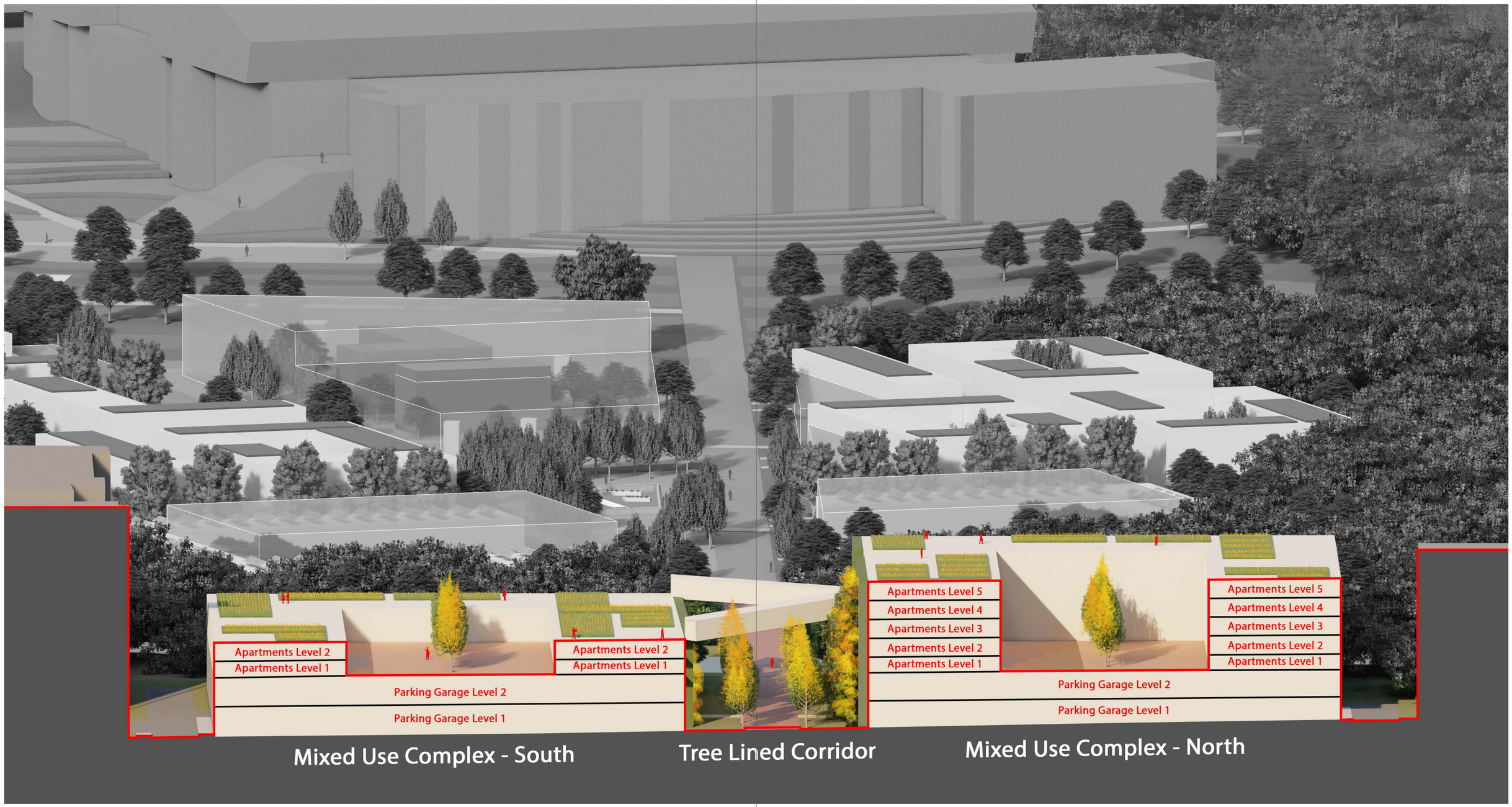

N
Zone 1 Site Plan
Scale: 1"= 100'
0
100
50
200 ft

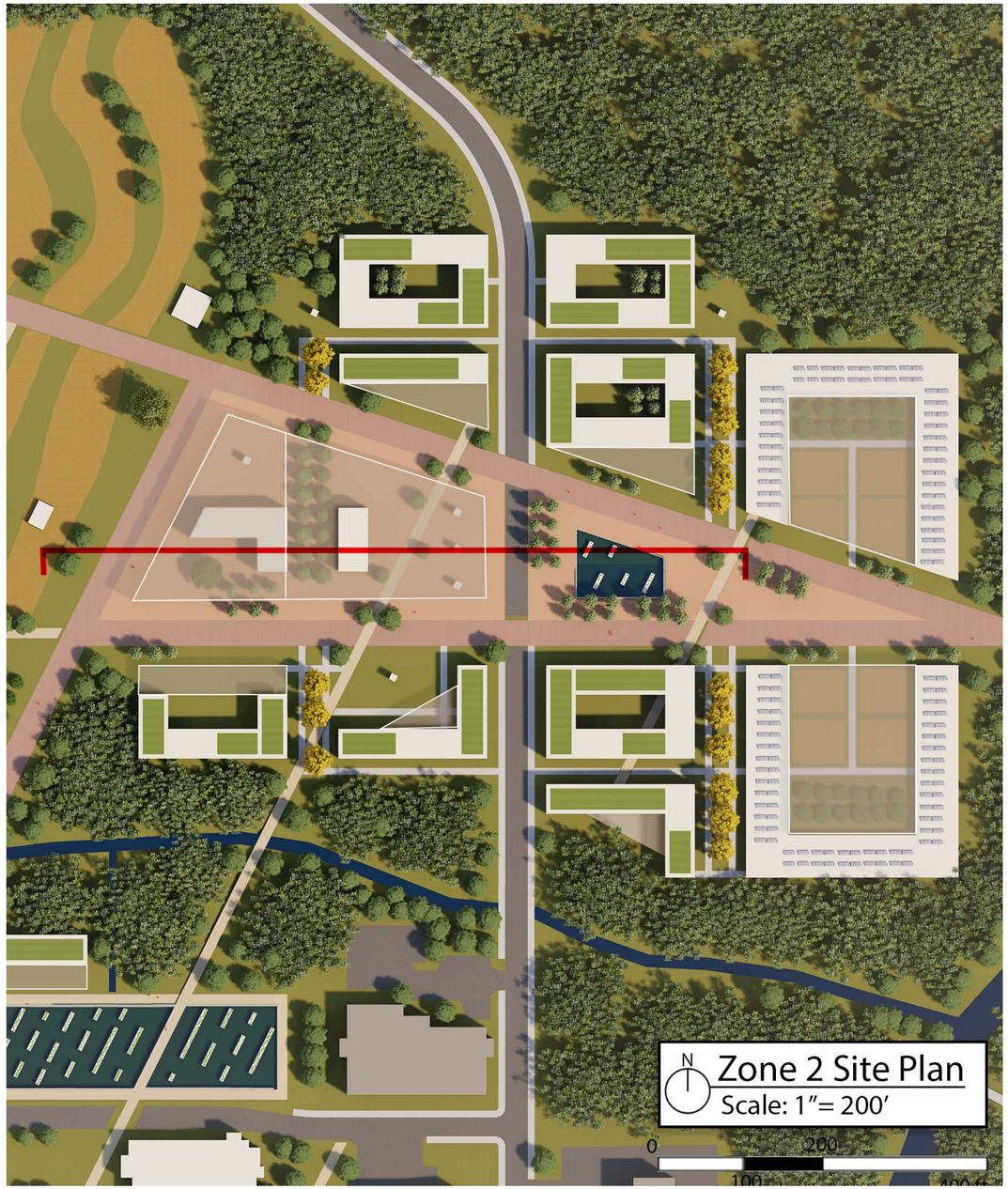

Campus Farm
Visitors Center
Community Gardens
Public Plaza

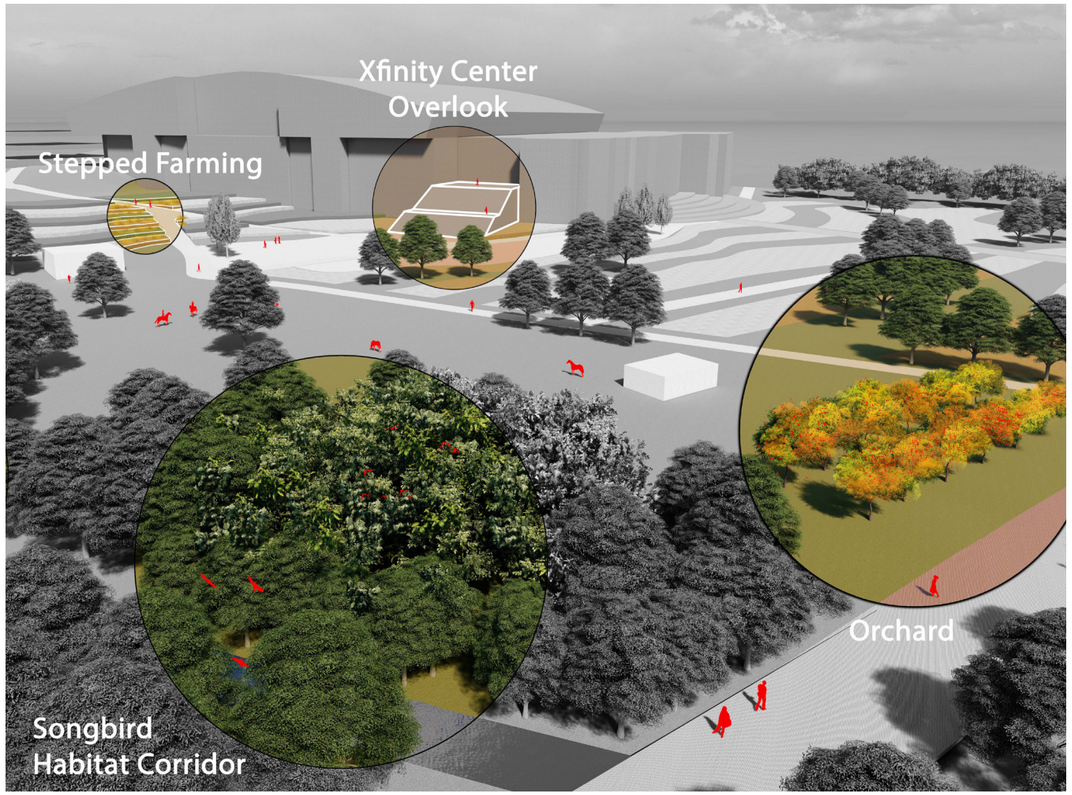


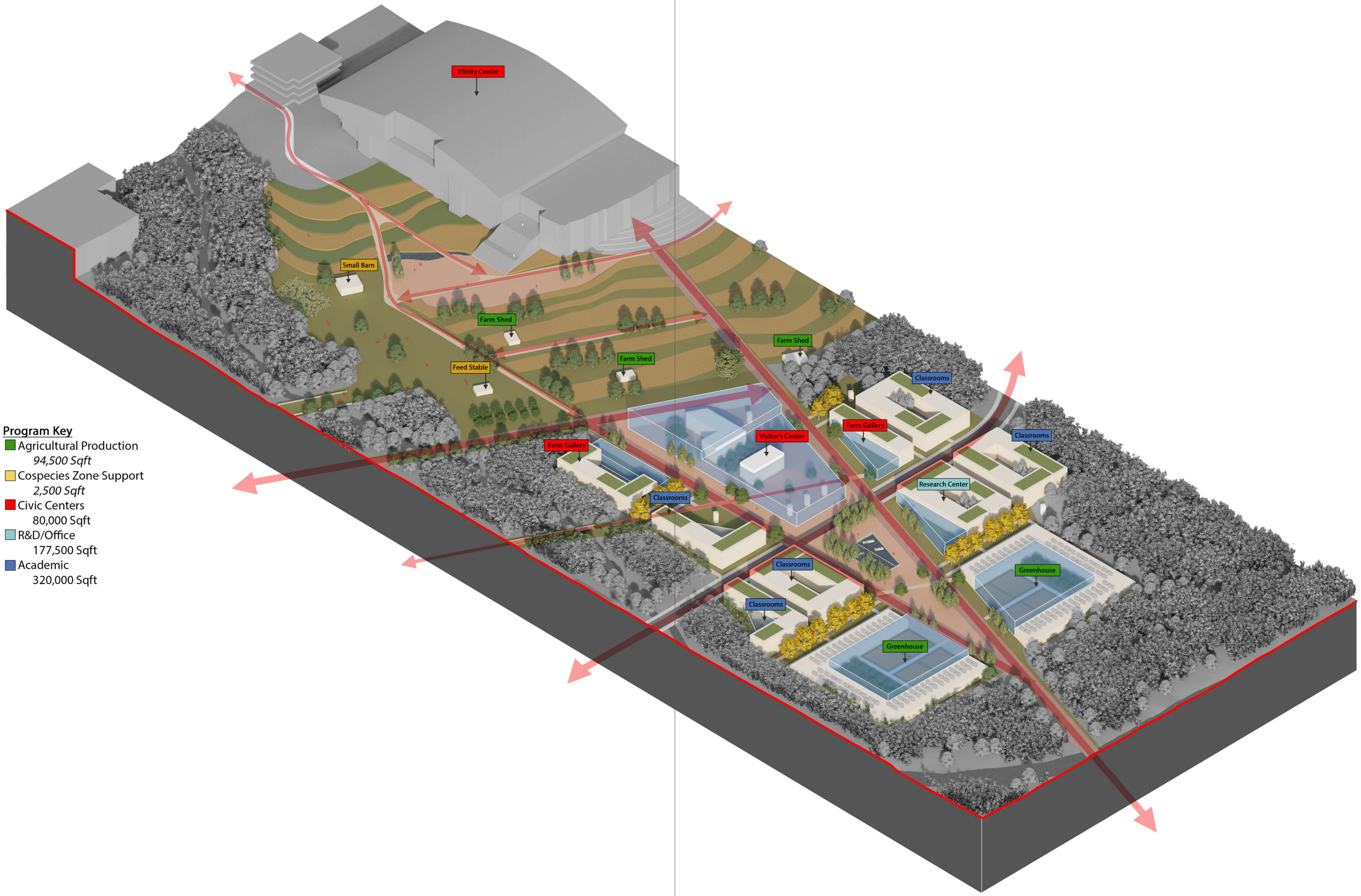
Program Key

- Agricultural Production
  44,600 Sqft
- Civic Centers
  38,000 Sqft
- Residential
  395,00 Sqft
- Commercial
  36,000 Sqft


Apartments Level 2
Apartments Level 1
Parking Garage Level 2
Parking Garage Level 1
Apartments Level 2
Apartments Level 1
Apartments Level 5
Apartments Level 4
Apartments Level 3
Apartments Level 2
Apartments Level 1
Parking Garage Level 2
Parking Garage Level 1
Apartments Level 5
Apartments Level 4
Apartments Level 3
Apartments Level 2
Apartments Level 1
Mixed Use Complex - South
Tree Lined Corridor
Mixed Use Complex - North

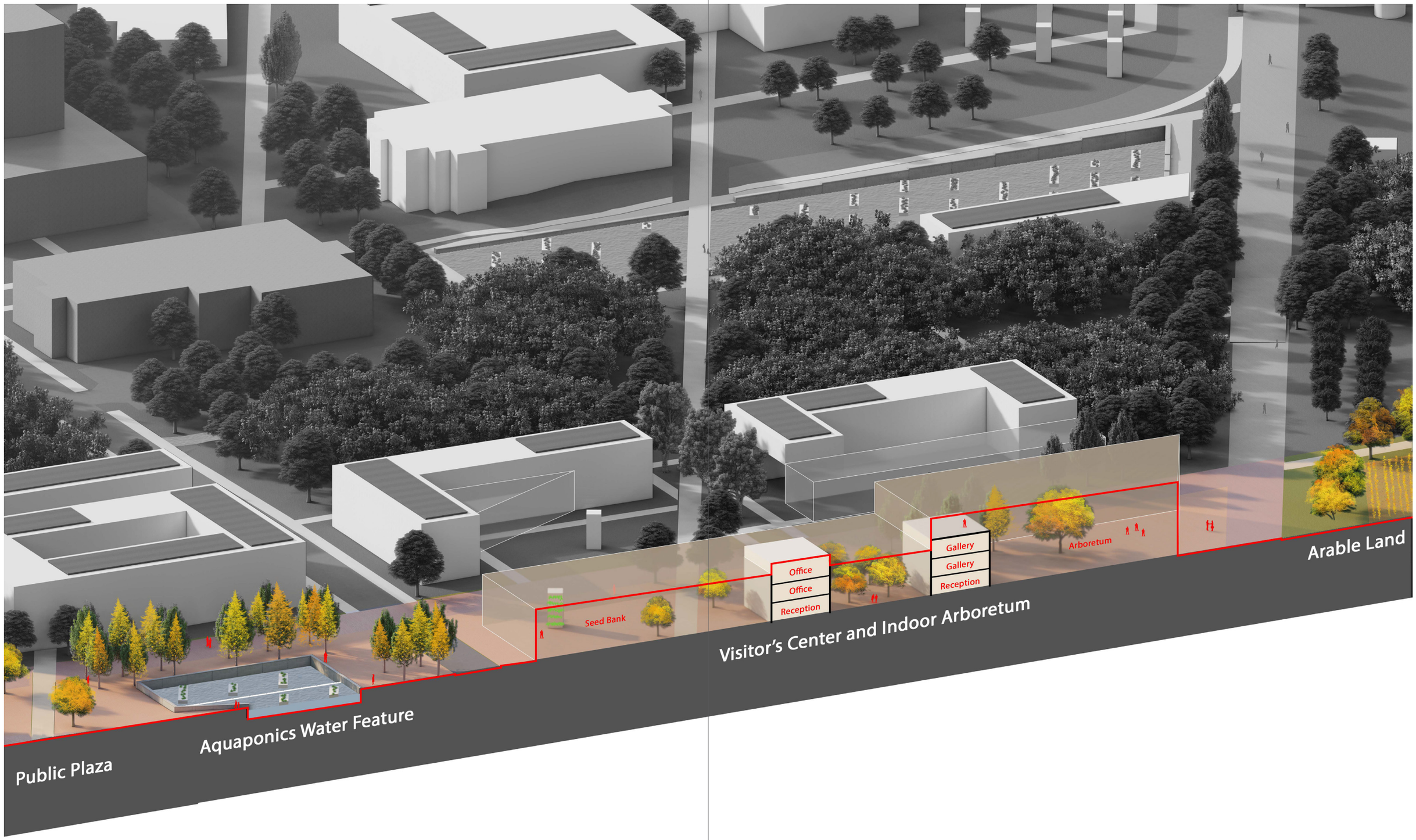

N
Zone 2 Site Plan
Scale: 1"= 200'
0
200
100

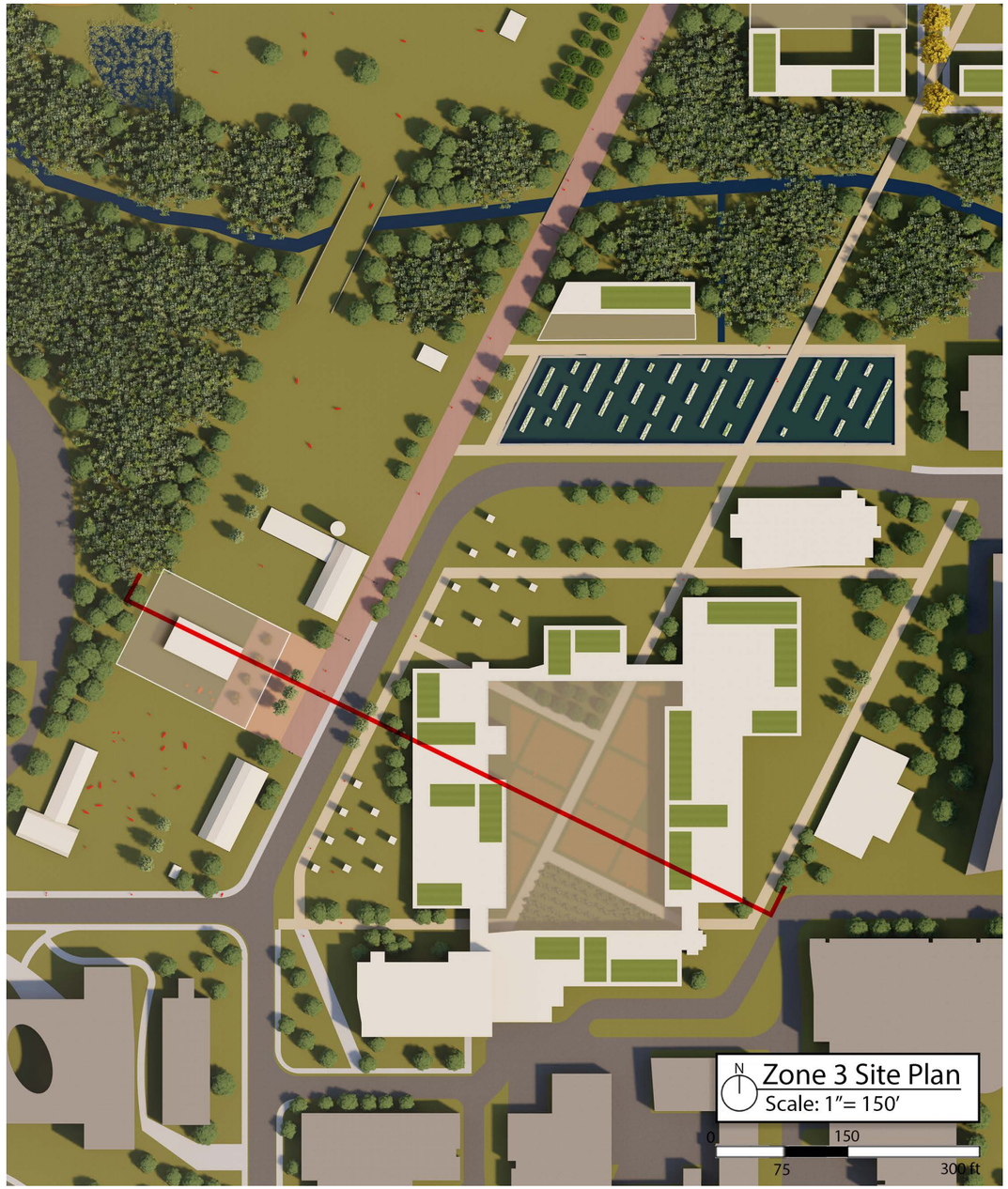

Xfinity Center
Overlook
Stepped Farming
Orchard
Songbird
Habitat Corridor

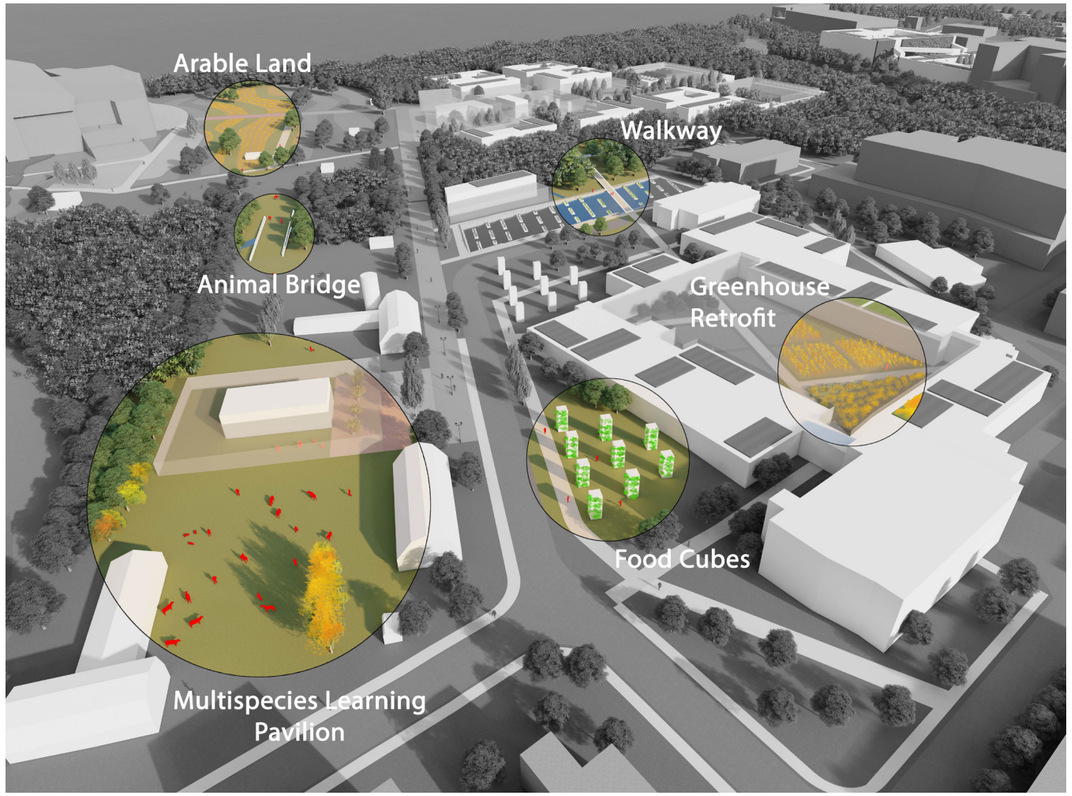


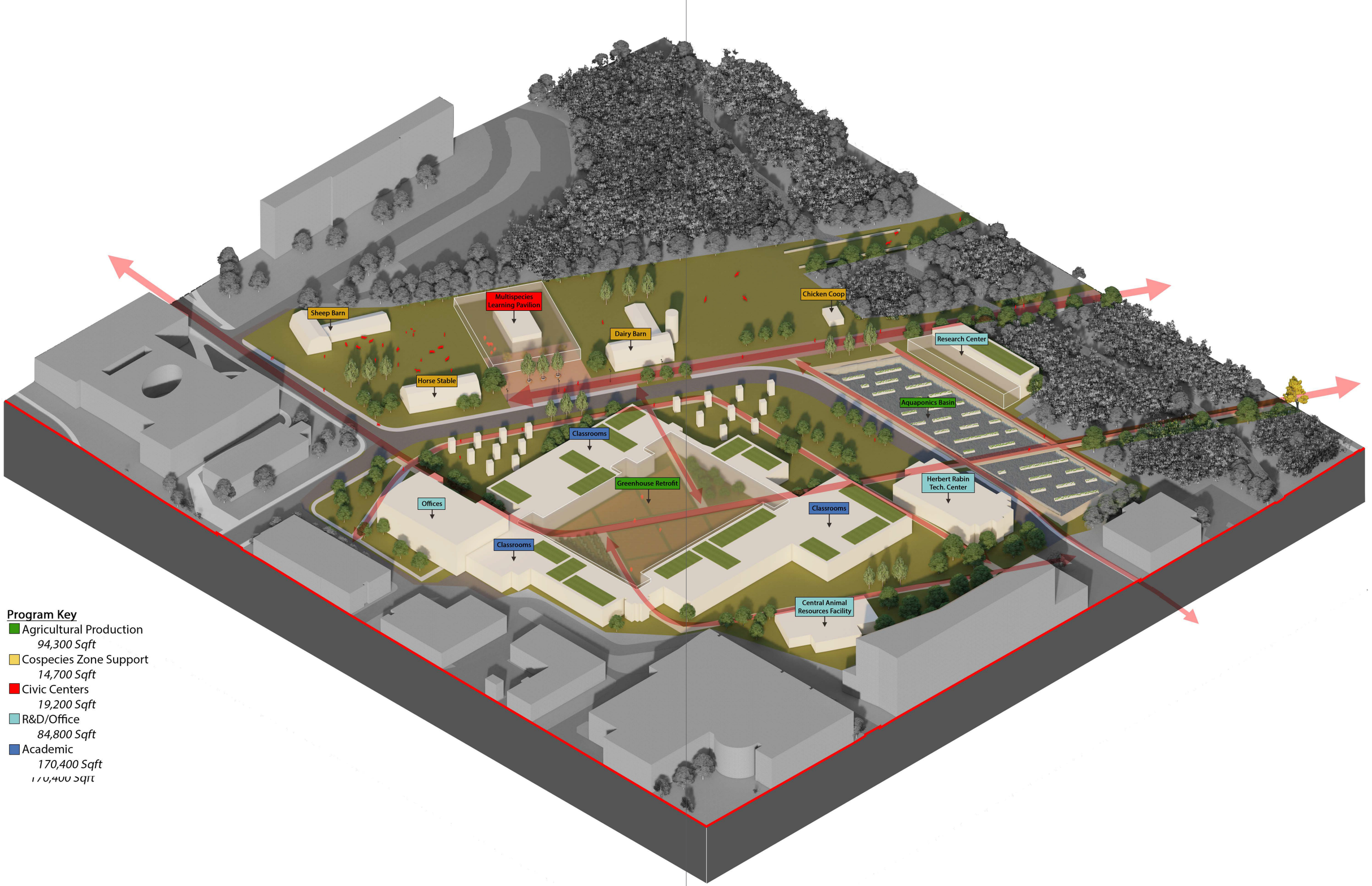
Program Key

- Agricultural Production
  94,500 Sqft
- Cospecies Zone Support
  2,500 Sqft
- Civic Centers
  80,000 Sqft
- R&D/Office
  177,500 Sqft
- Academic
  320,000 Sqft


Public Plaza
Aquaponics Water Feature
Seed Bank
Office
Office
Reception
Visitor's Center and Indoor Arboretum
Gallery
Gallery
Reception
Arboretum
Arable Land

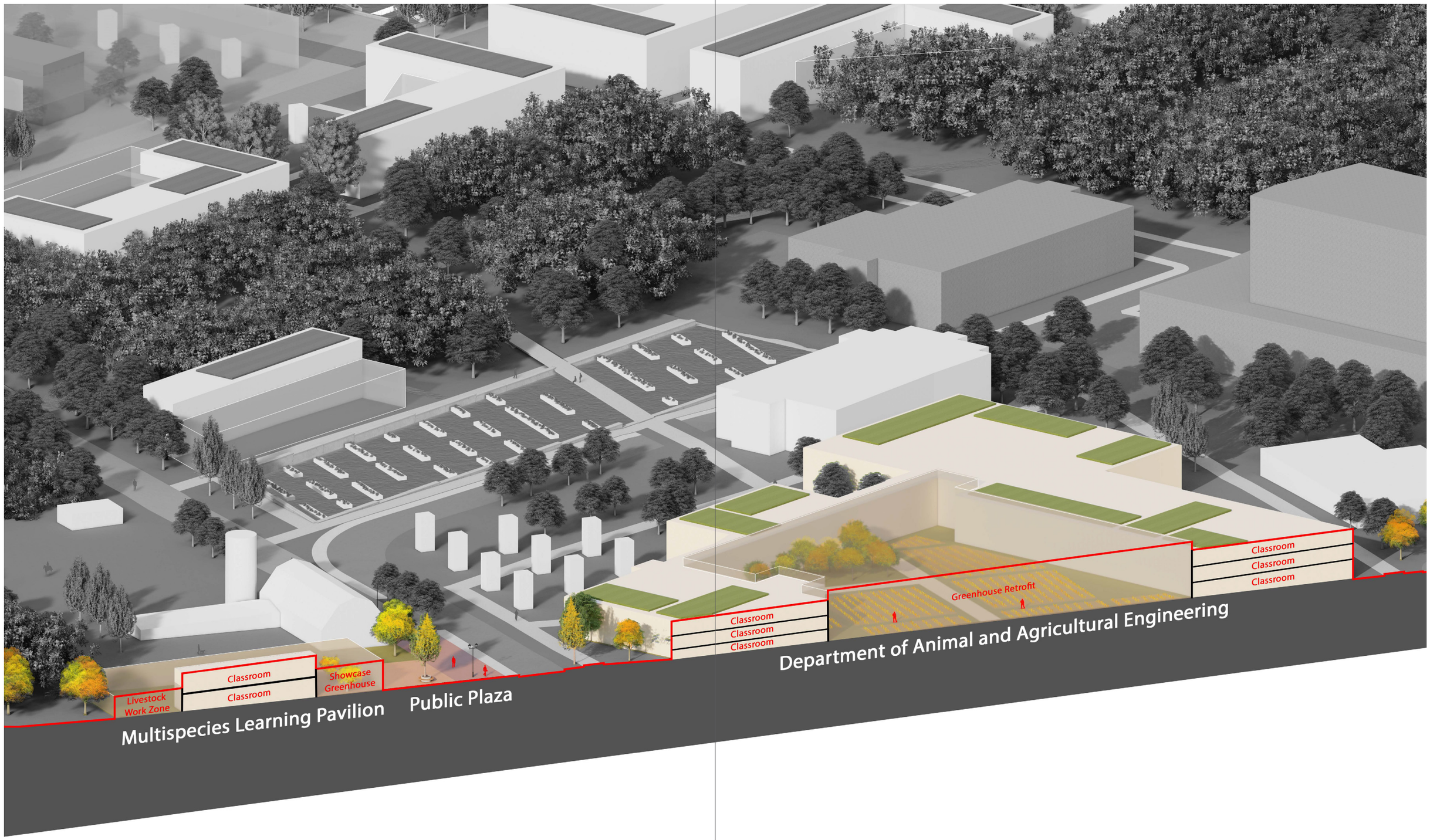

N
Zone 3 Site Plan
Scale: 1"= 150'
0
150
75
300 ft

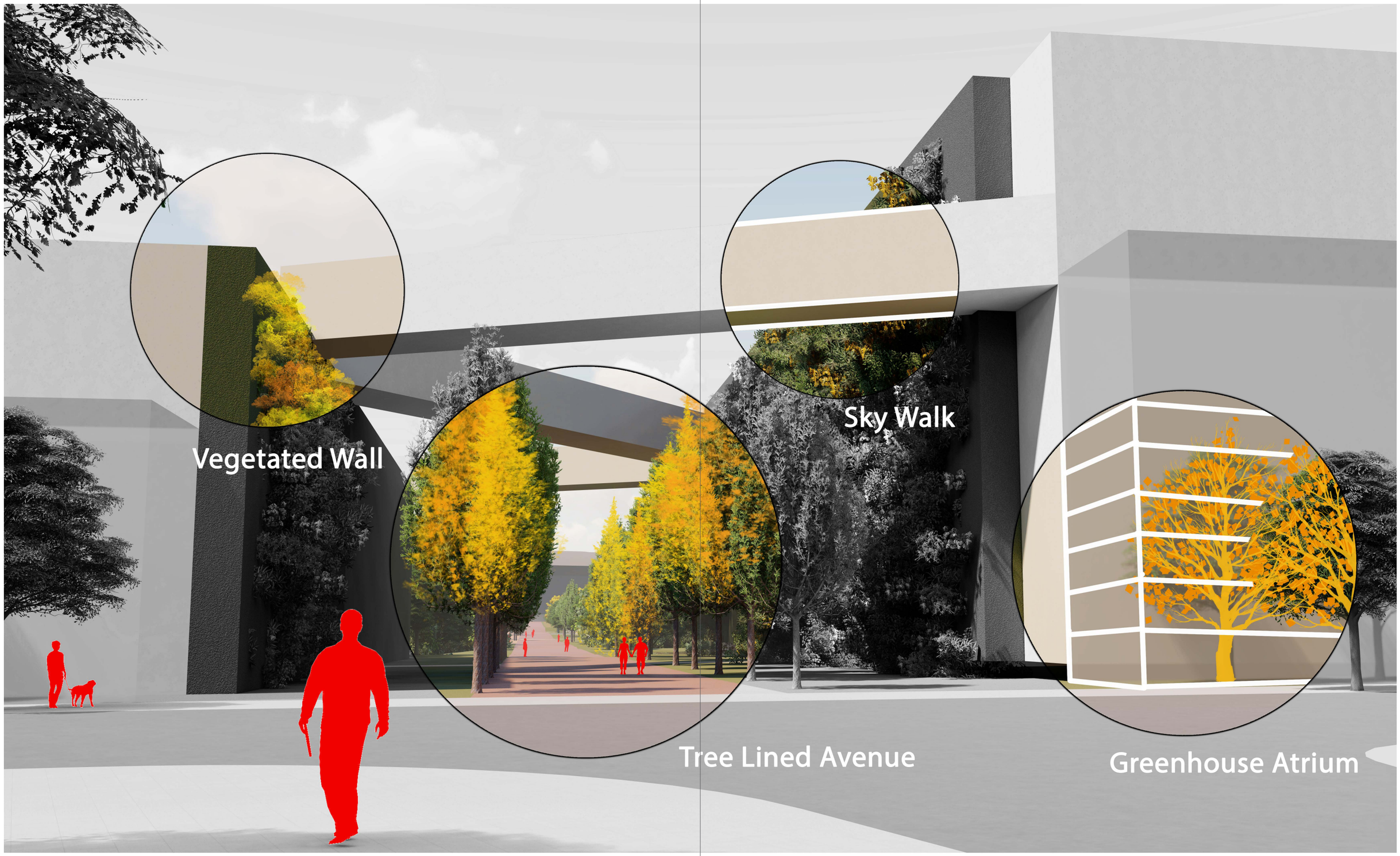

Arable Land
Walkway
Animal Bridge
Greenhouse
Retrofit
Food Cubes
Multispecies Learning
Pavilion

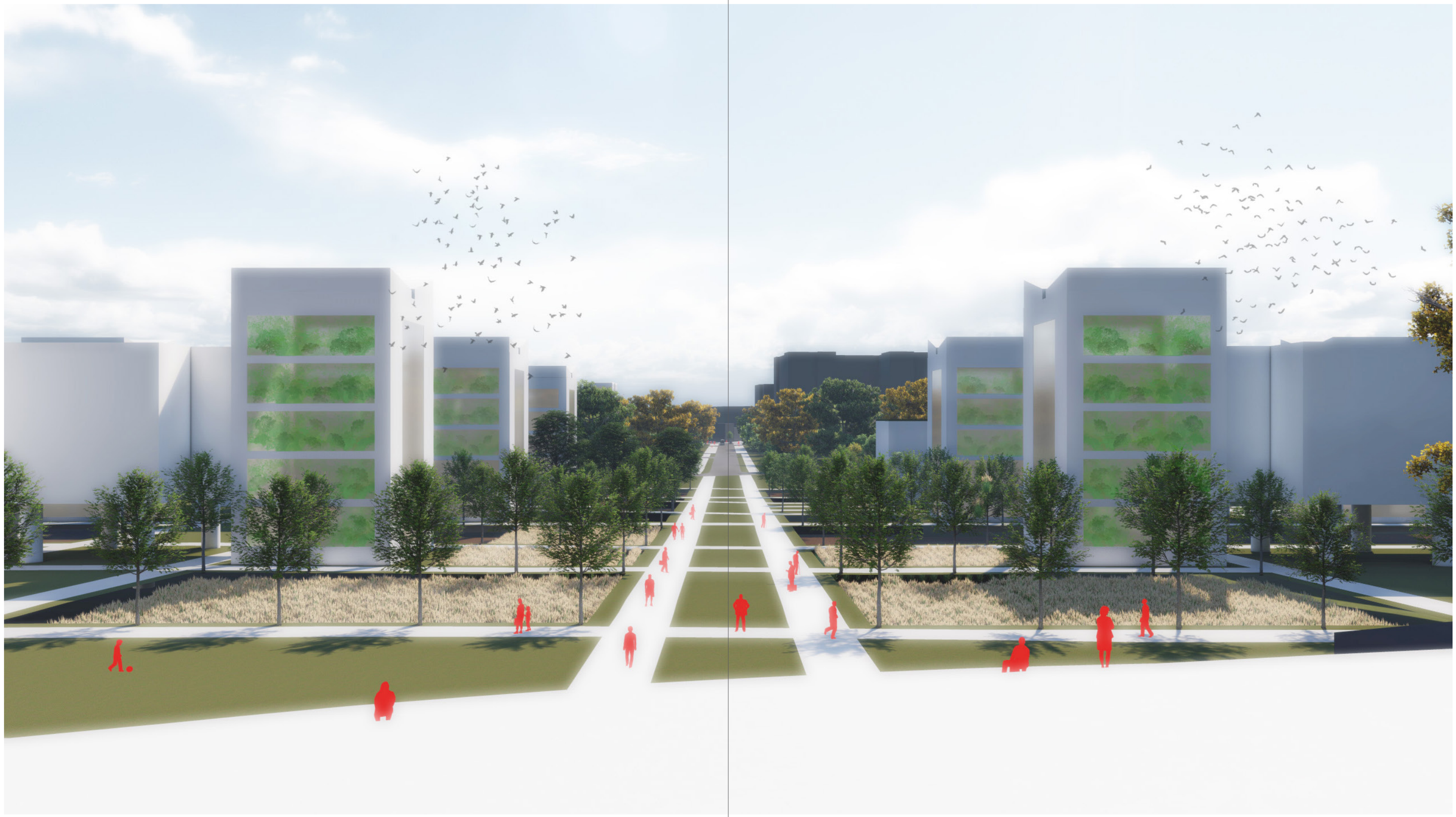


Program Key

- Agricultural Production
  94,300 Sqft
- Cospecies Zone Support
  14,700 Sqft
- Civic Centers
  19,200 Sqft
- R&D/Office
  84,800 Sqft
- Academic
  170,400 Sqft
  170,400 Sqft


Livestock
Work Zone
Classroom
Classroom
Showcase
Greenhouse
Multispecies Learning Pavilion
Public Plaza
Classroom
Classroom
Classroom
Greenhouse Retrofit
Classroom
Classroom
Classroom
Department of Animal and Agricultural Engineering


Vegetated Wall
Tree Lined Avenue
Sky Walk
Greenhouse Atrium

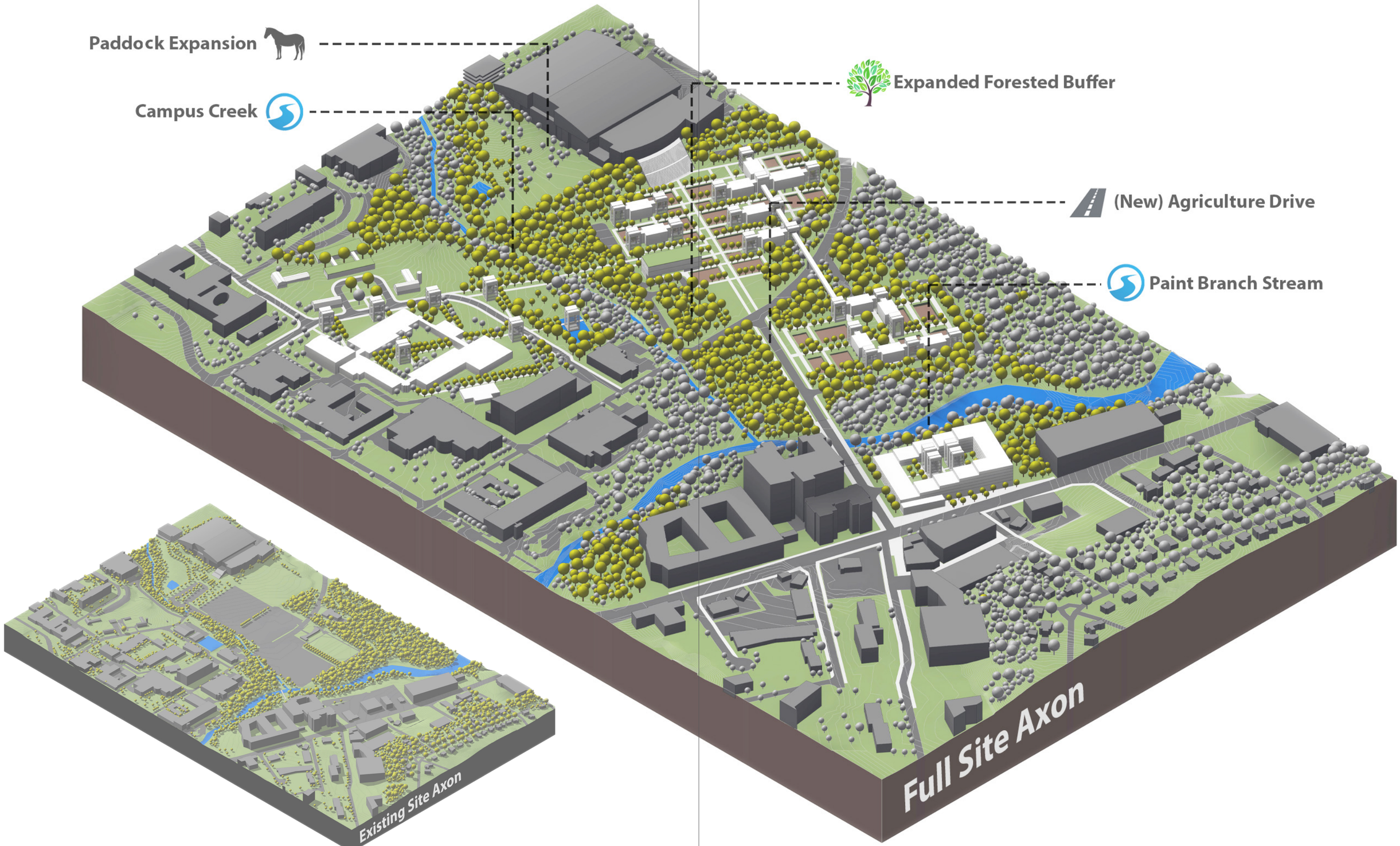


AgroEcology Innovation District

designed by Dylan Spanier

This design uses vertical farming towers as a typology that organizes a range of public spaces in the AID, and creates highly efficient food production opportunities. The towers, flanked by educational buildings and multiple agricultural plots, line a new Agriculture Promenade that connects the Xfinity Center and the city. A grid of towers also reorganizes the Campus Farm district and knits its various spaces together.


N
W
E
S
0
50
100
200
400

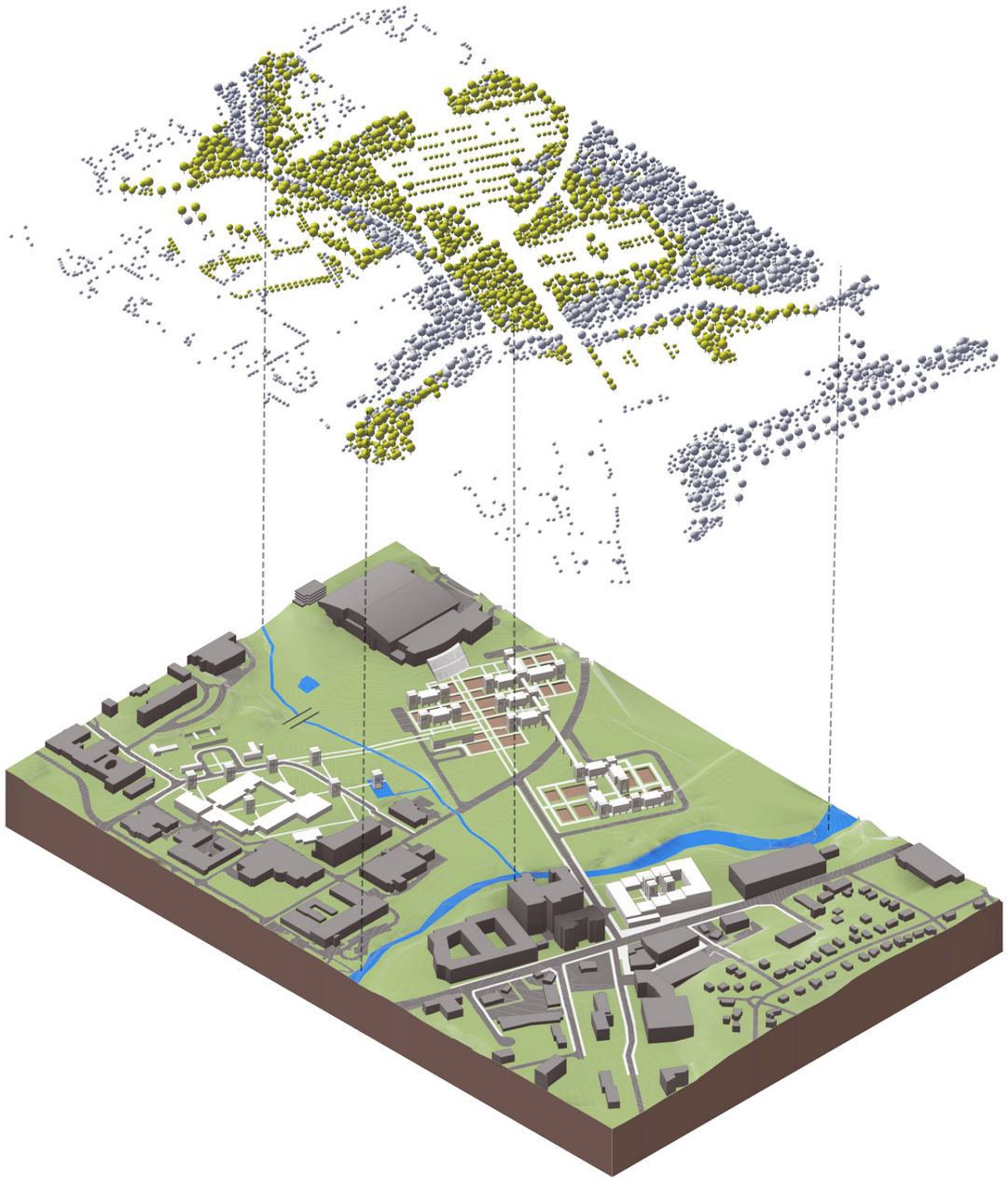

Paddock Expansion
Campus Creek
Expanded Forested Buffer
(New) Agriculture Drive
Paint Branch Stream
Full Site Axon
Existing Site Axon

Proposed Vegetation & New Agricultural Corridor Expansion

Existing Vegetation

New Vegetation

Forested Buffer Expansion: 46 Acres TOTAL



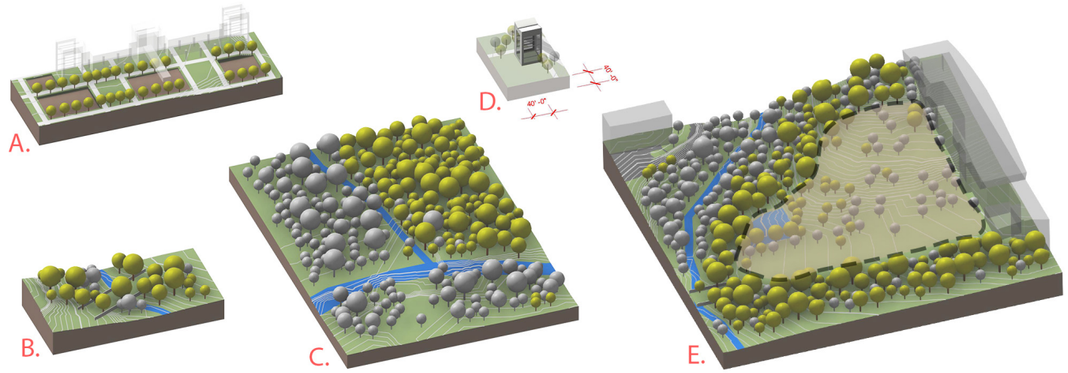
A. High Density Mixed Use:
Parking, Retail, Apartments
Total: 613,700 sqft.

B. Visitor Center:
New Hub for Agricultural Urbanism
Total: 40,000 sqft.

C. Classroom/Labs:
Education Facilities
Total: 350,000 sqft

D. Campus Farm Pavilion
Open Air Learning Pavilion
Total: 16,000 sqft

E. Vertical Farming Towers
Vertical Farming for Food Production
8,000 sqft Each



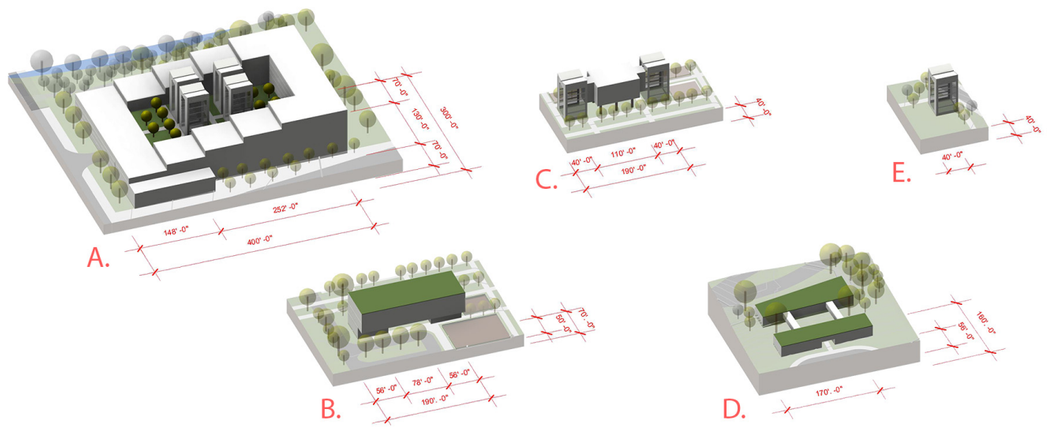
A. Agriculture Zones:
Wet & Dry Crops
Total: 650,000 sqft.

B. Land Bridge:
Land Bridge to Paddok Expansion

C. Forested Buffer Expansion:
300 ft. Buffer Expansion
Total: 46 Acres

D. Vertical Farming Towers
Vertical Farming for Food Production
8,000 sqft Each

E. Paddok Expansion:
Animal Expansion
Total: 125,000 sqft



Vertical Farming Towers
&
Mixed Use

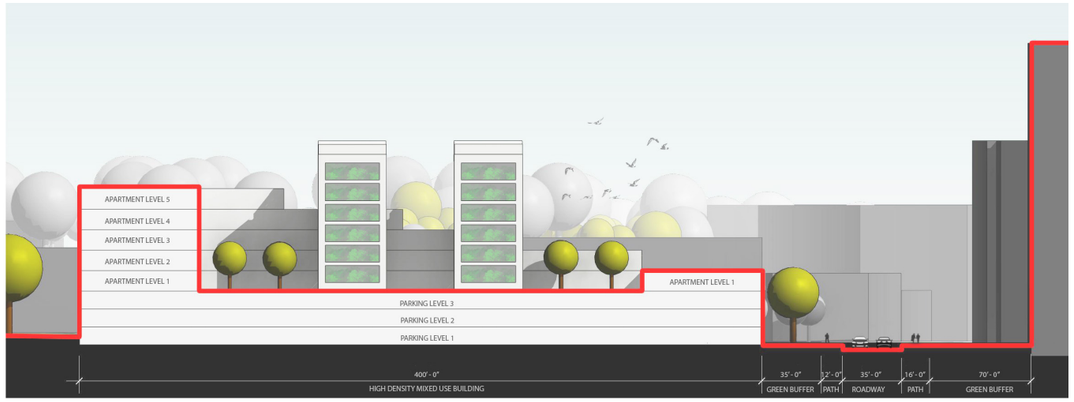
Agriculture Drive

Baltimore Ave.

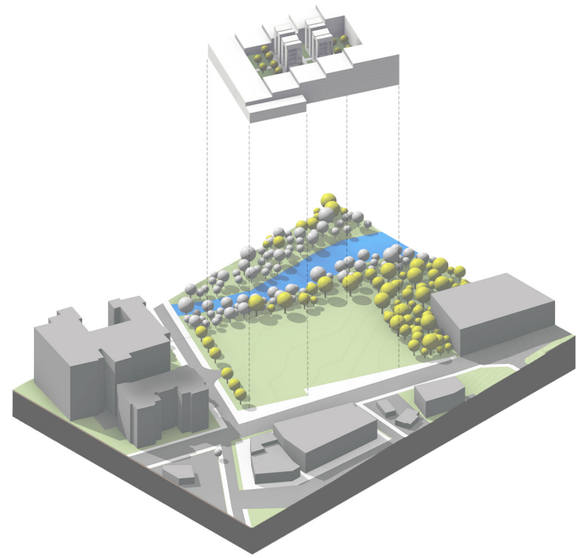
Zone 1 - High Density Mixed Use



SITE PLAN - ZONE 1
SCALE: 1" = 100'-0"



Site Section - Zone 1
Scale: 1" = 80' - 0"

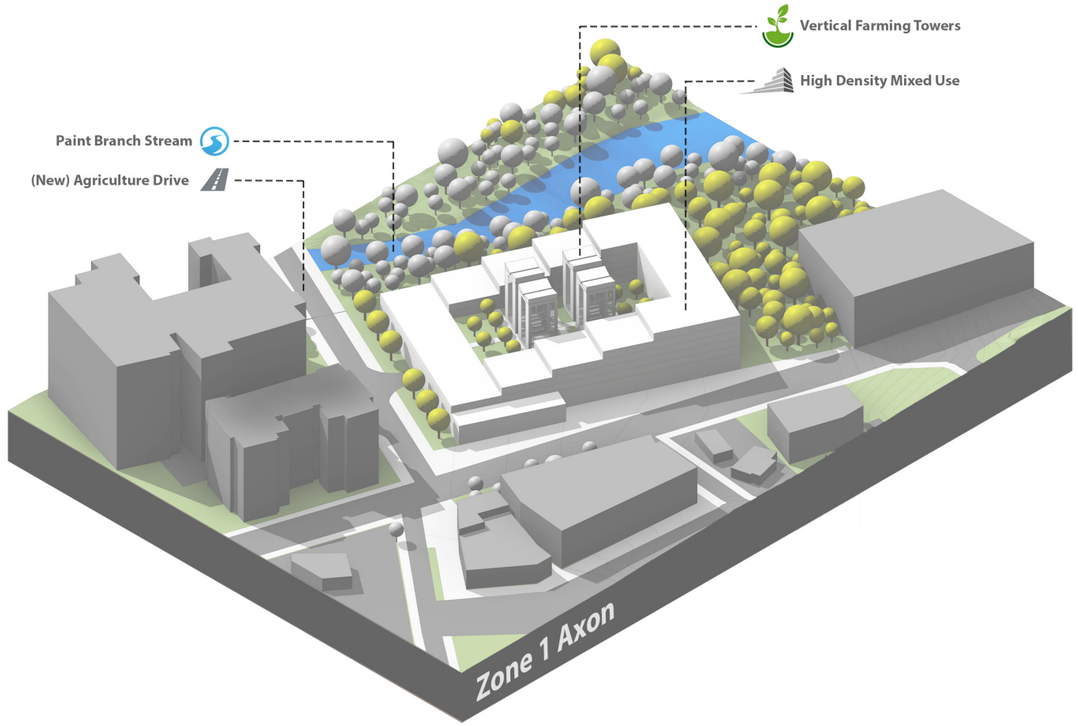


Proposed High Density Mixed Use:

Parking Levels - 240,000 sqft
Retail / Commercial - 65,000 sqft
Vertical Farming Towers - 38,500 sqft
Interior Courtyard - 33,800 sqft
Apartments - 236,400 sqft

TOTAL: 613, 700 sqft

Infrastructure - Baltimore Avenue





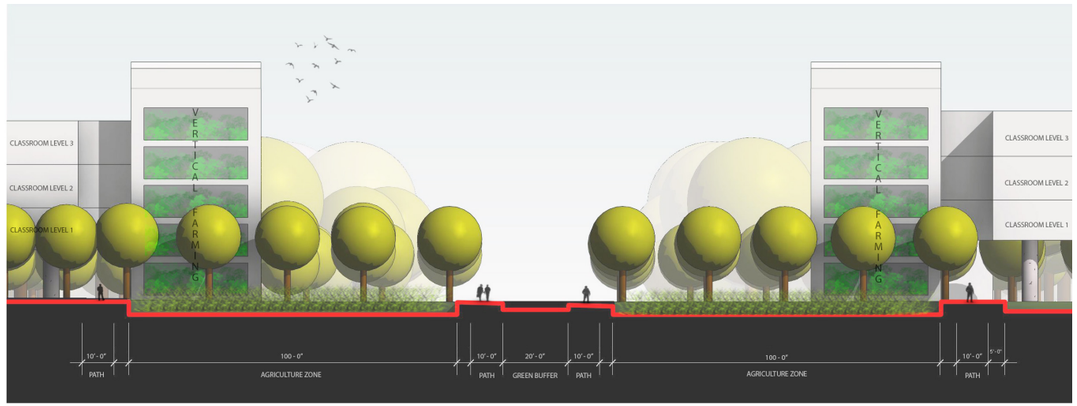
Agricultural Zones



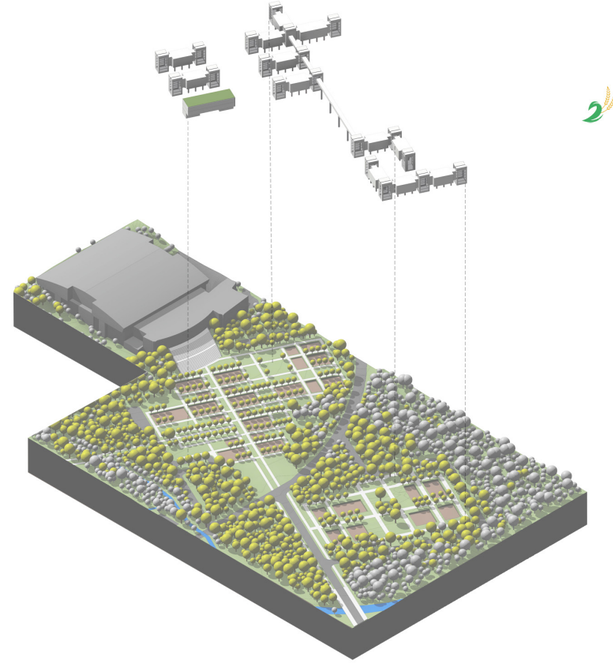
Zone 2 - Agriculture Zones



SITE PLAN - ZONE 2
SCALE: 1" = 200'-0"



Site Section - Zone 2
Scale: 1" = 40' - 0"

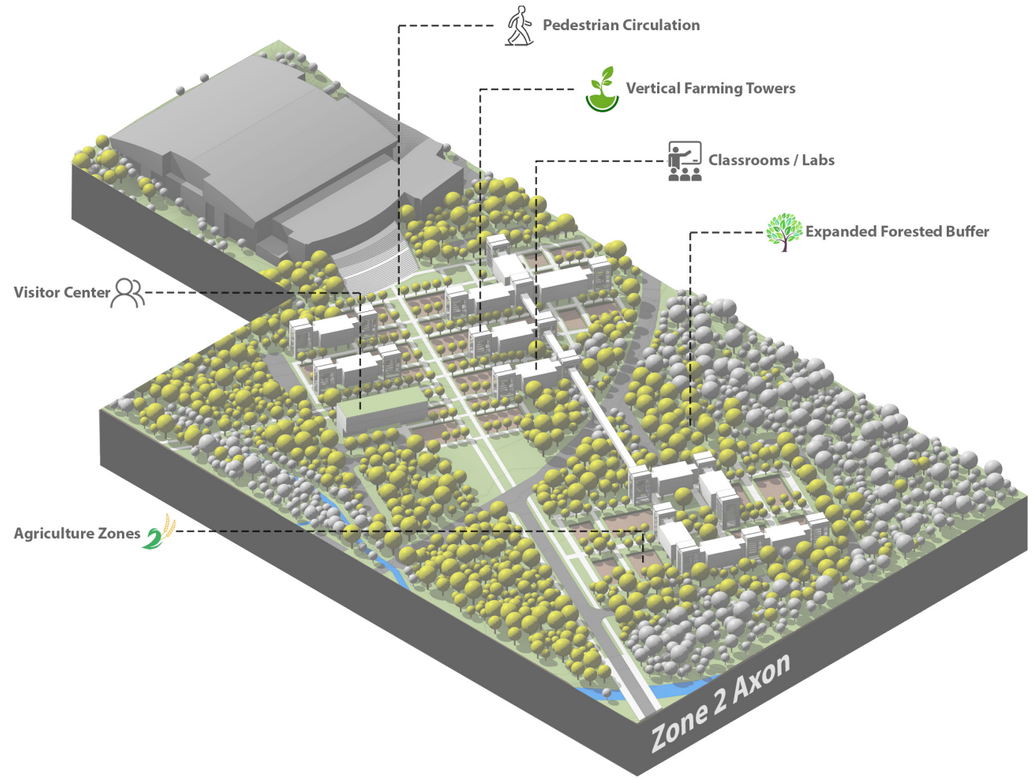


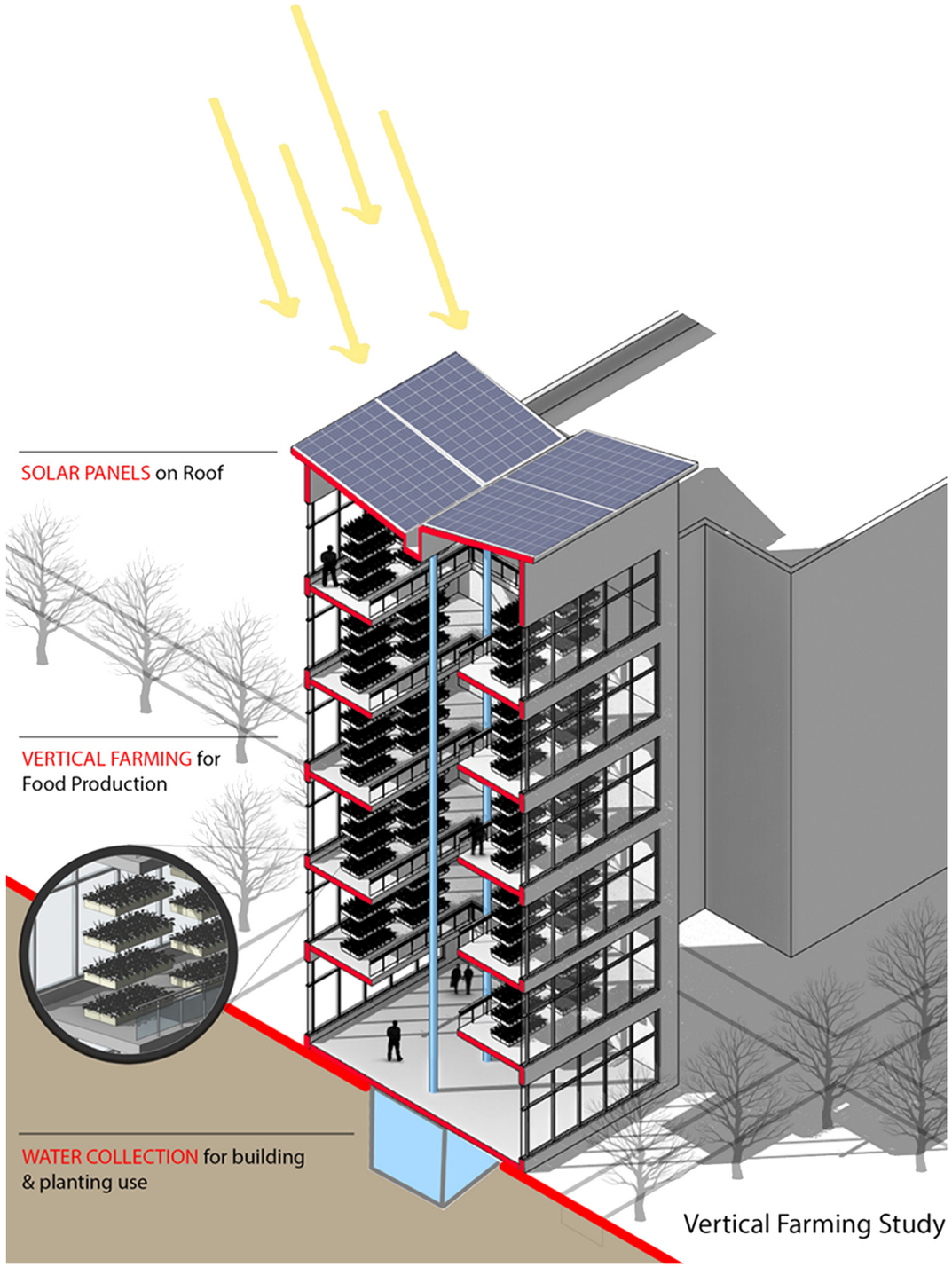
Proposed Agriculture Corridor:

Labs / Classrooms - 350,000 sqft
Agriculture Zones - 600,000 sqft
Vertical Farming Towers - 112,000 sqft
Visitors Center - 40,000 sqft

TOTAL: 1,102, 000 sqft

Infrastructure - AgroEcology District




SOLAR PANELS on Roof
VERTICAL FARMING for
Food Production
WATER COLLECTION for building
& planting use
Vertical Farming Study


Vertical Farming Towers

Multispecies Learning Pavilion
&
Green Roof



Historic Barn & Silo



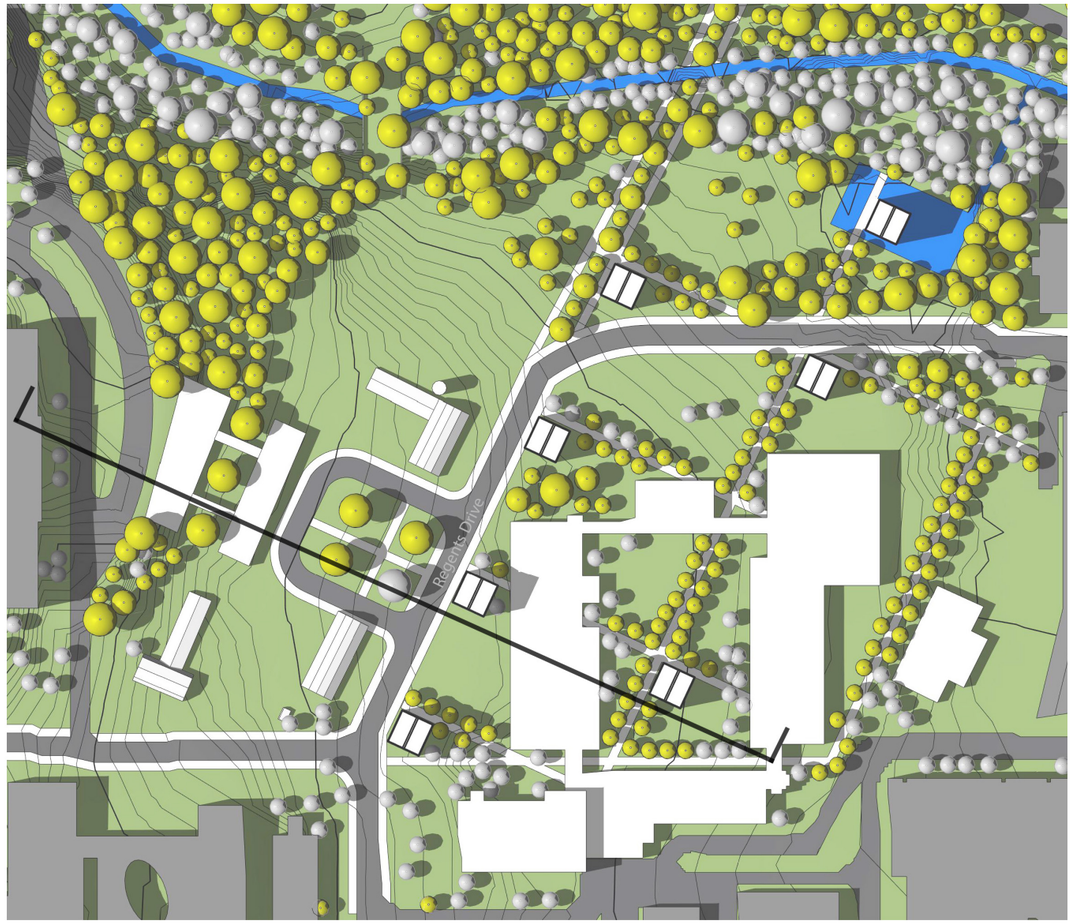
Vertical Farming Towers



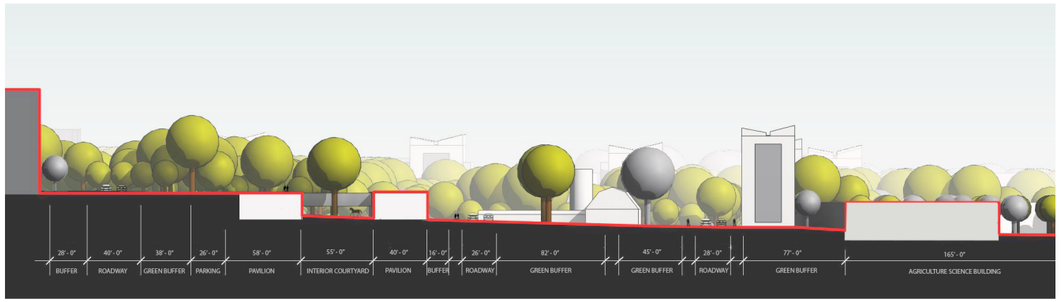
Public Transit



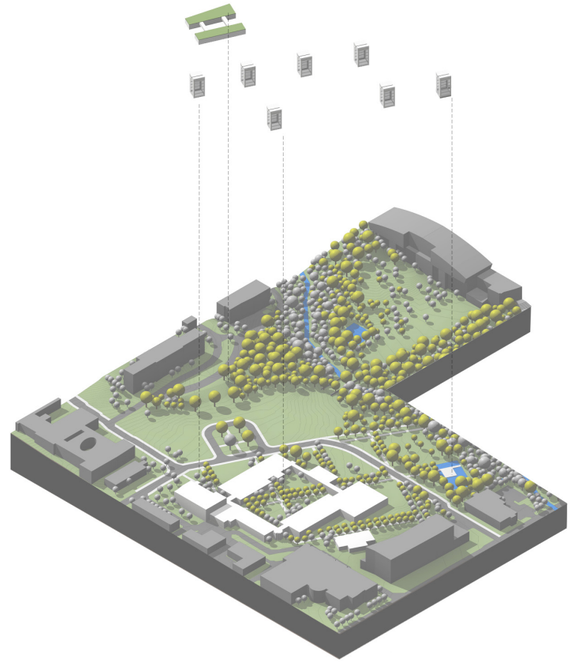
Zone 3 - Campus Farm & Pavilion



SITE PLAN - ZONE 3
SCALE: 1" = 200'-0"



Site Section - Zone 3
Scale: 1" = 120' - 0"

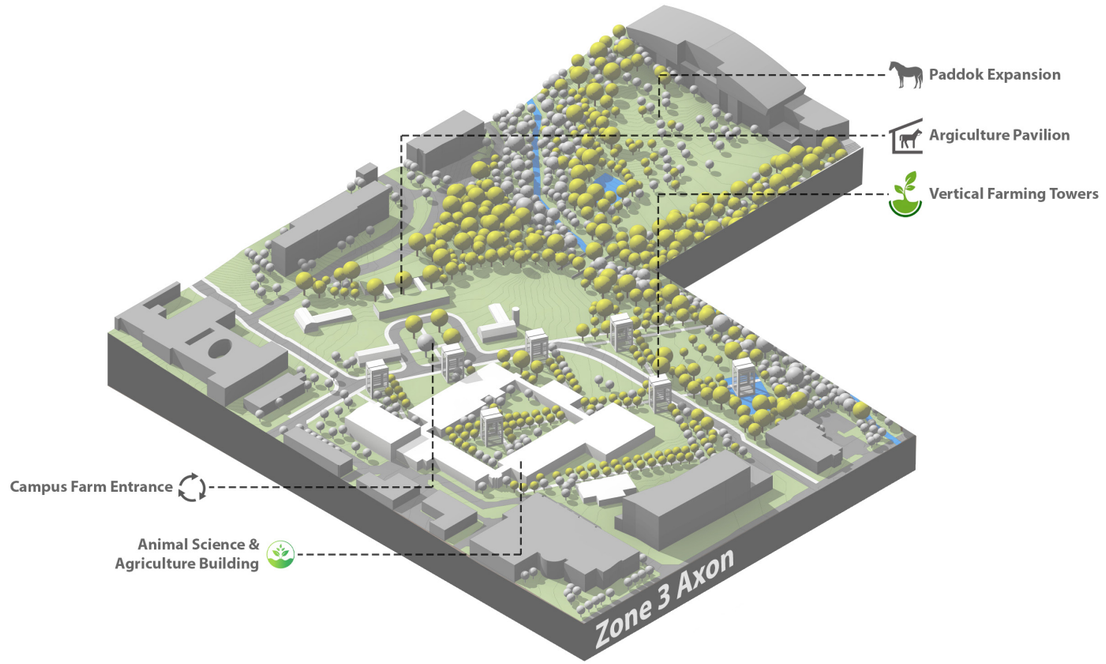


Proposed Campus Farm:

Campus Farm Pavilion - 16,000 sqft
Vertical Farming Towers - 56,000 sqft

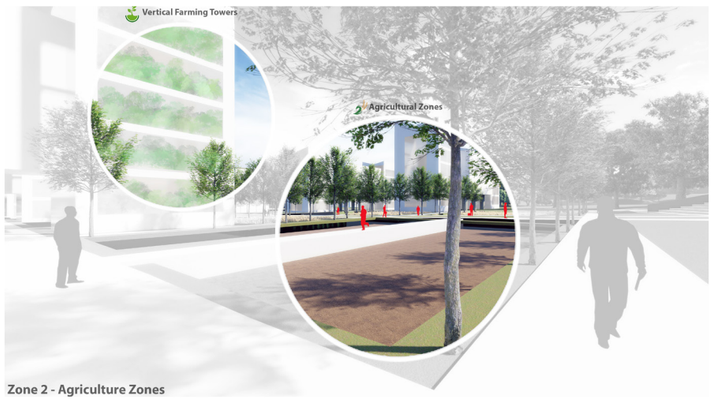
TOTAL: 72,000 sqft

Infrastructure - Campus Farm



Vertical Farming Towers

Agricultural Zones



Zone 2 - Agriculture Zones


UNIVERSITY OF
18
56
MARYLAND
SCHOOL OF
ARCHITECTURE,
PLANNING & PRESERVATION