



Massachusetts School
Building Authority



AECOM TISHMAN



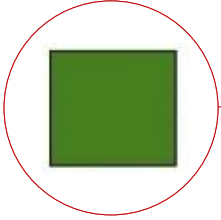
LPA | A

ICEBREAKER: Before we begin, please respond in the chat and “Tell us about something you do in your everyday life to help the environment.”



KATIE CROCKETT | ROB PARA JR. | CHRIS LEE | CHRISTINA BAZELMANS

ARCHITECT | LAMOUREUX PAGANO & ASSOCIATES ARCHITECTS



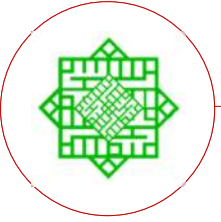
CHRIS SCHAFFNER | CARRIE HAVEY | ANTHONY HARDMAN | JACOB SAVONA

SUSTAINABILITY CONSULTANT | THE GREEN ENGINEER



KEVIN SEAMAN

MECHANICAL ENGINEER | SEAMAN ENGINEERING CORP.



AZIM RAWJI

ELECTRICAL ENGINEER | ART ENGINEERING



LYNNE GIESECKE | LAUREN SCHUNK

LANDSCAPE ARCHITECT | STUDIO 2112

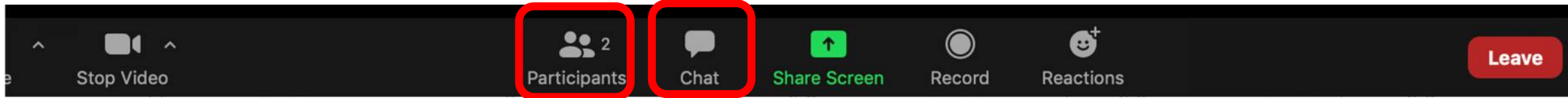
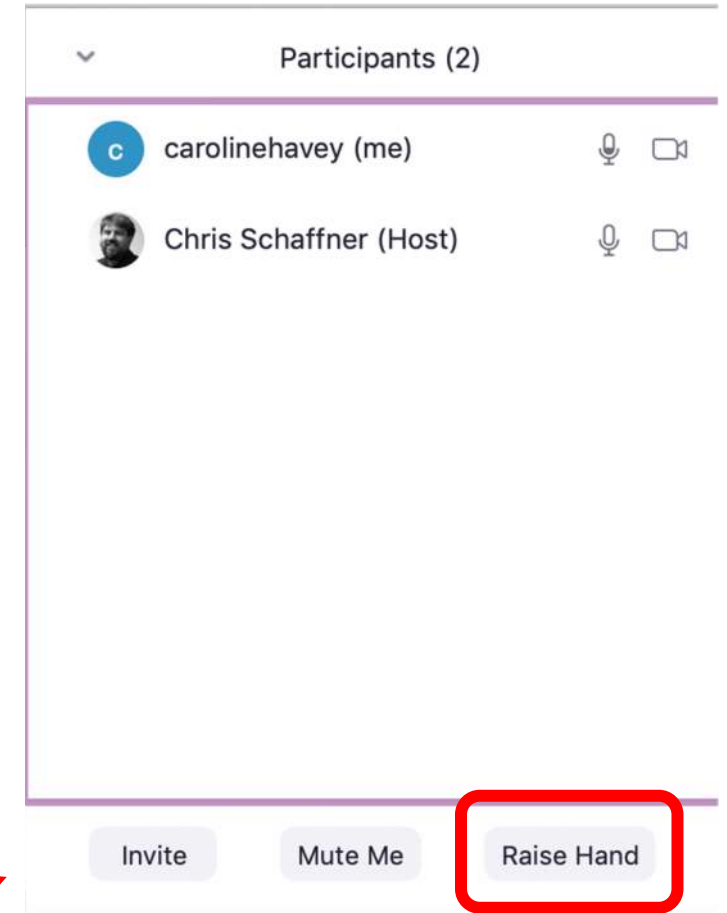


MATT BRASSARD

CIVIL ENGINEER | NITSCH ENGINEERING

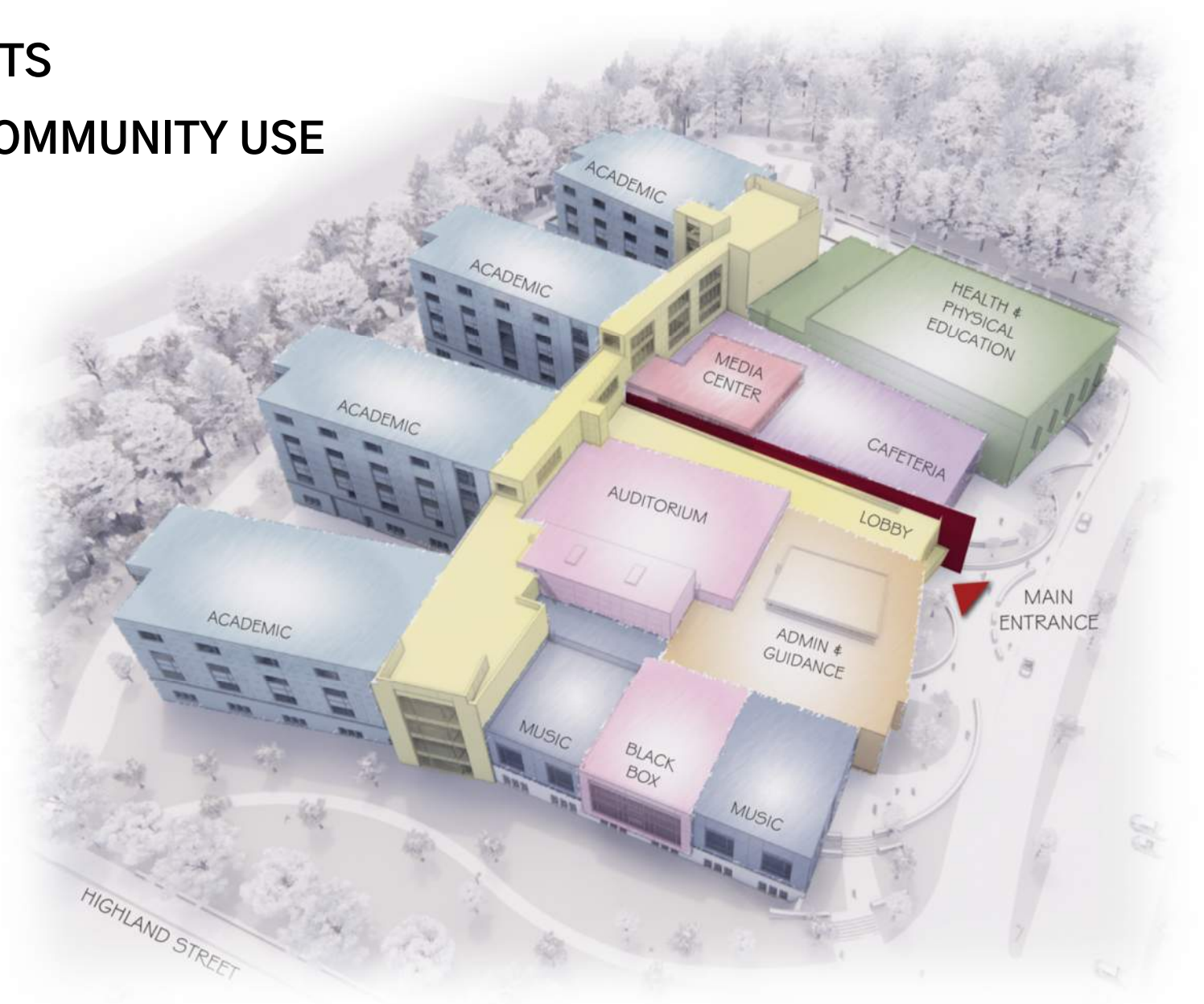
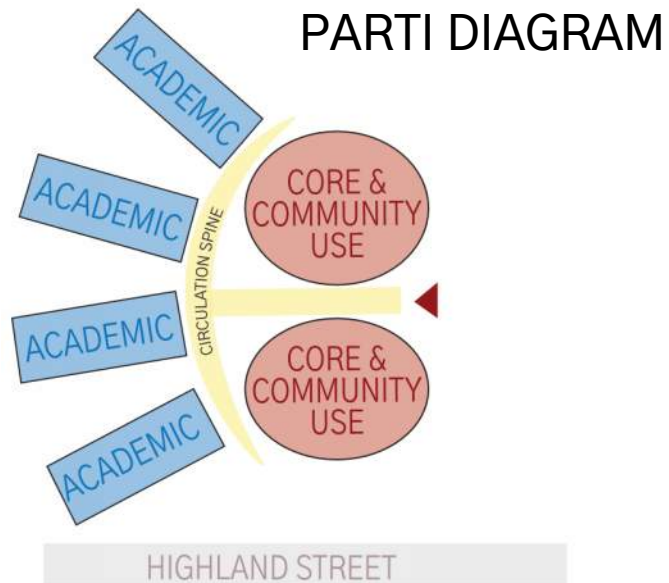
GROUND RULES

- This meeting will be recorded.
- After the meeting, The Green Engineer will compile a report summarizing the workshop

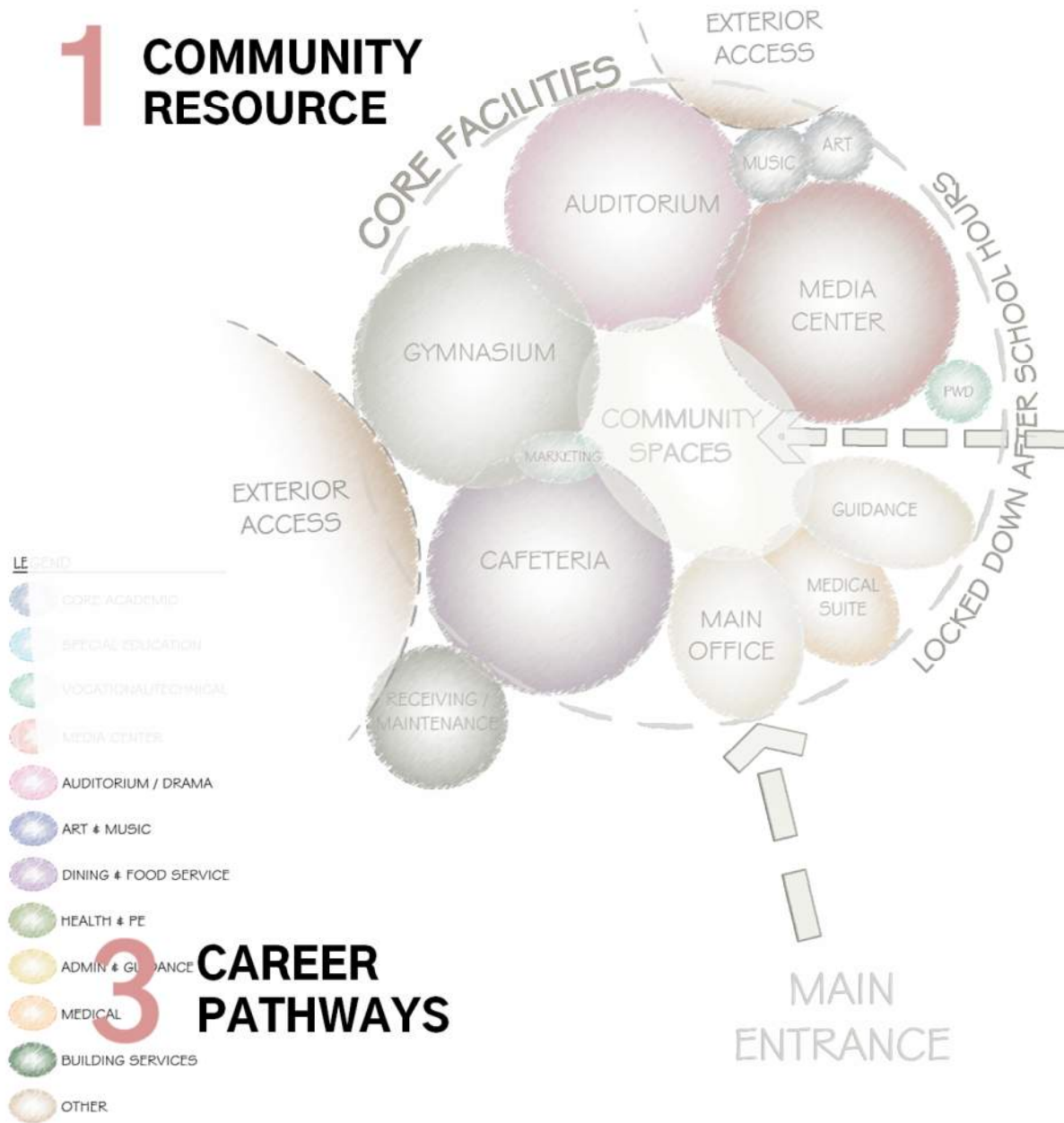


ICEBREAKER – Responses

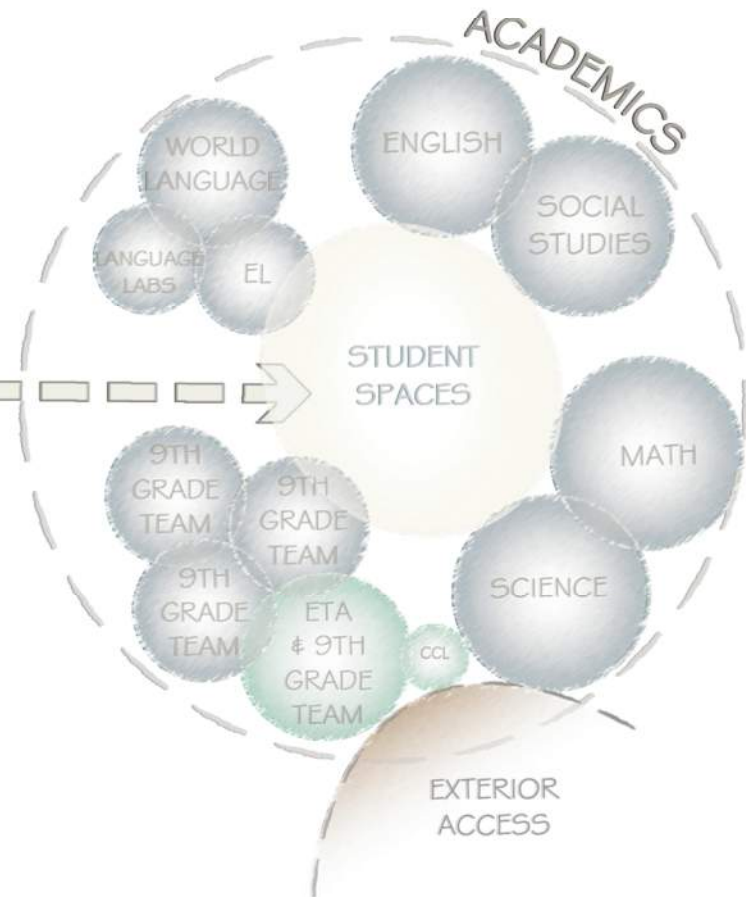
- **NEW CONSTRUCTION** ADJACENT TO THE EXISTING SCHOOL
- ENROLLMENT: **1670 STUDENTS**
- EXPANDED PROGRAM AND **COMMUNITY USE**
- AREA: +/- **422,000 SF**
- OCCUPANCY **FALL 2024**



1 COMMUNITY RESOURCE



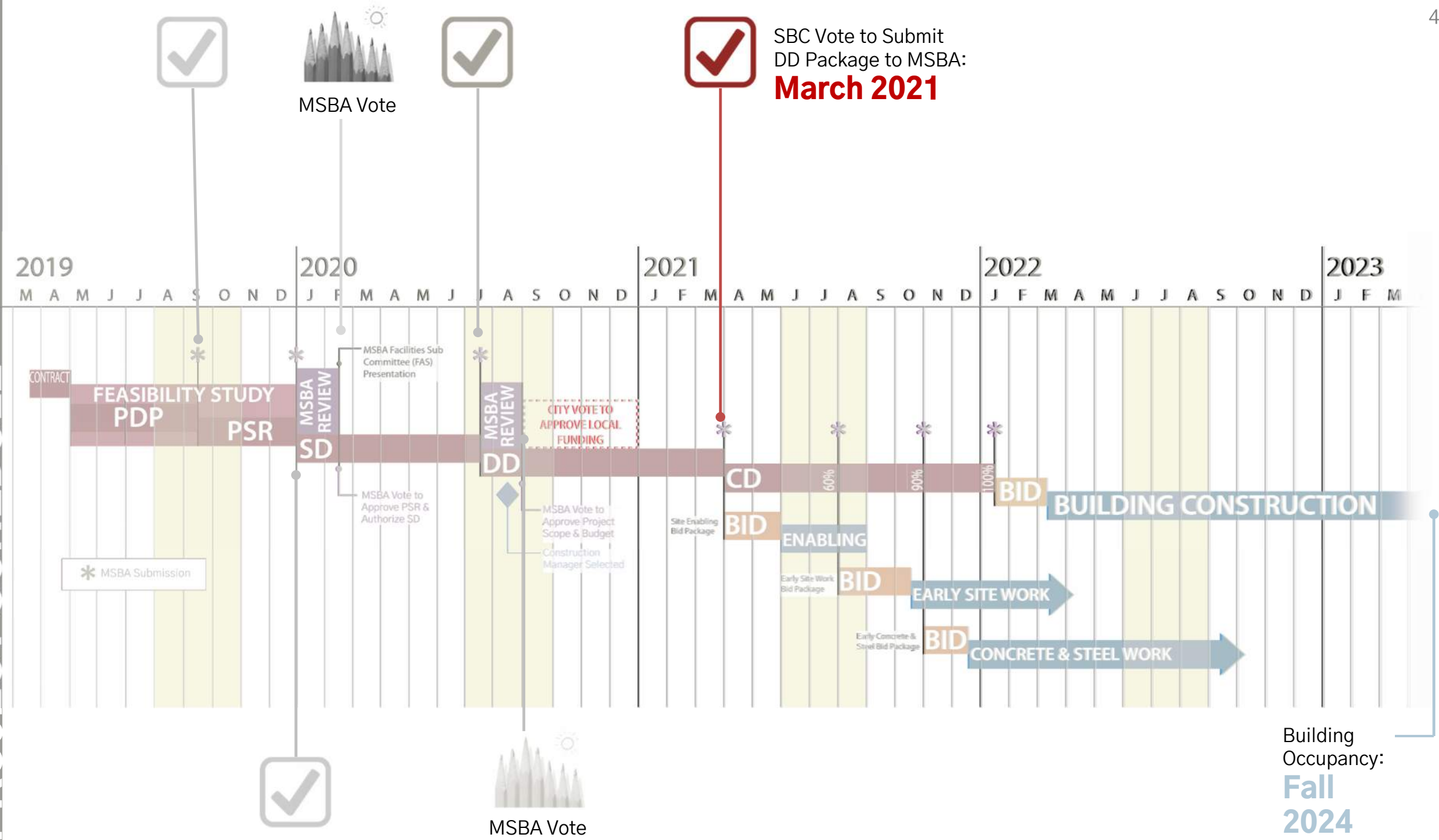
2 CLUSTERS OF LEARNING



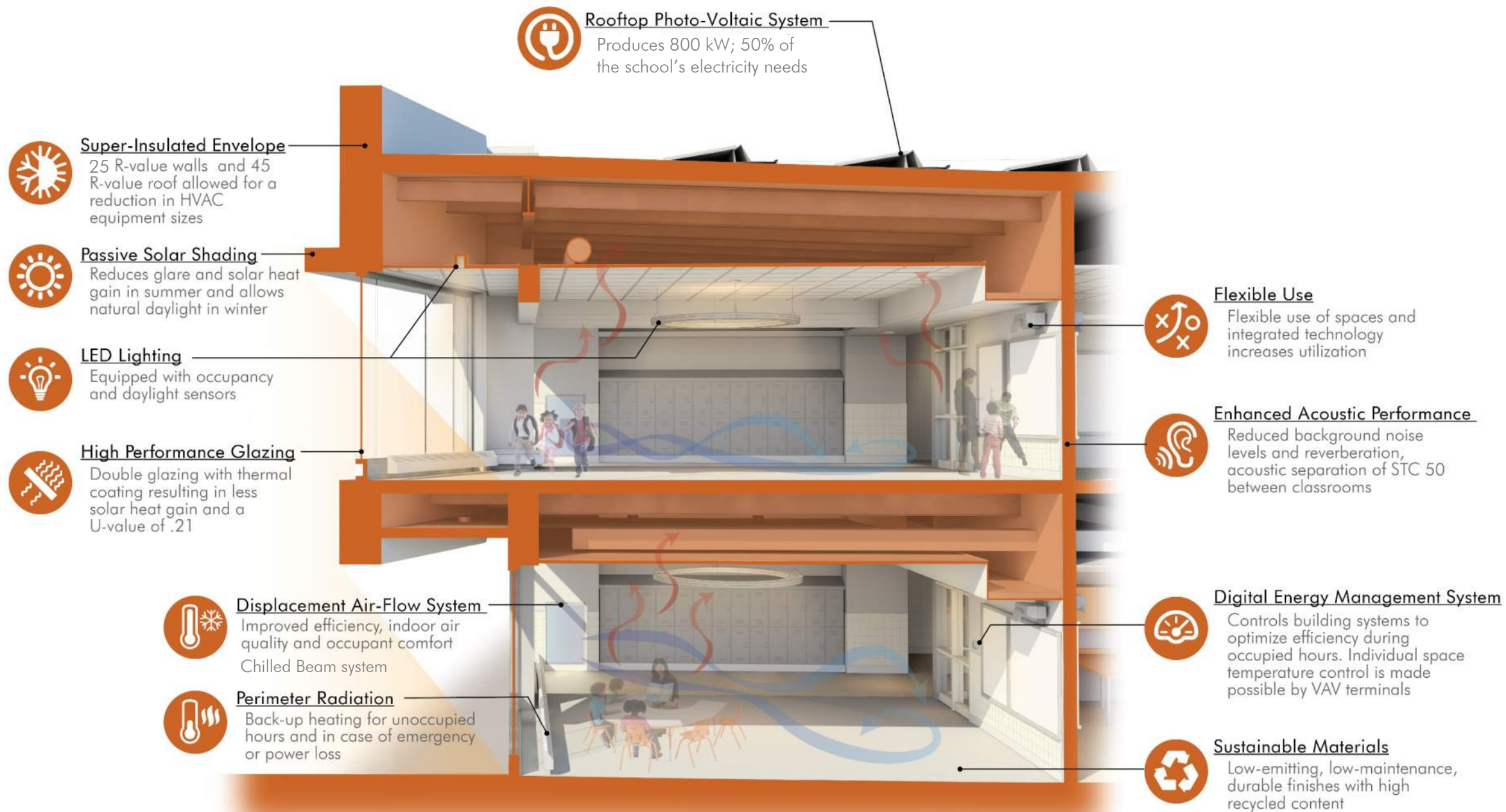
4 EXTERIOR CONNECTIONS

421, 858 Gross Square Feet Required by Proposed Educational Program

PROJECT SCHEDULE



Building
Occupancy:
**Fall
2024**



- BUILDING TO SERVE AS **COMMUNITY RESOURCE**
- FUNCTION AS A **SHELTER / WARMING STATION**
- **+50 YEAR** LIFESPAN
- **DURABLE** MATERIALS
- FULL AIR CONDITIONING FOR **YEAR-ROUND USE**
- **LANDSCAPE** BIODIVERSITY/ HEAT ISLAND EFFECT
- **STORMWATER** COLLECTION SYSTEMS
- LOW WATER USE FIXTURES
- ACOUSTICAL CONSIDERATIONS
- DOHERTY AS AN **EDUCATIONAL** TOOL
- **LEED SILVER CERTIFICATION**

50%

OF BUILDING ELECTRICITY
USE PROVIDED BY 800 kW
ROOFTOP SOLAR PV ARRAY

ENERGY USE
REDUCTION BEYOND
CODE BASELINE

±35%

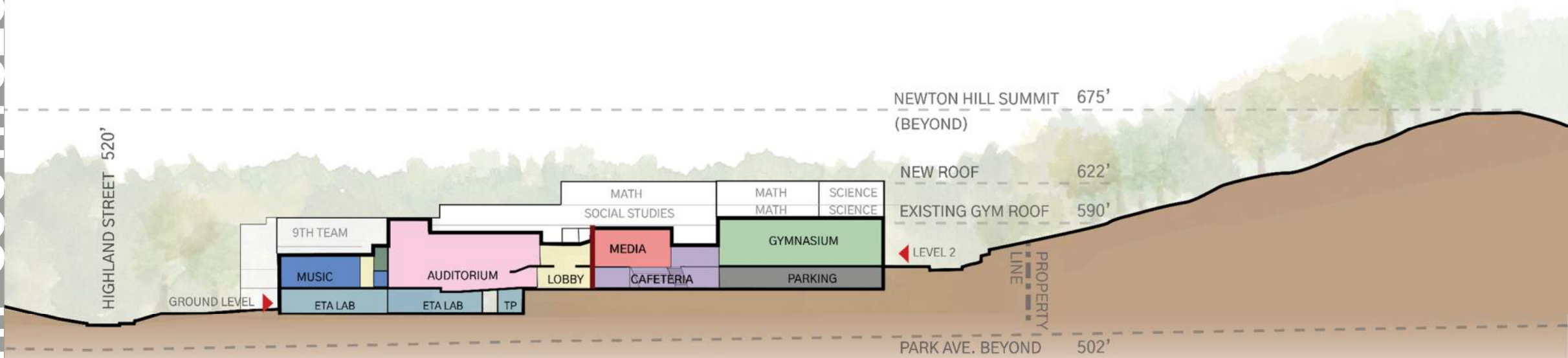
38 Kbtu
/SF
/yr

TARGET SITE
ENERGY USE
INTENSITY (EUI)

R VALUES OF
SUPER-INSULATED
WALLS/ROOF

25 WALL / 45 ROOF

NORTH-SOUTH SECTION



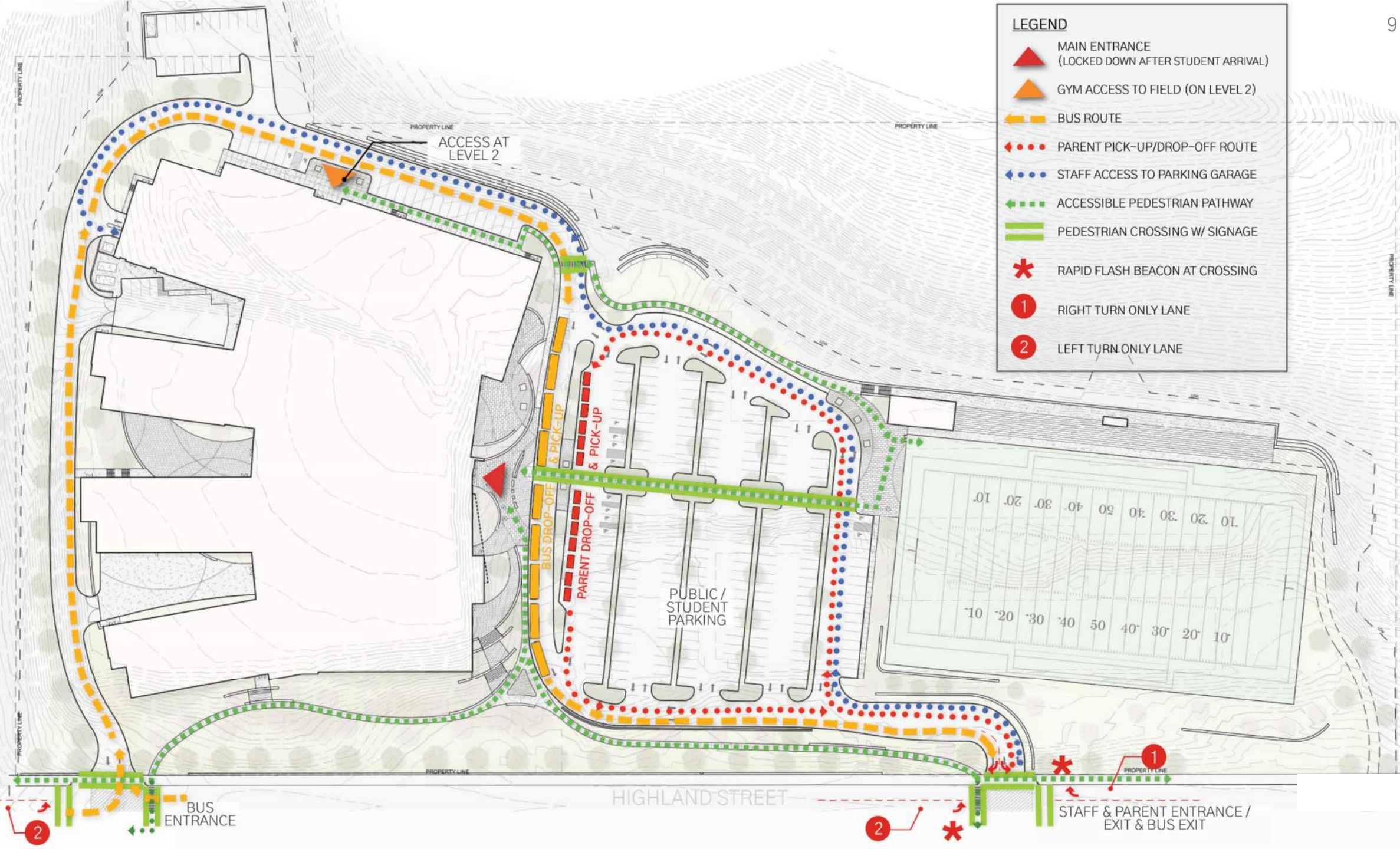
DOHERTY SITE: EXISTING



SITE PLAN: SITE FEATURES



SITE PLAN: CIRCULATION



LEGEND

- ▲ MAIN ENTRANCE
(LOCKED DOWN AFTER STUDENT ARRIVAL)
- ▲ GYM ACCESS TO FIELD (ON LEVEL 2)
- BUS ROUTE
- ♦♦♦ PARENT PICK-UP/DROP-OFF ROUTE
- ♦♦♦ STAFF ACCESS TO PARKING GARAGE
- ACCESSIBLE PEDESTRIAN PATHWAY
- PEDESTRIAN CROSSING W/ SIGNAGE
- * RAPID FLASH BEACON AT CROSSING
- 1 RIGHT TURN ONLY LANE
- 2 LEFT TURN ONLY LANE









MSBA Requirements & LEED Overview

- USING **LEED FOR SCHOOLS**, ACHIEVE A MINIMUM OF “**CERTIFIED**”
- **EXCEED** THE LEVEL OF **ENERGY EFFICIENCY** REQUIRED IN THE CURRENT MASSACHUSETTS (BASE) **ENERGY CODE BY 20%**, USING THE LEED FOR SCHOOLS “OPTIMIZE ENERGY PERFORMANCE” CREDIT





Doherty Memorial High School Sustainability Workshop Survey

The purpose of this survey is to gather community input on the sustainable design features proposed for the Doherty Memorial High School Project.

The results of this survey will help to determine the discussion topics for the Virtual Sustainability Workshop scheduled for October 5th, 2020 from 4:30-6:30 PM.

Please provide all responses by September 28, 2020.

The building and site design will incorporate many of the features shown below.
Which topics are most important to you?

Please rank each of the items in the list below on a scale from 1 (Most important) to 4 (Not important).

	1 (Most Important)	2 (Important)	3 (Slightly Important)	4 (Not as Important)
Heat Island Reduction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Healthy Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Embodied Carbon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

100+

RESPONDENTS
INCLUDING STAFF,
STUDENTS, PARENTS,
NEIGHBORS & CITY AND
COMMUNITY
REPRESENTATIVES

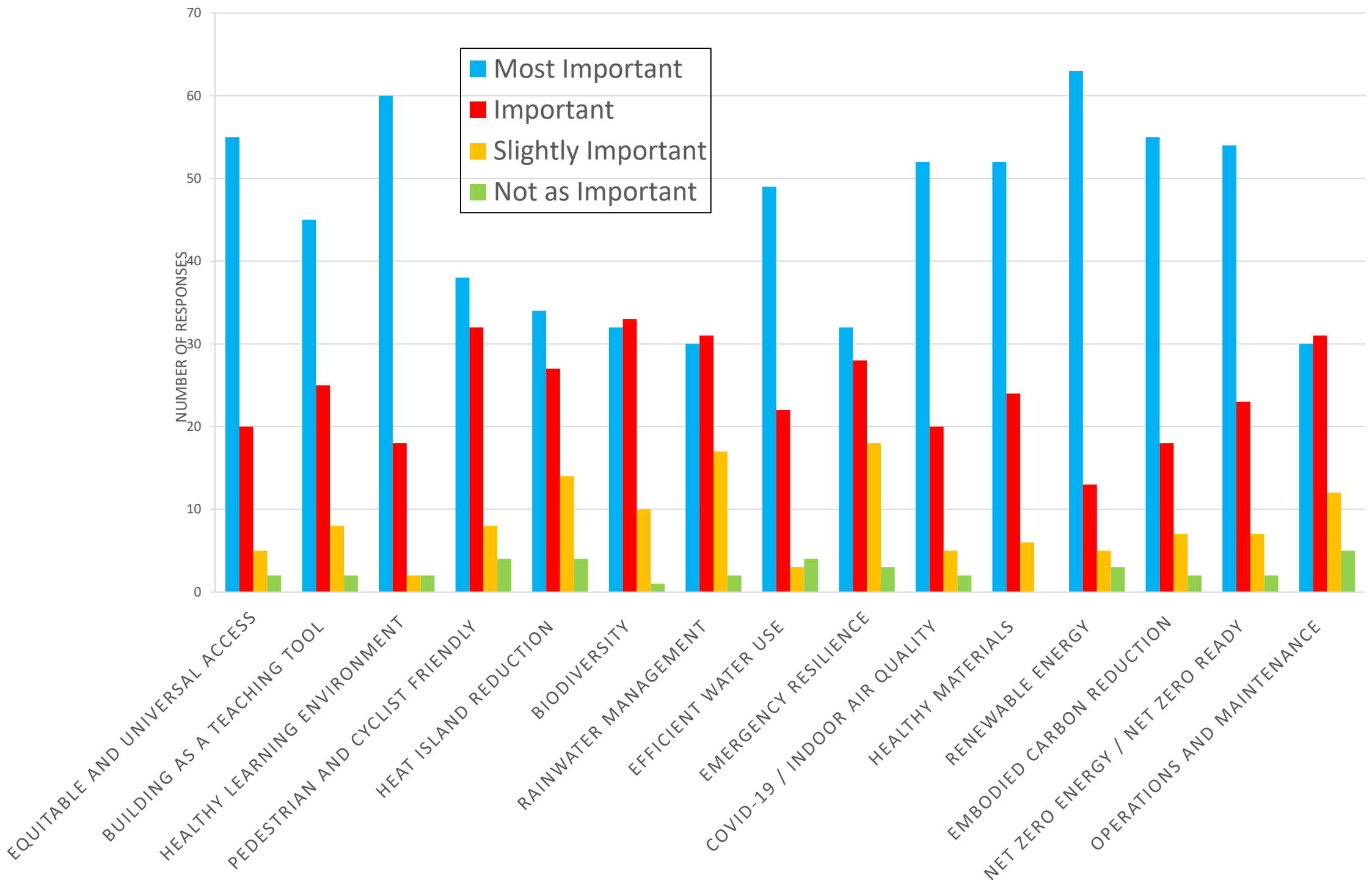
66%

OF RESPONDENTS
BELIEVE RENEWABLE
ENERGY IS A TOP
PRIORITY

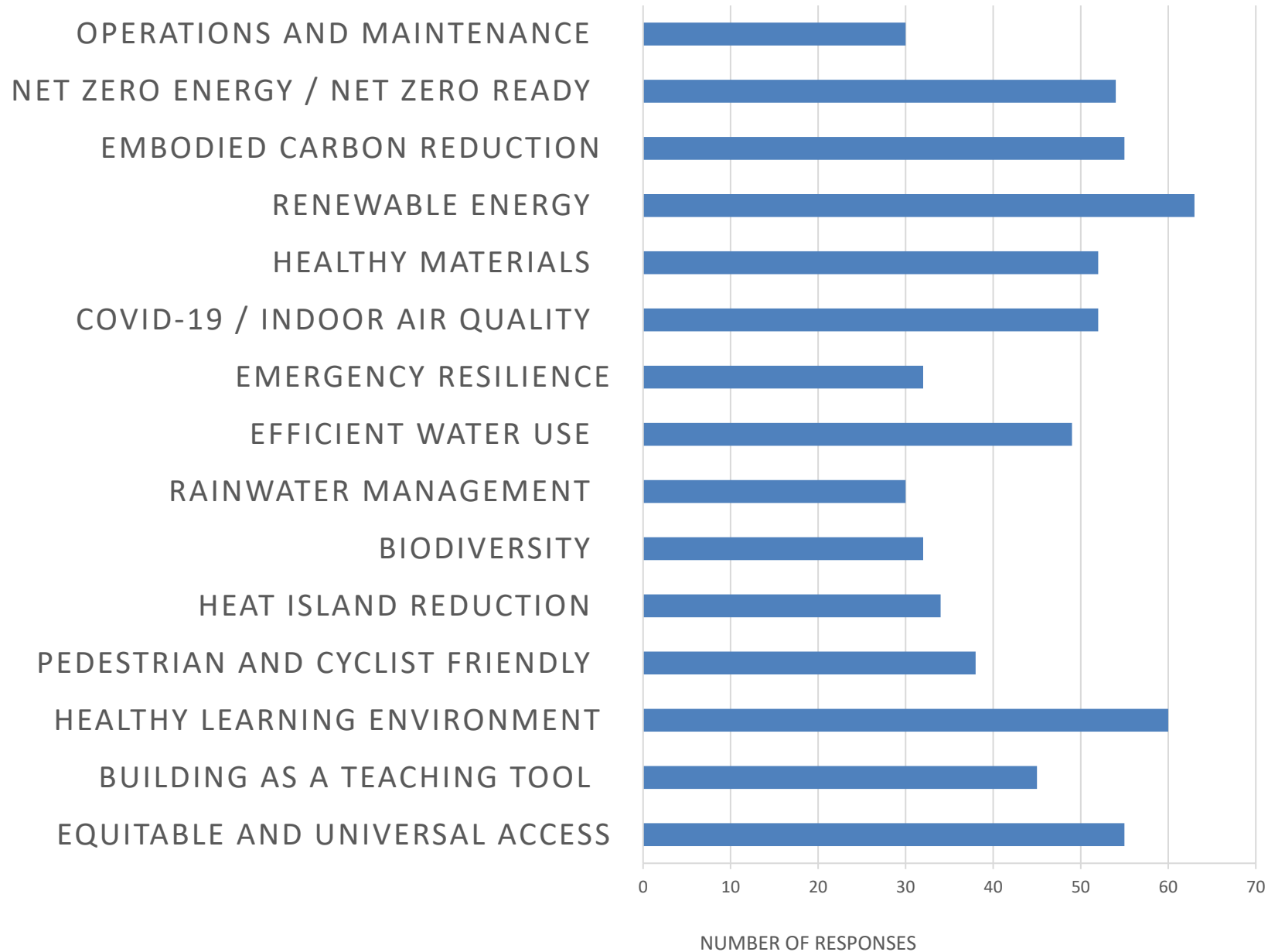
72

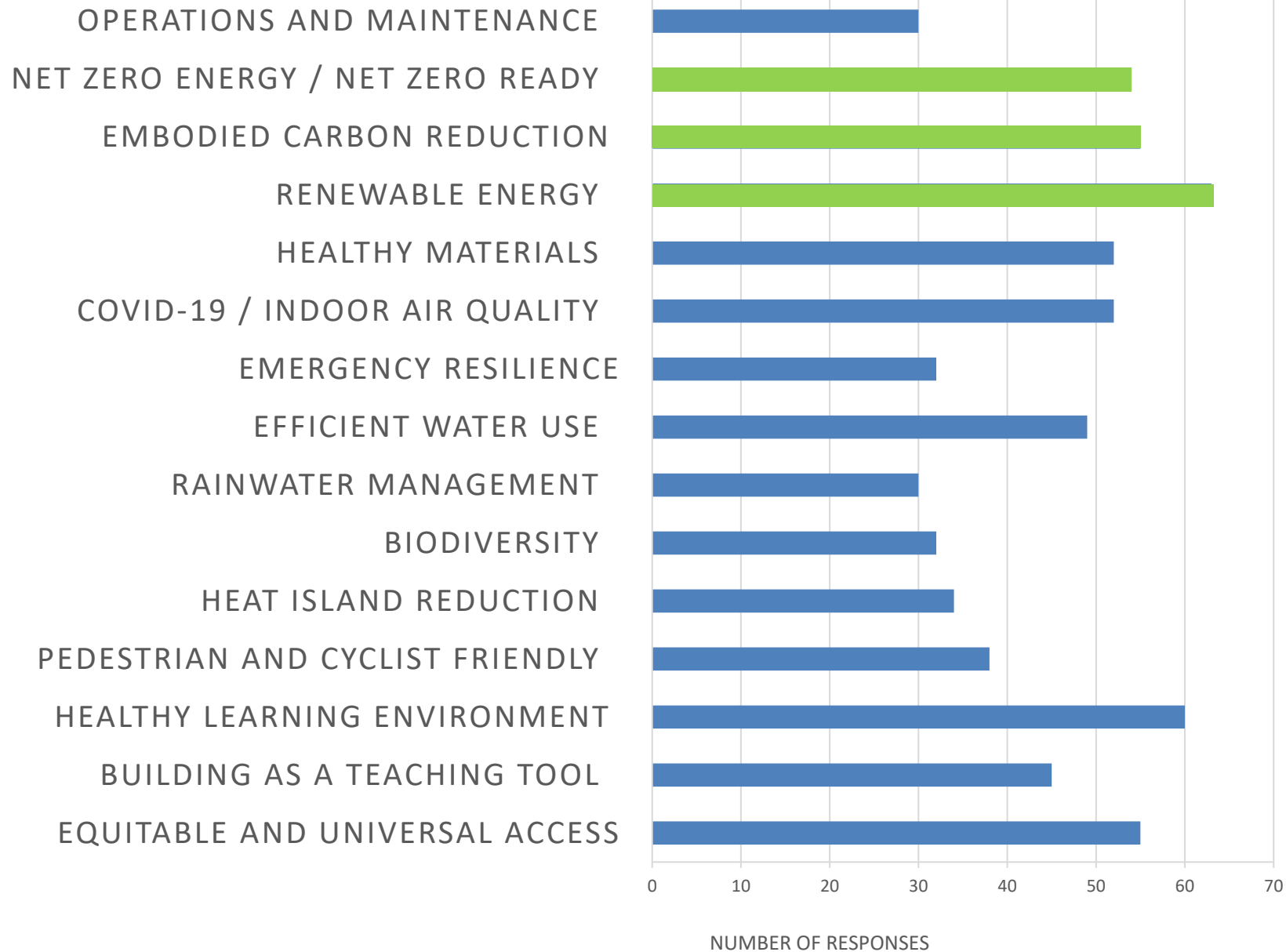
RESPONDENTS
PRIORITIZE A
HEALTHY LEARNING
ENVIRONMENT FOR
STUDENTS AND STAFF

SURVEY RESULTS



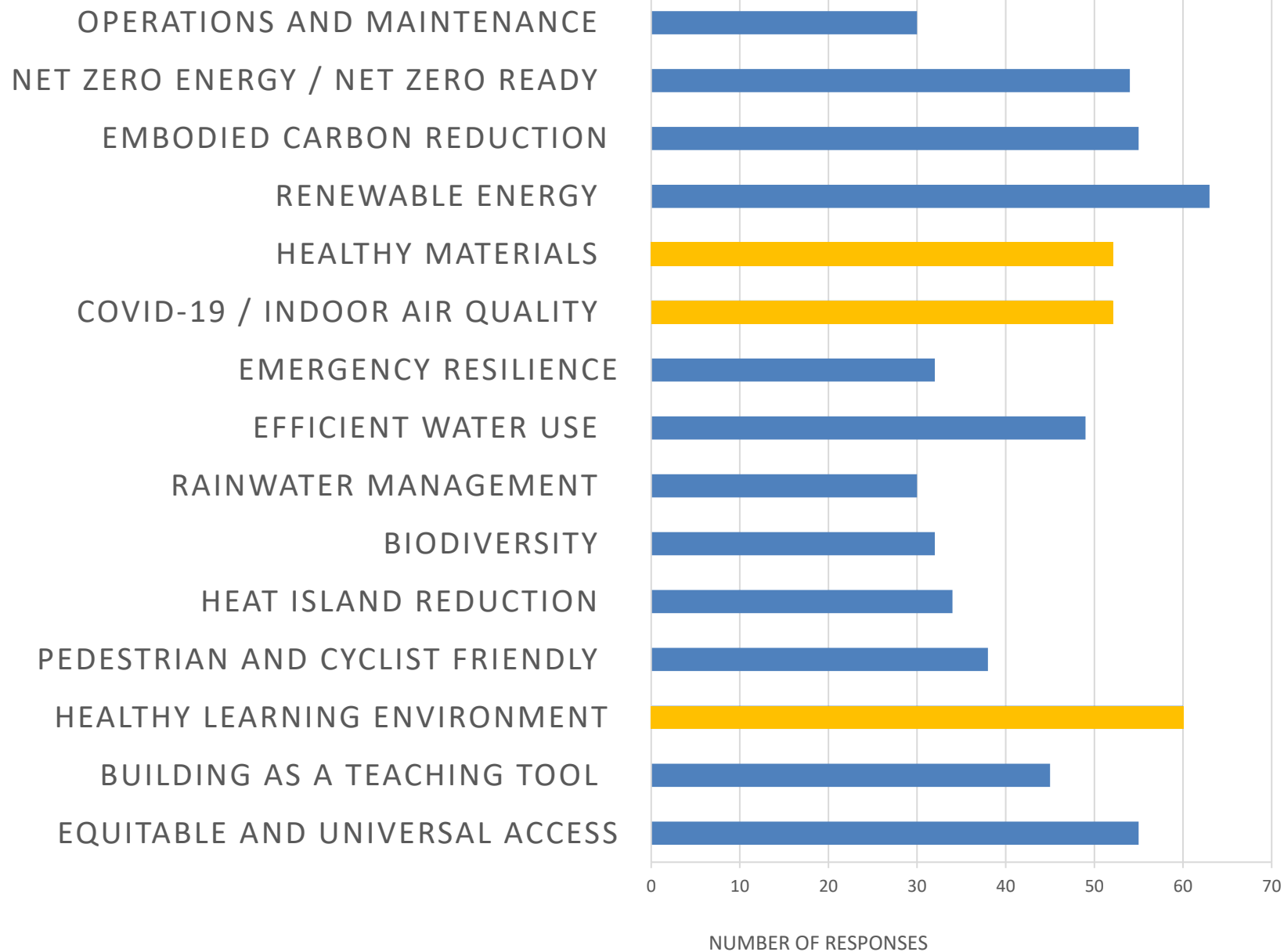
SURVEY RESULTS





SELECTED DISCUSSION TOPICS:

1 ENERGY

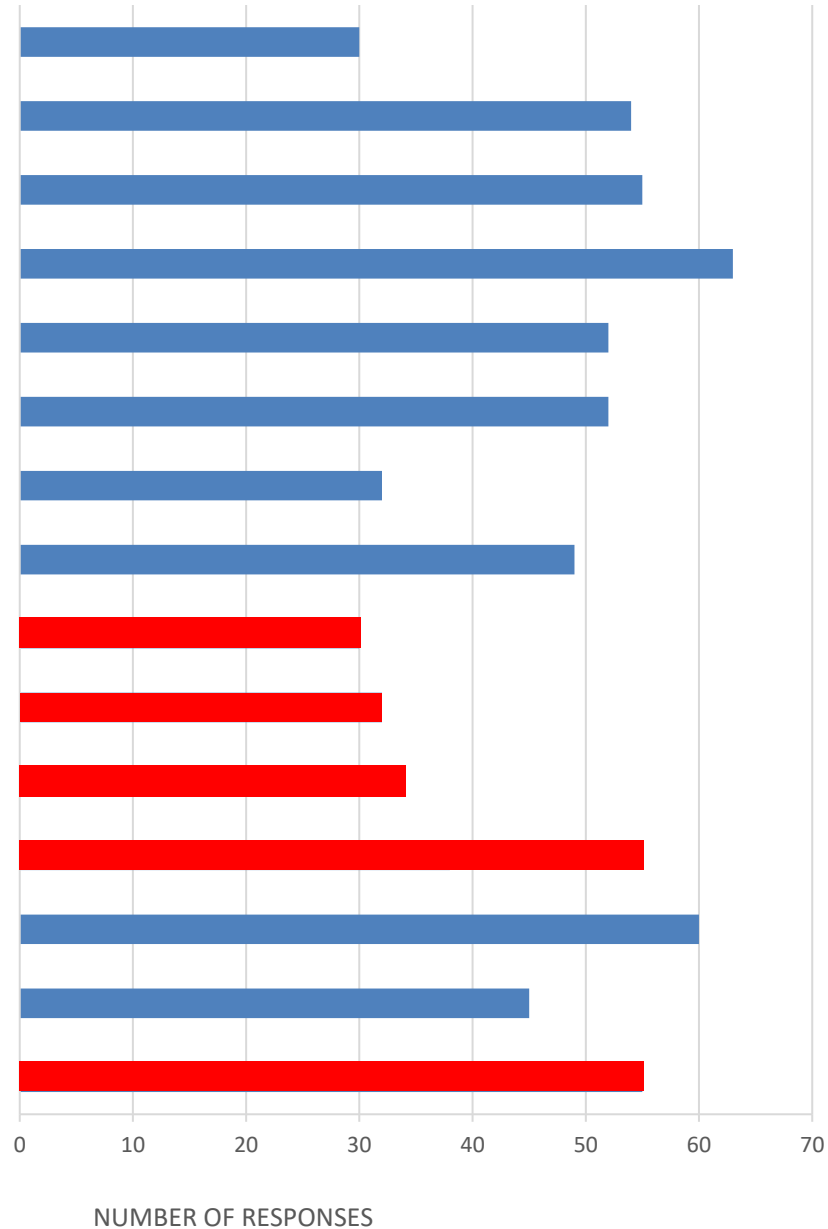


SELECTED DISCUSSION TOPICS:

1 ENERGY

2 HEALTHY LEARNING ENVIRONMENT

OPERATIONS AND MAINTENANCE
 NET ZERO ENERGY / NET ZERO READY
 EMBODIED CARBON REDUCTION
 RENEWABLE ENERGY
 HEALTHY MATERIALS
 COVID-19 / INDOOR AIR QUALITY
 EMERGENCY RESILIENCE
 EFFICIENT WATER USE
 RAINWATER MANAGEMENT
 BIODIVERSITY
 HEAT ISLAND REDUCTION
 PEDESTRIAN AND CYCLIST FRIENDLY
 HEALTHY LEARNING ENVIRONMENT
 BUILDING AS A TEACHING TOOL
 EQUITABLE AND UNIVERSAL ACCESS



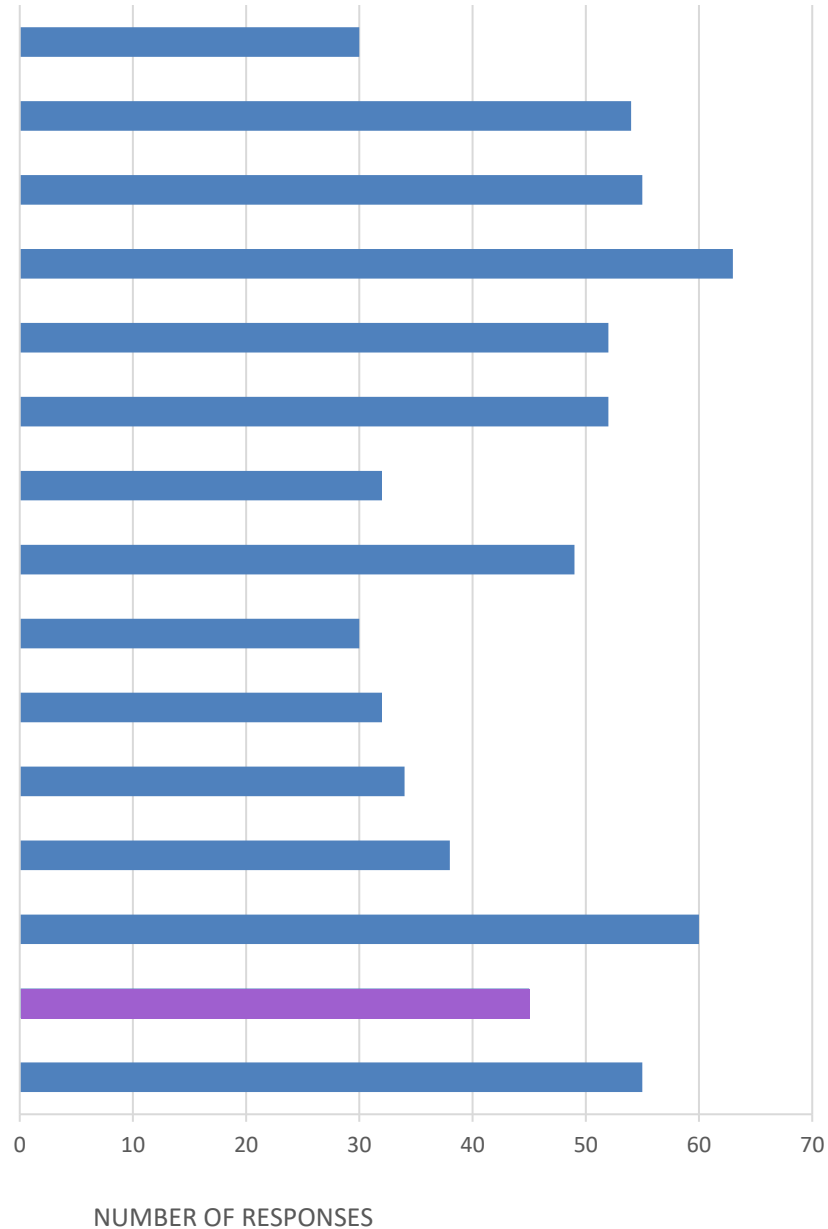
SELECTED DISCUSSION TOPICS:

1 ENERGY

2 HEALTHY LEARNING ENVIRONMENT

3 SITE ACCESS & SUSTAINABILITY

OPERATIONS AND MAINTENANCE
 NET ZERO ENERGY / NET ZERO READY
 EMBODIED CARBON REDUCTION
 RENEWABLE ENERGY
 HEALTHY MATERIALS
 COVID-19 / INDOOR AIR QUALITY
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 BIODIVERSITY
 HEAT ISLAND REDUCTION
 PEDESTRIAN AND CYCLIST FRIENDLY
 HEALTHY LEARNING ENVIRONMENT
 BUILDING AS A TEACHING TOOL
 EQUITABLE AND UNIVERSAL ACCESS



SELECTED DISCUSSION TOPICS:

1 ENERGY

2 HEALTHY LEARNING ENVIRONMENT

3 SITE ACCESS & SUSTAINABILITY

4 BUILDING AS A TEACHING TOOL

TOPIC 1: **ENERGY**

- Renewable Energy
- Net Zero Readiness
- Embodied Carbon Reduction



RN Series

R-13 Double Wall Construction



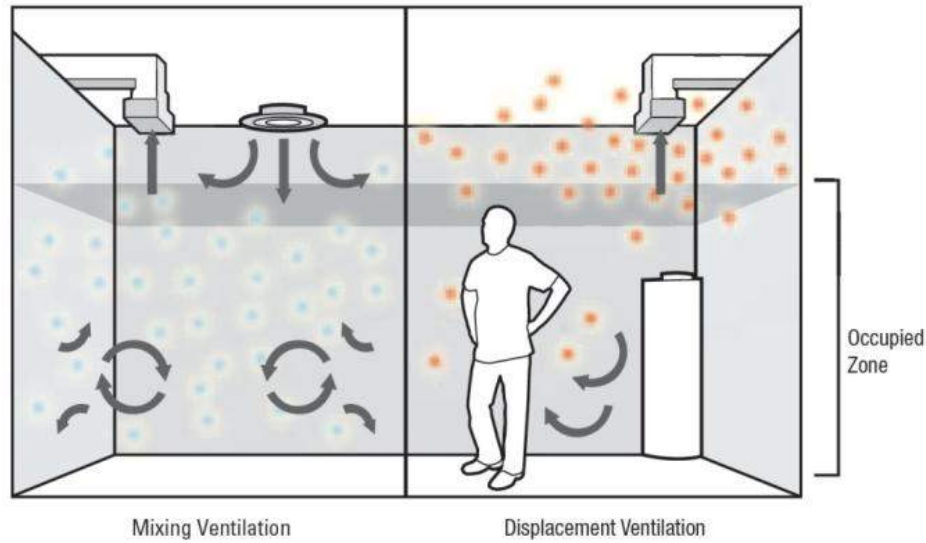
Inverter Compressors



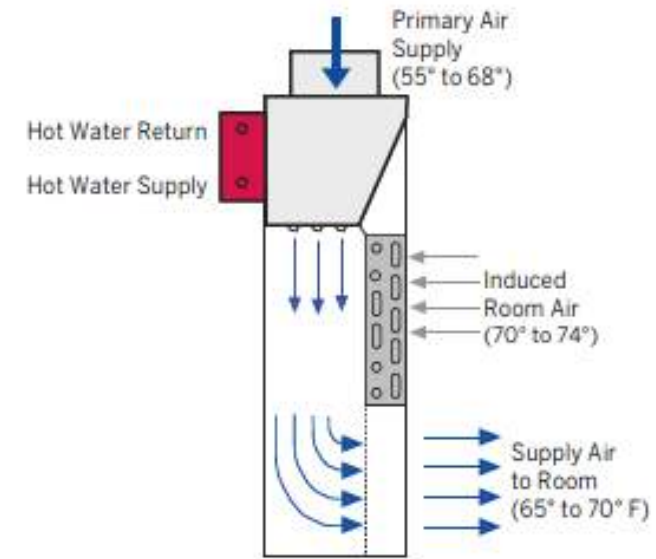
Total Energy Recovery Segments



Direct Drive Fans with EC Motors or VFD



Mixed Air vs Displacement



Displacement Chilled Beam

Superior Indoor Air Quality with Displacement Ventilation

Studies claim large improvements in air quality with Displacement

- Classroom study with DV shows **up to ~30% lower peak CO2 levels**¹
- ASHRAE recognizes a minimum **20% improvement in air quality**.²
- **DV – Results show 25% to 90% better air quality** than mixing.³
- Two year study in 12 schools retrofitted with DV - **reduced asthmatic symptoms by 69%**.⁴

1. Arent, J., Eley, C., & Meister, B. (2006). *Displacement Ventilation in Action: Performance Monitoring of Demonstration Classrooms*. ACEE Summer Study on Energy Efficiency in Buildings.
 2. ASHRAE Standard 62.1 – 2013. *Ventilation for Acceptable Indoor Air Quality*.
 3. Jung, A., and M. Zeller, 2005. *Analysis and Testing of Methods to Determine Indoor Air Quality and Air Change Effectiveness*. Original technical paper from Rheinisch-Westfälische Technical University of Aachen, Germany, 1994.
 4. Smedje, G., & Norback, D. (2000). *New Ventilation Systems at Select Schools in Sweden - Effects on Asthma and Exposure*.

Ambient Lighting System

- **LED LIGHT FIXTURES**
- **40–50% MORE EFFICIENT THAN CODE**

Lighting Control System

- **DAYLIGHT DIMMING & OCCUPANCY SENSORS**
- **PLUG LOAD CONTROL**

Solar Photovoltaic System

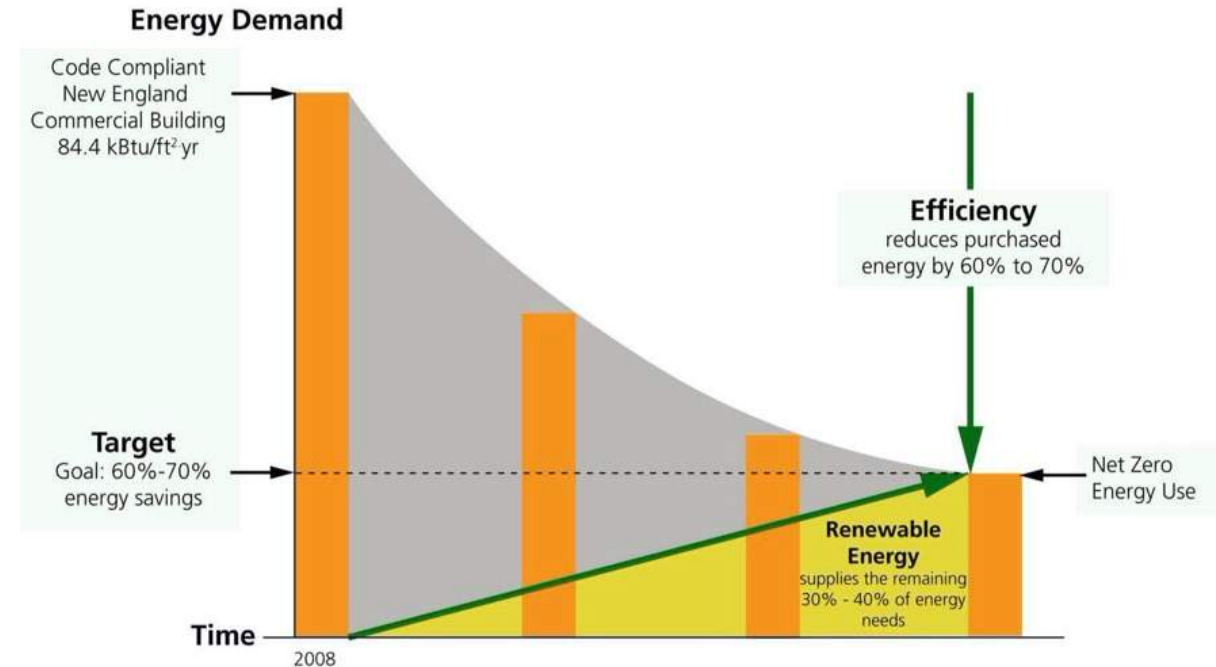
- **800 kW ROOF MOUNTED PHOTOVOLTAIC SYSTEM**
- **BASED ON 425-WATT PV MODULES**
- **PROJECTED TO OFFSET 40–50% OF THE BUILDING'S ELECTRICAL CONSUMPTION**

Pathways to Low/Zero Carbon



- Low EUI
- Decarbonization of Heat
- Solar on Site
- Community Renewables

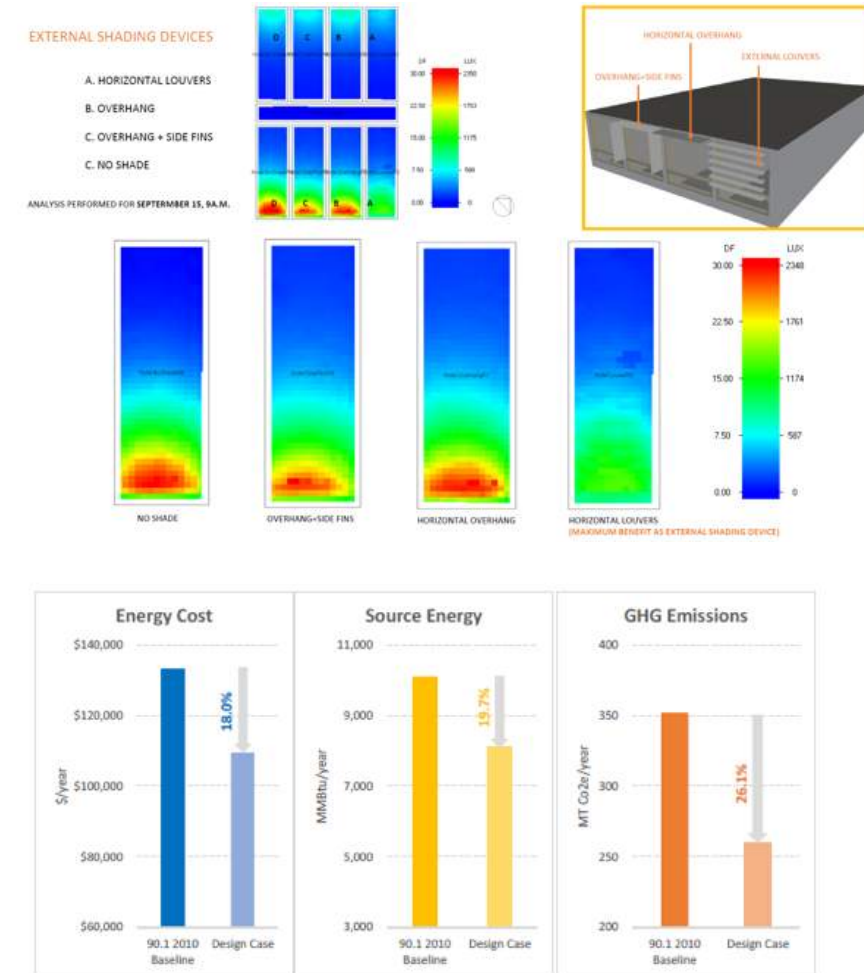
General Approach



Source: Federal R&D Agenda for Zero-Net Energy high Performance Green Buildings, National Science and Technology Council, October 2008

Common Themes of Successful Low Carbon Projects

- ESTABLISH **ENERGY TARGETS EARLY**
- FOCUS ON **REDUCING LOADS** – BUILDING ENVELOPE, RIGHT SIZING
- NON-TYPICAL **HVAC SYSTEMS** – HEAT PUMPS, ERVS
- **MODELING** USED TO TEST ALTERNATIVES
- DECISION TO ELIMINATE **FOSSIL FUELS** IS CRITICAL AND DIFFICULT
- THIRD-PARTY OWNERSHIP OF **RENEWABLES**



TOPIC 1: **ENERGY**

- Discussion

TOPIC 2:

HEALTHY ENVIRONMENT

- Healthy Learning Environment for Students
- Healthy Materials
- Indoor Air Quality / COVID-19

HIGH PERFORMANCE ENVELOPE

Super-insulation & high performance glazing allows for a reduction in HVAC equipment sizes



WEIGHT ROOM

Strength training, cardio,
heart rate monitoring

HEALTH CLASSROOMS

Nutrition, Lifestyle, Health, Social
Emotional Skills, Mindfulness

ADAPTIVE PE

Alternative physical education
space for Special Education
students and Special Olympics and
Unified Sports

GYMNASIUM

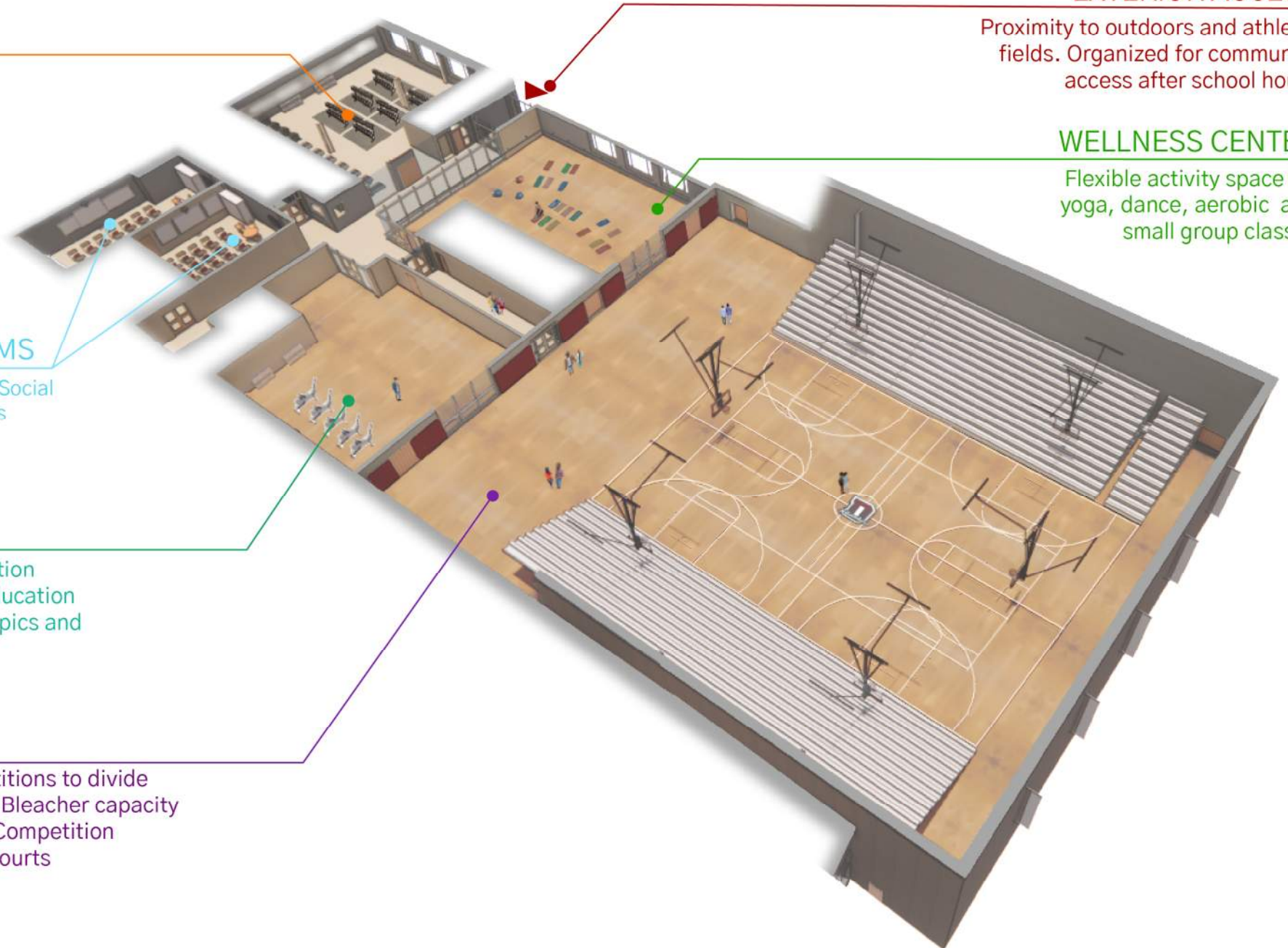
18,000 SF with mobile partitions to divide
into (5) teaching stations. Bleacher capacity
for full student assembly. Competition
Basketball and Volleyball courts

EXTERIOR ACCESS

Proximity to outdoors and athletic
fields. Organized for community
access after school hours

WELLNESS CENTER

Flexible activity space for
yoga, dance, aerobic and
small group classes



- ALL STUDENTS RECEIVE **FREE BREAKFAST AND LUNCH**
- **CHEF-RUN KITCHEN** WITH **FROM-SCRATCH** COOKING
- **SATELLITE GRAB AND GO** WILL PROVIDE **DINNER** TO STUDENTS AFTER SCHOOL HOURS
- **OUTDOOR DINING** AND ALTERNATIVE CAFETERIA SEATING



STUDENT / COMMUNITY GARDEN



Consolidated Recommendations: ASHRAE, CIBSE, REHVA

- **INCREASE AIR SUPPLY AND EXHAUST VENTILATION**
- **USE OPERABLE WINDOWS**
- **LIMIT OR ELIMINATE USE OF AIR RECIRCULATION**
- **INCREASE HOURS OF VENTILATION SYSTEM OPERATION**
- **UPGRADE FILTRATION**
- **CLOSE TOILET LIDS**

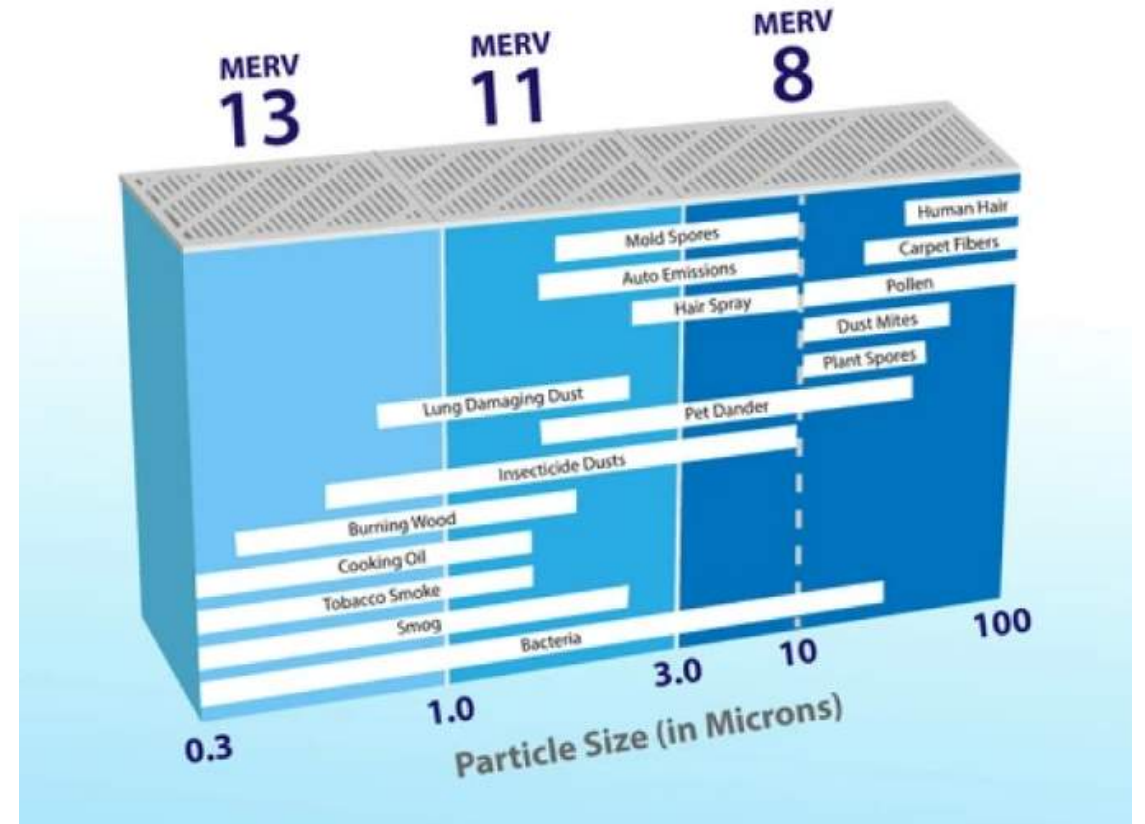




Bipolar Ionization



UV-C Light



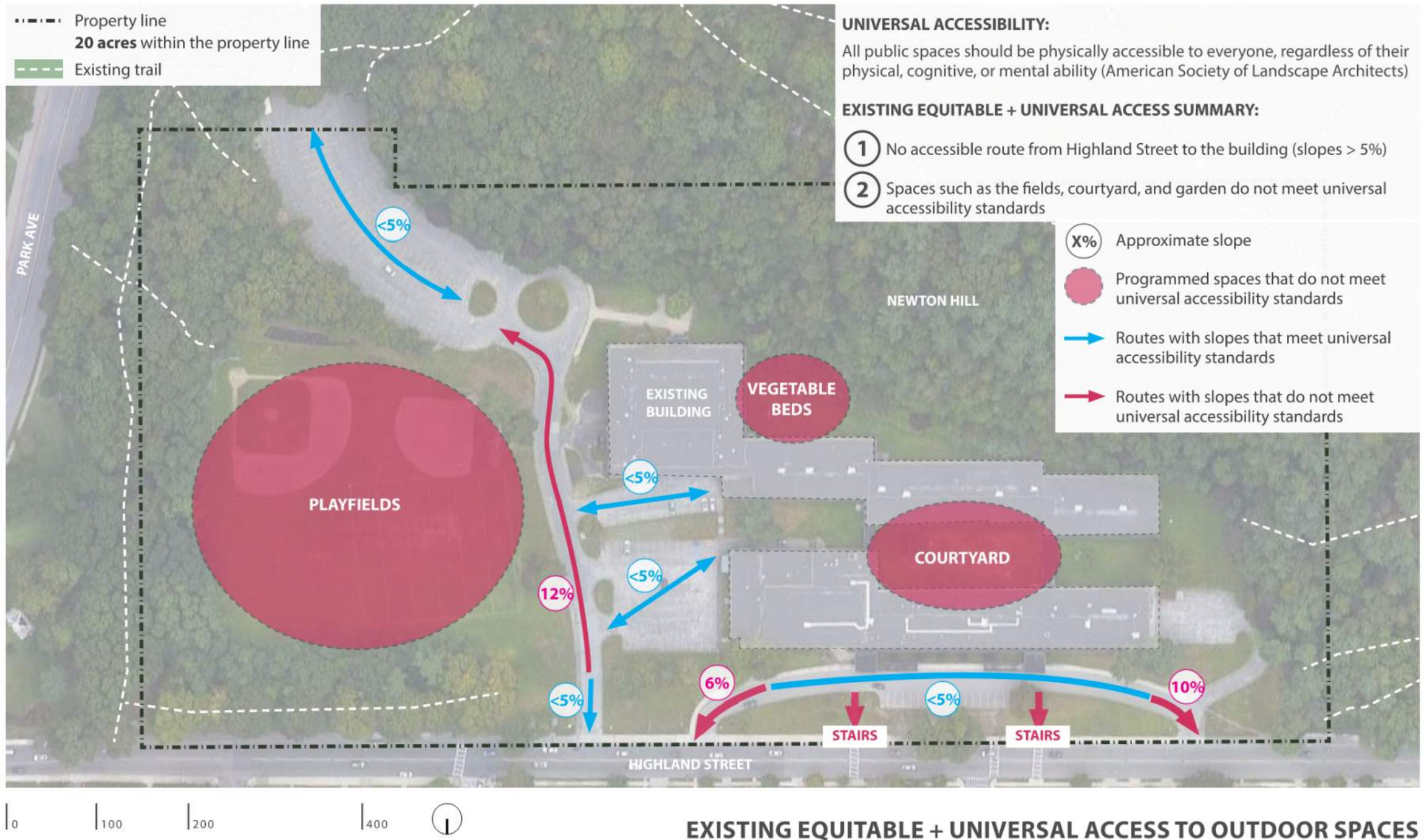
Filtration

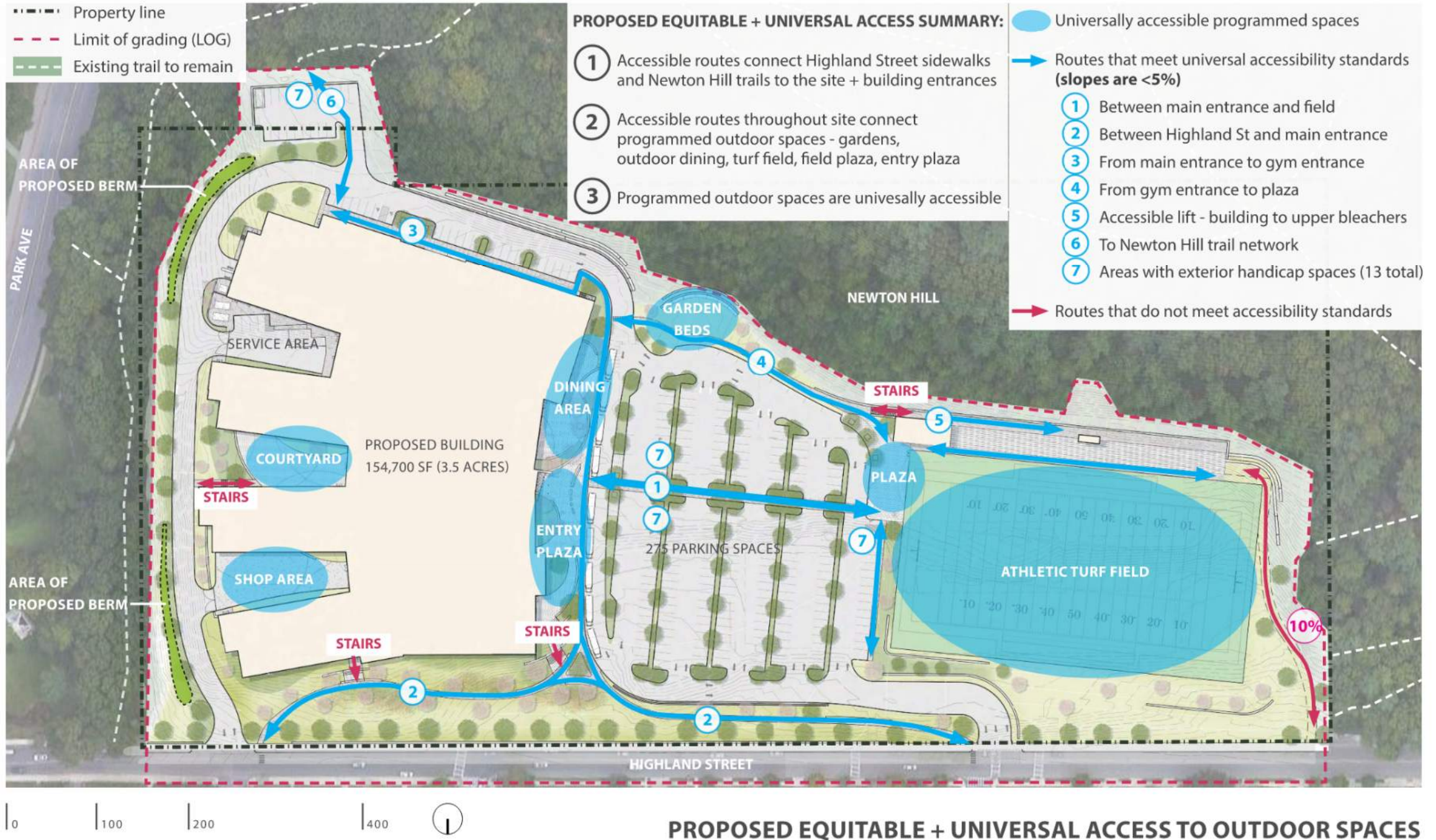
TOPIC 2: **HEALTHY ENVIRONMENT**

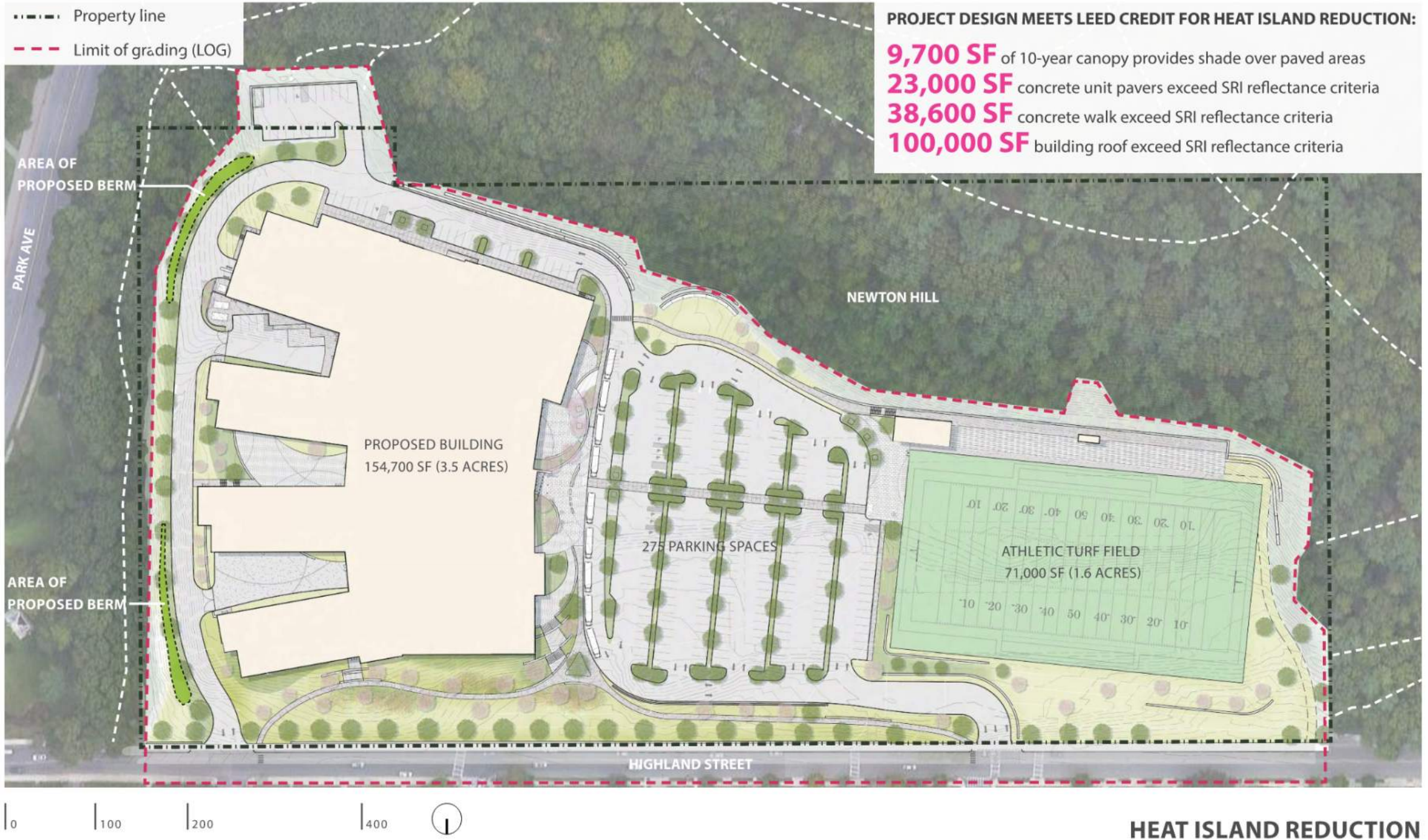
- Discussion

TOPIC 3: **SUSTAINABLE SITE FEATURES**

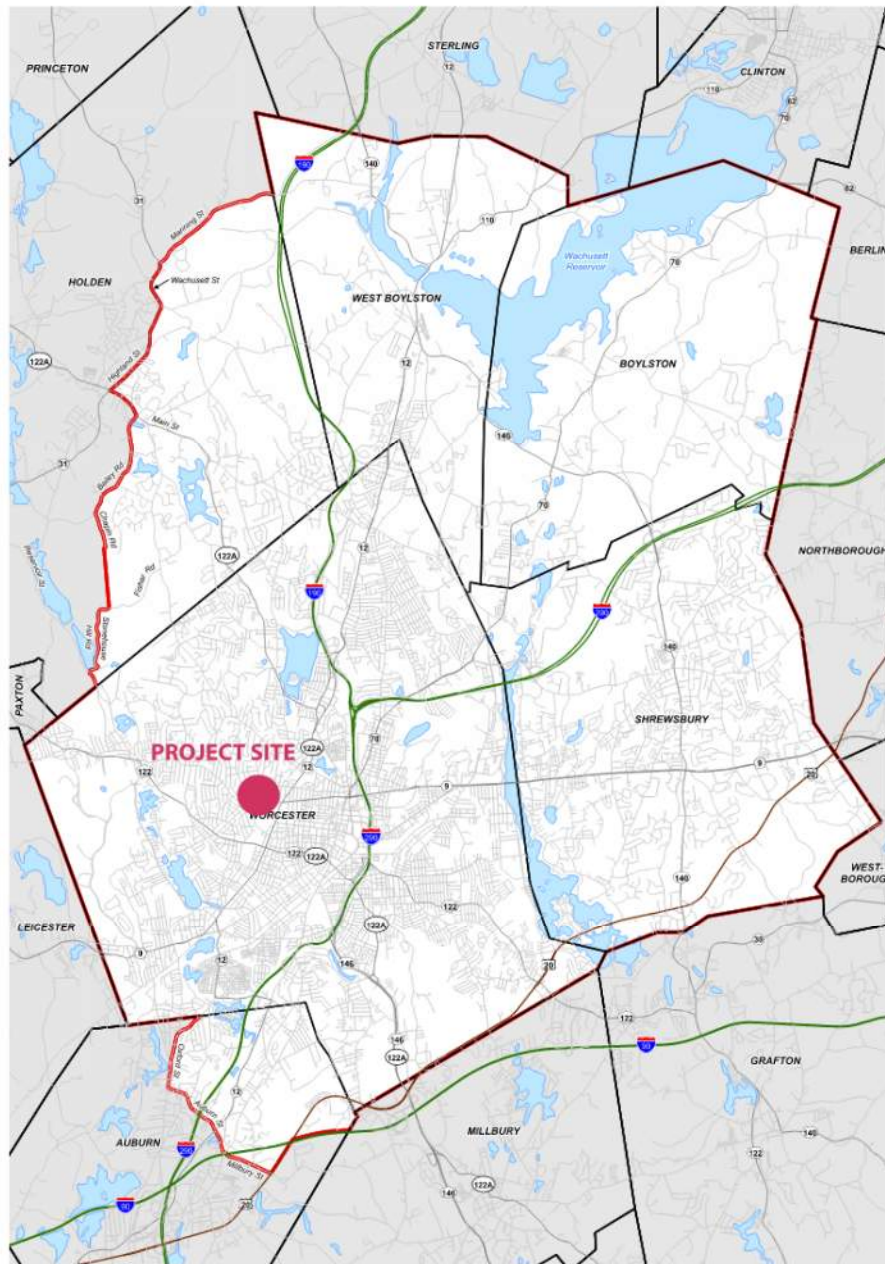
- Equitable Access
- Reduction of Heat Island Effect
- Biodiversity
- Rainwater Management











A.L.B. QUARANTINE ZONE

A.L.B. DO NOT PLANT LIST

* = Located on site



MAPLE*

Acer spp.



HORSECHESTNUT

Aesculus spp.



WILLOW

Salix spp.



ELM*

Ulmus spp.



BIRCH*

Betula spp.



KATSURA

Cercidiphyllum japonicum



MIMOSA

Albizia julibrissin



ASH*

Fraxinus spp.



SYCAMORE*

Plantanus spp.



MOUNTAIN ASH

Sorbus spp.



POPLAR

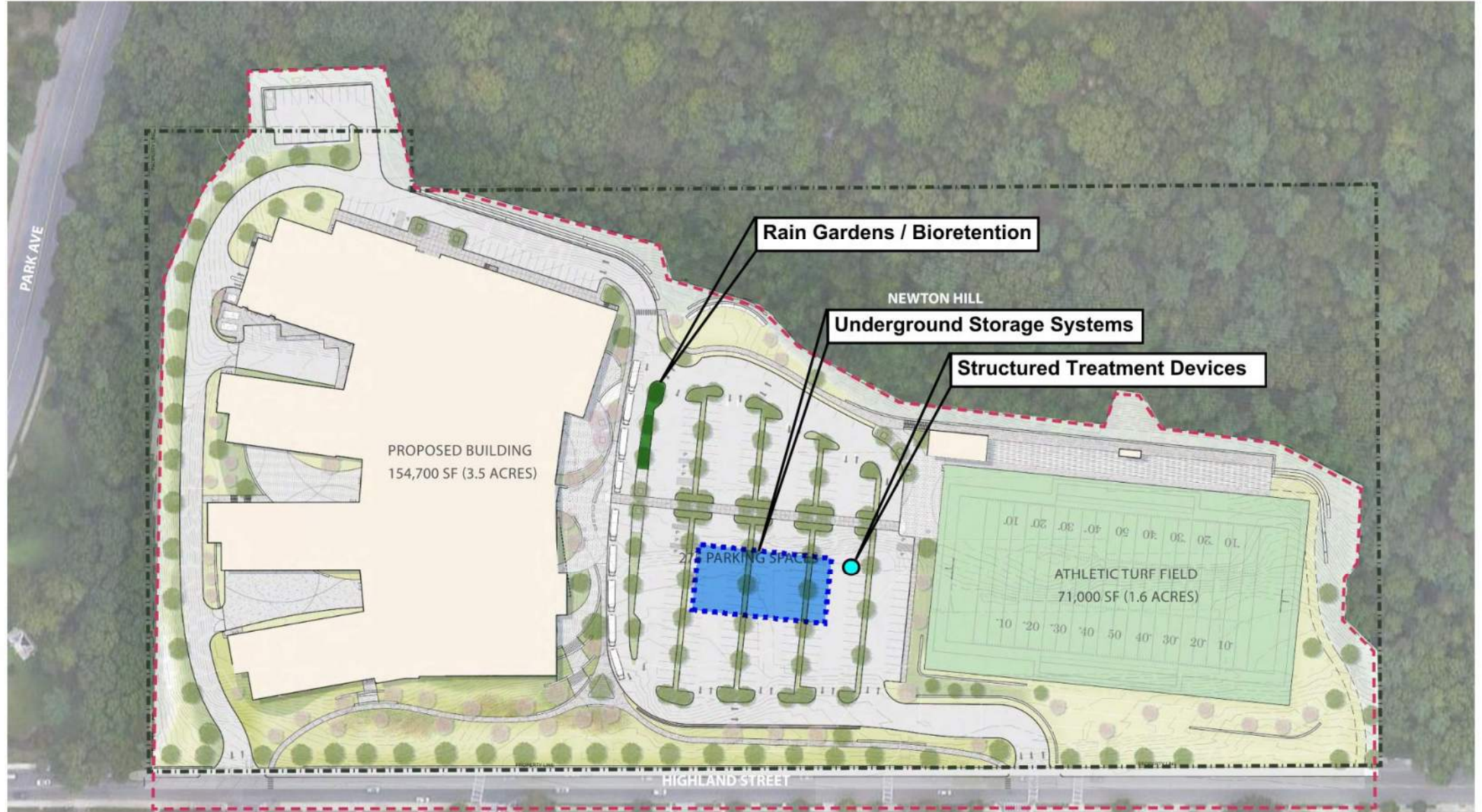
Populus spp.



HACKBERRY*

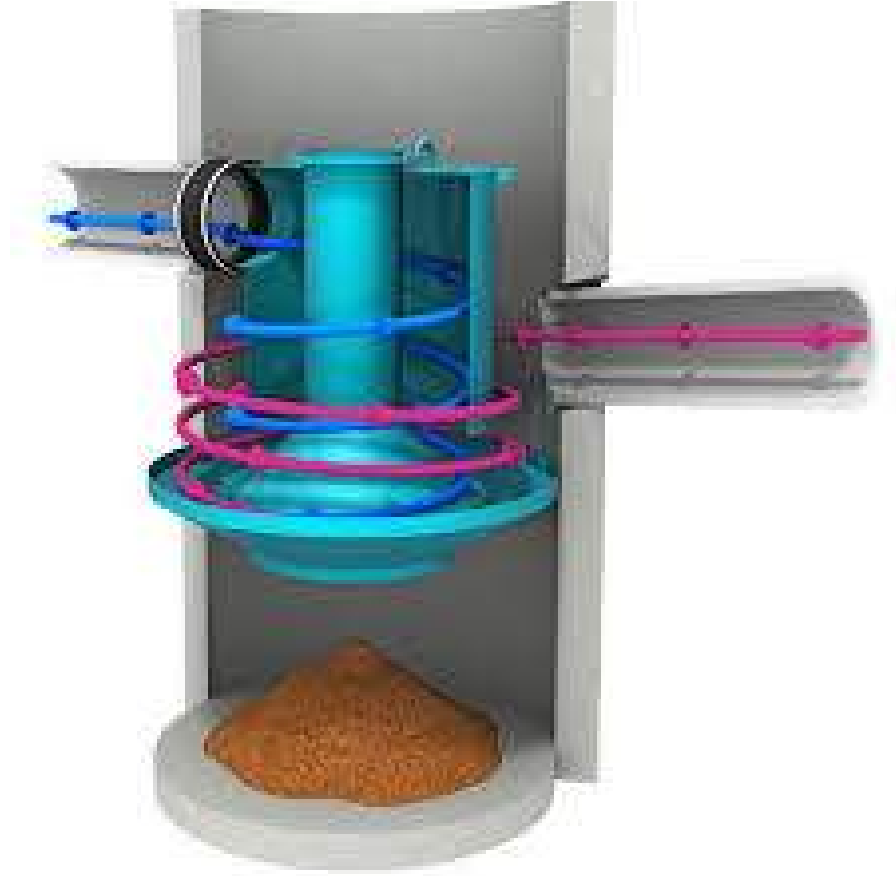
Celastris orbiculatus



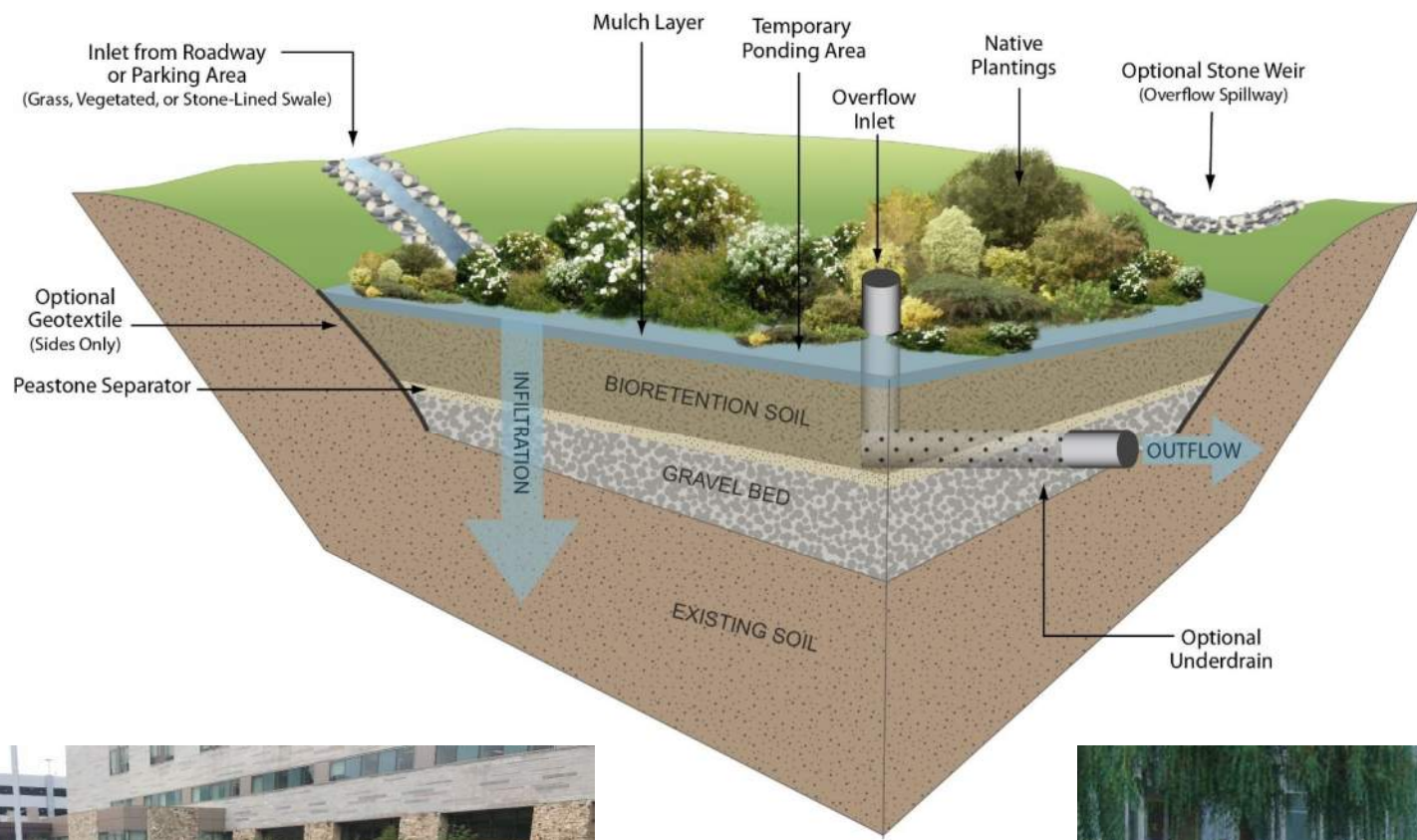


UNDERGROUND STORAGE SYSTEMS





RAIN GARDENS / BIORETENTION



TOPIC 3: **SUSTAINABLE SITE FEATURES**

- Discussion

TOPIC 4: **BUILDING AS A TEACHING TOOL**

- Features within the building that will teach occupants about sustainability

ACTIVE

- INTERACTIVE DISPLAYS FOR ENERGY USAGE AND BUILDING SYSTEMS PERFORMANCE

PASSIVE

- BUILDING SIGNAGE
- SUN SHADING / PV SYSTEMS
- BIODIVERSITY

FUNCTIONAL

- OCCUPANCY/DAYLIGHT SENSORS
- RAIN GARDENS/STORMWATER MANAGEMENT

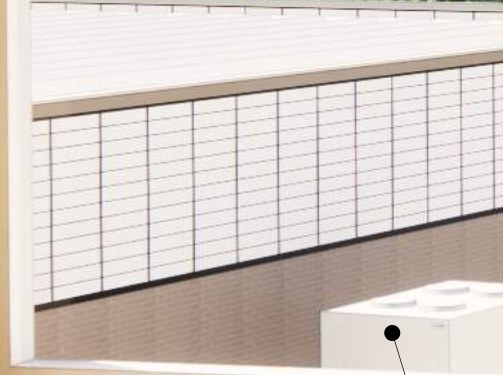
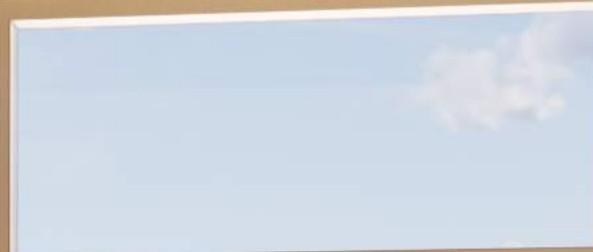
CURRICULUM

- SCIENCE AND BIOTECHNOLOGY PROGRAMS
- ENGINEERING & TECHNOLOGY ACADEMY
- CONSTRUCTION CRAFT LABORER

Auditorium



BUILDING AS A TEACHING TOOL



Newton Hill beyond

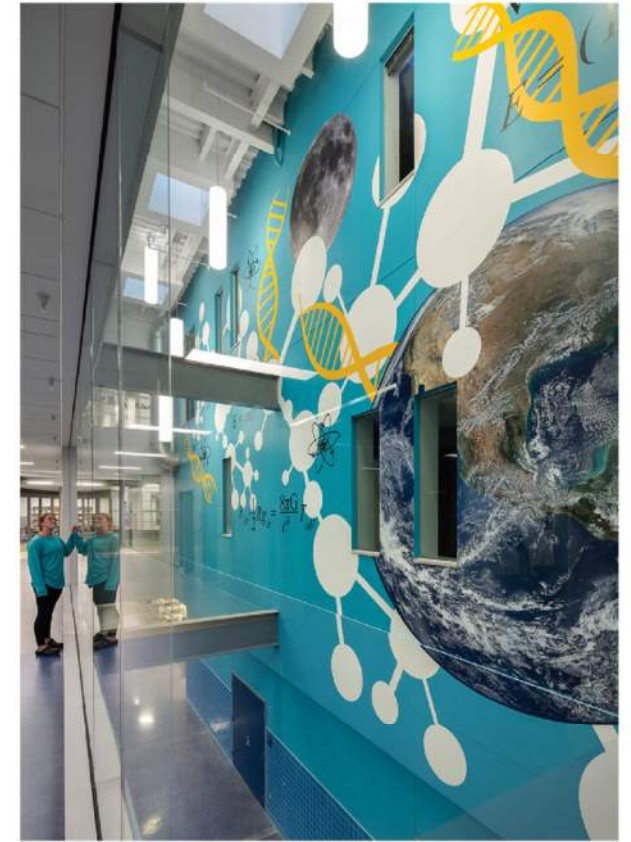
Efficient systems & digital
energy management software

800 Kw Rooftop PV Array

Mural Concept



CAFETERIA / GYMNASIUM WALL

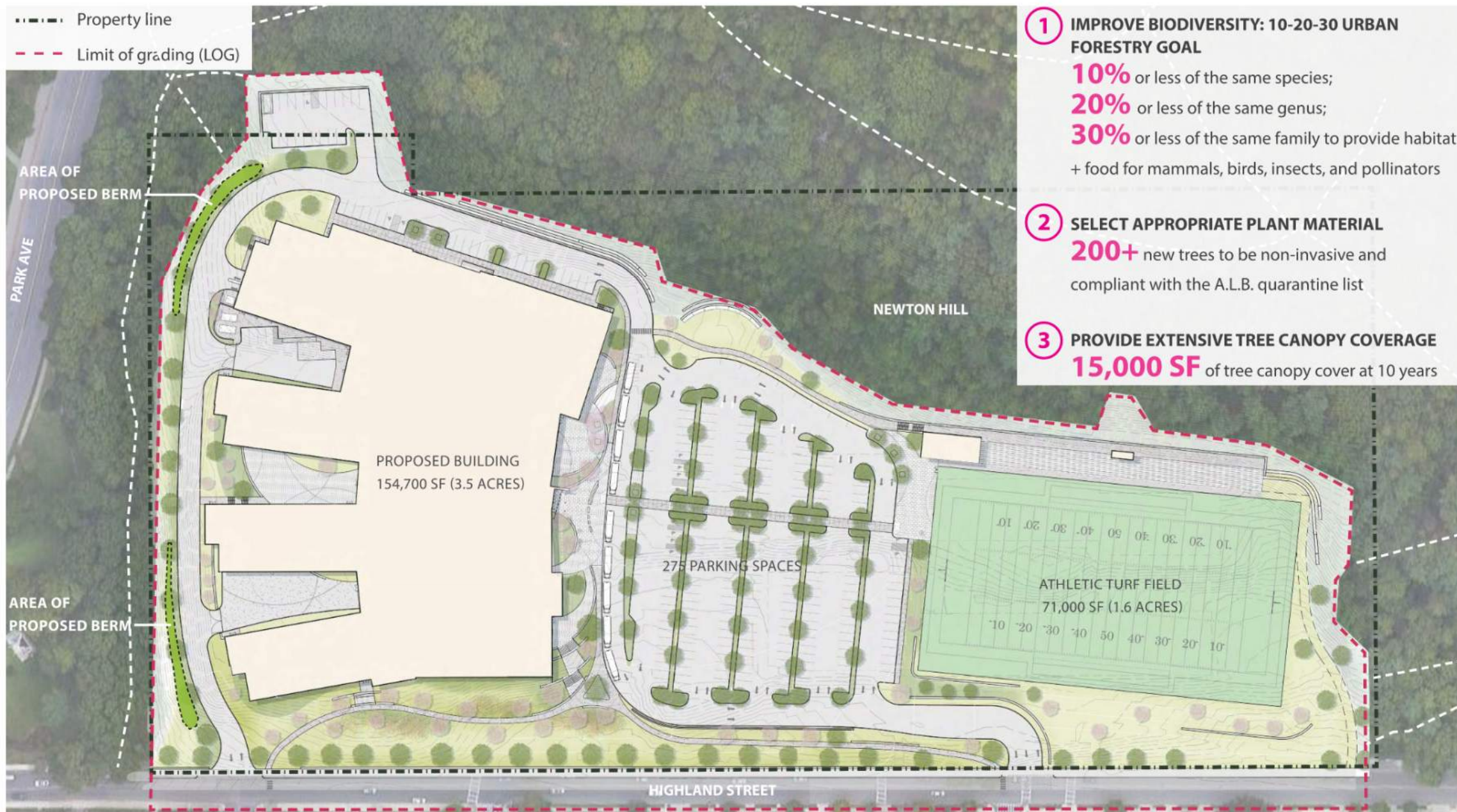


Wellness Concept



Abstract Map Concept





- 1 IMPROVE BIODIVERSITY: 10-20-30 URBAN FORESTRY GOAL**
10% or less of the same species;
20% or less of the same genus;
30% or less of the same family to provide habitat
 + food for mammals, birds, insects, and pollinators
- 2 SELECT APPROPRIATE PLANT MATERIAL**
200+ new trees to be non-invasive and compliant with the A.L.B. quarantine list
- 3 PROVIDE EXTENSIVE TREE CANOPY COVERAGE**
15,000 SF of tree canopy cover at 10 years

HABITAT LEGEND:



BIRDS



FRUITING
SPECIES



POLLINATORS



LARVAL
HOST

<10%
OF ANY SPECIES

<20%
OF ANY GENUS

<30%
OF ANY FAMILY

CANOPY

UNDERSTORY

SHRUB + PERENNIAL LAYER

FAMILY:

ROSACEAE

GENUS:

-AMELANCHIER
-CRATAEGUS
-MALUS
-PRUNUS
-RUBUS
-SPIRAEA

FABACEAE

-CERCIS
-CLADRASTIS
-GLEDITSIA

FAGACEAE

-FAGUS
-QUERCUS

CANOPY

UNDERSTORY

SHRUB + PERENNIAL LAYER

FAMILY:

PINACEAE

GENUS:

-ABIES
-LARIX
-PICEA
-PINUS

CORNACEAE

-CORNUS
-NYSSA

CUPRESSACEAE

-JUNIPERUS
-METASEQUOIA
-TAXODIUM

10-20-30 GOAL

TOPIC 4: **BUILDING AS A TEACHING TOOL**

- Discussion

SHARE YOUR THOUGHTS: **BREAKOUT SESSIONS**

- Breaking everyone into groups
- Opportunity to share your thoughts and reactions to what we have just talked about
- Each room will have a team leader from the design team

