

ARCHITECTURE

COMFORT

DURABILITY AND
RESILIENCY

ENERGY
PERFORMANCE

ENGINEERING

ENVIRONMENTAL
IMPACT

INTEGRATED
PERFORMANCE

MARKET ANALYSIS

OCCUPANT
EXPERIENCE





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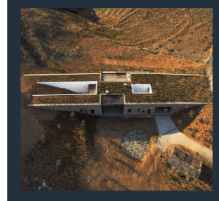


CHASE COTE
INDUSTRY PARTNER

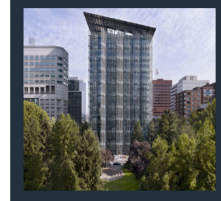
RECOMMENDED DESIGN STRATEGIES



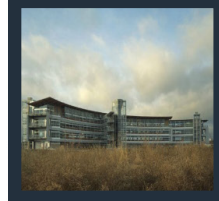
Direct Gain: Heat Storage



Earth Sheltering



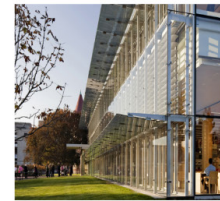
East/West Shading



Form For Daylighting



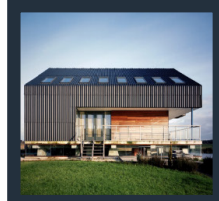
Form For Heating



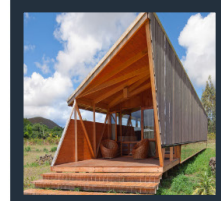
Side Daylighting Controls



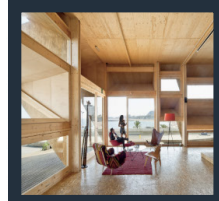
Building Facade



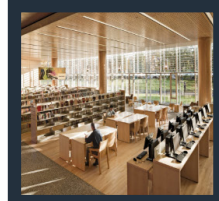
Clerestories and Skylight



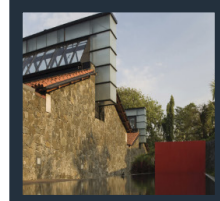
Cross Ventilation



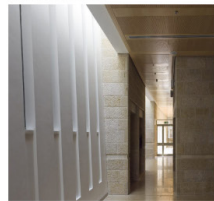
Daylight from Multiple Sides



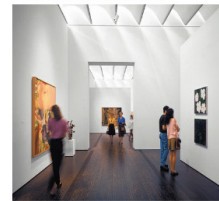
Side Daylighting



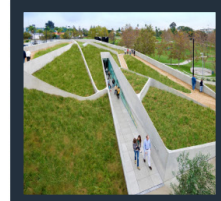
Stack Ventilation



Top Daylighting



Top Daylighting Controls



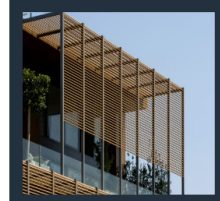
Green Roof



Indirect Gain: Sunspace



Intermediate Light Shelves



Shading Devices



1. EMBODY THE 'HABITAT' NAME

- Rain garden home to local vegetation and wildlife.
- Green roof with bee hives that boost pollination in the surrounding area.
- Interior vegetation that enhances indoor air quality creating an interior building habitat for the occupants

2. CONSTRUCT AN EFFICIENT PERFORMING BUILDING WITH PASSIVE & ACTIVE DESIGN STRATEGIES BASED ON THE LOCAL CLIMATE

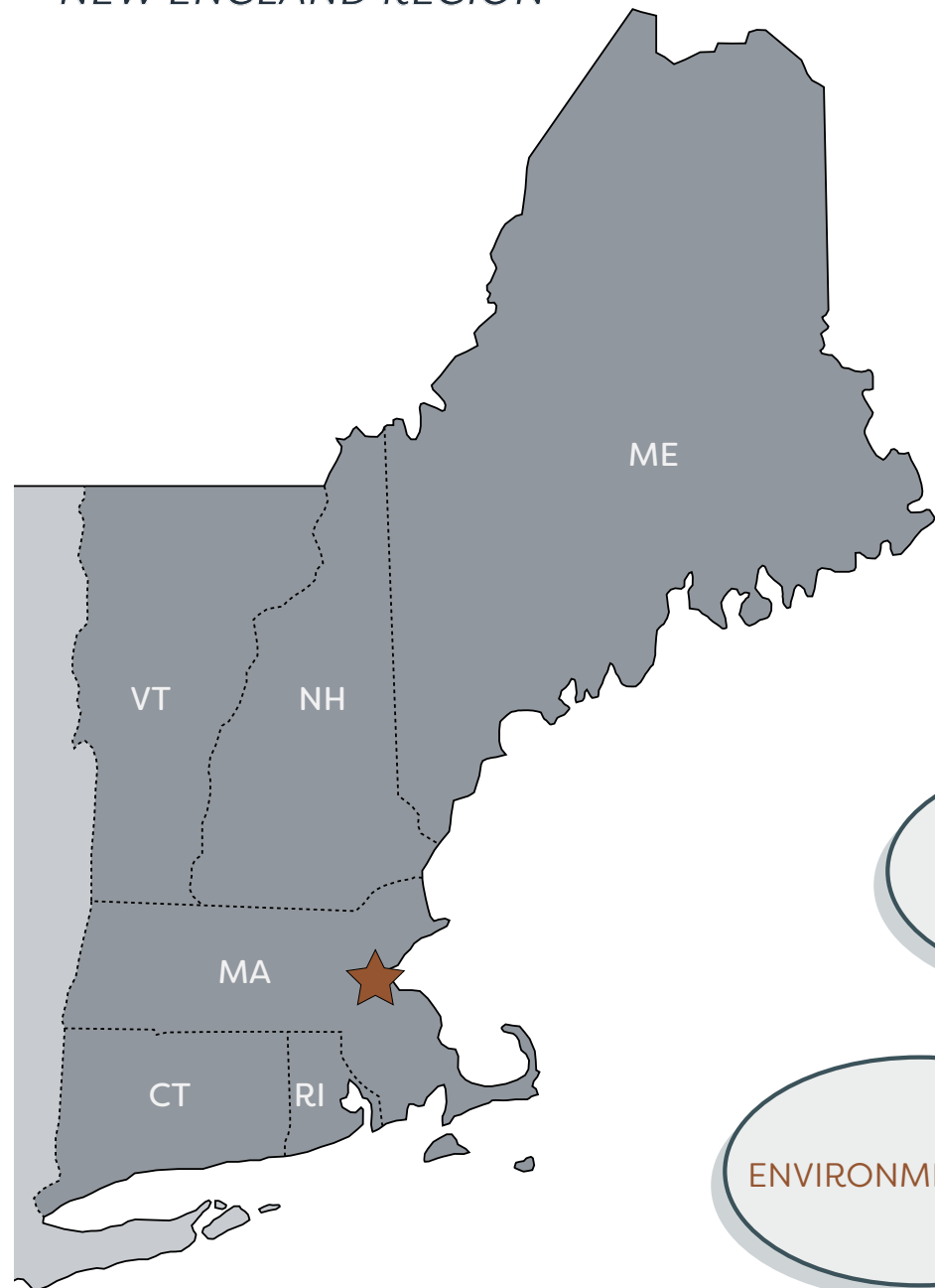
Passive Strategies

- Cross Ventilation
- Clerestories and Skylights
- Earth Sheltering
- Efficient Insulation
- Form for Daylighting and Heating
- Operable Windows
- Passive Solar Shading
- Rainwater Collection System
- Stack Ventilation

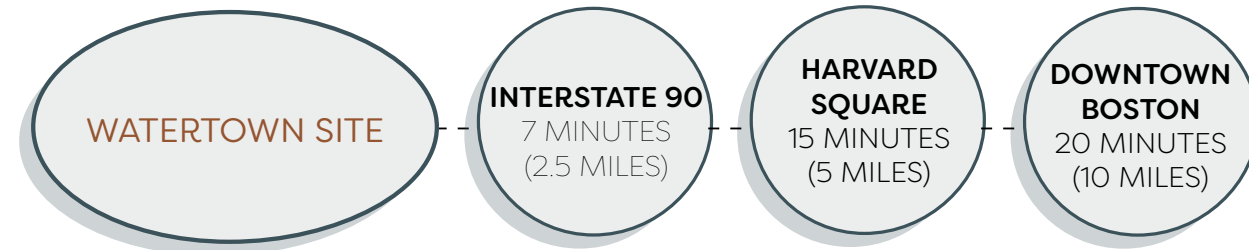
Active Strategies

- AI Building Automation
- Energy-Efficient Lighting (LEDs)
- Geothermal Heat Pump HVAC System with Radiant Floor Heating
- Mono-crystalline PV Panels and BIPV Solar Glass Cells
- Water Conservation (Efficient Plumbing Systems)

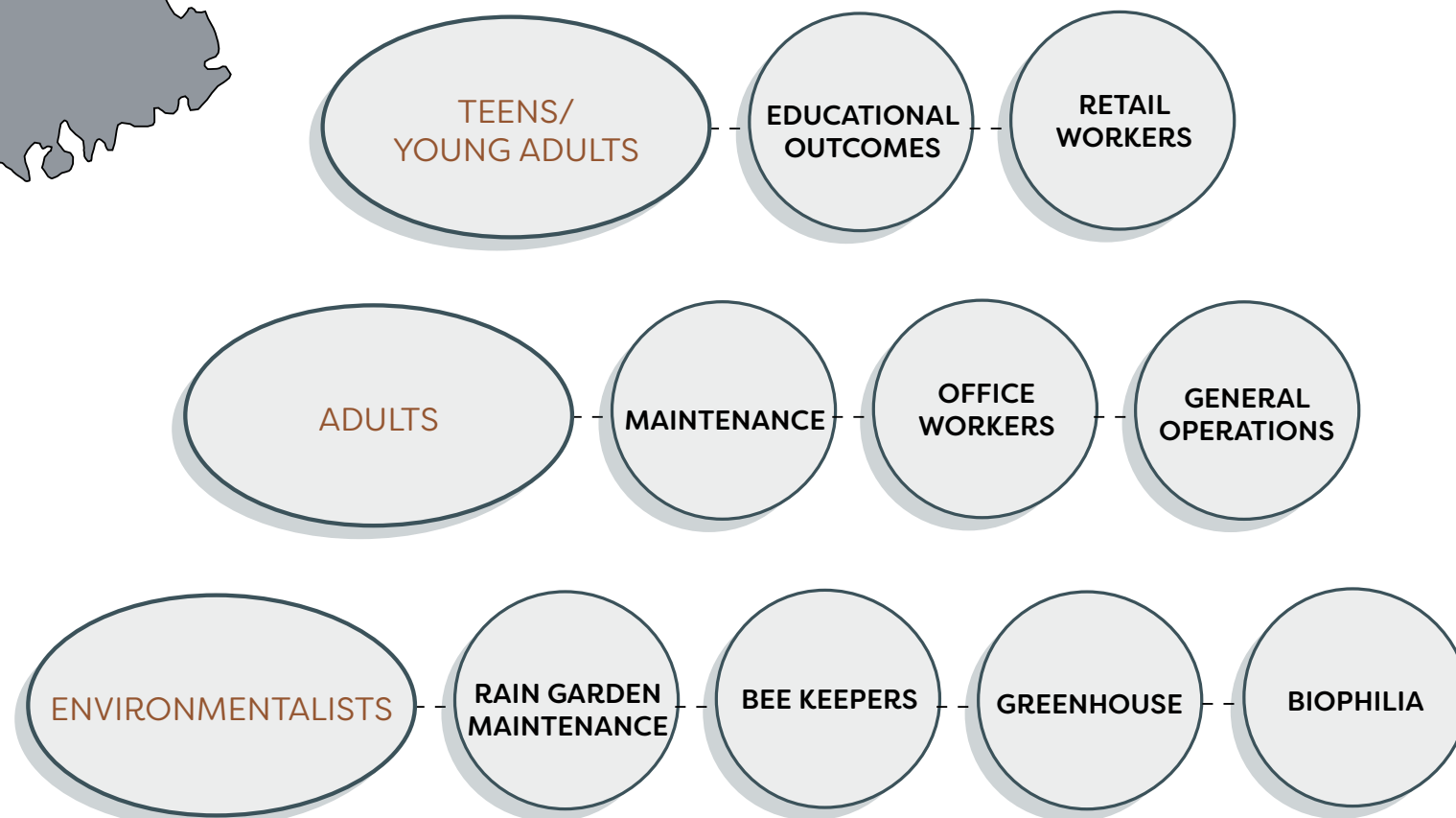
NEW ENGLAND REGION

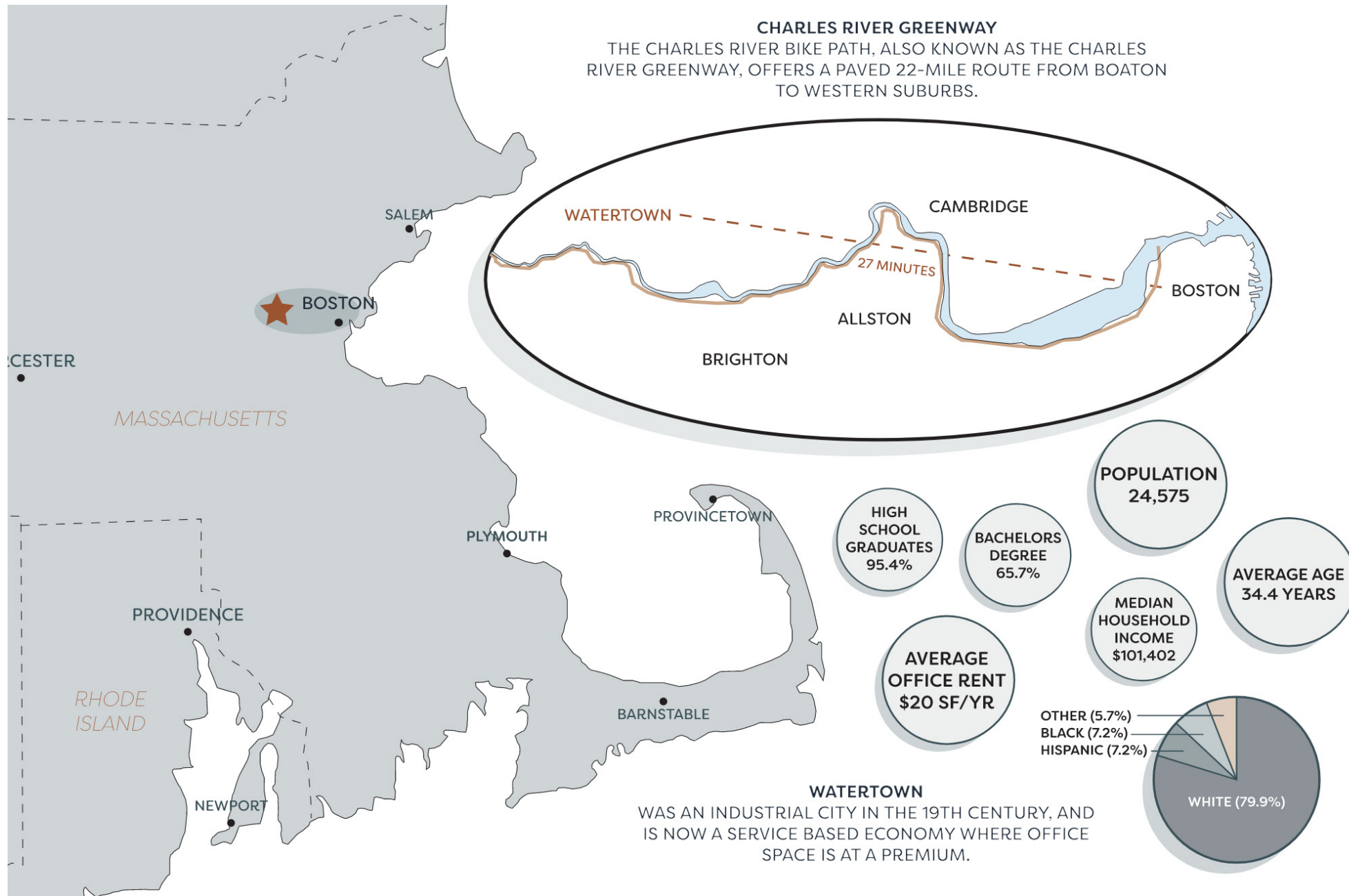


SITE PROXIMITY



CREATING JOBS IN WATERTOWN





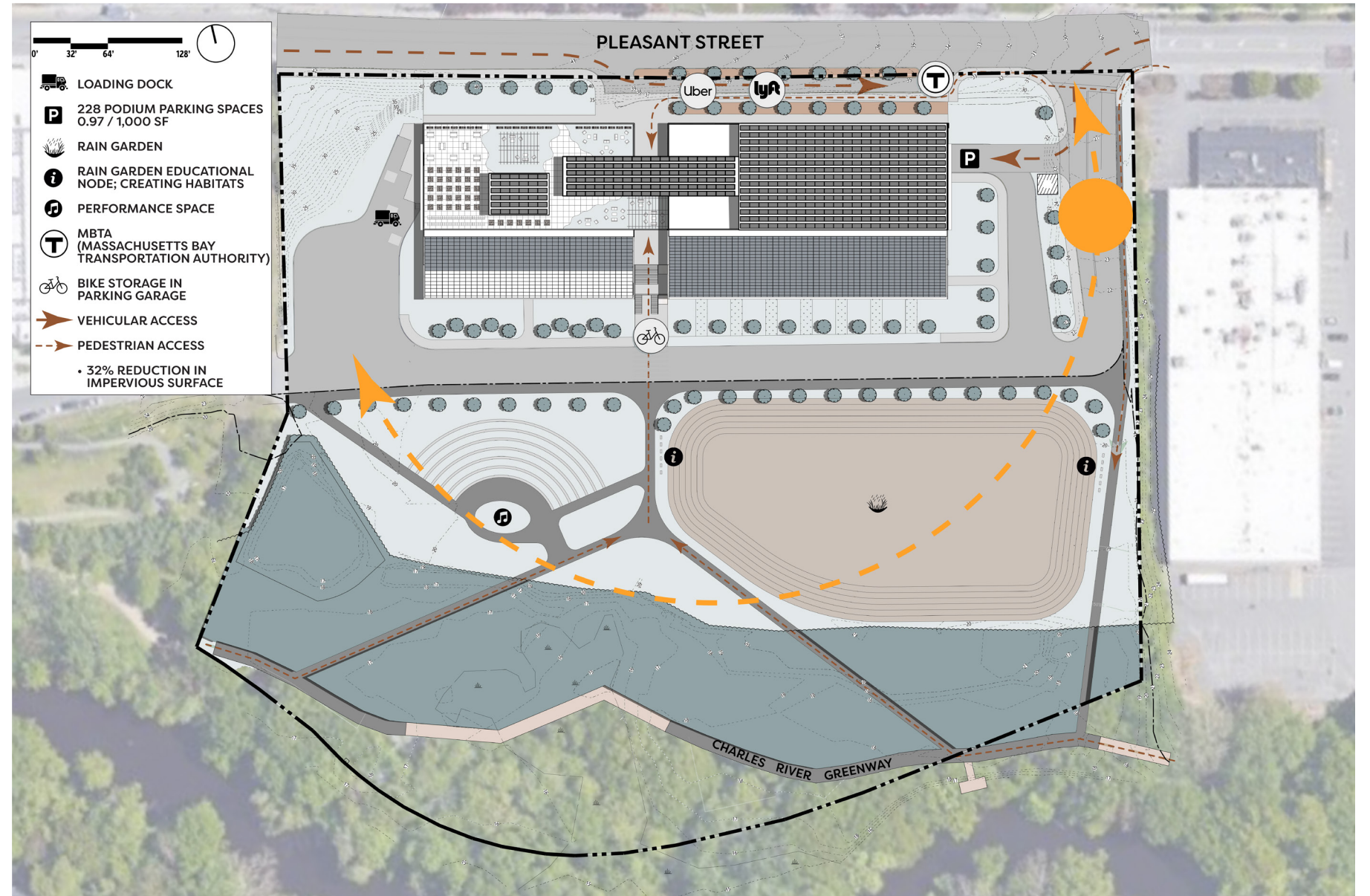
COST ESTIMATE

	DIVISION DESCRIPTION	TOTAL
A	Demoliton	\$1,964,500
B	Site Preparation	\$5,270,000
C	Structure	\$38,627,190
D	Envelope	\$20,656,671
E	Finishes	\$13,731,000
F	Systems	\$22,516,970
G	Services	\$24,150,087
BUILDING TOTAL		\$126,916,418
COST / SQ. FT		\$542 / SQ. FT
H	Land	\$34,000,000
GRAND TOTAL		\$160,916,418

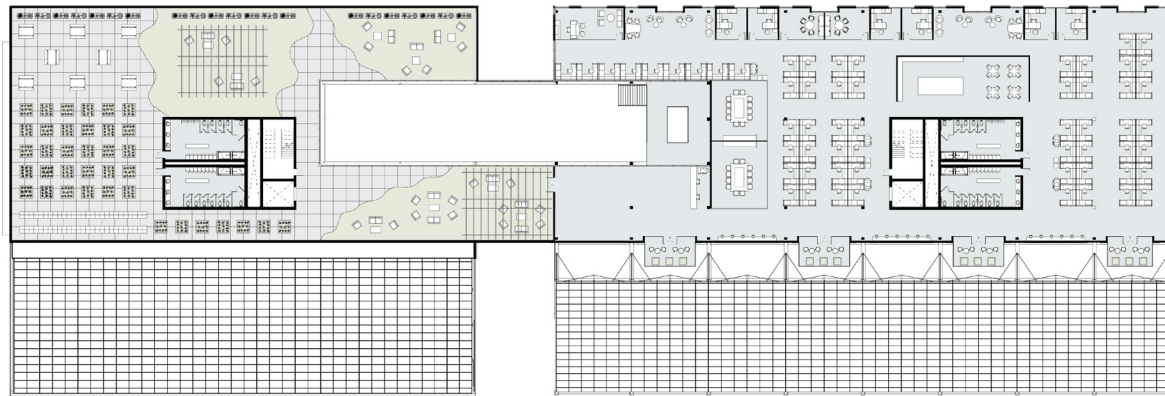
EXISTING SITE AERIAL



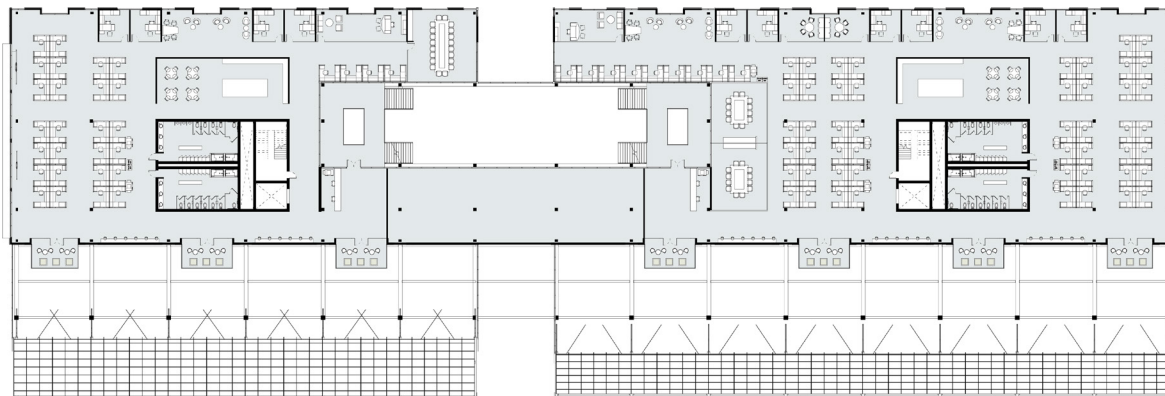
PROPOSED SITE PLAN



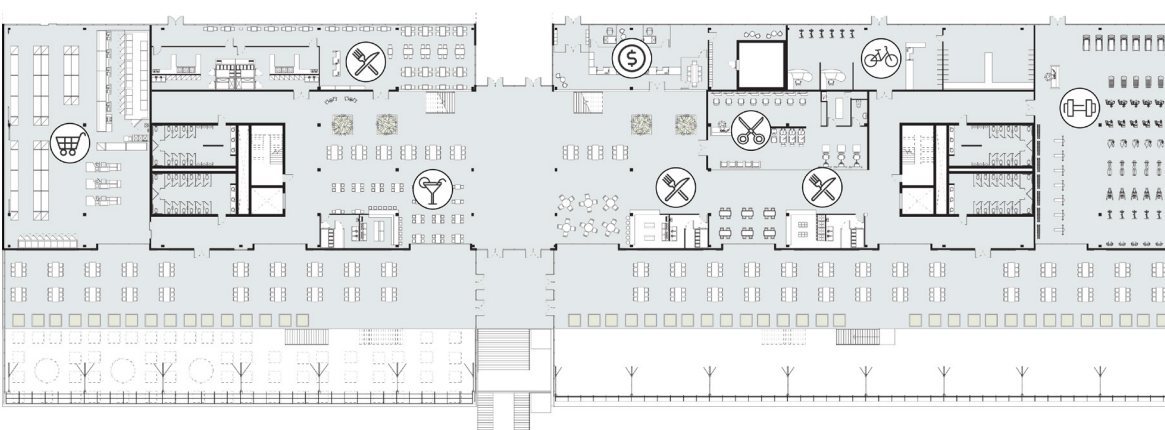
GREEN ROOF PLAN



OFFICE FLOOR PLAN

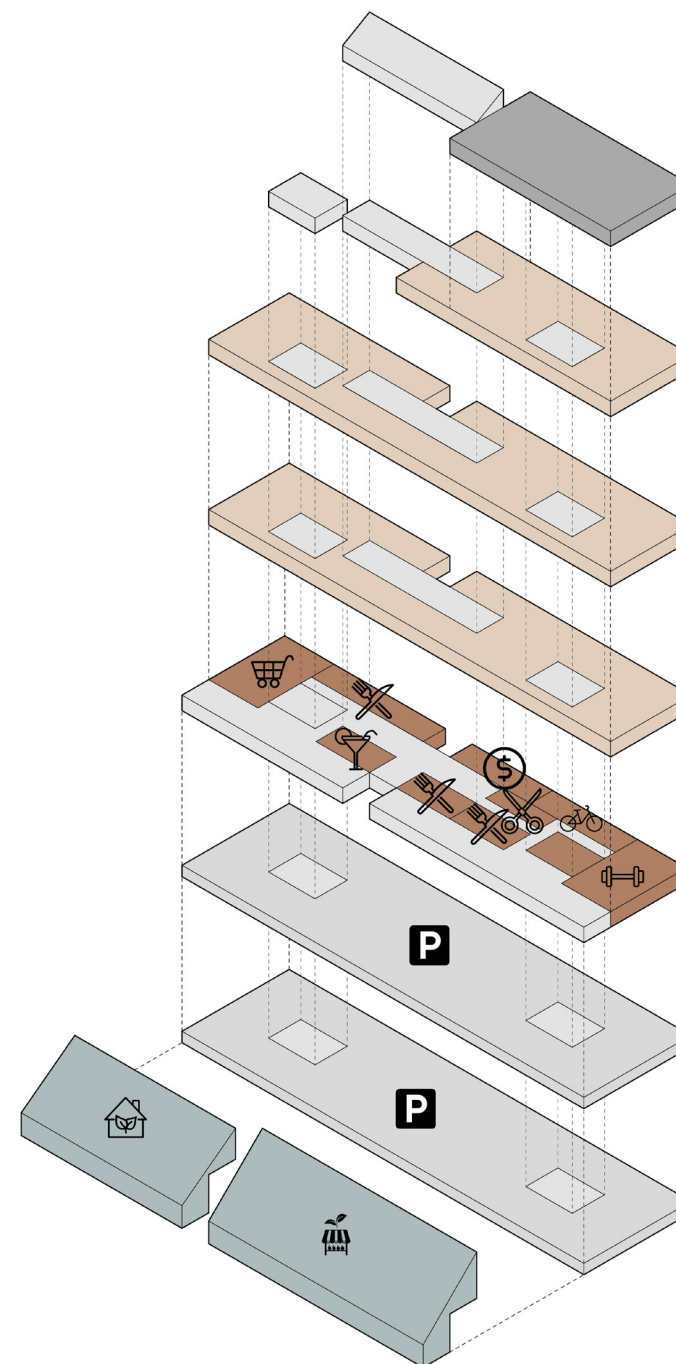


RETAIL FLOOR PLAN



0' 16' 32' 64'

EXPLODED PROGRAMMATIC AXON



FLOOR 7: MEP PENTHOUSE

FLOORS 4-6: OFFICE

FLOOR 3: COMMERCIAL

- Ⓢ BANK
- 🍷 BAR
- ✂️ BARBER SHOP
- 🚲 BIKE SHOP & REPAIR
- 🍴 FOOD VENDOR
- 🛒 SPECIALTY GROCERY STORE
- 🏋️ GYM

FLOOR 1-2S: PARKING

- 🏡 FARMER'S MARKET
- 🏠 GREENHOUSE

GREEN ROOF: 13,000 sq. ft

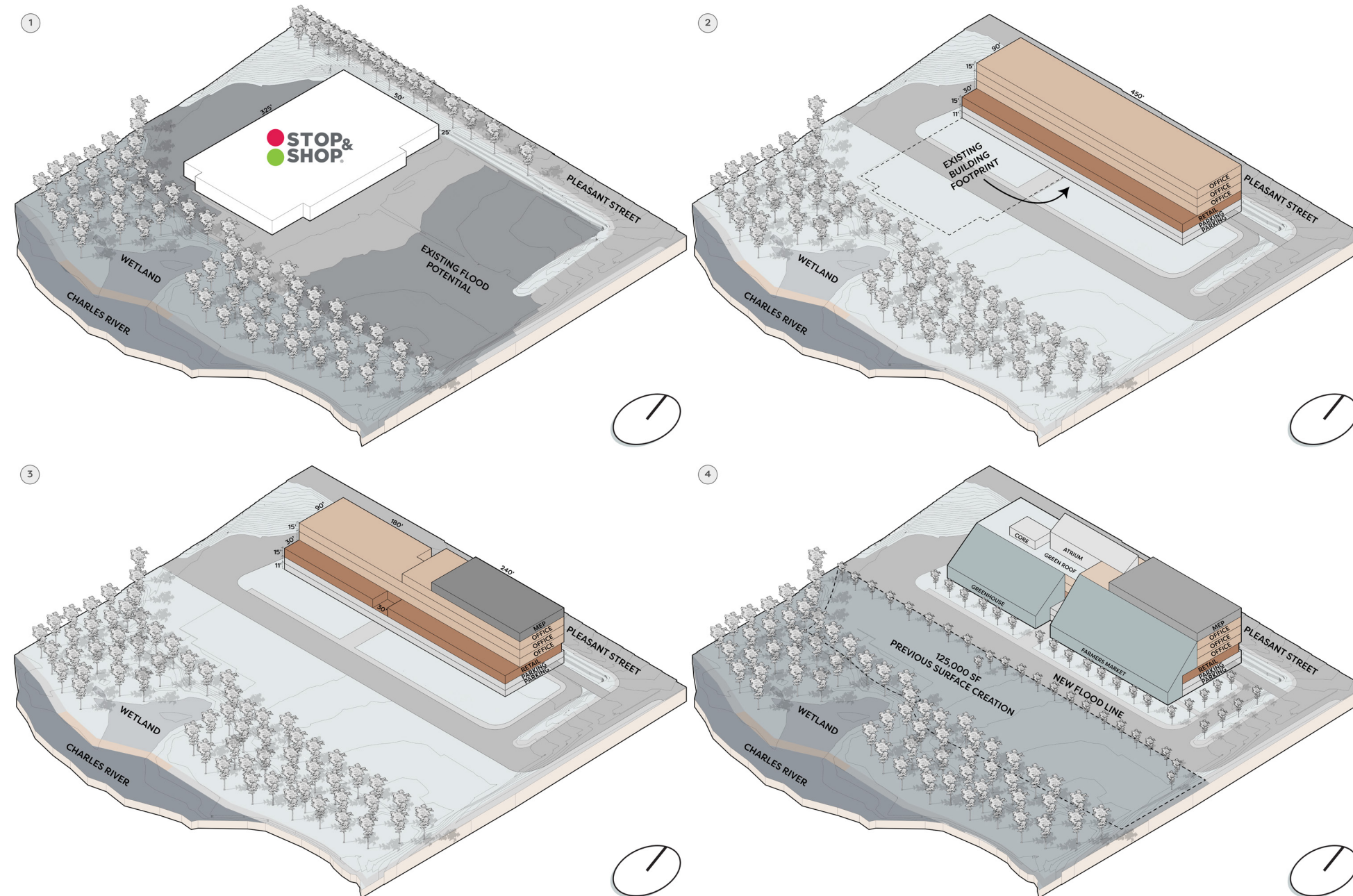
OFFICE: 77,000 sq. ft.

RETAIL: 40,000 sq. ft.

PARKING: 50,000 sq. ft., 228 Spaces
(23 EV CHARGING SPACES)

TOTAL: 234,000 sq. ft

MASSING PROGRESSION



STEP 1: DEMOLISH EXISTING BUILDING (WHY?)

- Existing building is outdated, under-utilized, and can only structure support 1 level of commercial program.
- Site does not adequately address issues such as climate change, rain / flood water surges, having a relationship with the local ecosystem, or even being visible along the main road.

STEP 2: BUILDING ORIENTATION

- Orient the proposed building so that it maximizes southern solar gain.

STEP 3: BREAKING UP THE FACADE

- Articulate the exterior architecture horizontally by carving out indents that create a main entry point and vertically by eliminating office program to create a green roof for the building's occupants as well as local pollinators.

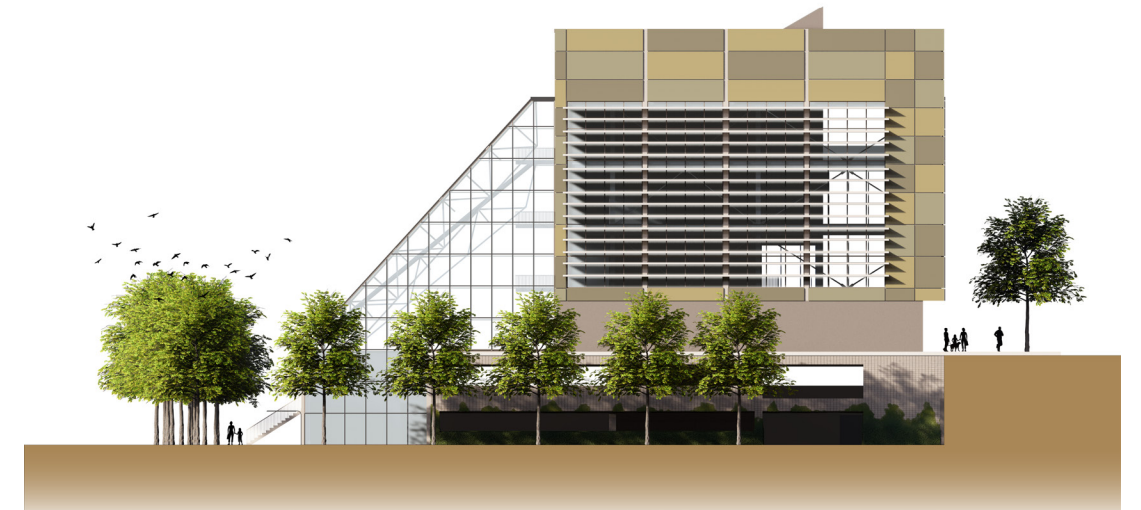
STEP 4: ENVIRONMENTAL DESIGN

- Integrate the southern facade by implementing a full building farmers market and greenhouse double skin facade. These programs act as an interior habitat for the building's occupants and allow for ample opportunities for renewable energy strategies.

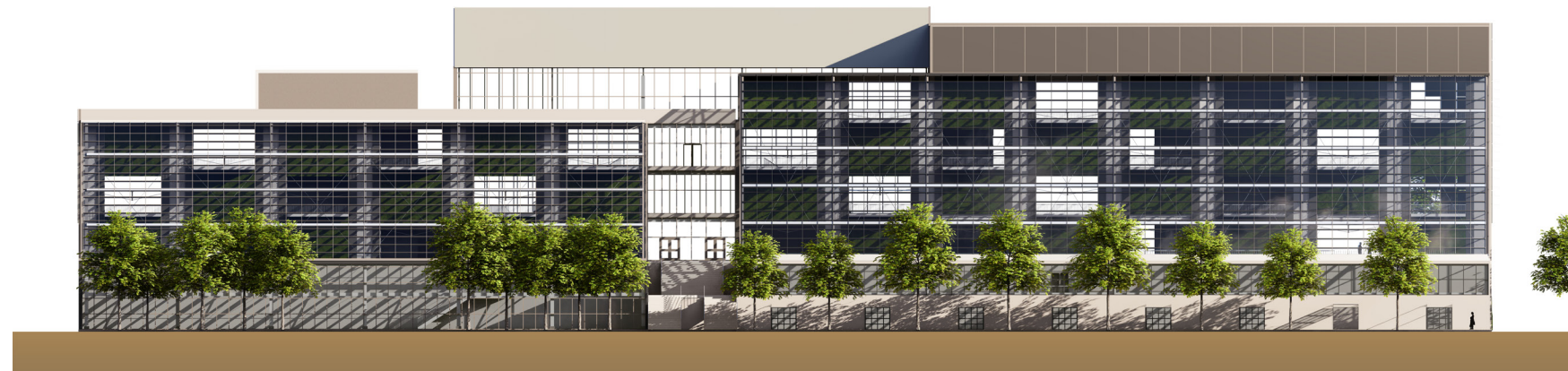
NORTH ELEVATION



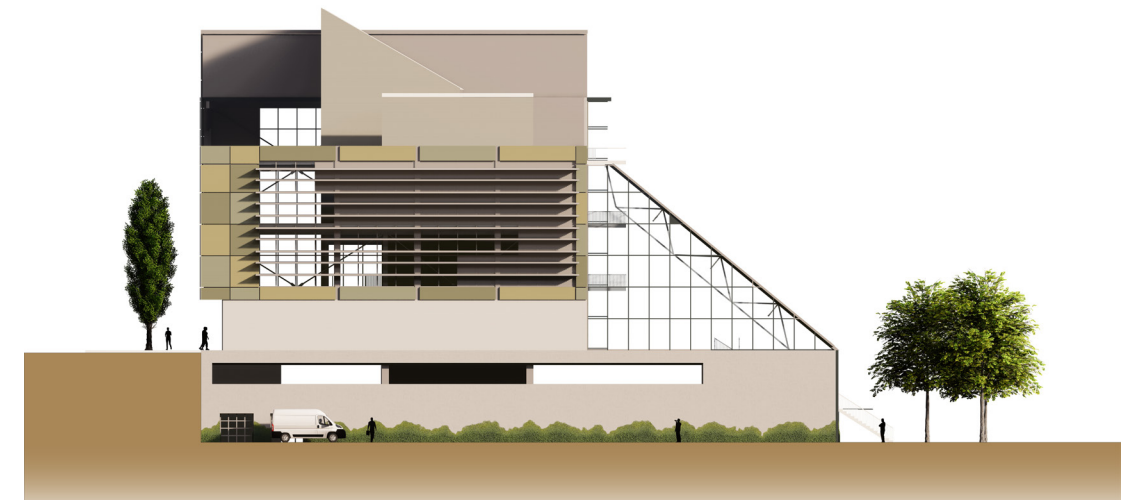
EAST ELEVATION



SOUTH ELEVATION



WEST ELEVATION

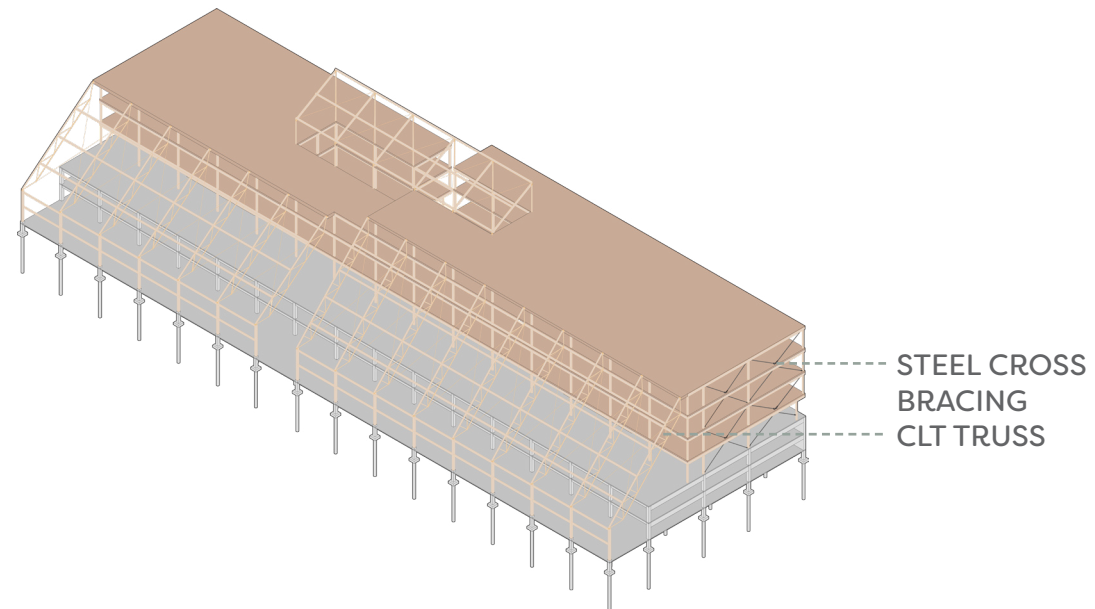
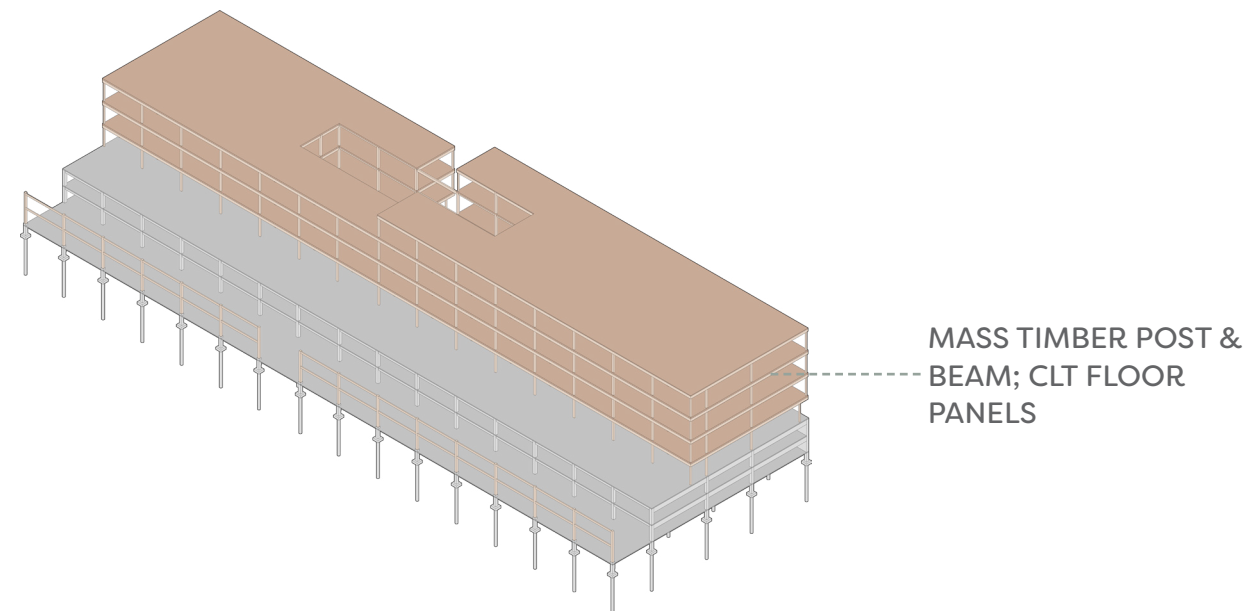
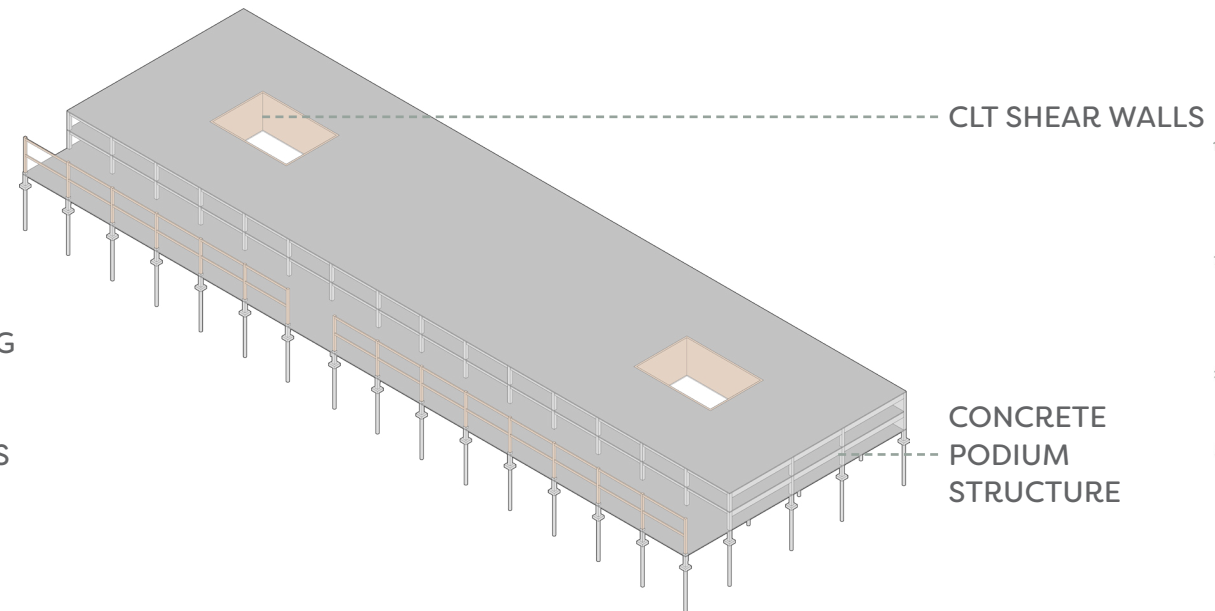
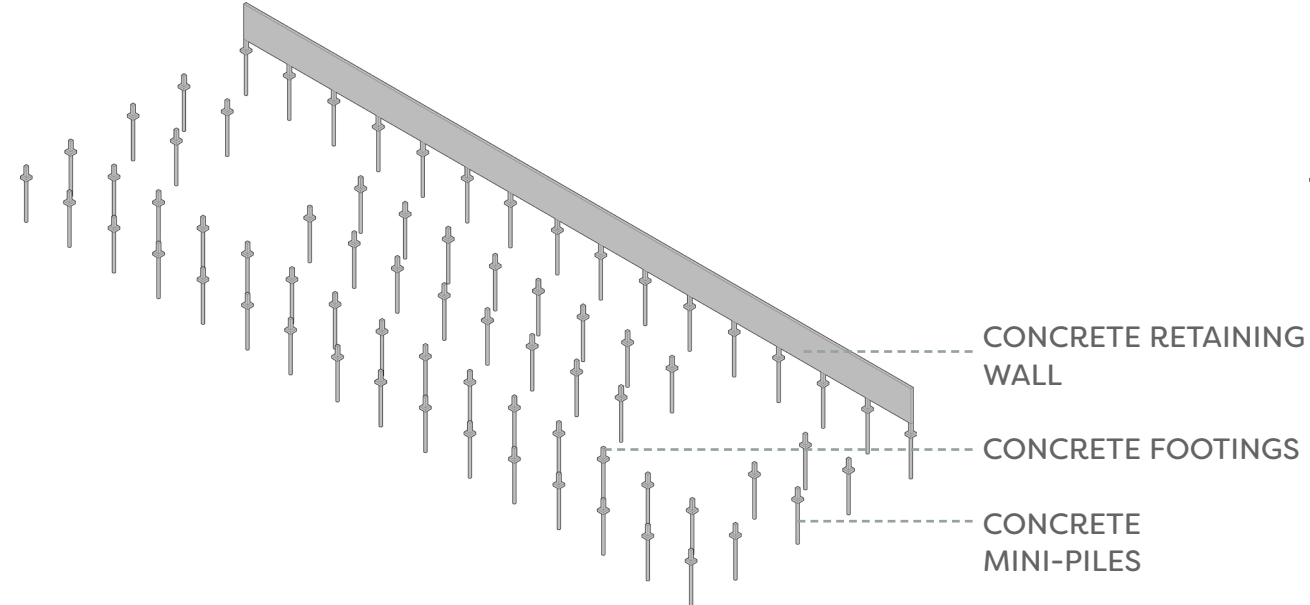


ONYX BIPV GLASS
MONO-CRYSTALLINE
SOLAR CELLS

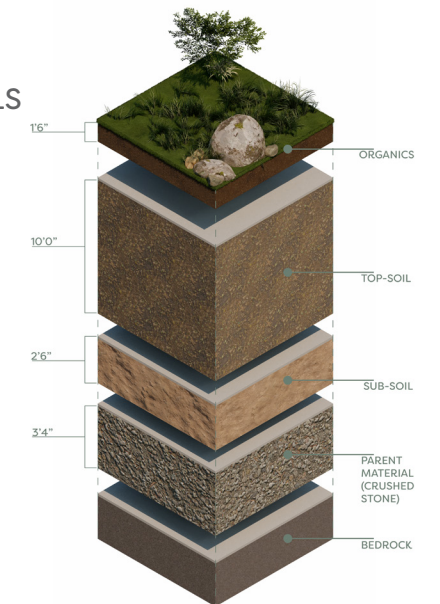
PARKING GARAGE ENTRY;
EV STATIONS, BIKE STORAGE



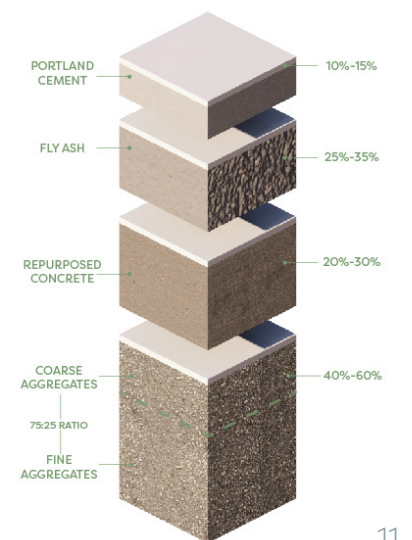
STRUCTURE SEQUENCE



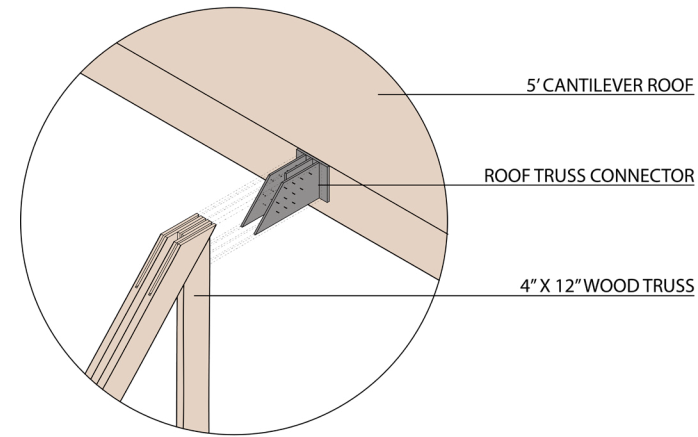
SOIL AXON



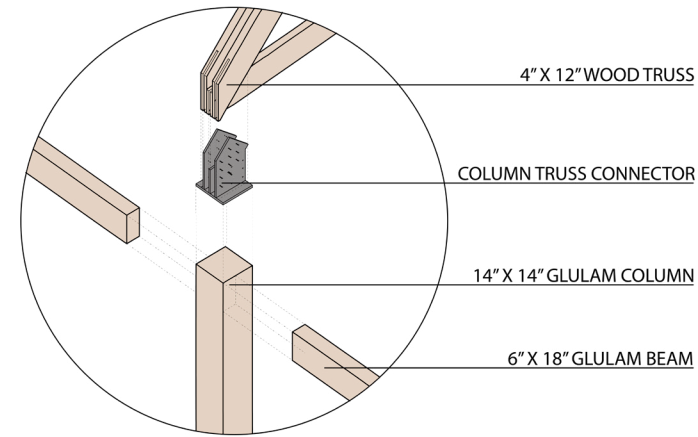
CONCRETE MIXTURE



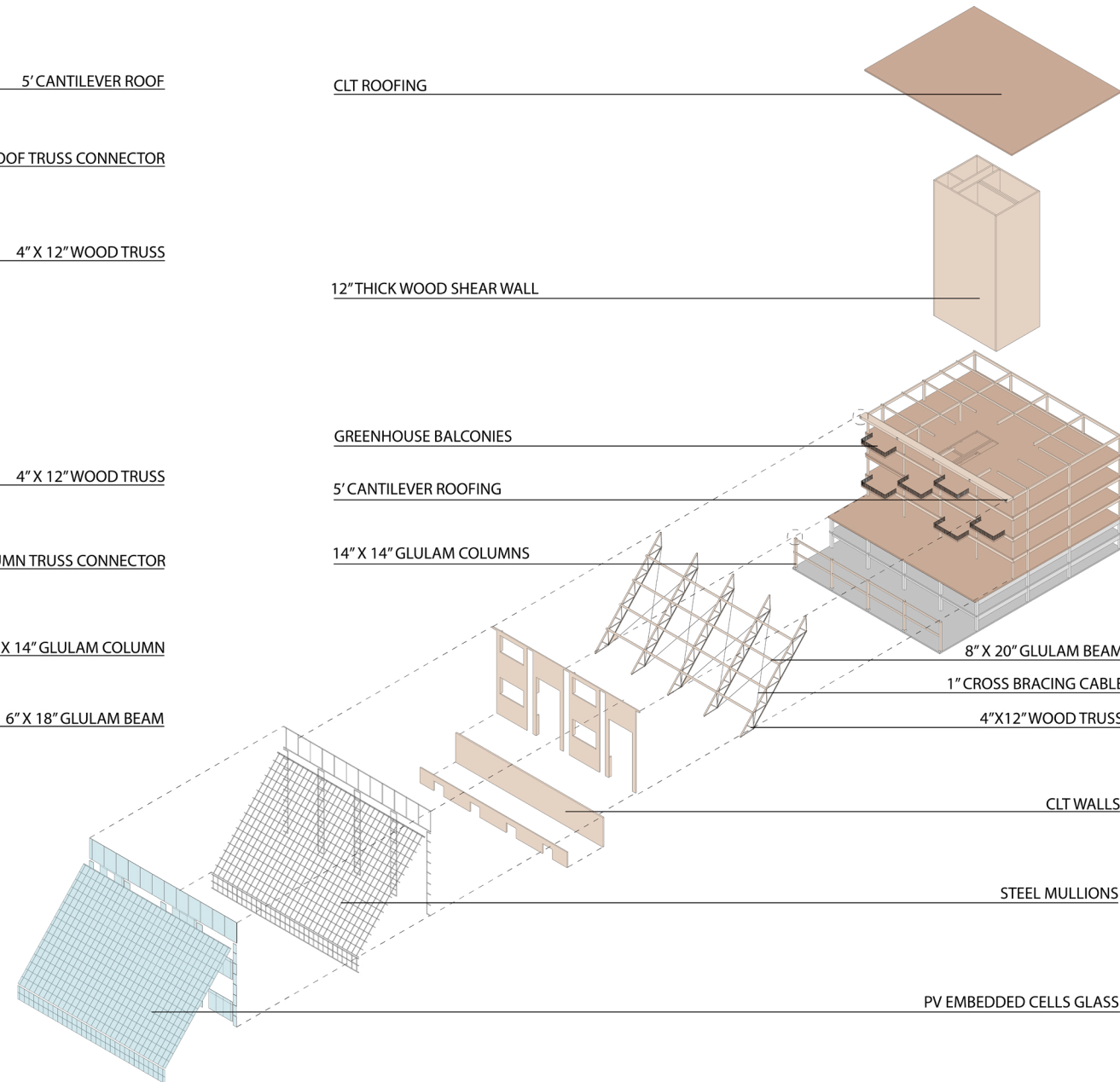
STRUCTURAL BAY BREAKDOWN



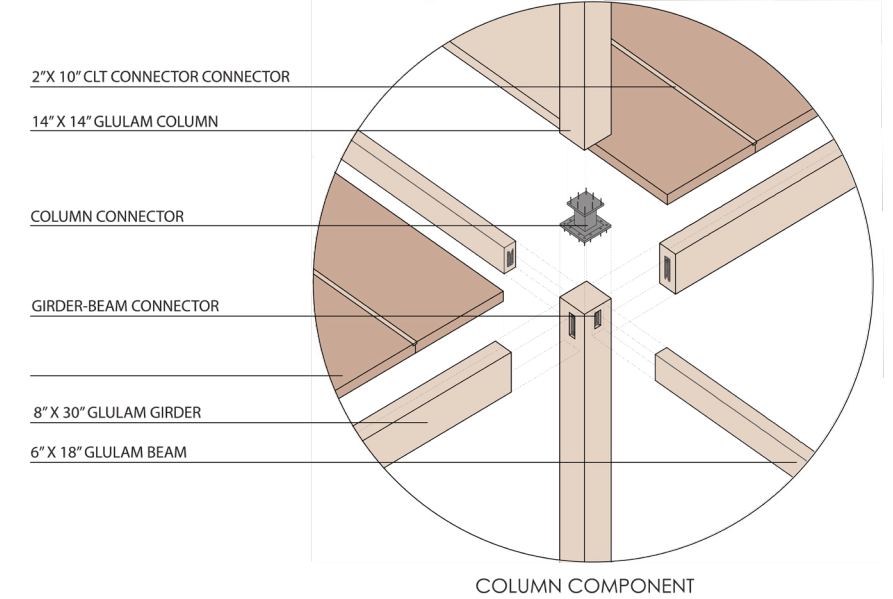
TRUSS TO ROOF COMPONENT



COLUMN TO TRUSS COMPONENT



MASS TIMBER CONNECTION

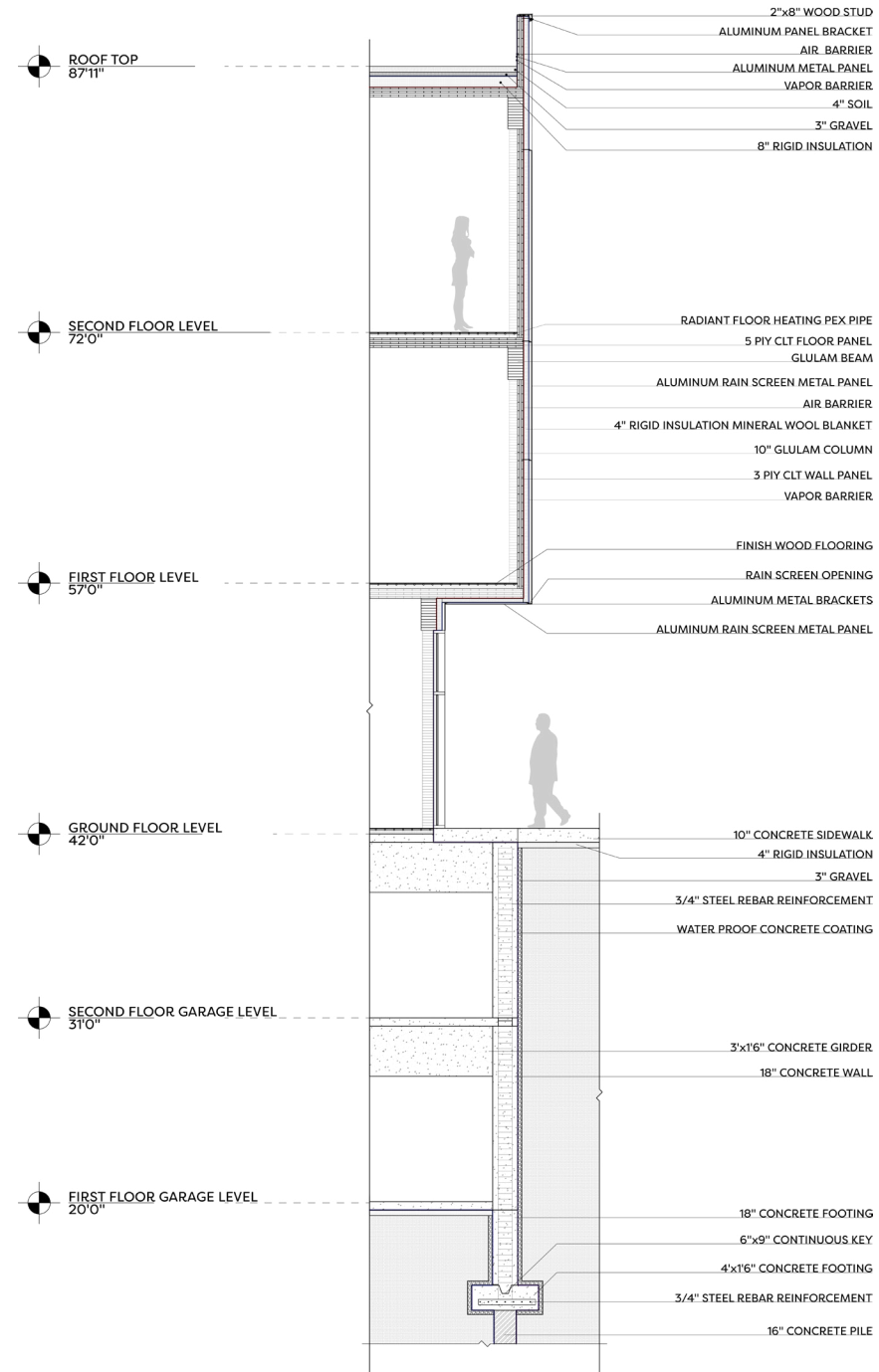


COLUMN COMPONENT

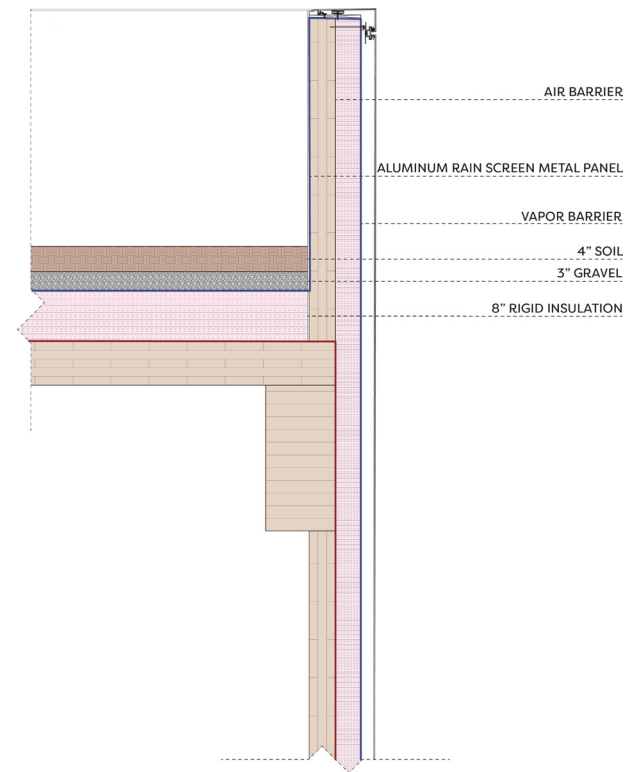


EMBODIED CARBON: -625,700,000 kgCO₂e/sq. ft.

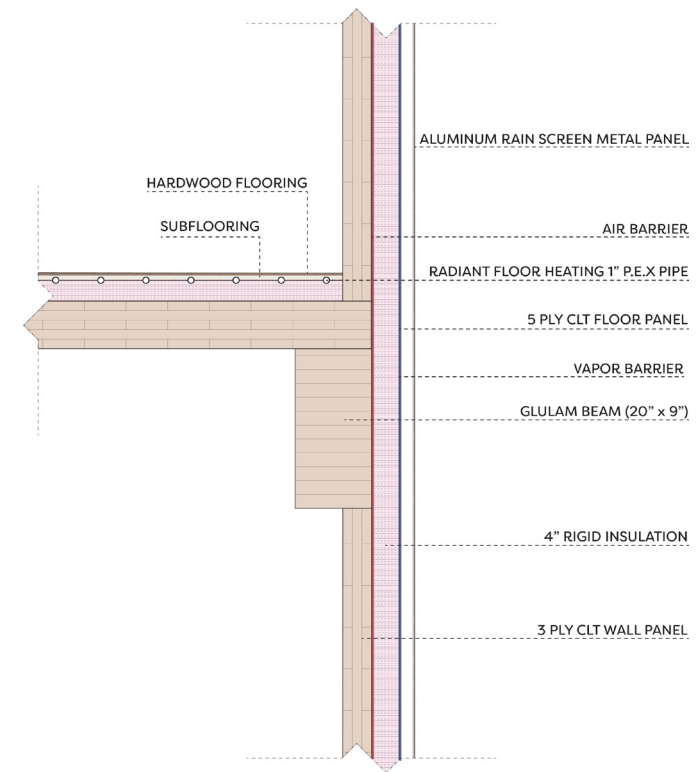
PLEASANT STREET DETAILED WALL SECTION



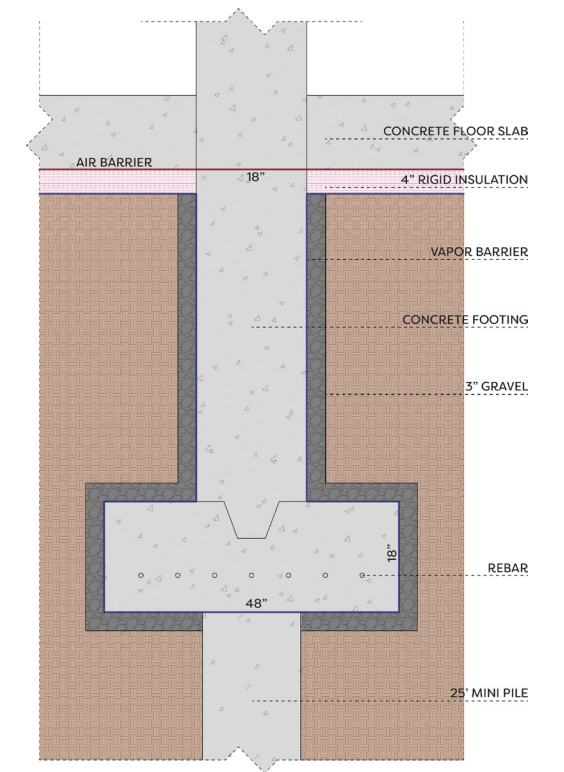
ROOF DETAIL



TIMBER WALL DETAIL

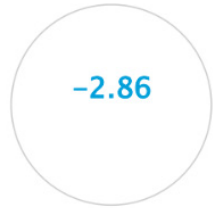


FOUNDATION DETAIL

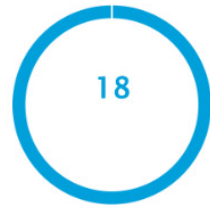


PROPOSED COVE TOOL EUI

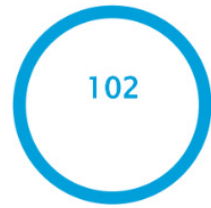
Proposed Whole Baseline EUI



LEED Points - EAc2 Credit



CO2 Reduction %

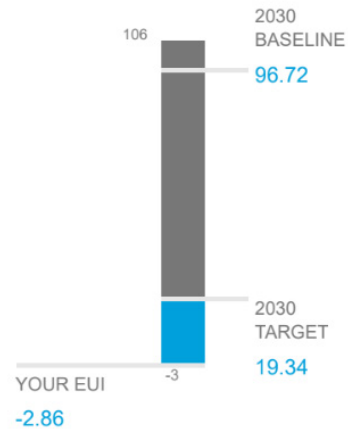


Office: -0.51 kBtu/ft²/yr
Retail: -5.74 kBtu/ft²/yr

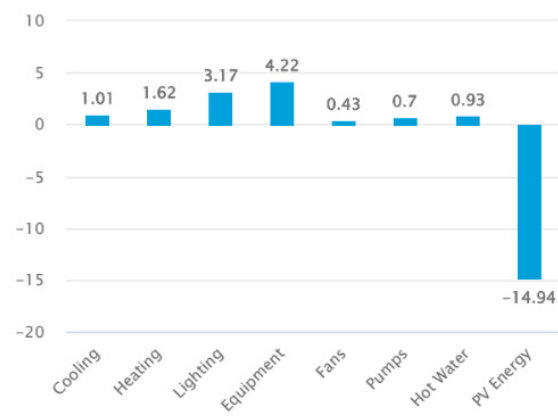
Electricity: \$-31094.11 /yr
Gas: \$0 /yr
TEDI: 11.56

2030 Baseline Emissions: 2711.7 Tonne CO2e/yr
You Saved: -80.3 Tonne CO2e/yr
419 Trucks of Ice/yr

Benchmarking Energy

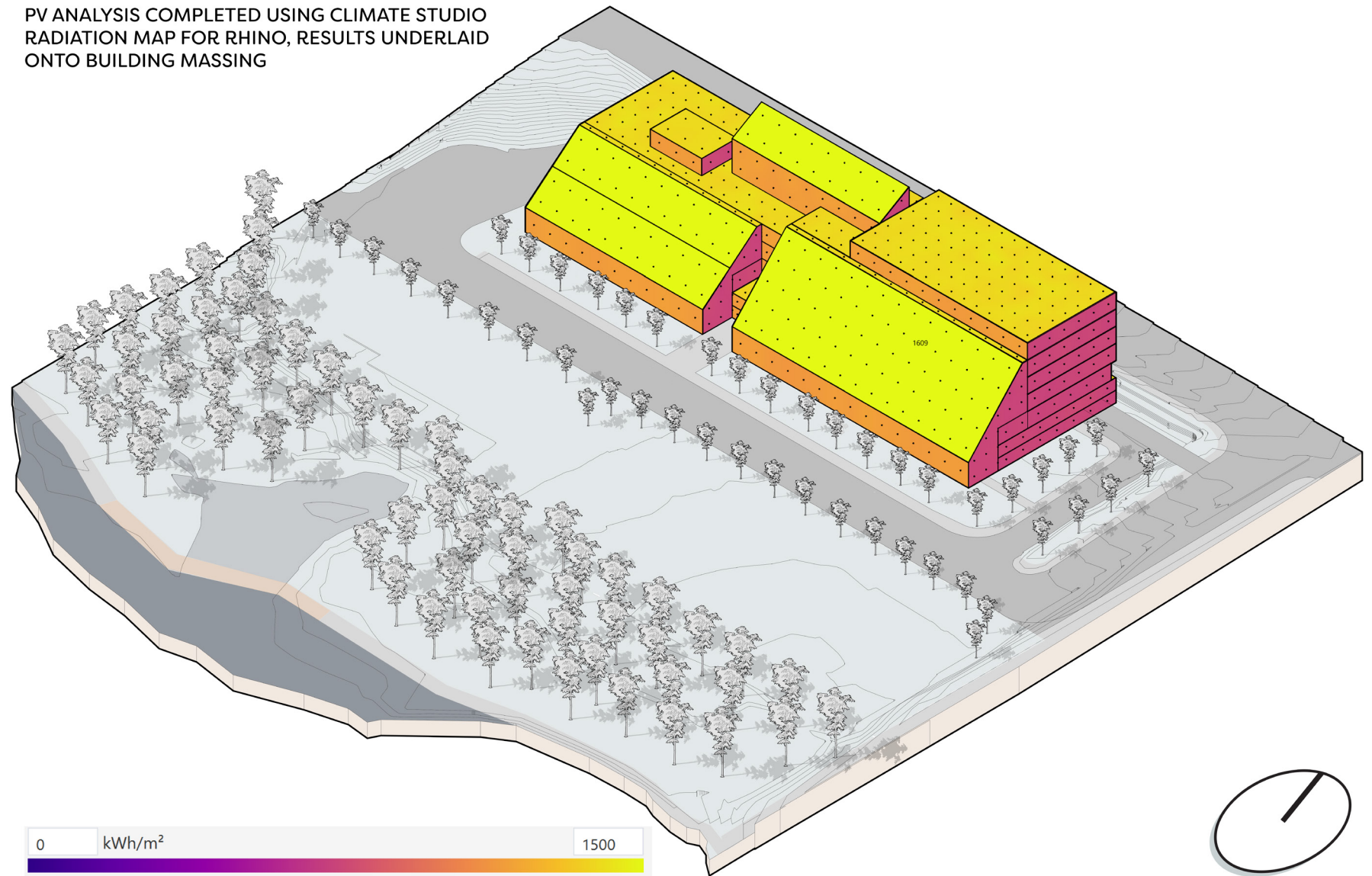


Proposed Whole Baseline EUI Breakdown

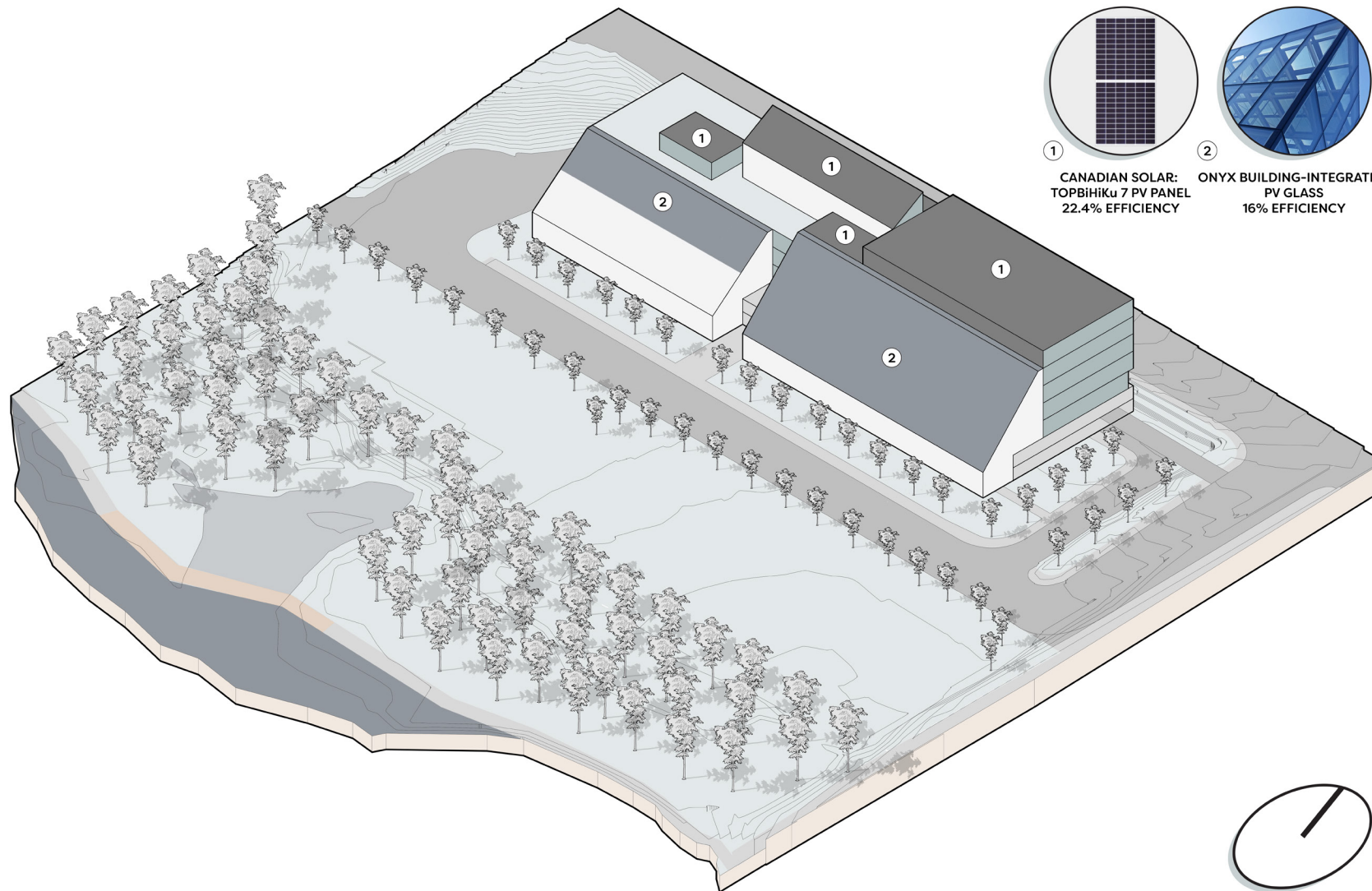


ANNUAL RADIATION ANALYSIS

PV ANALYSIS COMPLETED USING CLIMATE STUDIO RADIATION MAP FOR RHINO, RESULTS UNDERLAID ONTO BUILDING MASSING



PV ANALYSIS AXON



- ① CANADIAN SOLAR: TOPBiHiKu 7 PV PANEL
22.4% EFFICIENCY
- ② ONYX BUILDING-INTEGRATED PV GLASS
16% EFFICIENCY

ENERGY OUTPUT (w/o PV): 1,897,000 KWH /yr

PHOTO-VOLTAIC PANEL ENERGY OUTPUT:

TOTAL AREA: 2,622 M²

CALCULATION:

$$2,622 \text{ M}^2 * 1,617 \text{ KWH/M}^2\text{-YR} = 3,691,776 \text{ KWH/YR} * 0.224 * 0.8 =$$

760,000 KWH/yr

PHOTO-VOLTAIC CELL ENERGY OUTPUT:

TOTAL AREA: 1,815 M²

CALCULATION:

$$1,815 \text{ M}^2 * 1,617 \text{ KWH/M}^2\text{-YR} = 2,934,855 \text{ KWH/YR} * 0.16 * 0.95 =$$

571,000 KWH/yr

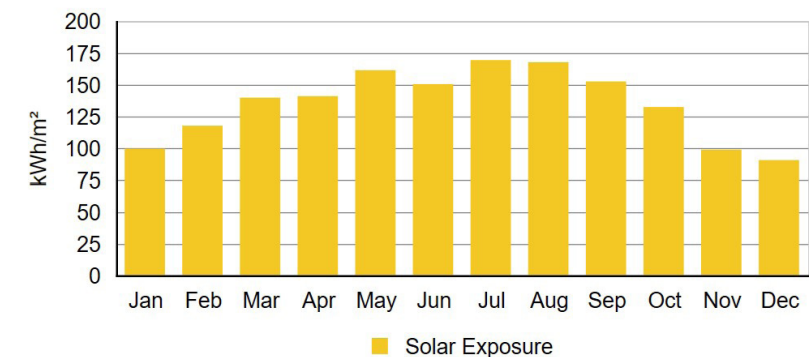
ENERGY OUTPUT (PV): 1,897,000 KWH/YR - 1,331,000 KWH/YR = **566,000 KWH/yr**

MONTHLY AVERAGE BUILDING UTILITY COST: \$30,035 (w/o PV); \$8,962 (PV)

30 YEAR LIFESPAN SAVINGS: \$7,586,000

ENERGY USE INTENSITY (WITH PV): 3.59 kBtu/ft²/yr

CLIMATE STUDIO AVERAGE PV OUTPUT



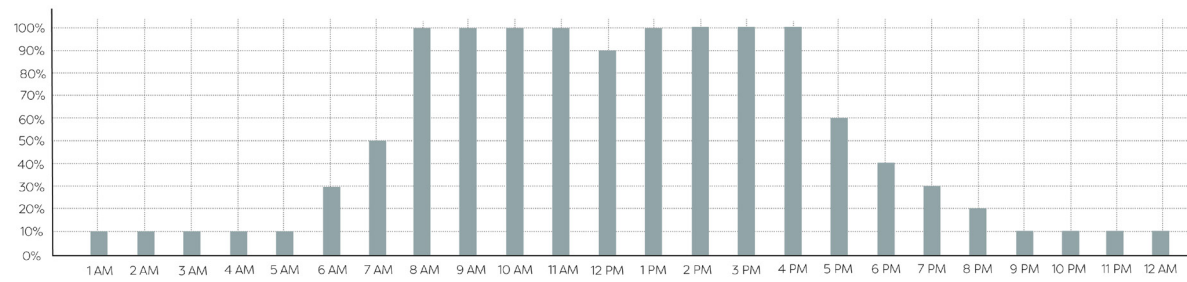
AVERAGE ENERGY OUTPUT:
1,617 KWH/M²-YR

*CALCULATION VARIES FROM COVE TOOL PROPOSAL

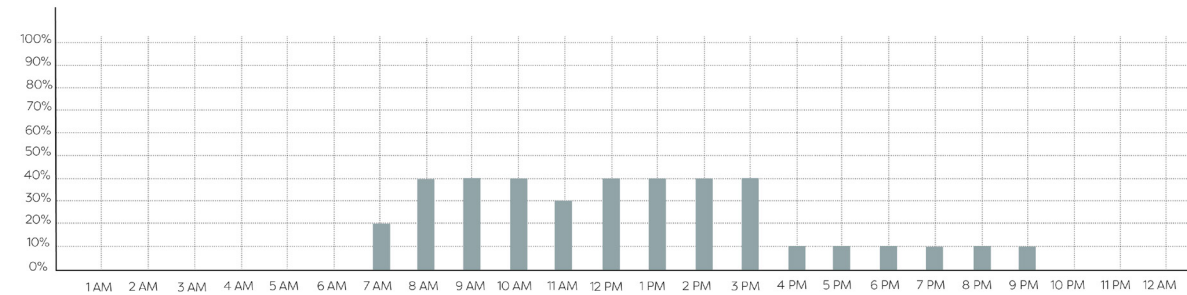
OFFICE OCCUPANCY SCHEDULE

OCCUPIED MONTHS **JAN** FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

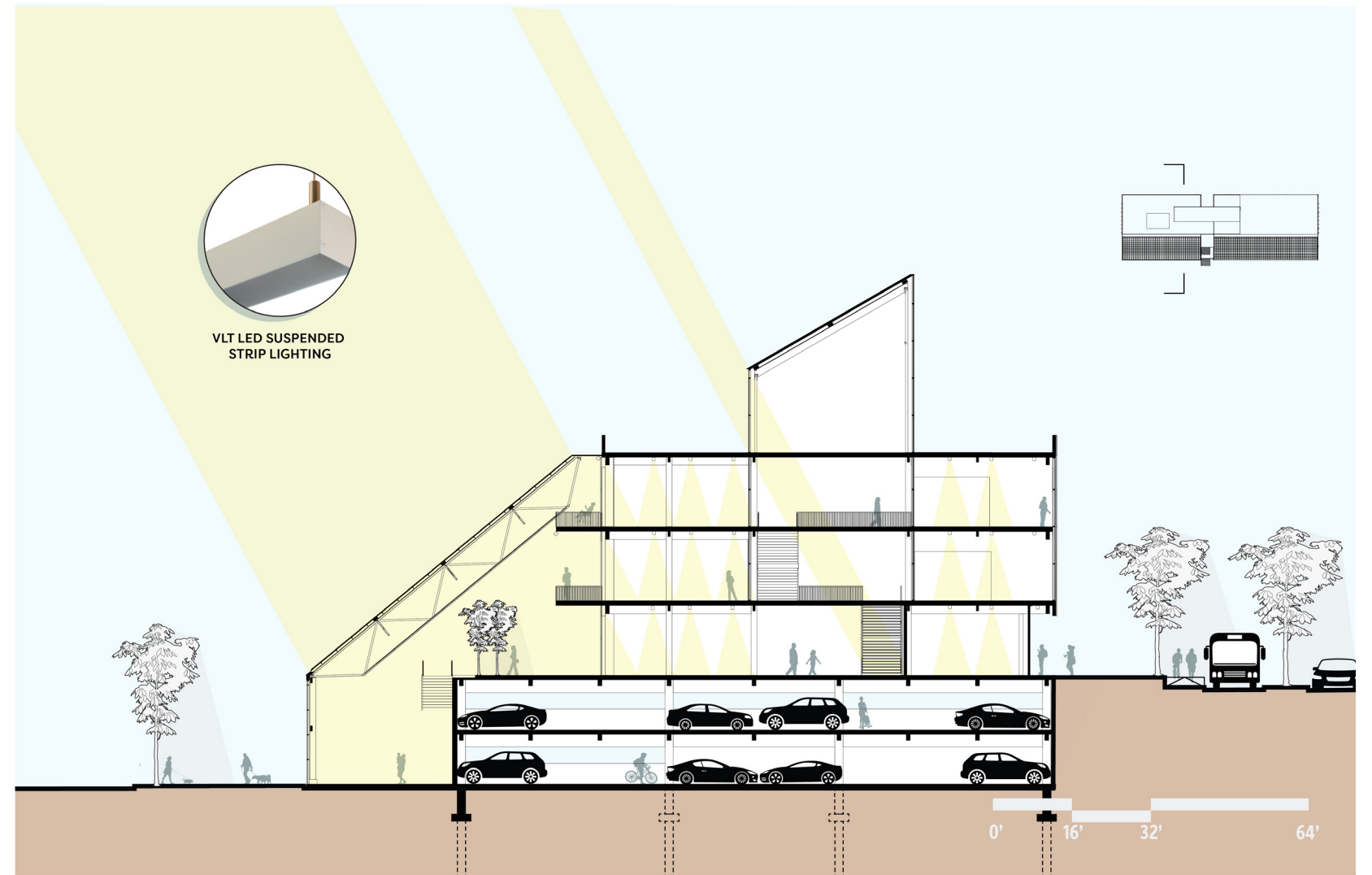
OCCUPIED DAYS **SUN** MON TUE WED THU FRI SAT



UNOCCUPIED DAYS **SUN** MON TUE WED THU FRI SAT



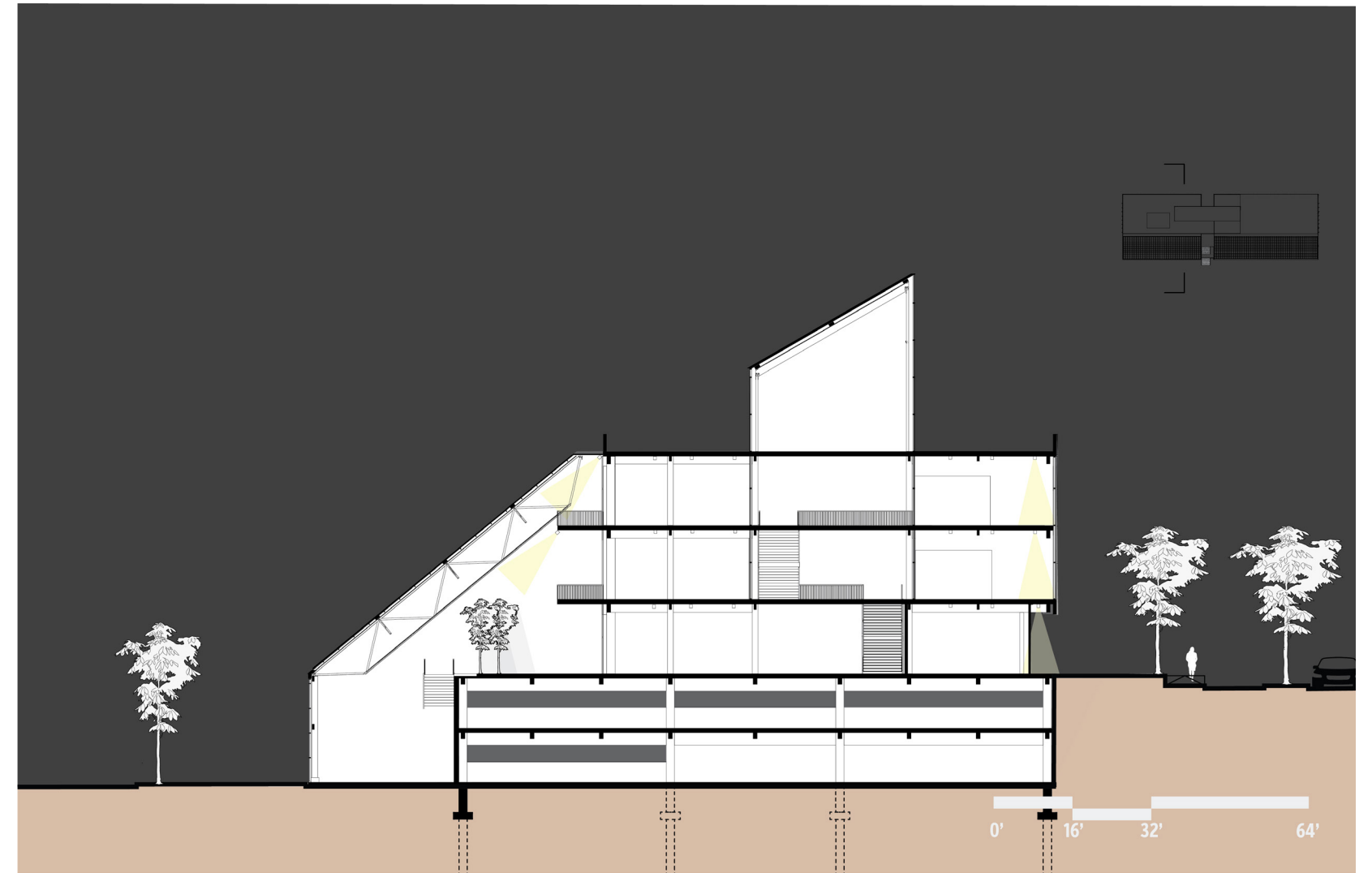
DAYTIME LIGHTING DIAGRAM



LIGHTING SCHEDULE



NIGHTTIME LIGHTING DIAGRAM

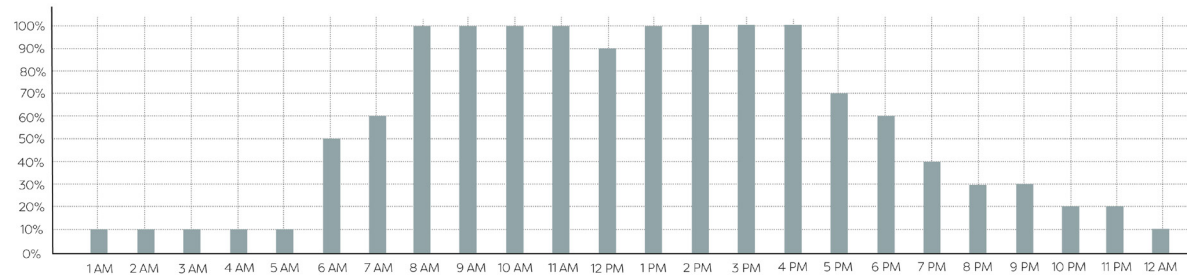




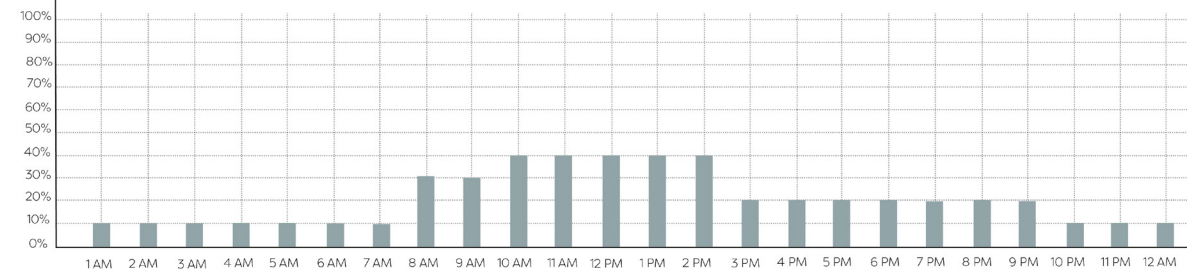
EQUIPMENT SCHEDULE

OCCUPIED MONTHS JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

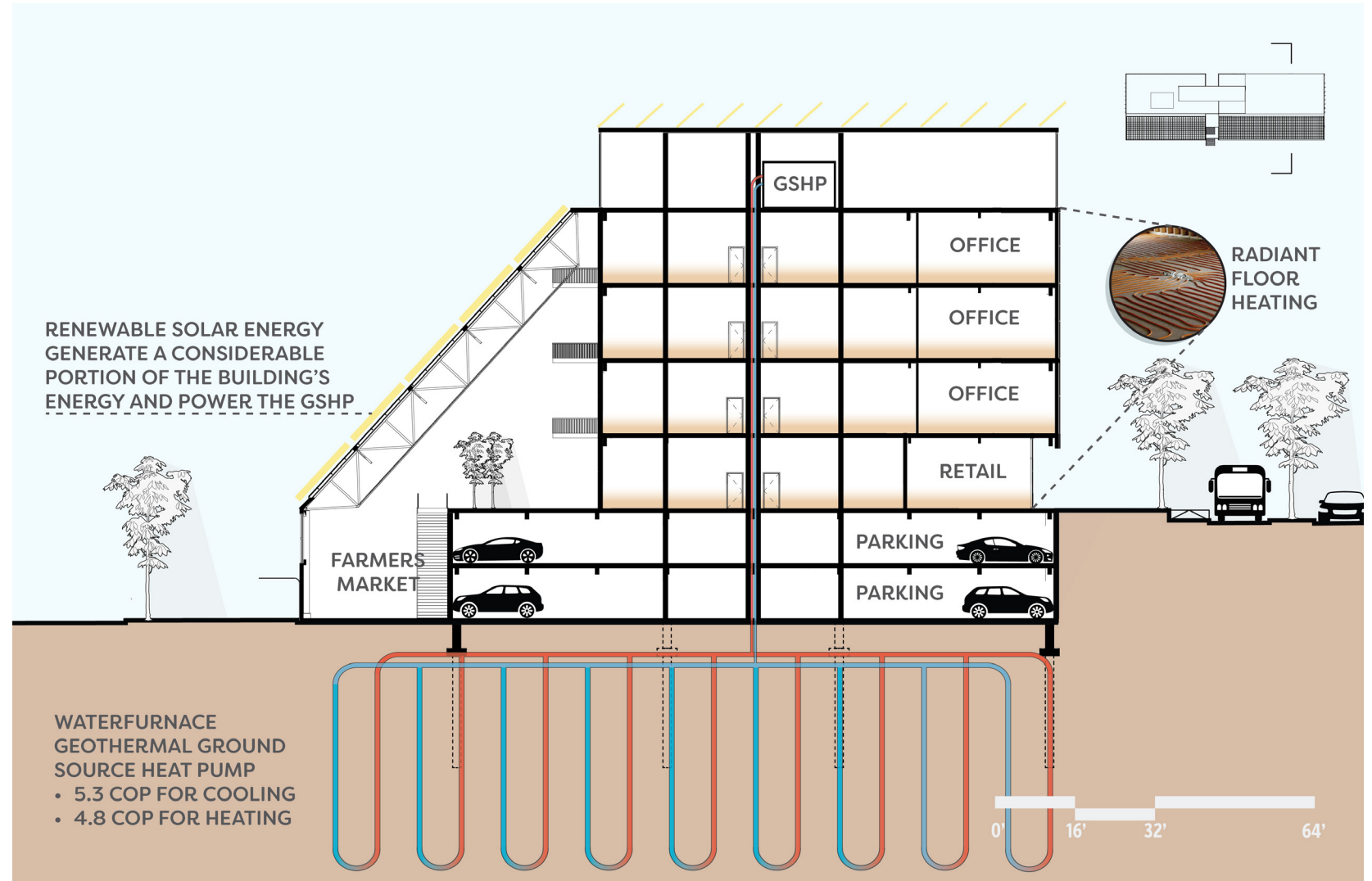
OCCUPIED DAYS SUN MON TUE WED THU FRI SAT



UNOCCUPIED DAYS SUN MON TUE WED THU FRI SAT

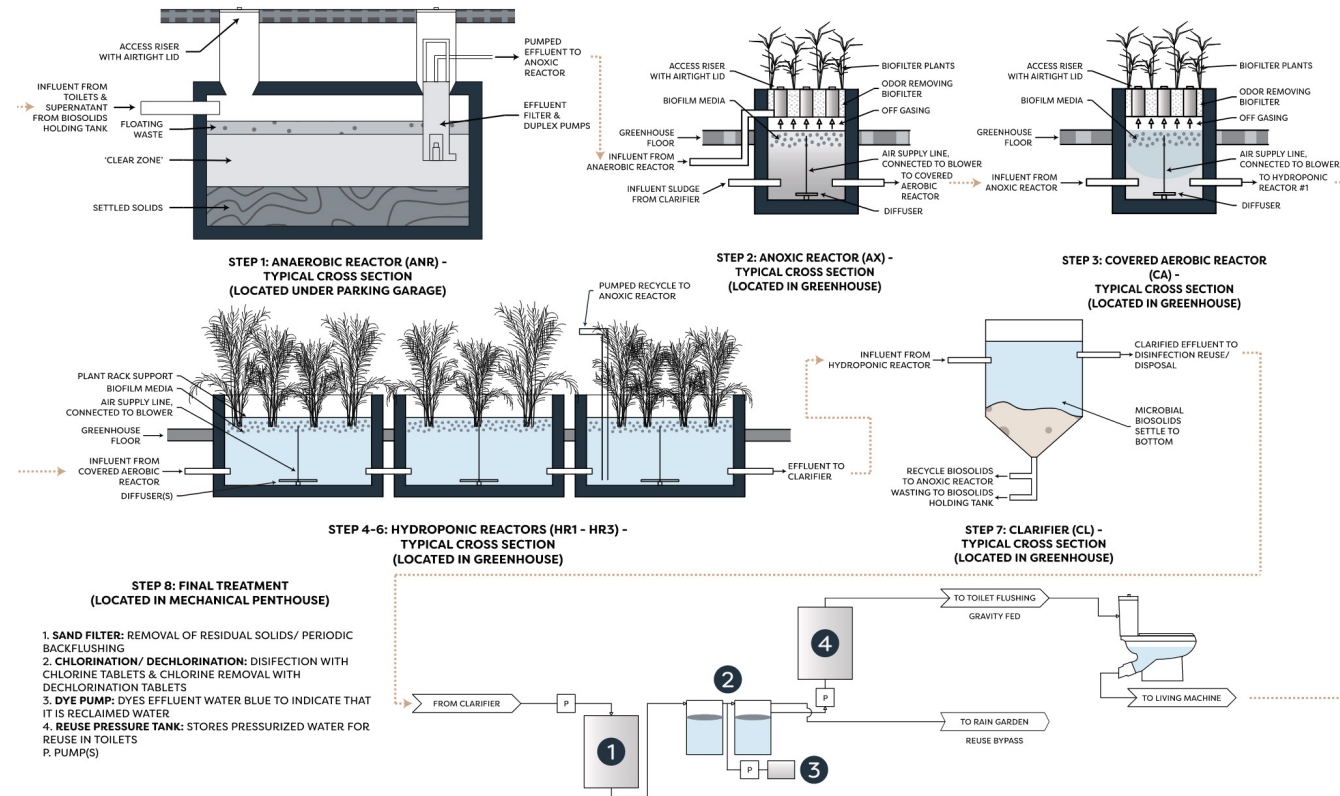


RADIANT FLOOR HEATING & COOLING DIAGRAM



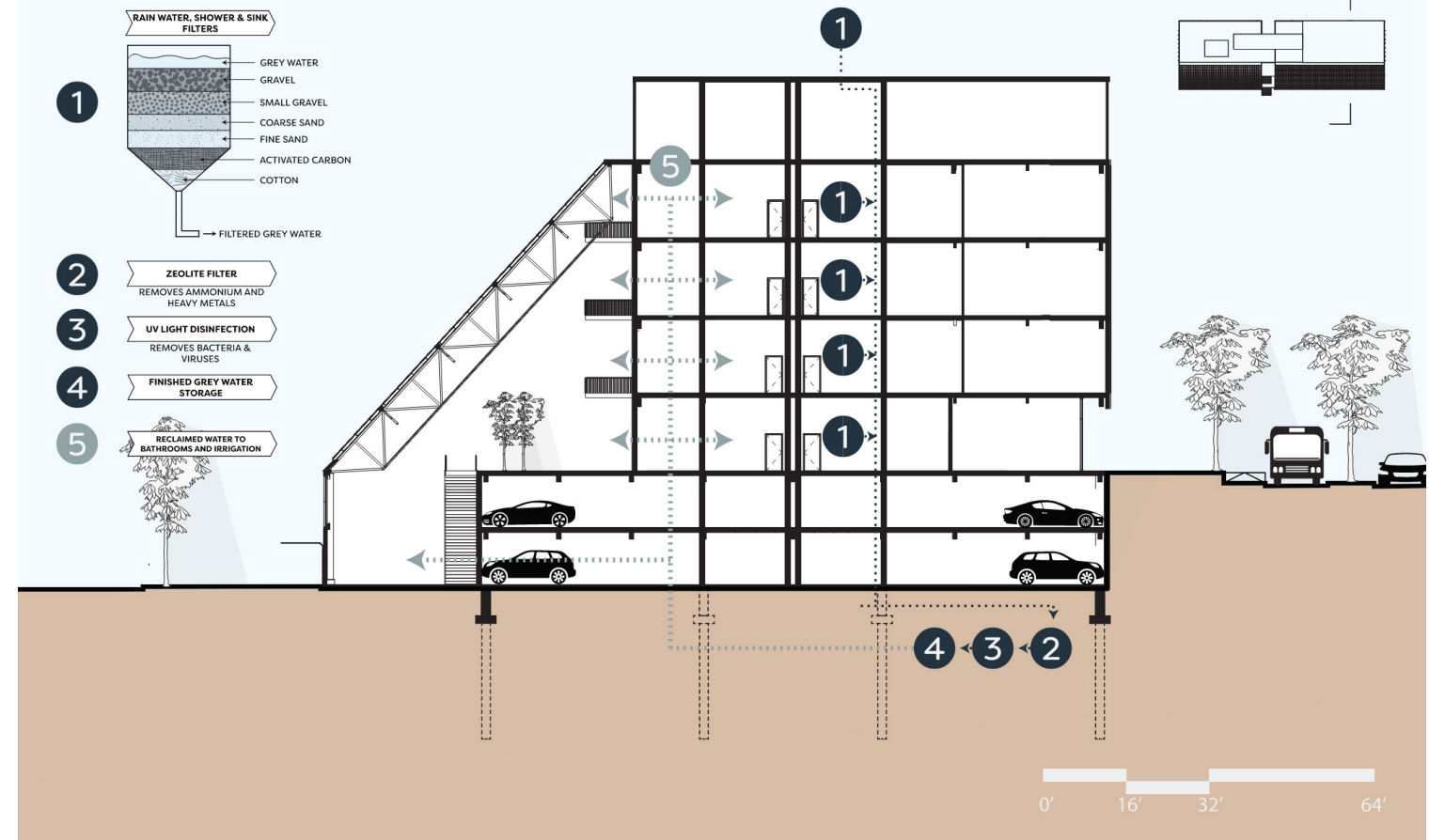
THE LIVING MACHINE

BLACK WATER RECYCLING THROUGH THE LIVING MACHINE



RAINWATER HARVESTING DIAGRAM

GREY WATER RECYCLING



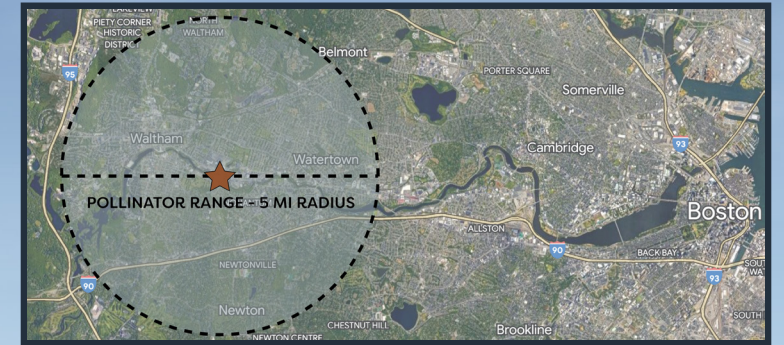
RENT-ABLE VEGETABLE GARDENS

INTERIOR GREEN WALLS;
CONNECTION TO NATURE

HYDROPONIC PLANTS

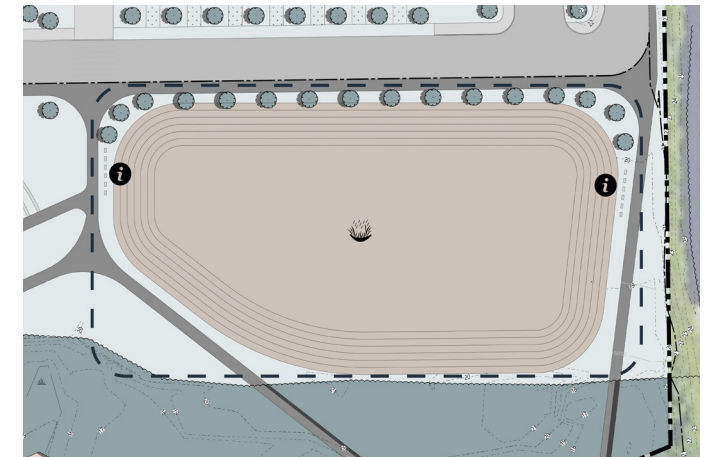
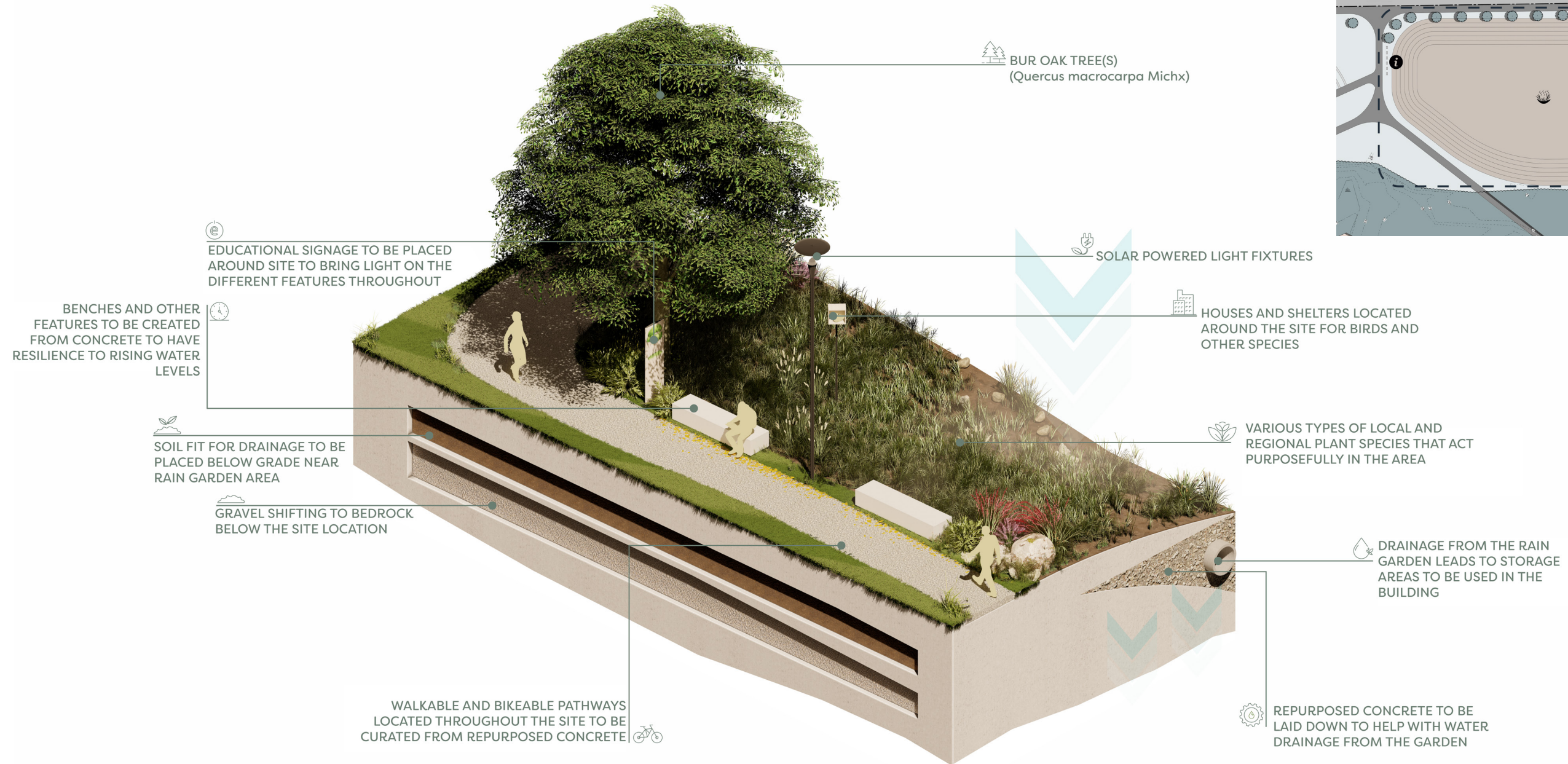


POLLINATOR IMPACT DIAGRAM

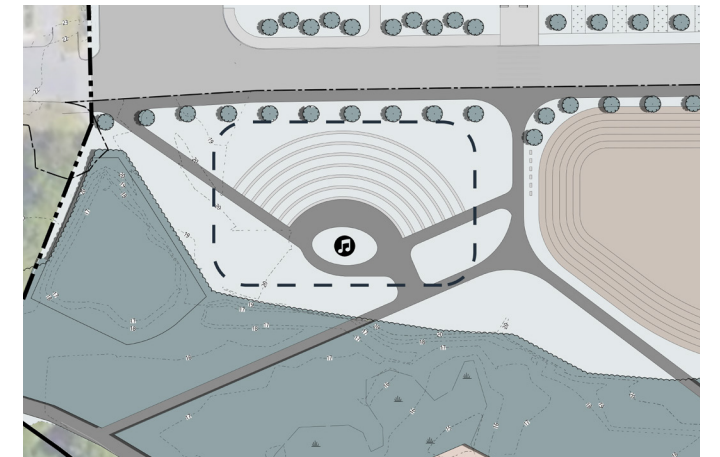


BEE HIVE HABITATS THAT BOOST LOCAL POLLINATION

RAIN GARDEN BREAKDOWN



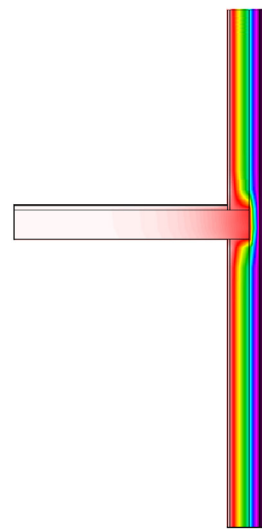
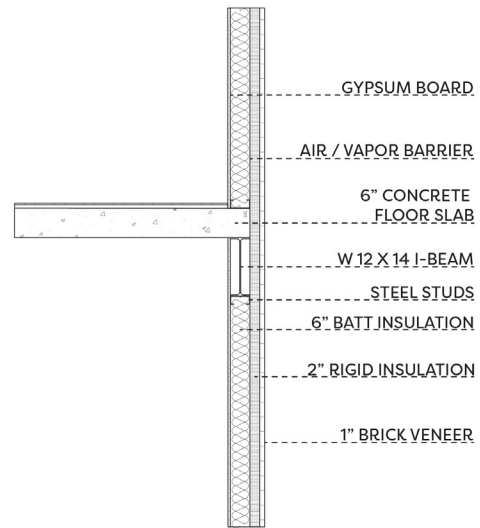
PERMEABLE PERFORMANCE SPACE AXON



WALL THERM COMPARISON

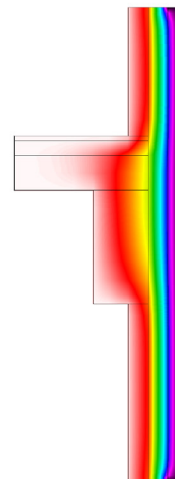
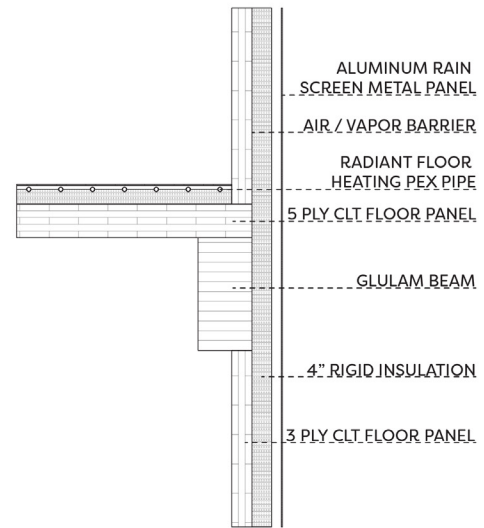
TYPICAL WALL CONSTRUCTION

R-VALUE: 23.17 h-ft²-F/Btu



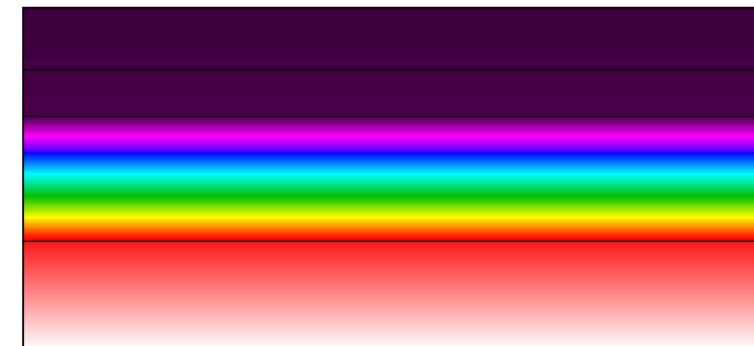
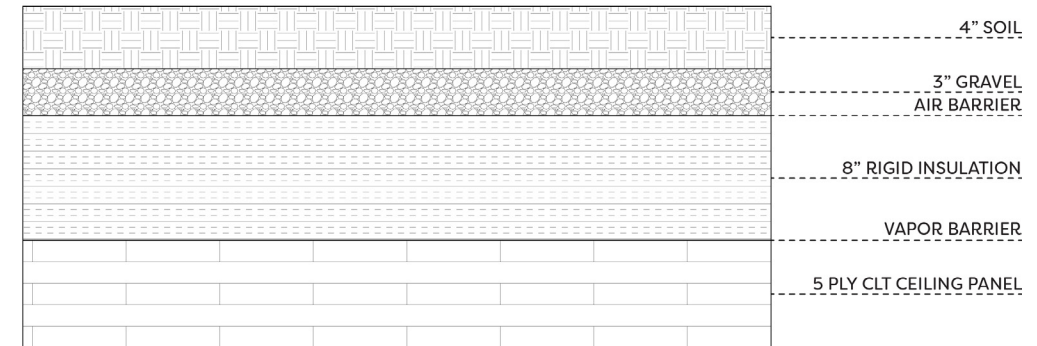
TIMBER WALL CONSTRUCTION

R-VALUE: 39.14 h-ft²-F/Btu

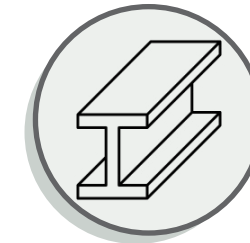
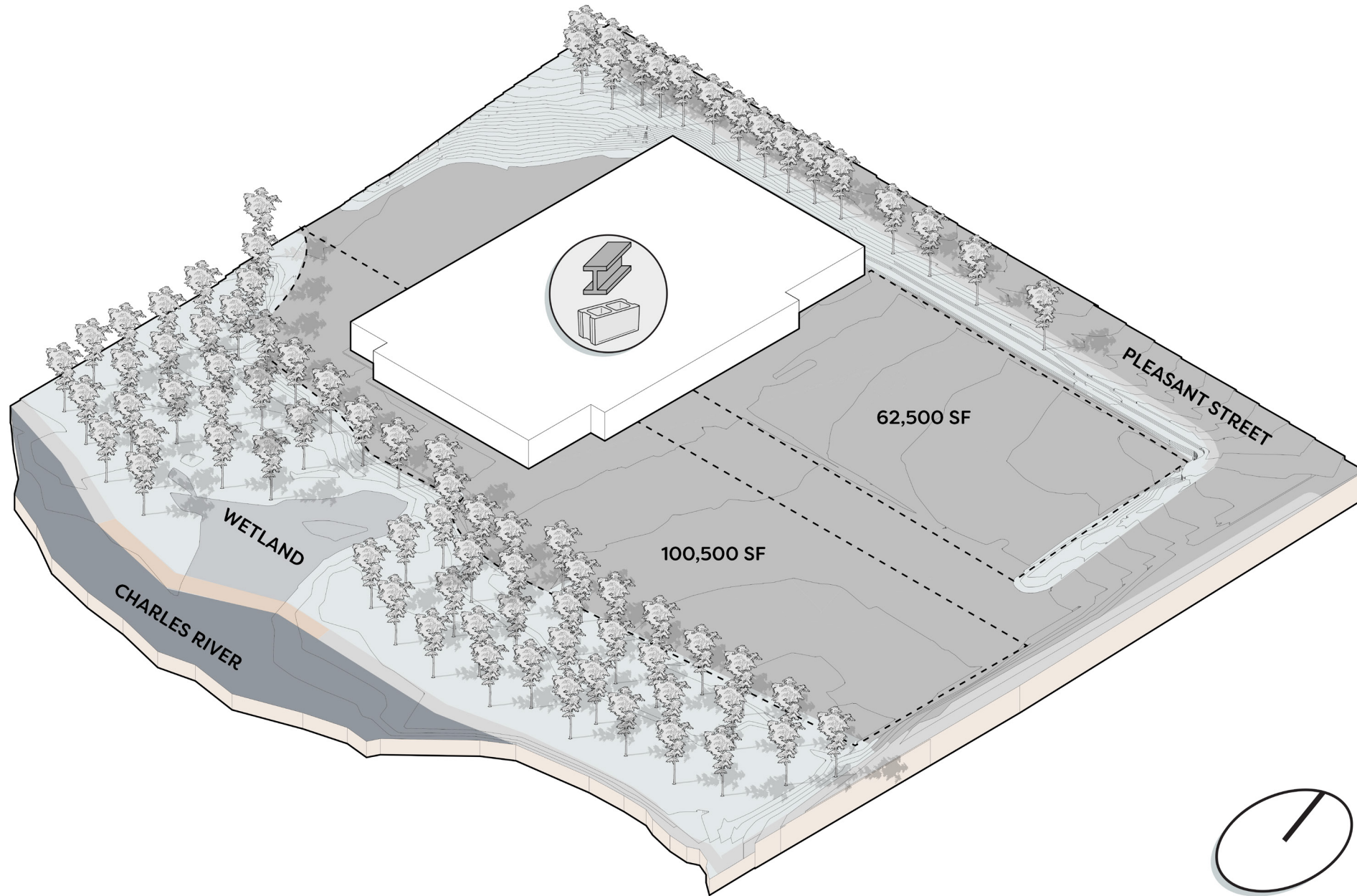


ROOF THERM SIMULATION

ROOF R-VALUE: 47.53 h-ft²-F/Btu



MATERIAL RE-USE

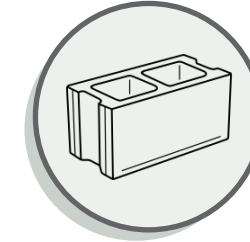


EXISTING STEEL

TRANSFERED
OFF-SITE TO

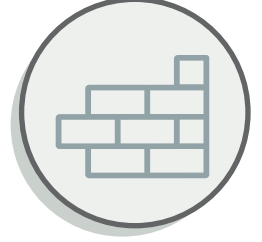


ELECTRIC ARC FURNACE



EXISTING CMU & ASPHALT

PULVERIZED
ON-SITE TO MAKE
NEW CONCRETE
AGGREGATE FOR



RETAINING WALL
& PARKING GARAGE

DEMOLITION

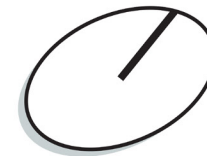


TOTAL: \$1,536,000
*INCLUDES LABOR,
MATERIAL SORTING,
AND OFF SITE TRANSPORT

RE-USE



TOTAL: \$428,500
*CMU BLOCKS & ASPHALT
TOTAL COST: \$1,964,500



MATERIALS MANUFACTURER MAP




CanadianSolar
GUELPH, ONTARIO, CANADA



NEW YORK, NY, USA



SIGCOTM
A CRH COMPANY
WESTBROOK, ME, USA

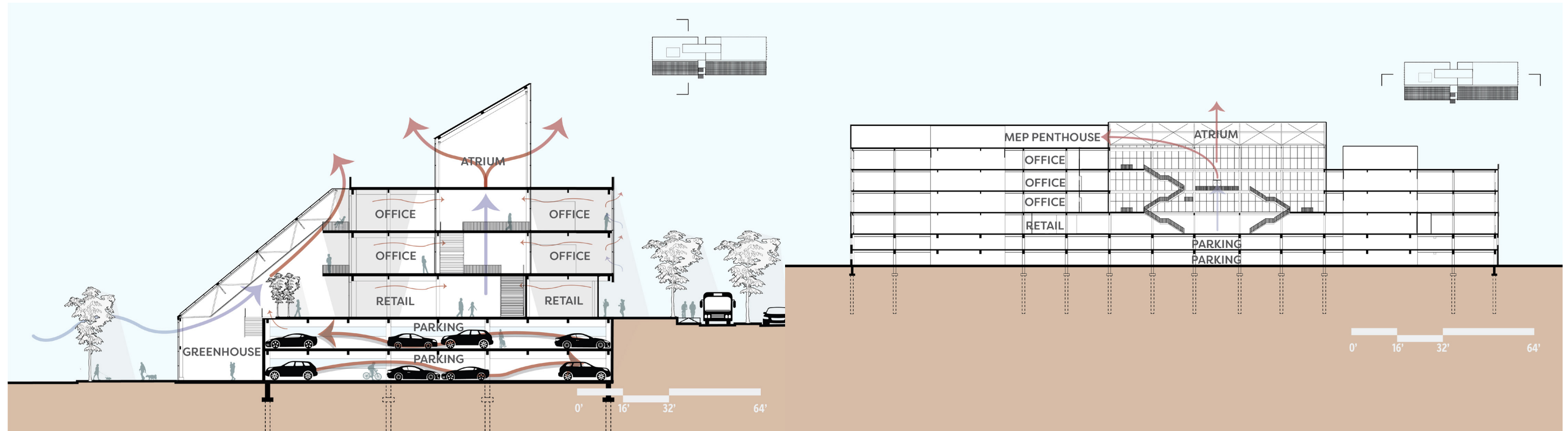

visual lighting technologies, llc[®]
CEDAR PARK, TX, USA


**BOSTON
CONCRETE**
LOWELL, MA, USA

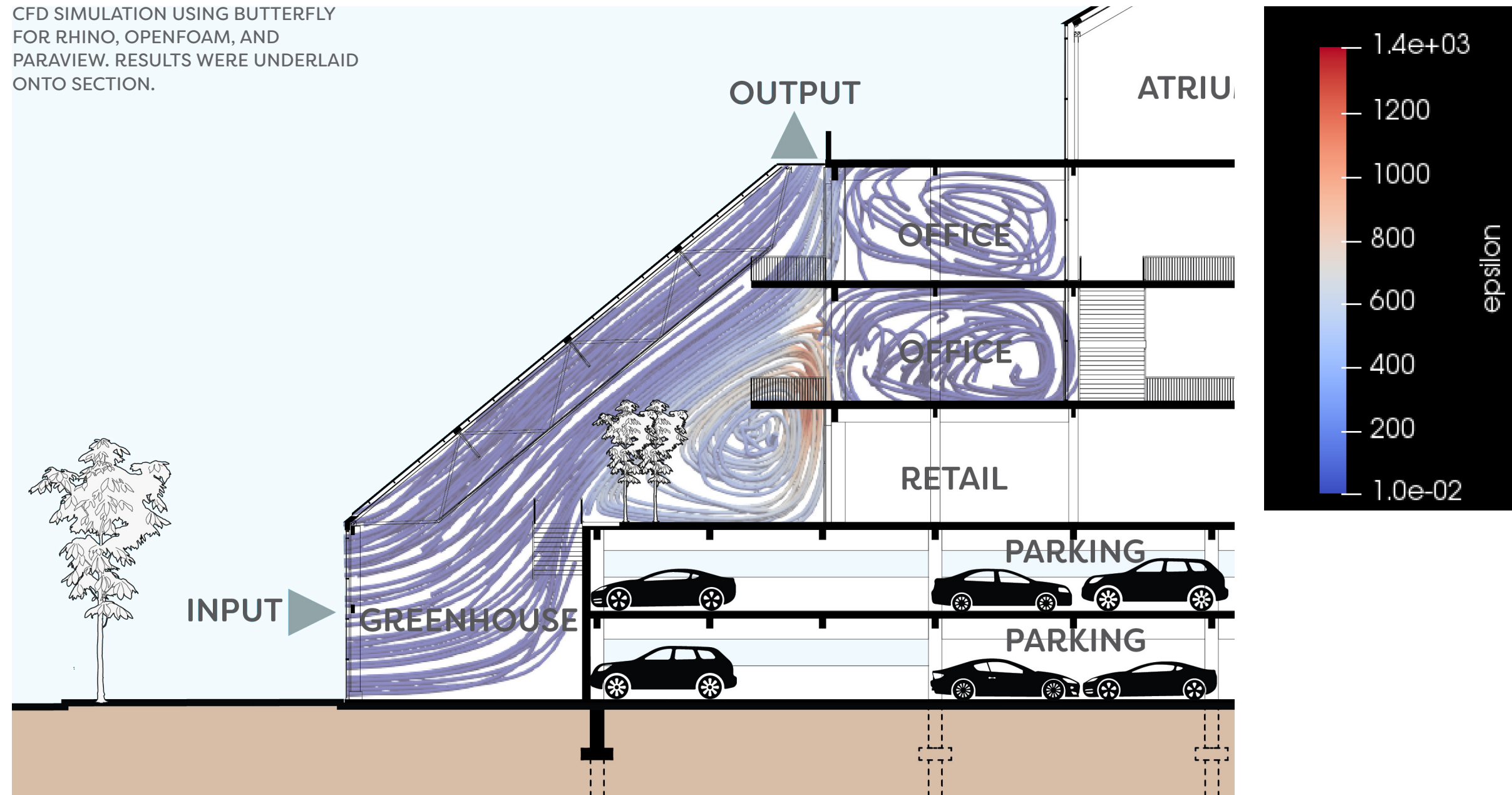

PORTLAND, ME, USA

NATURAL VENTILATION DIAGRAM

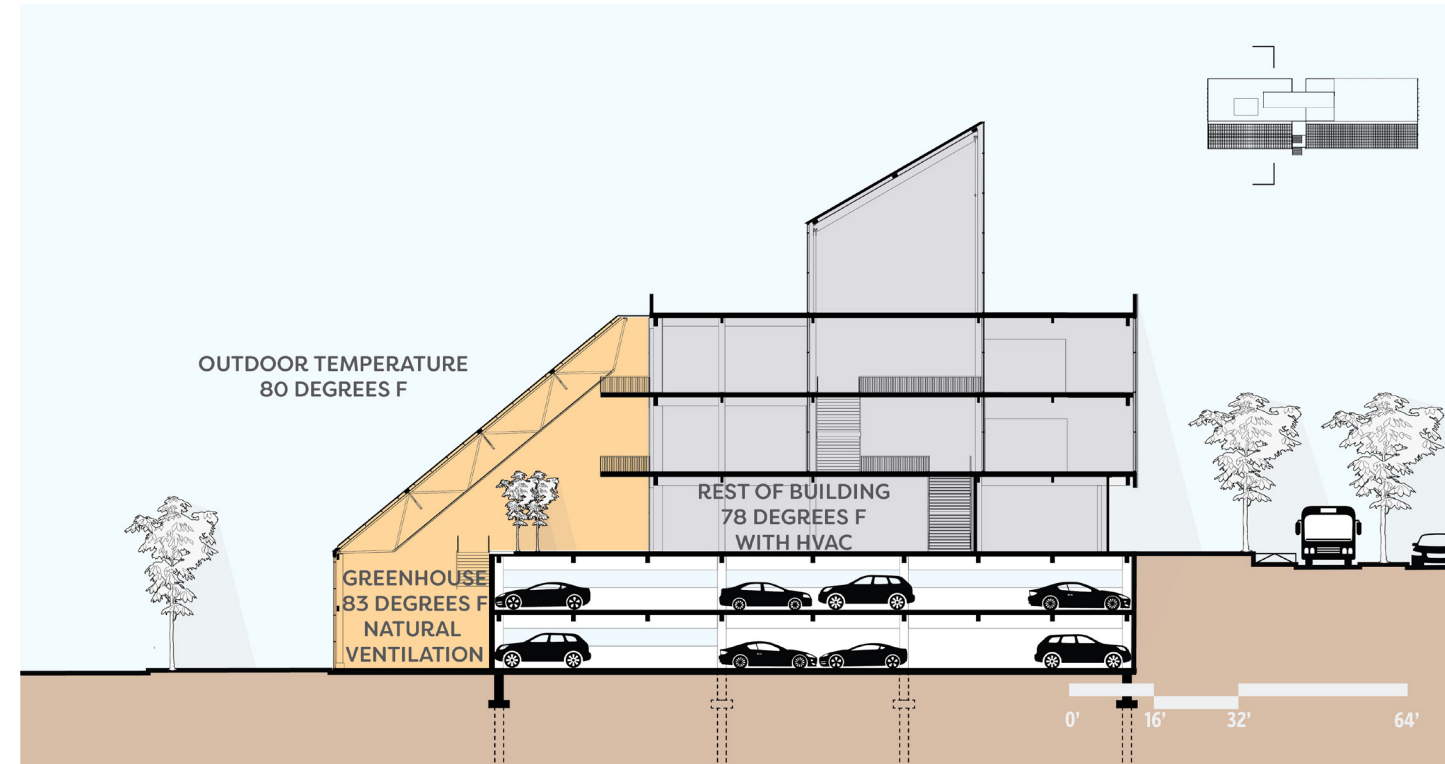
STACKED VENTILATION DIAGRAM



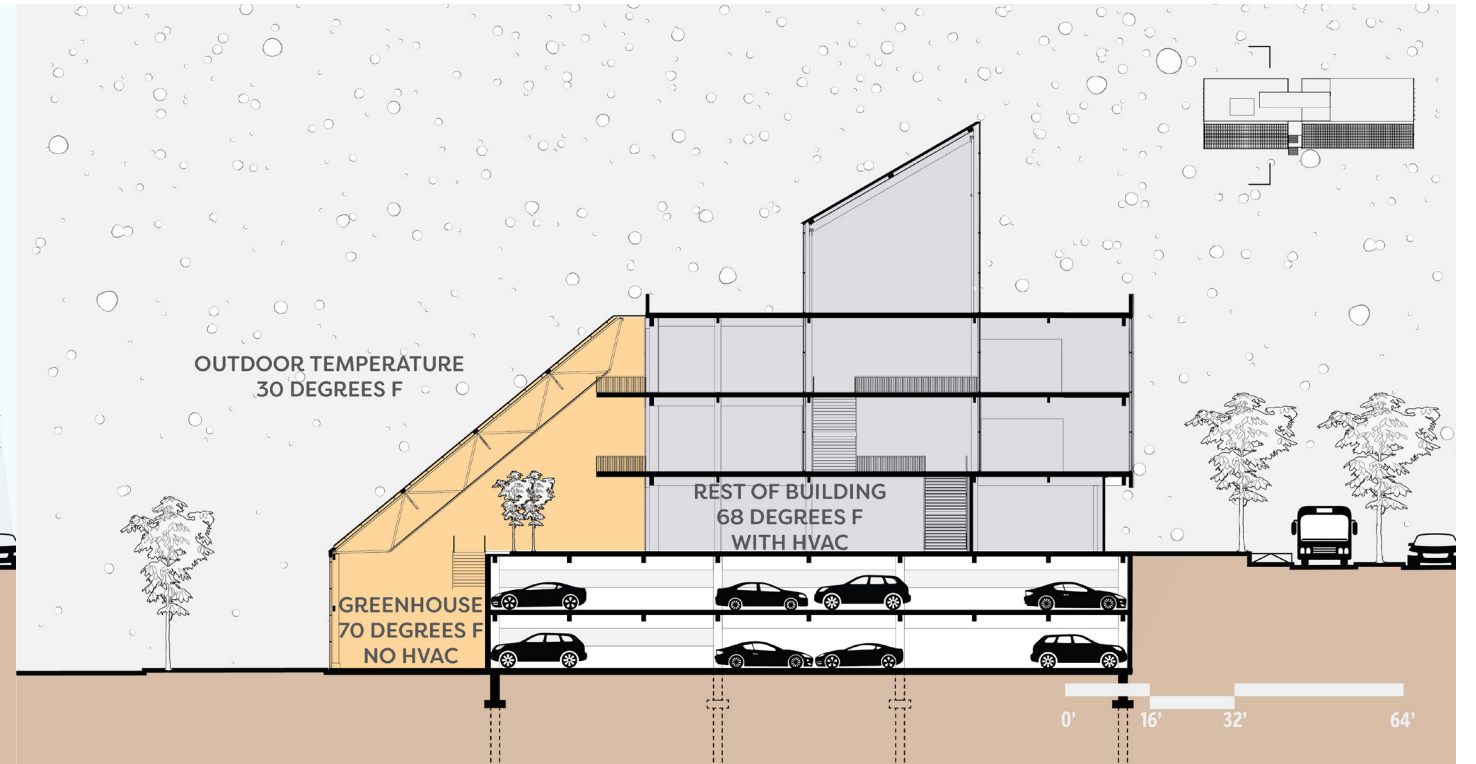
GREENHOUSE CFD STUDY
CFD SIMULATION USING BUTTERFLY
FOR RHINO, OPENFOAM, AND
PARAVIEW. RESULTS WERE UNDERLAID
ONTO SECTION.



GREENHOUSE SUMMER

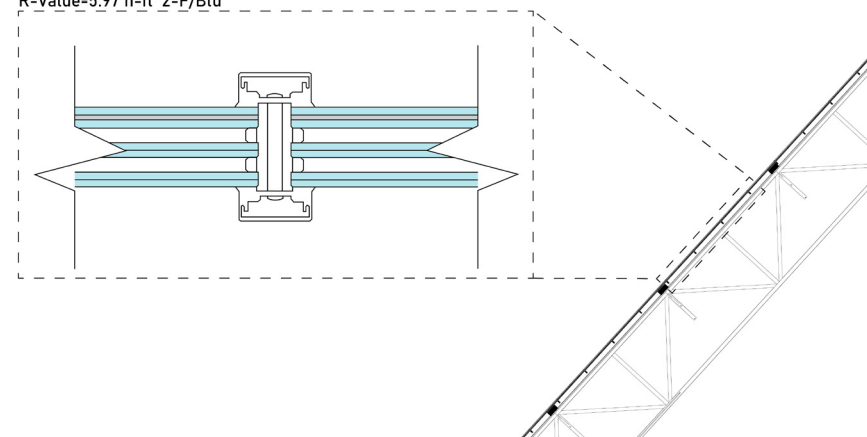


GREENHOUSE WINTER



BIPV DETAIL

Onyx Mono-Crystalline BIPV Cells
Triple-Paned Glazing Unit; R-Value:
R-Value=5.97 h-ft²-F/Btu



SHRUBS; MAINTAINED THROUGH SLIDING WINDOWS

AMBIENT NORTH FACING LIGHT

BIPV SOLAR CELLS
REDUCE SOUTHERN GLARE

VEGETATION SEQUESTERS
CARBON + PURIFIES AIR

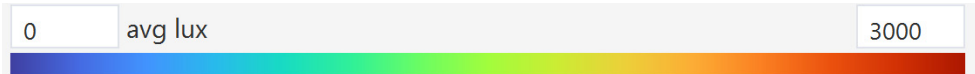
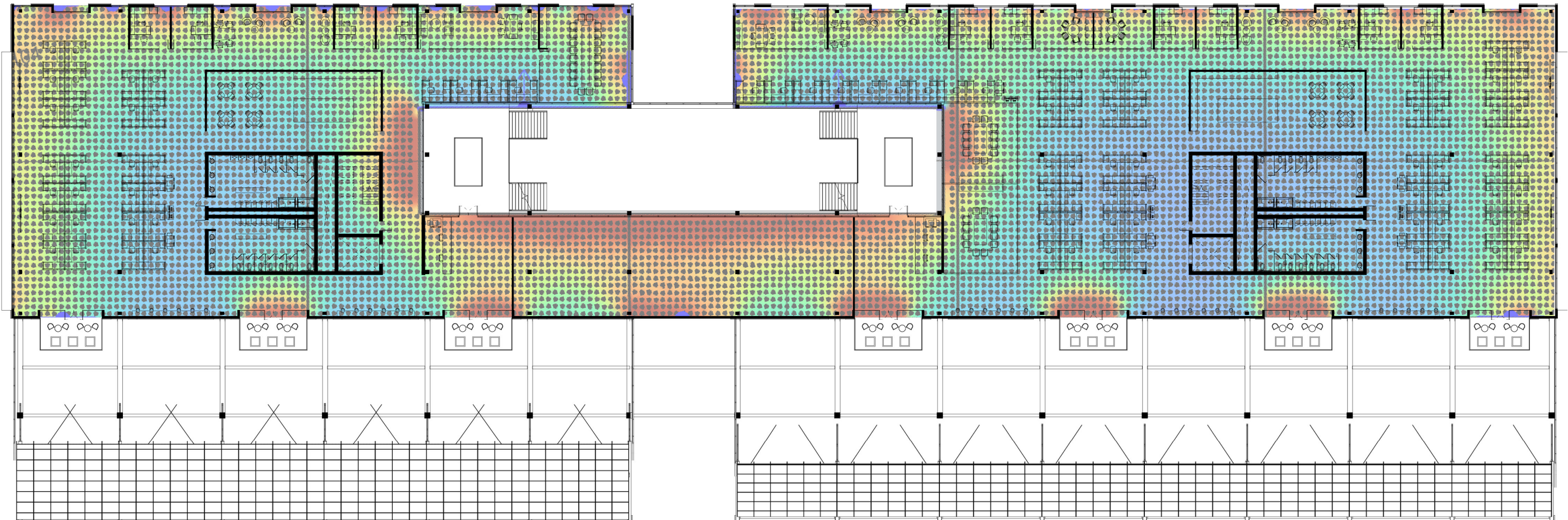
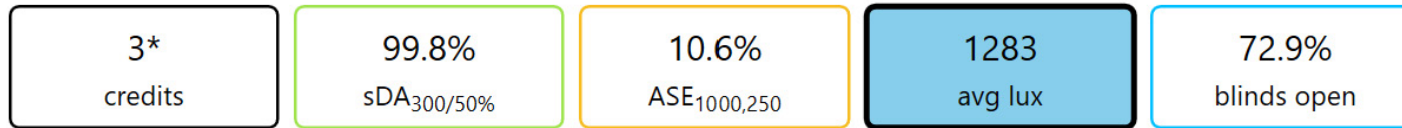


COMFORT

CLT TRUSS

FOLD-ABLE GARAGE DOORS;
PROVIDE SHADING +
NATURAL VENTILATION

OFFICE ANNUAL DAYLIGHTING ANALYSIS



OFFICE DAYLIGHT AVAILABILITY ANALYSIS COMPLETED USING CLIMATE STUDIO FOR RHINO.

ENERGY BENCHMARKS

Energy

97
National Average

19
2030 Target

55%
Daylight

10%
Glare

ALUMINUM HORIZONTAL PASSIVE SOLAR SHADING

AESTHETICALLY-PLEASING EXPOSED STRUCTURAL SYSTEMS

INTERIOR GREEN WALLS



COVE TOOL SITE ACCESS ANALYSIS

80

Walk Score®
Very Walkable

31

Transit Score®
Some Transit

65

Bike Score®
Bikeable



WELCOME TO THE HABITAT

SELECT A CATEGORY TO BEGIN:

ENERGY CONSUMPTION

RAIN WATER COLLECTION

RAIN GARDEN

POLLINATORS

BUILDING EMISSIONS

OCCUPANT EXPERIENCE

MATERIALS

ENERGY CONSUMPTION

Month	Solar Exposure (kWh/m²)
Jan	100
Feb	120
Mar	140
Apr	140
May	160
Jun	150
Jul	170
Aug	170
Sep	150
Oct	130
Nov	100
Dec	90

SELECT A DIFFERENT CATEGORY:

ENERGY CONSUMPTION

RAIN WATER COLLECTION

RAIN GARDEN

POLLINATORS

BUILDING EMISSIONS

OCCUPANT EXPERIENCE

MATERIALS

RAIN WATER COLLECTION

SELECT A DIFFERENT CATEGORY:

ENERGY CONSUMPTION

RAIN WATER COLLECTION

RAIN GARDEN

POLLINATORS

BUILDING EMISSIONS

OCCUPANT EXPERIENCE

MATERIALS

BUILDING EMISSIONS

Proposed Whole Baseline EUI

-2.86

Office: -0.51 kWh/ft²/yr
Retail: -5.74 kWh/ft²/yr

LEED Points - EA2 Credit

18

Electricity: \$-31094.11 /yr
Gas: \$0 /yr
TEDE: 11.56

CO2 Reduction %

102

2030 Baseline Emissions: 2711.7 Tonne CO2e/yr
Emissions: -80.3 Tonne CO2e/yr
You Saved: 419 Trucks of 1ton/yr

Benchmarking Energy

2030 BASELINE: 96.72
2030 TARGET: 19.34
YOUR EUI: -2.86

Proposed Whole Baseline EUI Breakdown

Category	Value
Cooling	1.01
Heating	1.62
Lighting	3.17
Equipment	4.22
Fans	0.43
Pumps	0.7
Hot Water	0.93
PI Energy	-14.54

SELECT A DIFFERENT CATEGORY:

ENERGY CONSUMPTION

RAIN WATER COLLECTION

RAIN GARDEN

POLLINATORS

BUILDING EMISSIONS

OCCUPANT EXPERIENCE

MATERIALS

THE HABITAT



• CHARLES RIVER GREEN WAY

Site borders a walking / bike path creating a far-reaching connection with the surrounding communities.

• DEMOGRAPHICS

The building's program opens the door for all demographic types to work / access the building.

• PROXIMITY TO BOSTON

Watertown is a short distance away from Massachusetts capital, Boston.



• BUILDING ORIENTATION

Building form utilizes site to maximize solar gain along the south facade.

• DOUBLE SKIN FACADE

Farmer's market and greenhouse along southern facade embodies a living environment that provides vegetation and purified air to the occupants of the building.



• MASS TIMBER STRUCTURE

Utilize new structural techniques that are more beneficial to the environment, lighter than typical construction structures, and are aesthetically pleasing.

• RETAINING WALL

Concrete retaining wall adjacent to the northern facade of the building allows for an activated retail level along Pleasant street.



• GEOTHERMAL HEAT PUMP

Efficient HVAC system with a better COP efficiency compared to a typical HVAC system.

• PV PANELS

Solar photo-voltaic panels on the roof and building-integrated glass solar cells on the southern slanted facade generate a considerable portion of the building's power.



• AI AUTOMATION

Optimizes the use of passive as well as active systems to maximize energy savings.

• RADIANT FLOOR HEATING

Provides thermal comfort at the appropriate time.



• RAINWATER HARVESTING

Rainwater management recycled into grey / black water for the building.

• RAIN GARDEN

Acts as a habitat for local vegetation and wildlife while at the same mitigating the effects of rain / flood water surges.



• CARBON SEQUESTRATION

Mass timber structure sequesters carbon meaning it has a negative embodied carbon.

• REUSE OF MATERIALS

Materials from existing building are sorted on site and recycled off site.

• BIKE STORAGE / PUBLIC TRANSIT

Reduces CO2 emissions.

• POLLINATORS

Providing a safe habitat for pollinators that help the local ecosystem.



• PASSIVE SOLAR SHADING

Horizontal shading devices along the east and west facades reduce glare from the rising and setting sun.

• BALCONIES

Provide shading from the southern sun and visually enhance user experience.

• OPERABLE WINDOWS

Operable windows ensure a controllable environment to the user's needs.

• GREENHOUSE / INTERIOR ATRIUM

Purifies air and passively sequesters CO2 enhancing the occupant experience.



• INTERIOR ATRIUM

Brings in natural sunlight and acts as stacked ventilation that redistributes rising air back into the MEP Penthouse.

• TERRACES

Provides attractive views and shading for office users.

• GREEN WALLS

Enhances air quality and provides a connection to nature.

EDUCATIONAL NODES

Curated stops that educate visitors about the importance of habitats.