

BEES + TREES

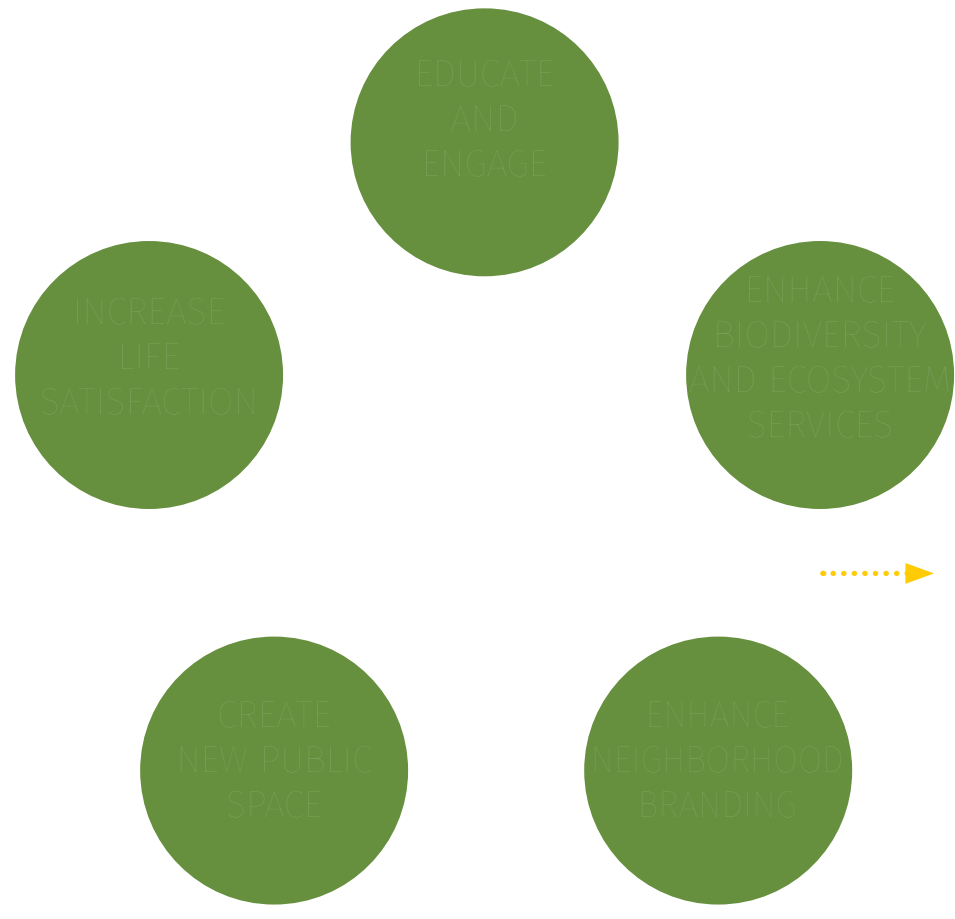
BUILDING A MORE RESILIENT NEIGHBORHOOD ECOLOGY

BENJAMIN CHRONISTER
MARCH 2014 - SPRING 2018
PENN STATE UNIVERSITY

POLLINATORS + URBAN ECOLOGY

URBAN ECOLOGY + BALTIMORE ECOSYSTEM STUDY

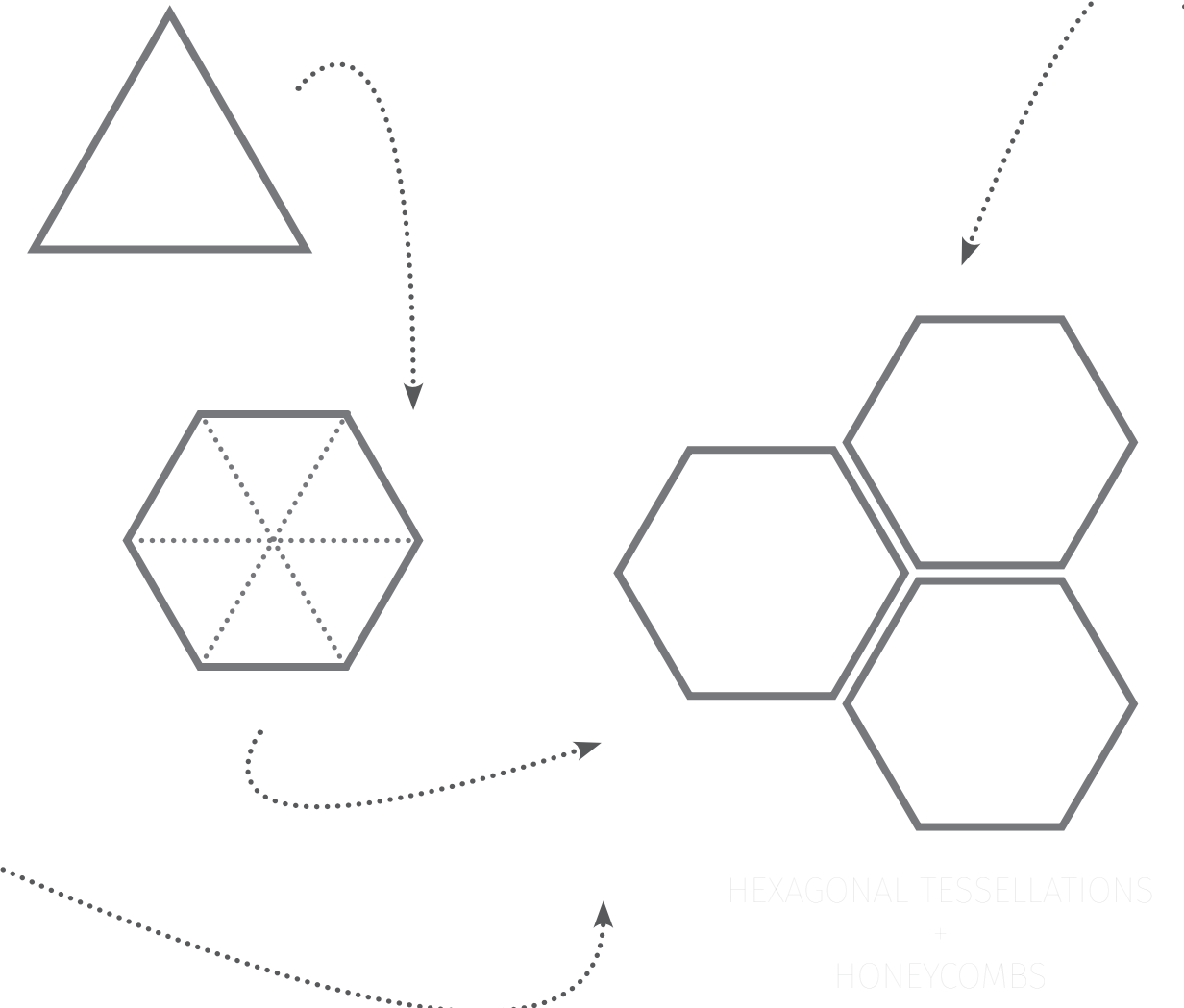
BIOPHYSICAL + SOCIOECONOMIC



MODULARITY +
REDUNDANCY +
MULTIFUNCTIONALITY =
RESILIENCE

RESILIENCE ACROSS SCALES

NATURE'S MOST RESILIENT SHAPE



BALTIMORE AS THE CITY OF NEIGHBORHOODS



MODULARITY + REDUNDANCY + RESILIENCY

MODULE I · PEOPLE + POLLINATORS

- A RESTING PLACE OR HOME FOR PEOPLE AND POLLINATORS
- HEAVY ON PLANTING - WOODY AND HERBACEOUS SPECIES
- GREENWALLS IN SUN, MOSS WALLS IN SHADE
- HEXAGONAL DESIGN LAYOUT
- SOLITARY BEE HOTELS
- INDIVIDUAL VACANT LOTS IN HIGH TRAFFIC LOCATIONS



MODULE II · EXPLORING + FORAGING

- AN EXPLORATORY GARDEN
- FOCUS ON EXTENDING BEE FORAGING SEASON
- VERY HEAVY WOODY PLANTING
- MOSS WALLS
- DESIGN LAYOUT BASED ON BEE FLIGHT PATTERNS
- GROUPS OF 2-3 LOTS IN LESS DESIRABLE LOCATIONS



CHARM CITY MEADWORKS ON BIDDLE STREET



CHARM CITY MEADWORKS

- LOCAL COMMUNITY INSTITUTION WITH DIRECT COMMUNITY INVOLVEMENT AND POTENTIAL FOR MORE COMMUNITY GATHERING SPACE
- CONNECTION TO COMMUNITY LEADERSHIP
- RESIDENT EMPLOYMENT
- BUSINESS CONNECTIONS
- RECOGNITION

HOFFMAN STREET + ENSOR STREET



MODULE III · COMMUNITY PRODUCTION

- URBAN AGRICULTURE AND APARIES
- AGROFORESTRY PLANTINGS - FRUIT, BERRIES, NUTS
- PLANTS THAT BEES LOVE
- GREEN WALLS IN SUN, MOSS WALLS IN SHADE
- DESIGN FOCUSED ON PRODUCTION
- GROUPS OF 3+ LOTS IN DESIRABLE LOCATIONS

MODULES ACROSS JOHNSTON SQUARE

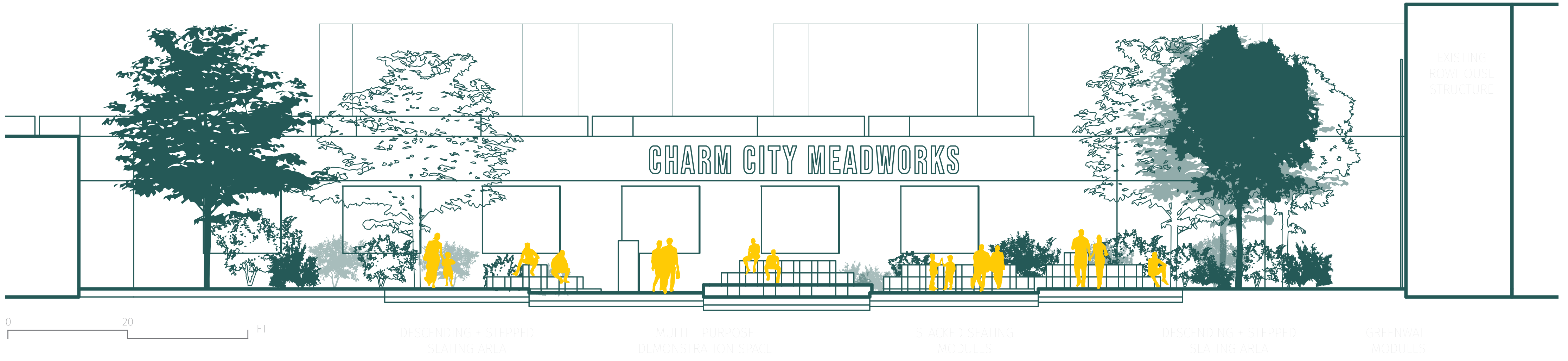
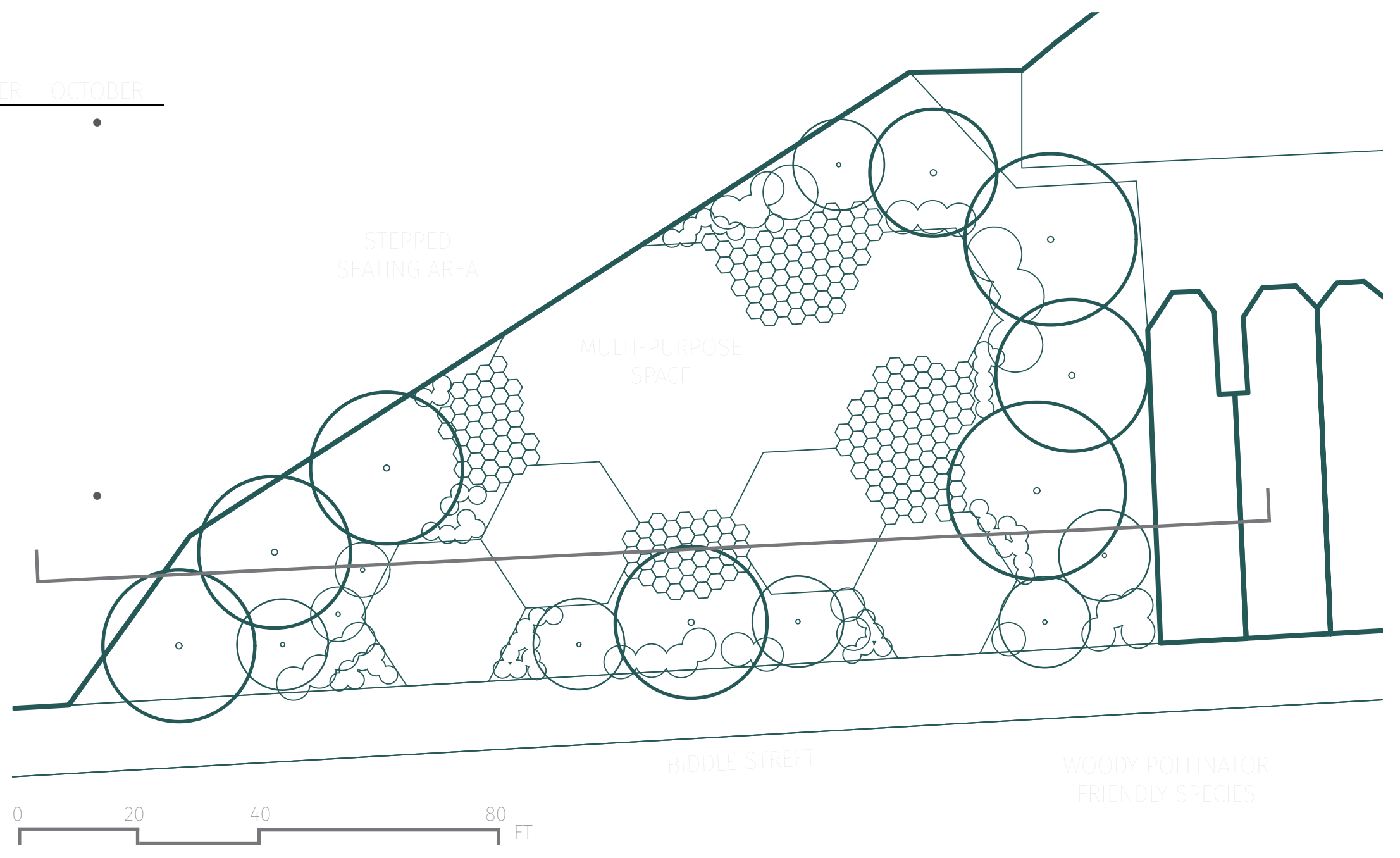


MODULE TYPOLOGY



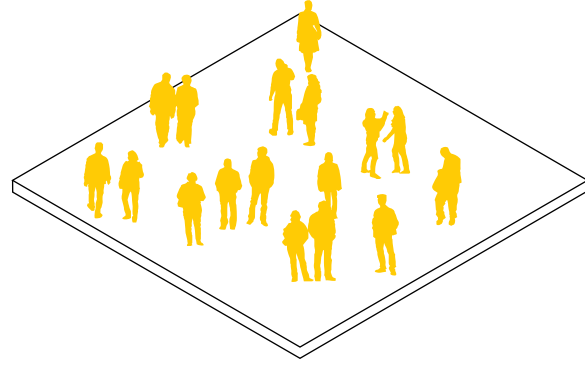
SPECIES LIST

	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
<i>Amelastor carolinianus</i>								•	•
<i>Arabis spirosa</i>							•	•	
<i>Campsis radicans</i>					•	•			
<i>Ceanothus americanus</i>					•	•			
<i>Cephalanthus occidentalis</i>							•	•	
<i>Cercis canadensis</i>		•	•						
<i>Clethra alnifolia</i>									
<i>Ipomoea sagittata</i>						•	•	•	
<i>Phlox spp.</i>				•	•	•	•	•	
<i>Pycnanthemum muticum</i>						•	•	•	
<i>Rhus copallinum</i>									•
<i>Solidago spp.</i>					•	•	•	•	



MULTI - PURPOSE SPACE

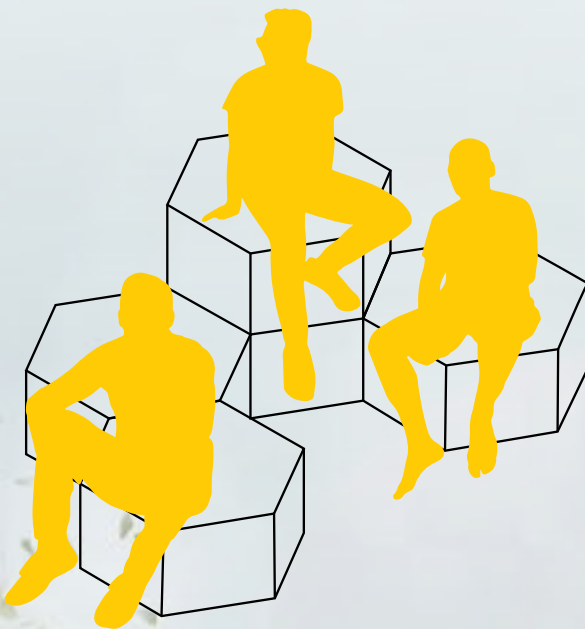
COMMUNITY GATHERINGS - WORKSHOPS



PRIVATE SEATING

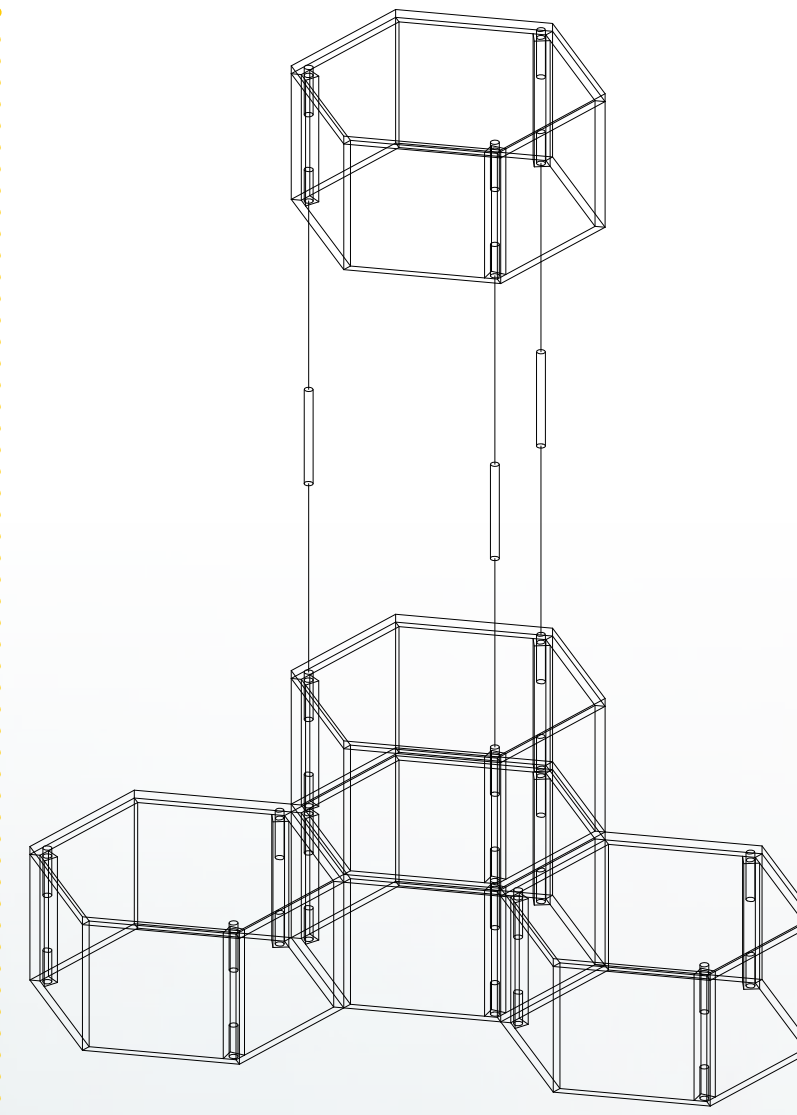


PUBLIC SEATING



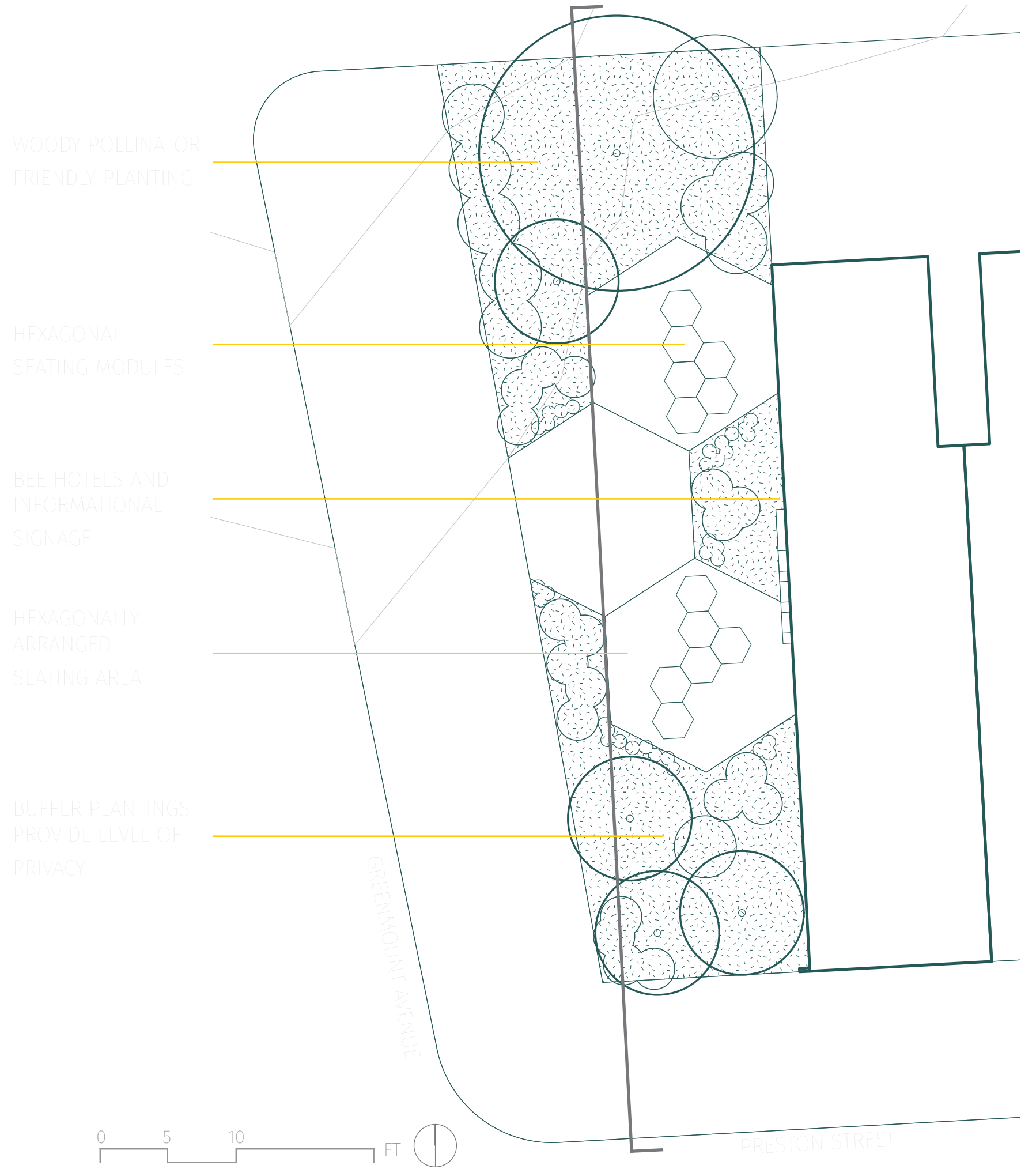
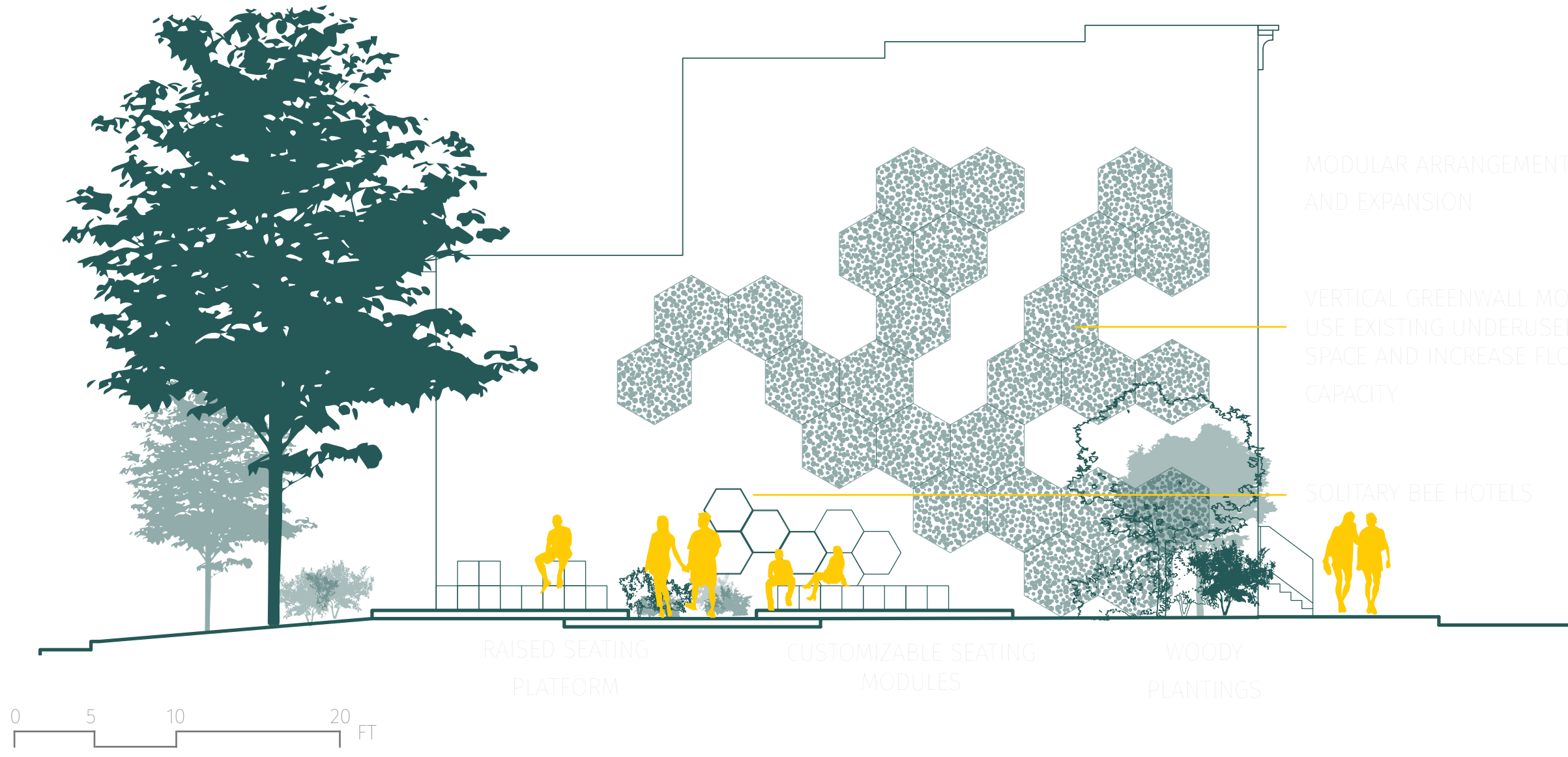
CUSTOMIZABLE SEATING MODULES

HEXAGONAL METAL SEATING
MODULAR
STACKABLE
CREATES A VARIETY OF SEATING OPTIONS

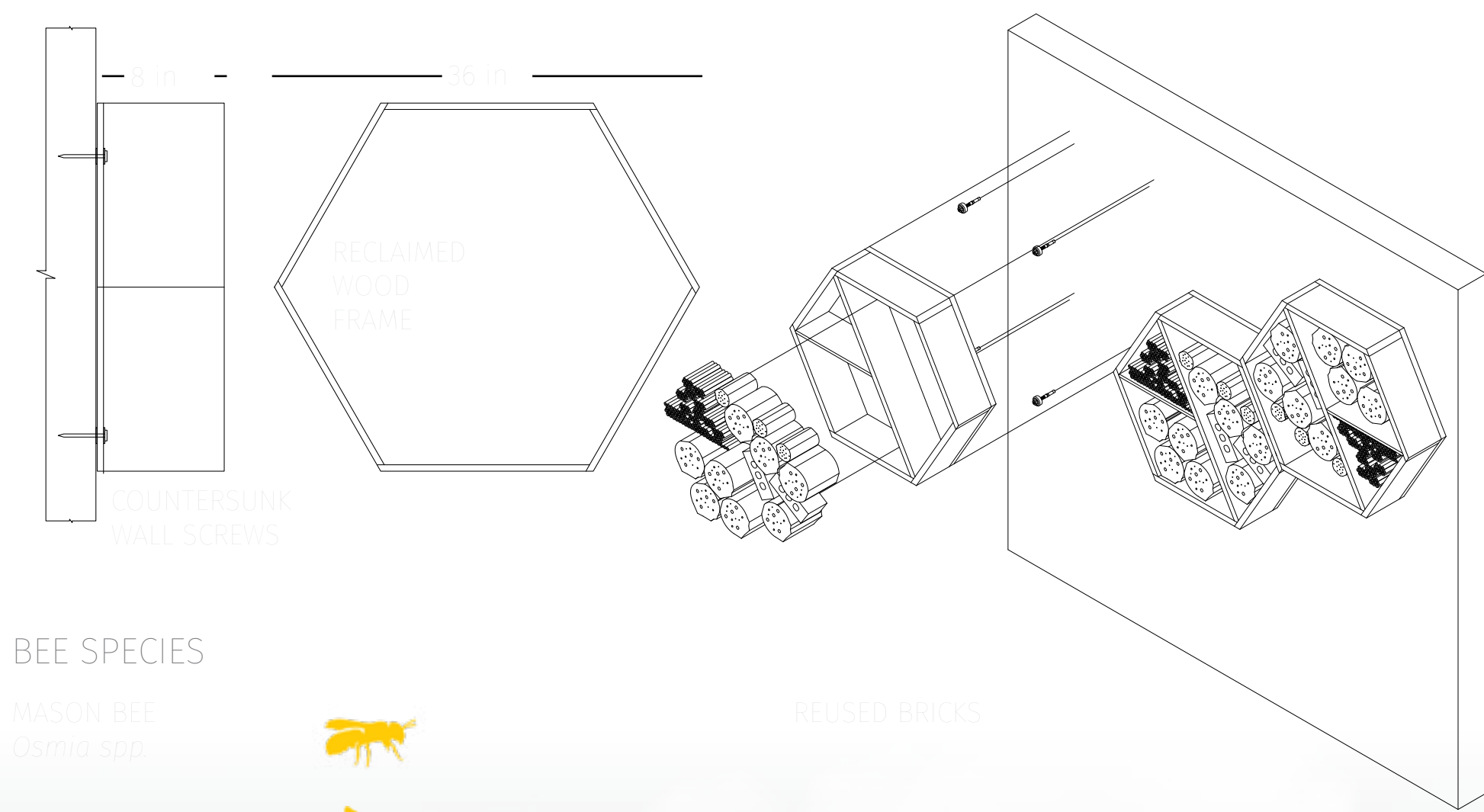


SPECIES LIST

	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
<i>Ampelaster canadensis</i>								•	•
<i>Arabis spiroaea</i>							•	•	
<i>Campsis radicans</i>									
<i>Ceanothus americanus</i>					•	•			
<i>Cephalanthus occidentalis</i>							•	•	
<i>Cercis canadensis</i>		•	•						
<i>Clethra alnifolia</i>							•	•	
<i>Ipomoea sagittata</i>							•	•	
<i>Phlox</i> spp.				•	•		•	•	
<i>Pycnanthemum muticum</i>							•	•	
<i>Rhus copallinum</i>							•	•	
<i>Solidago</i> spp.					•	•	•	•	•



SOLITARY BEE HOTELS



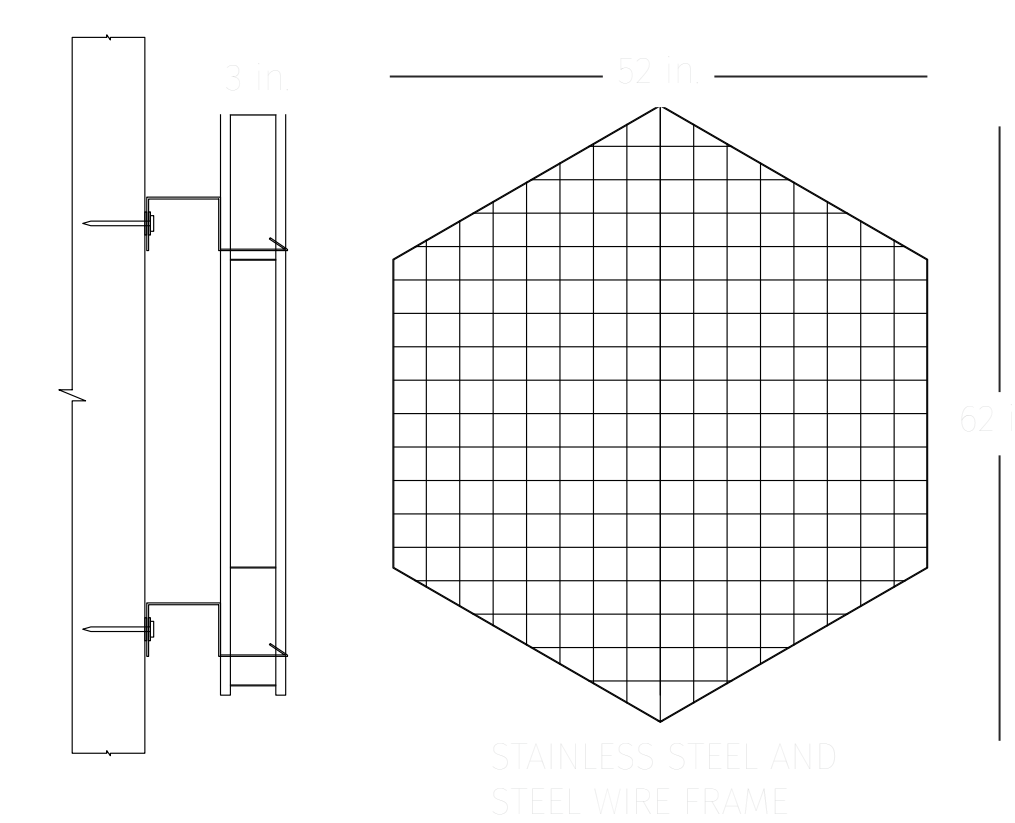
BEE SPECIES

- MASON BEE *Osmia* spp.
- CARPENTER BEE *Xylocopa* spp.
- LEAF-CUTTER BEE *Megachile* spp.



- REUSED BRICKS
- REUSED WOOD SCRAPS
- HONEYCOMB MATTRESS

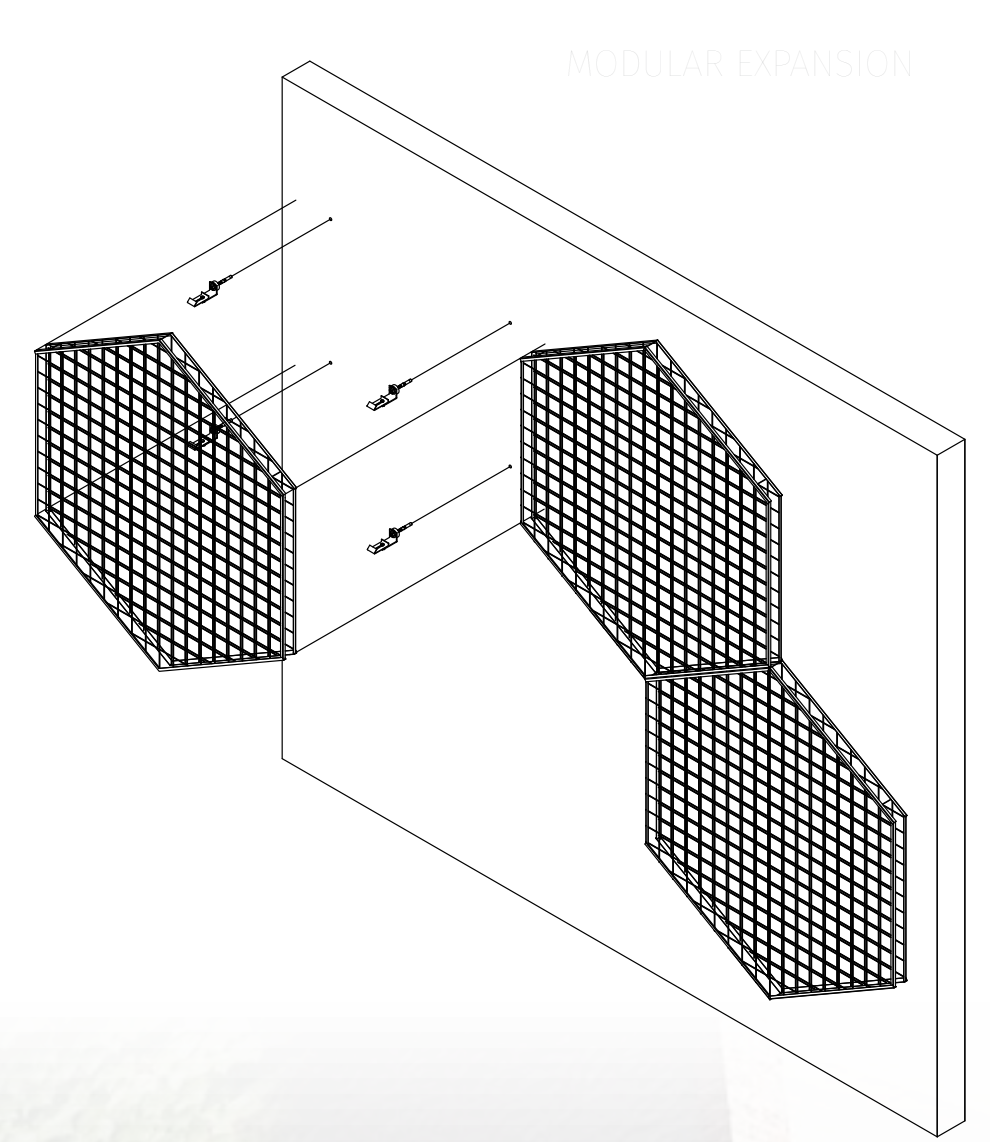
VERTICAL GREENING MODULE : VINES



- BUMBLE BEE *Bombus* spp.
- SWEAT BEE *Halictidae* family

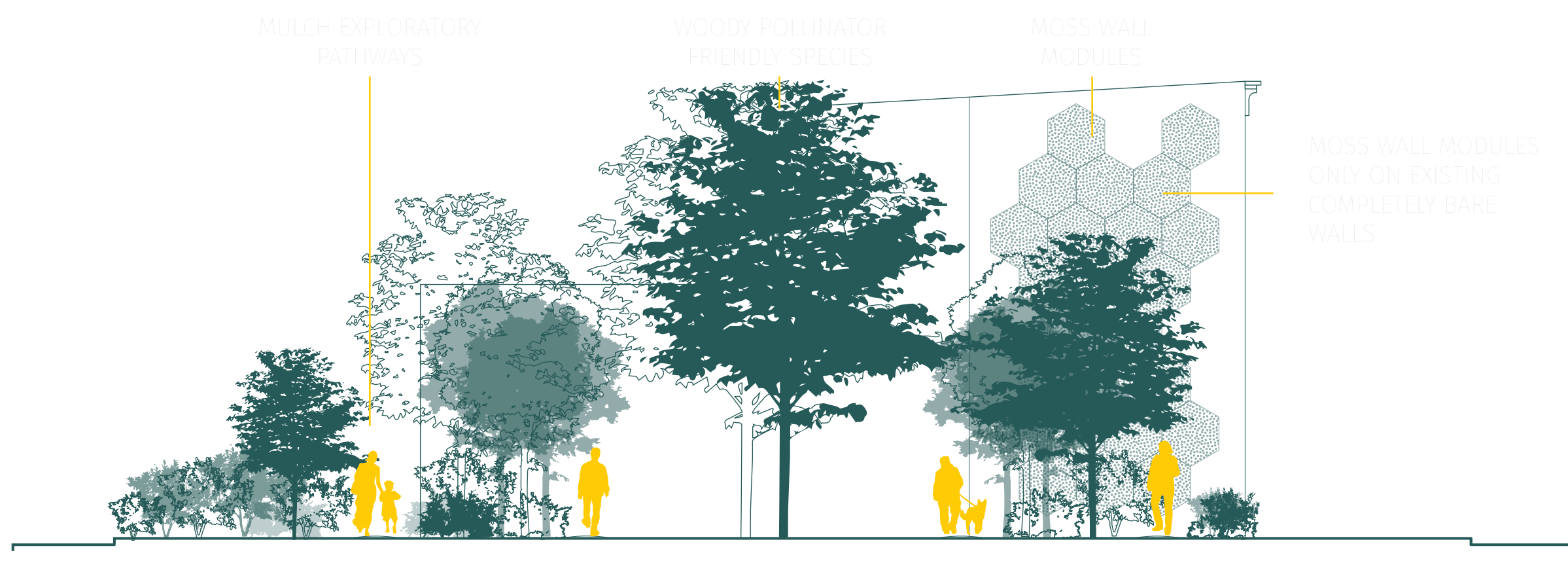


- GROUND NESTS
- GROUND NESTS

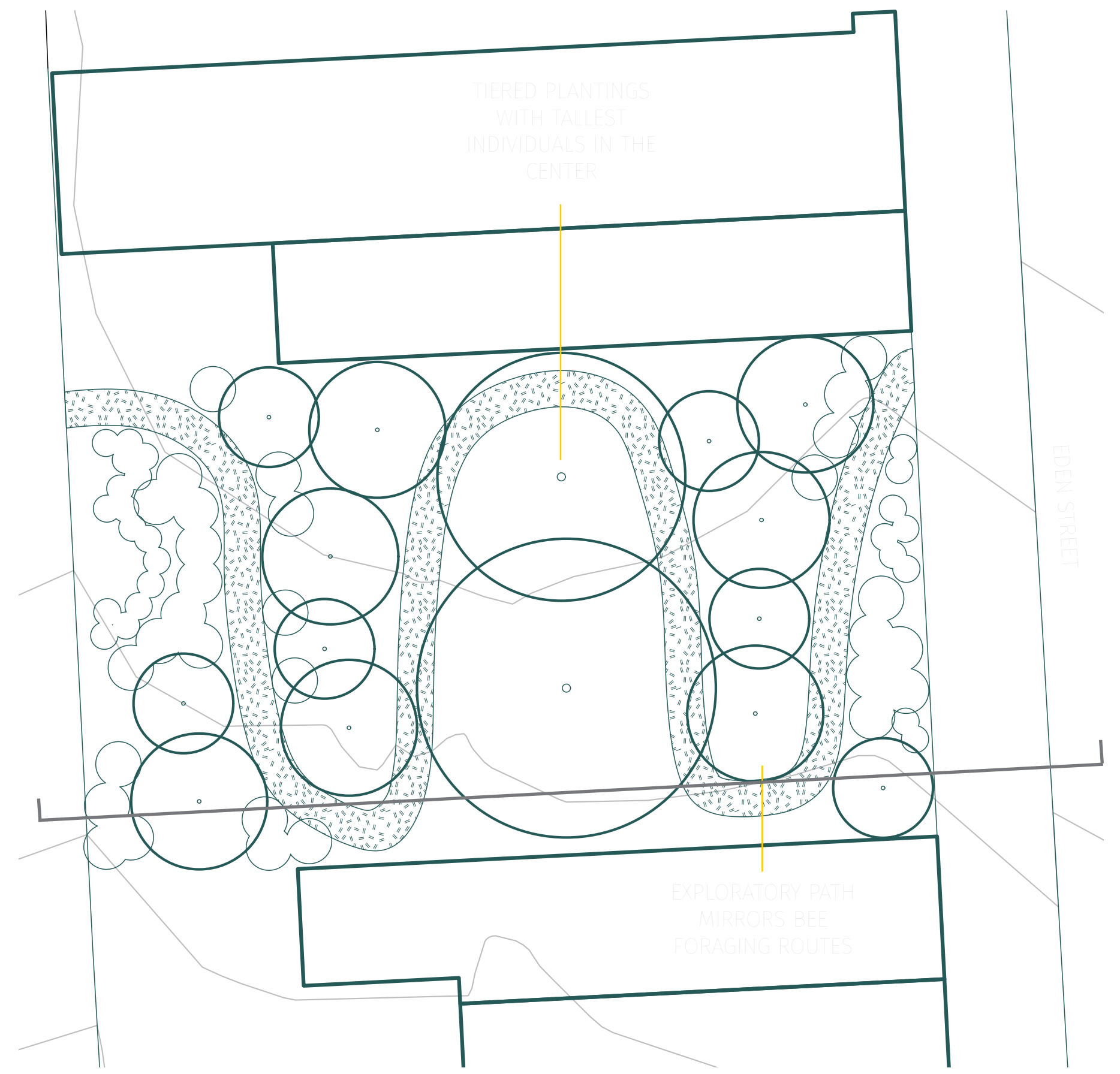


SPECIES LIST

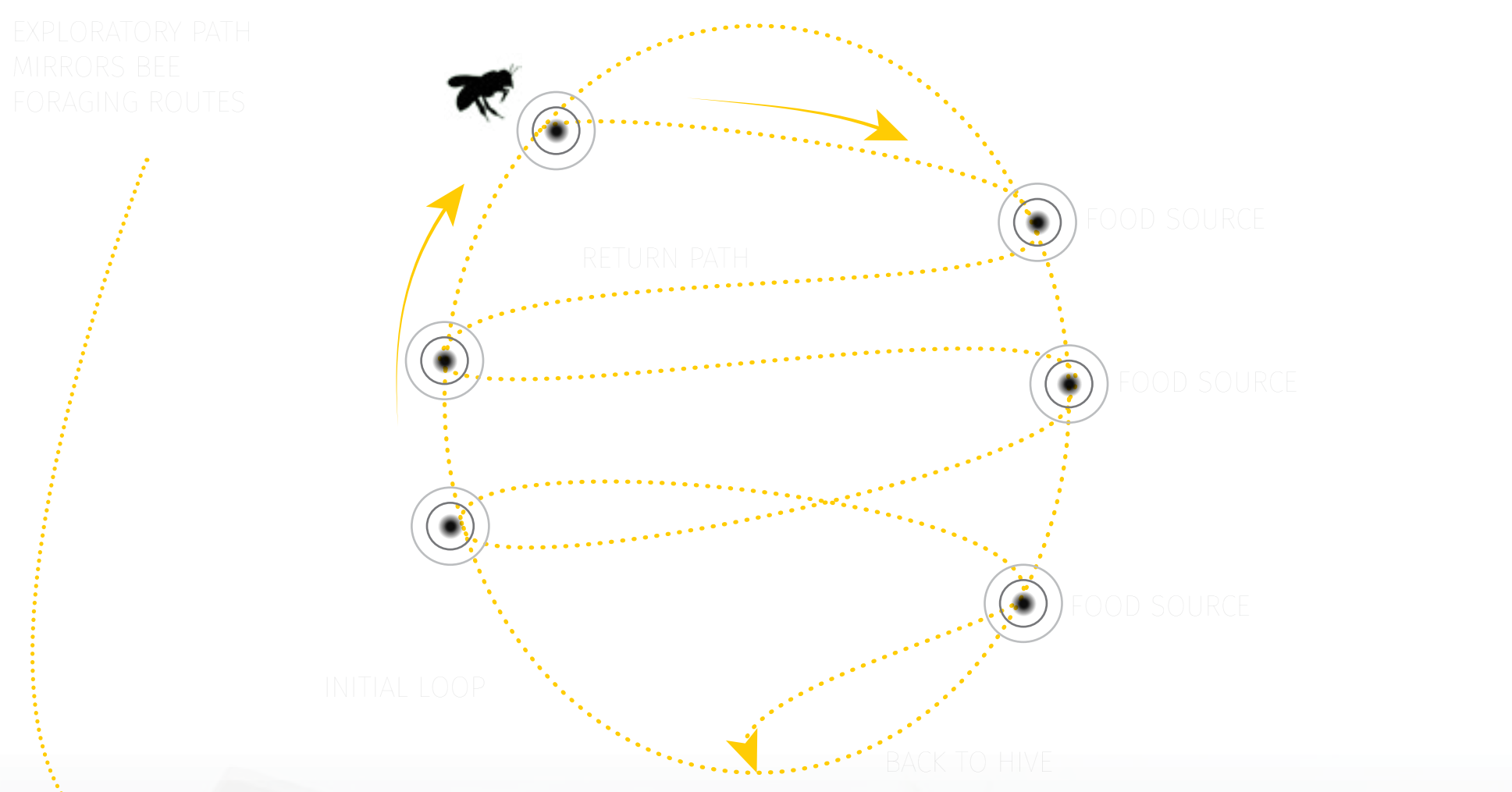
	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
<i>Aesculus glabra</i>									
<i>Aesculus parvifolia</i>									
<i>Baccharis halimifolia</i>									
<i>Cercis canadensis</i>									
<i>Cornus mas</i>									
<i>Heptacodium miconoides</i>									
<i>Malus angustifolia</i>									
<i>Nyssa sylvatica</i>									
<i>Ostrya arborescens</i>									
<i>Rhus spp.</i>									



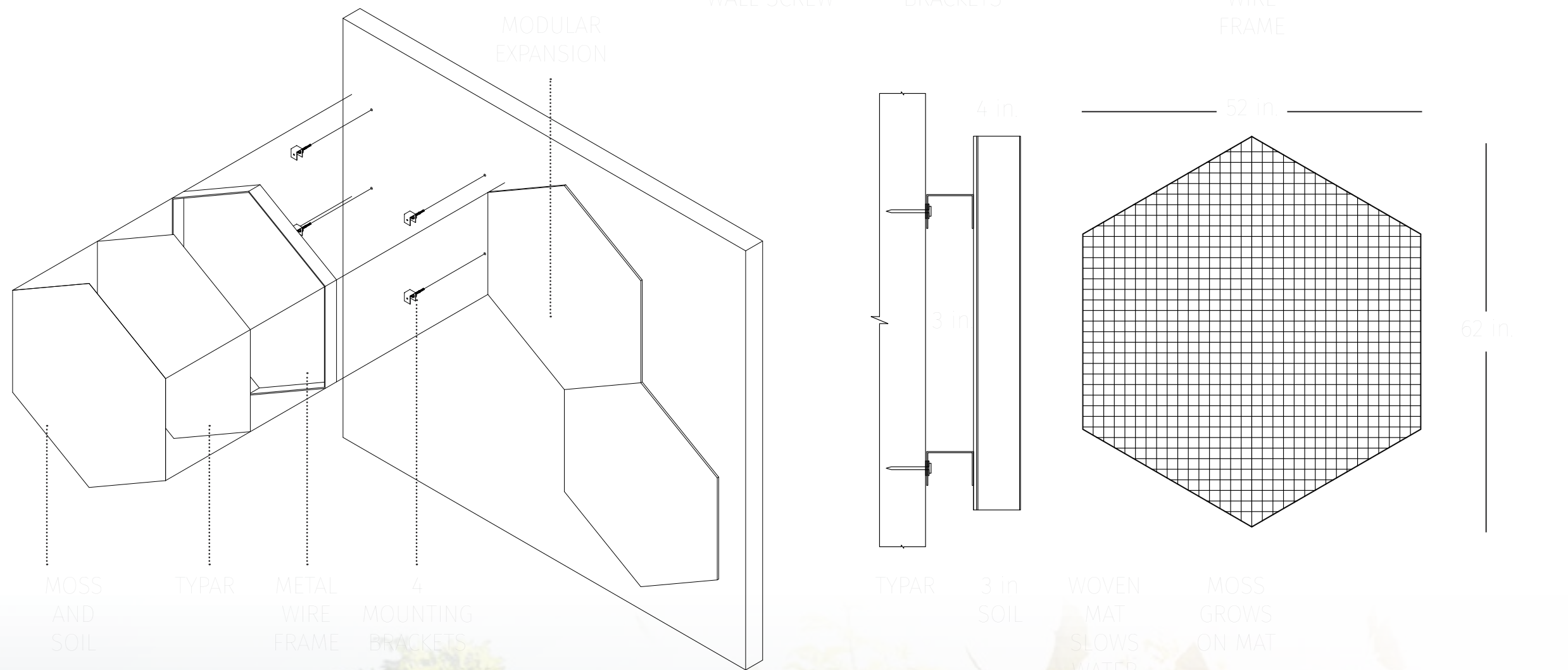
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0 10 40 FT



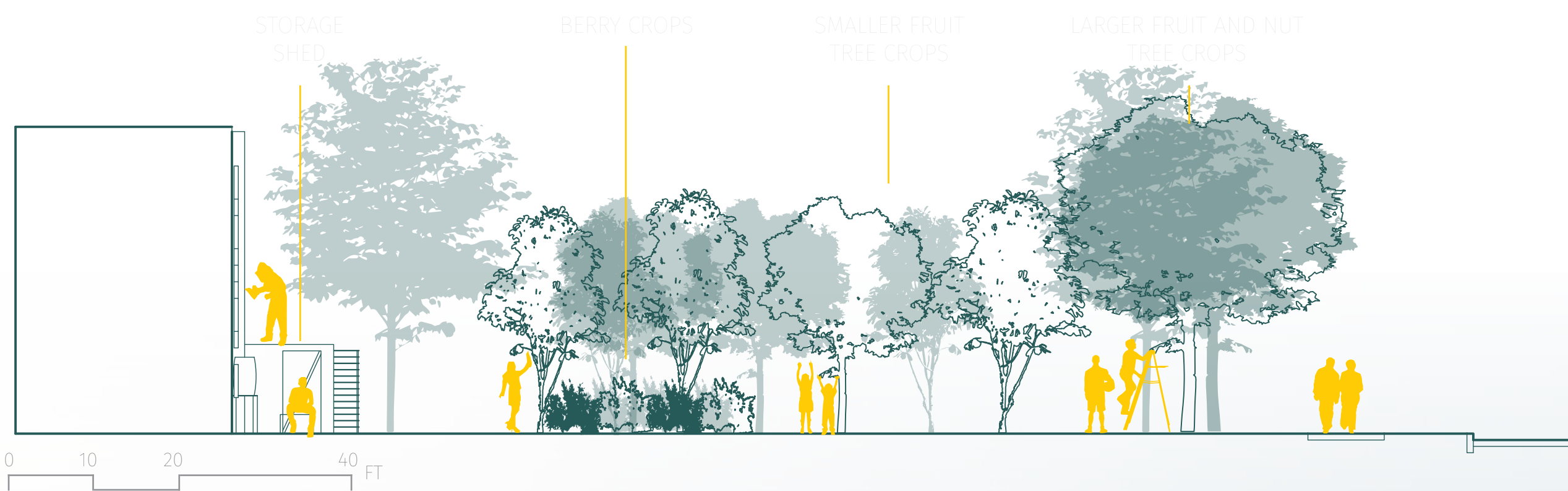
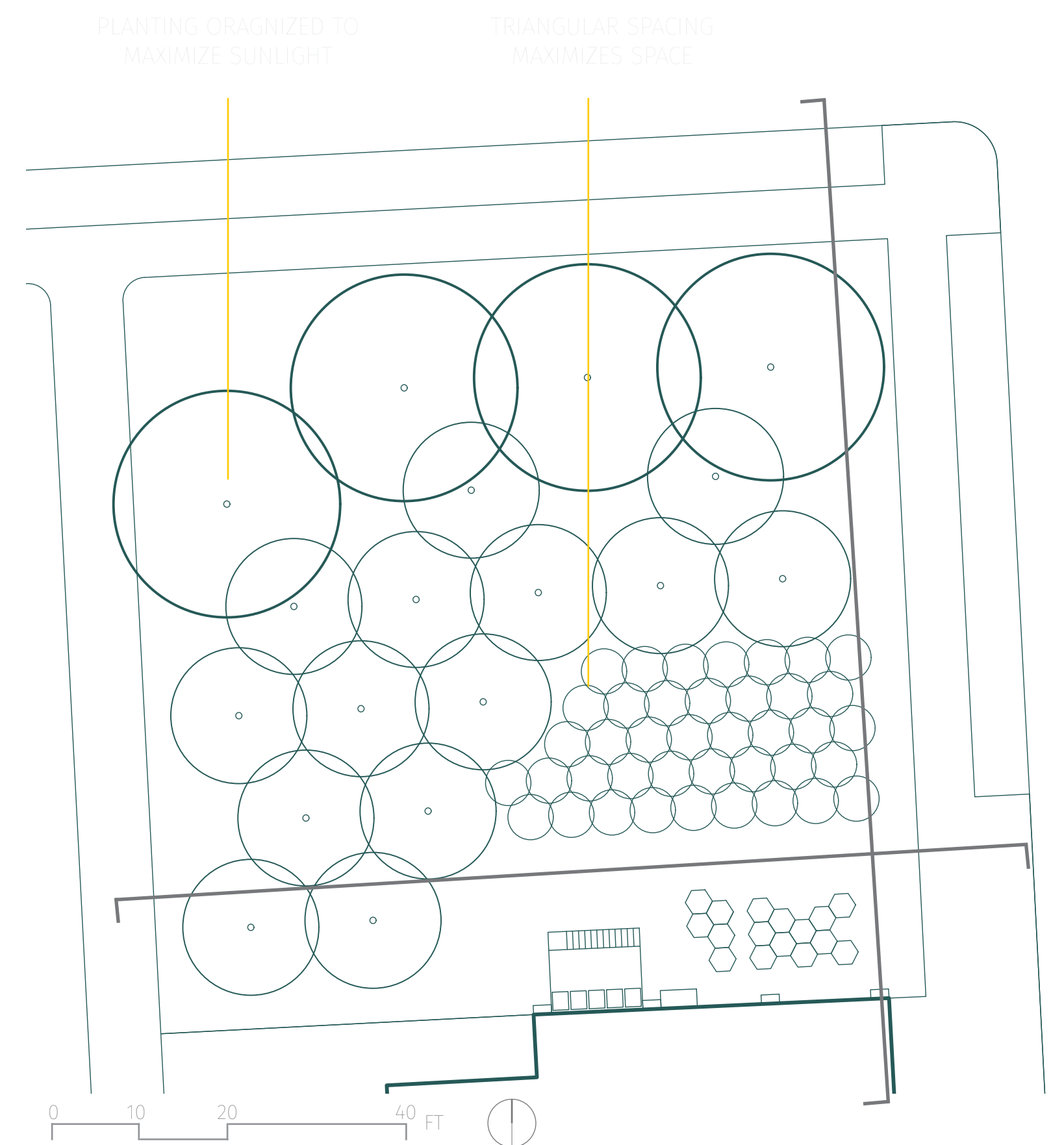
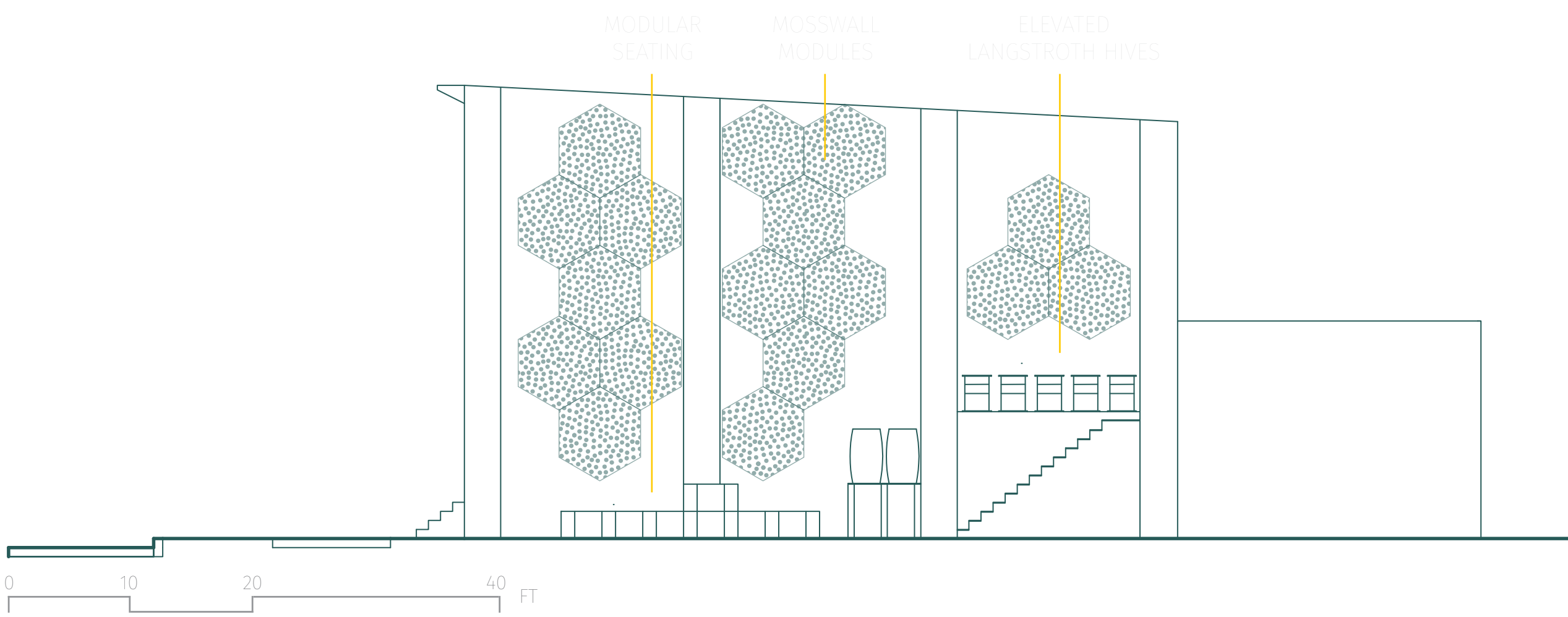
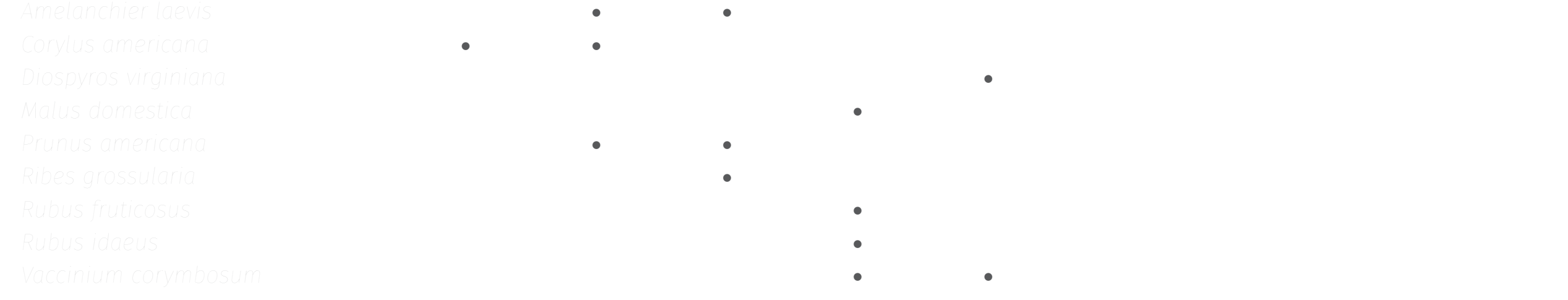
VERTICAL GREENING MODULE : MOSS



SPECIES LIST

- Ampelocera labris*
- Corylus americana*
- Diospyros virginiana*
- Morus domestica*
- Prunus americana*
- Ribes grossularia*
- Rubus fruticosus*
- Rubus idaeus*
- Vaccinium corymbosum*

FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER



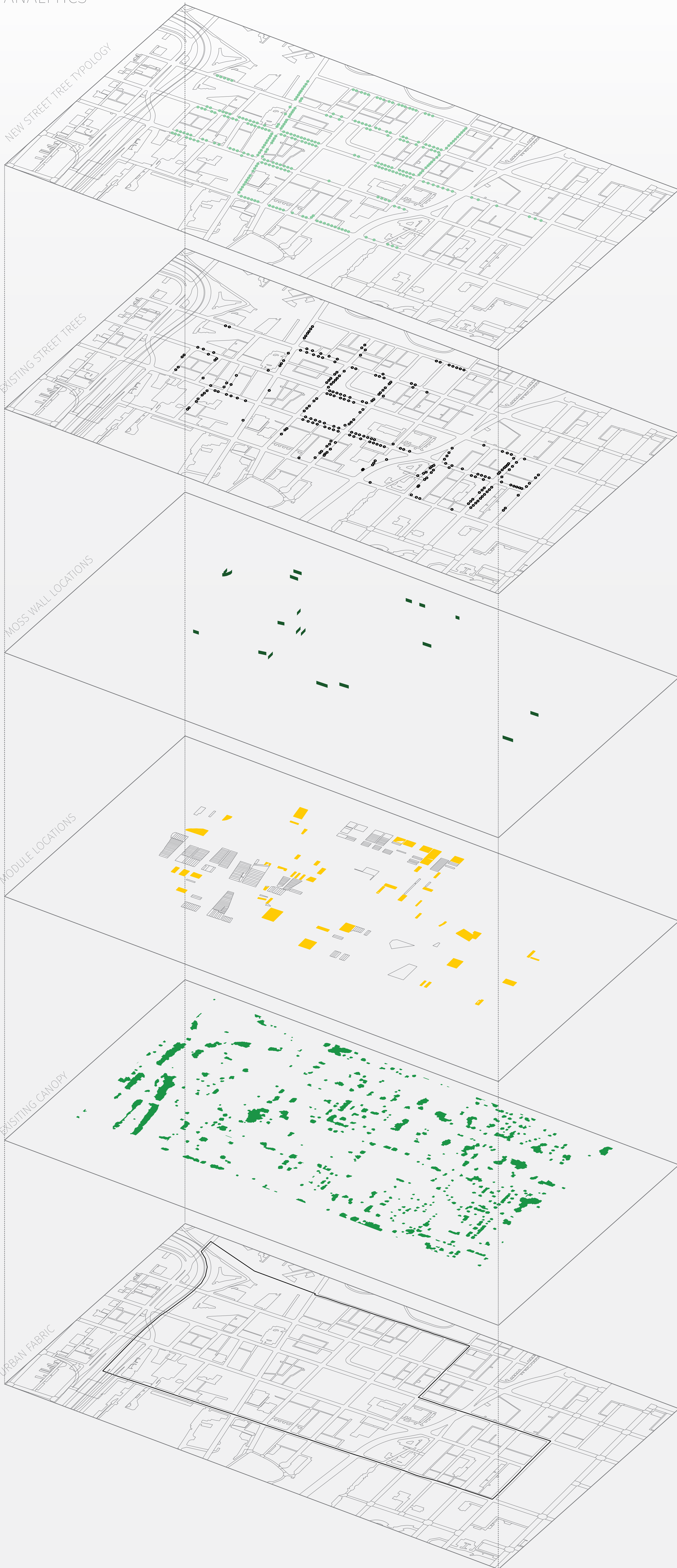
ELEVATED LANGSTROTH HIVES



BEE SPECIES

HONEY BEE
Apis mellifera





STREET TREES ADDED

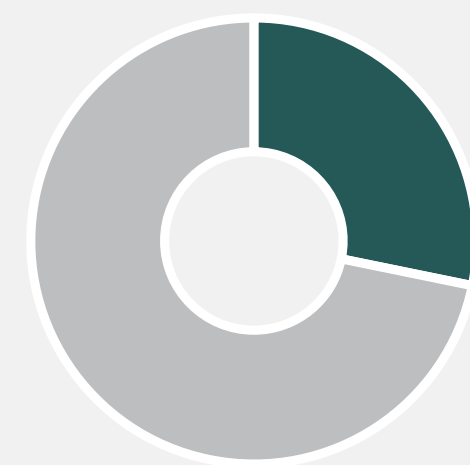
300 STREET TREES ADDED

CARBON SEQUESTRATION POTENTIAL

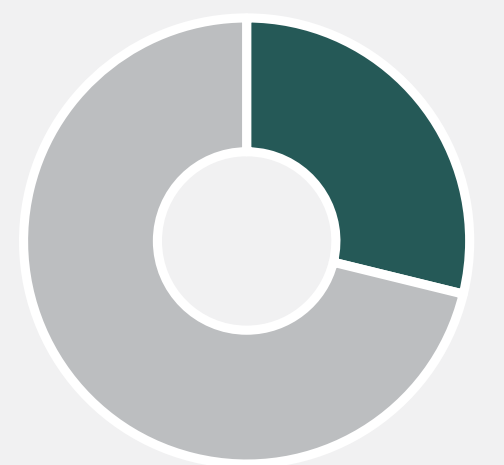
200 TONS OF ANNUAL CO2 SEQUESTRATION BY MOSS WALLS

60 TONS OF ANNUAL CO2 SEQUESTRATION BY NEW STREET TREES

VACANT LAND USED

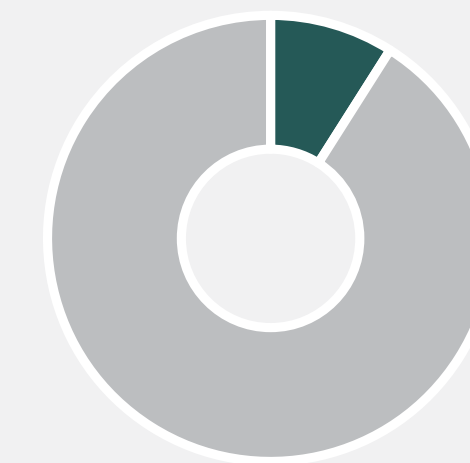


3.6 ACRES USED



113 of 392 LOTS USED

CANOPY COVER INCREASE



9% EXISTING



20% + NEW

INCOME OPPORTUNITIES

FOOD PRODUCED
 Blackberries: 10 lbs per bush x 25 bushes x 12 sites = 3,000 lbs per year
 Apples: 4 bushels per tree x 14 trees x 12 sites = 672 bushels per year
 POTENTIAL GROSS INCOME FROM PRODUCE
 Blackberries: \$5 per pound x 3,000 lbs = \$15,000 per year
 Apples: \$70 per bushel x 672 bushels = \$47,040 per year
 HONEY PRODUCED: 30 lbs per hive x 5 hives per site x 12 sites = 1,800 lbs of honey per year
 POTENTIAL GROSS INCOME FROM HONEY: \$18,000 per year
 TOTAL POTENTIAL GROSS INCOME FROM BEES AND TREES: approximately \$80,000 per year (after 5 year establishment time)