



...teaching the building

PROCESS



DESIGNERS



PROFESSIONALS



STUDENTS

PROJECT GOALS + VISIONS—SSEBE

- Creates a **highly collaborative** environment that facilitates **spontaneous conversations** between students, faculty, administrators, industry representatives, alumni and representatives from allied professional programs. These spaces will address the different levels of collaboration, from informal to formal to social by providing **impromptu gathering** spaces.
- Provides **flexible, highly configurative** research and teaching areas to **future-proof** the spaces for unknown changes in teaching modalities and research foci. There will be a **variety** of spaces to accommodate different sizes of group learning and different learning modalities.
- Creates a **transparent immersive experience** that lets the teaching and research become **accessible** to students, faculty and visitors who are not part of that specific program. The building should also reveal construction techniques and become a living **didactic tool** for our program.
- Facilitates the ability for students to create life-long friends and business **networks** with each other, faculty and alumni.

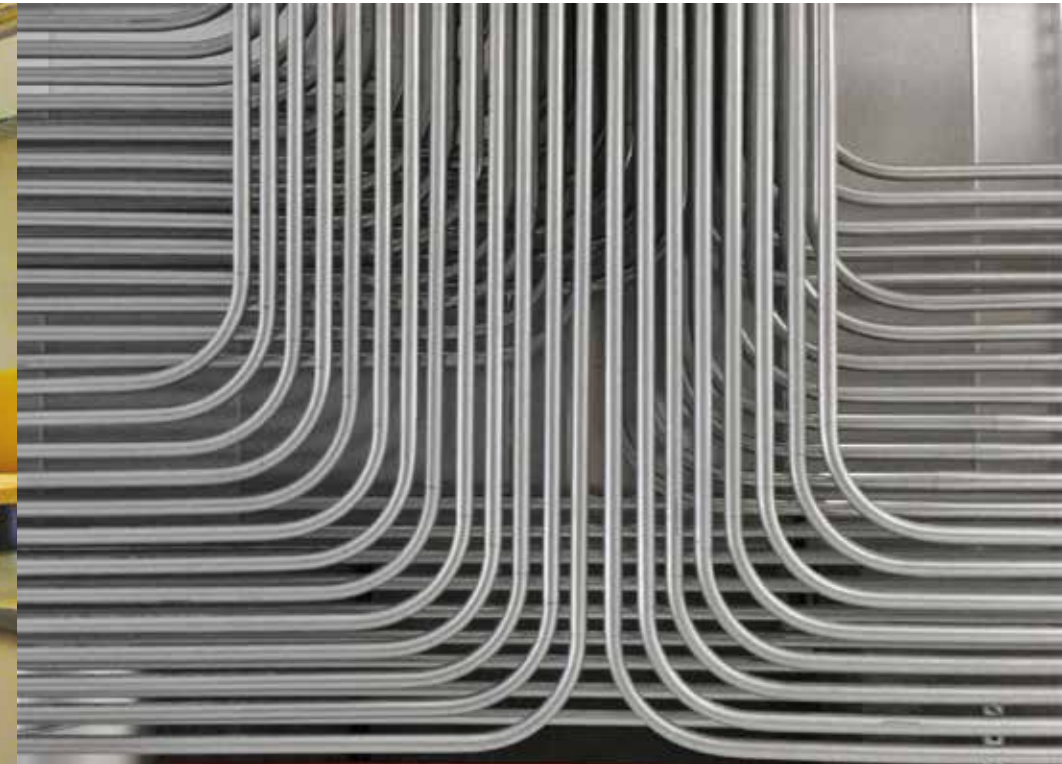
KEY PLANNING PRINCIPLES



DAYLIGHTING



COLLABORATION



DIDACTIC

MIXED-USE BUILDING

DEWSC
DEL E. WEBB
SCHOOL OF
CONSTRUCTION

+

UNIVERSITY
**CLASS
ROOMS**

=

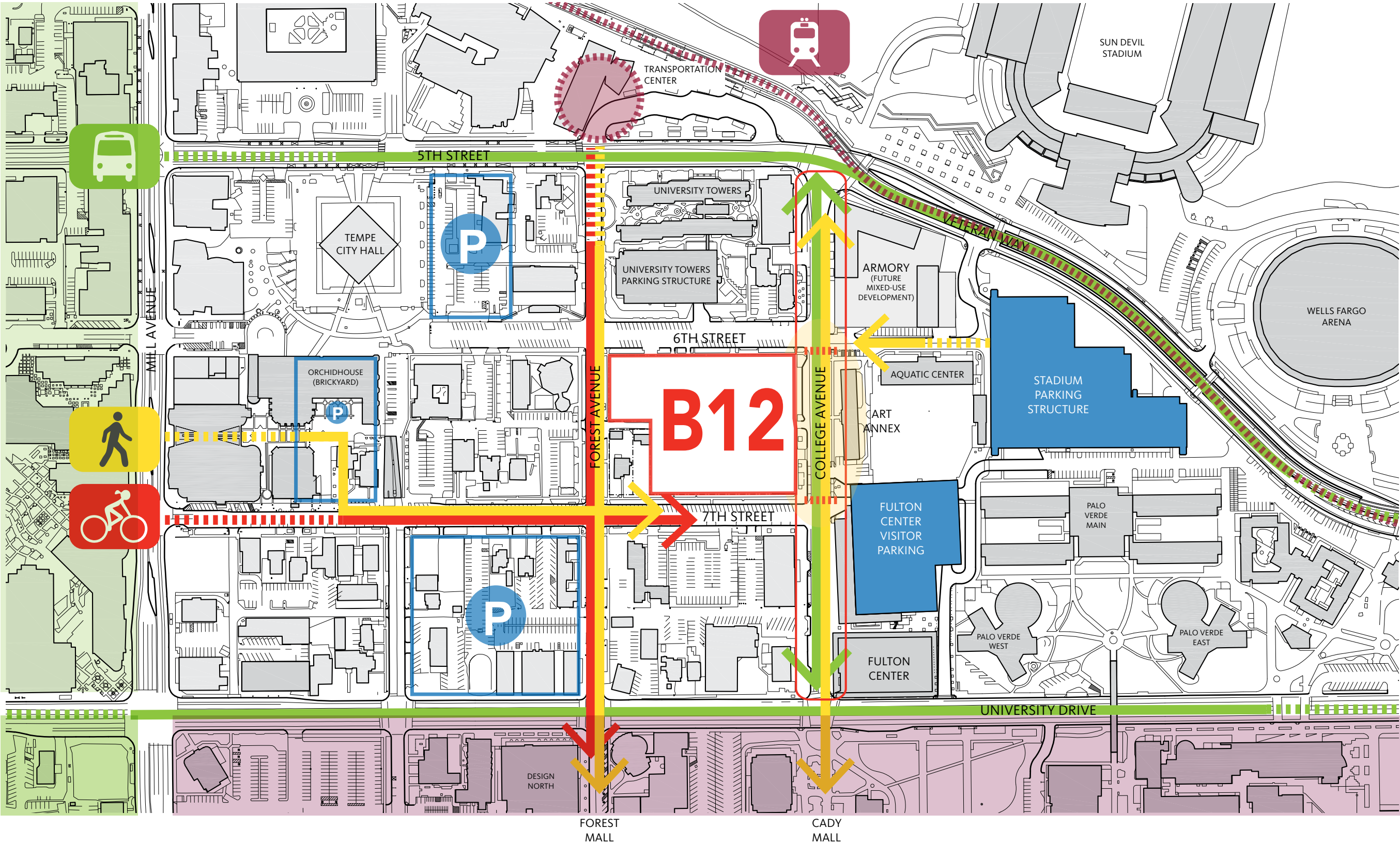
**ACADEMIC
HYBRID**

**SUN
DEVIL**
MARKETPLACE

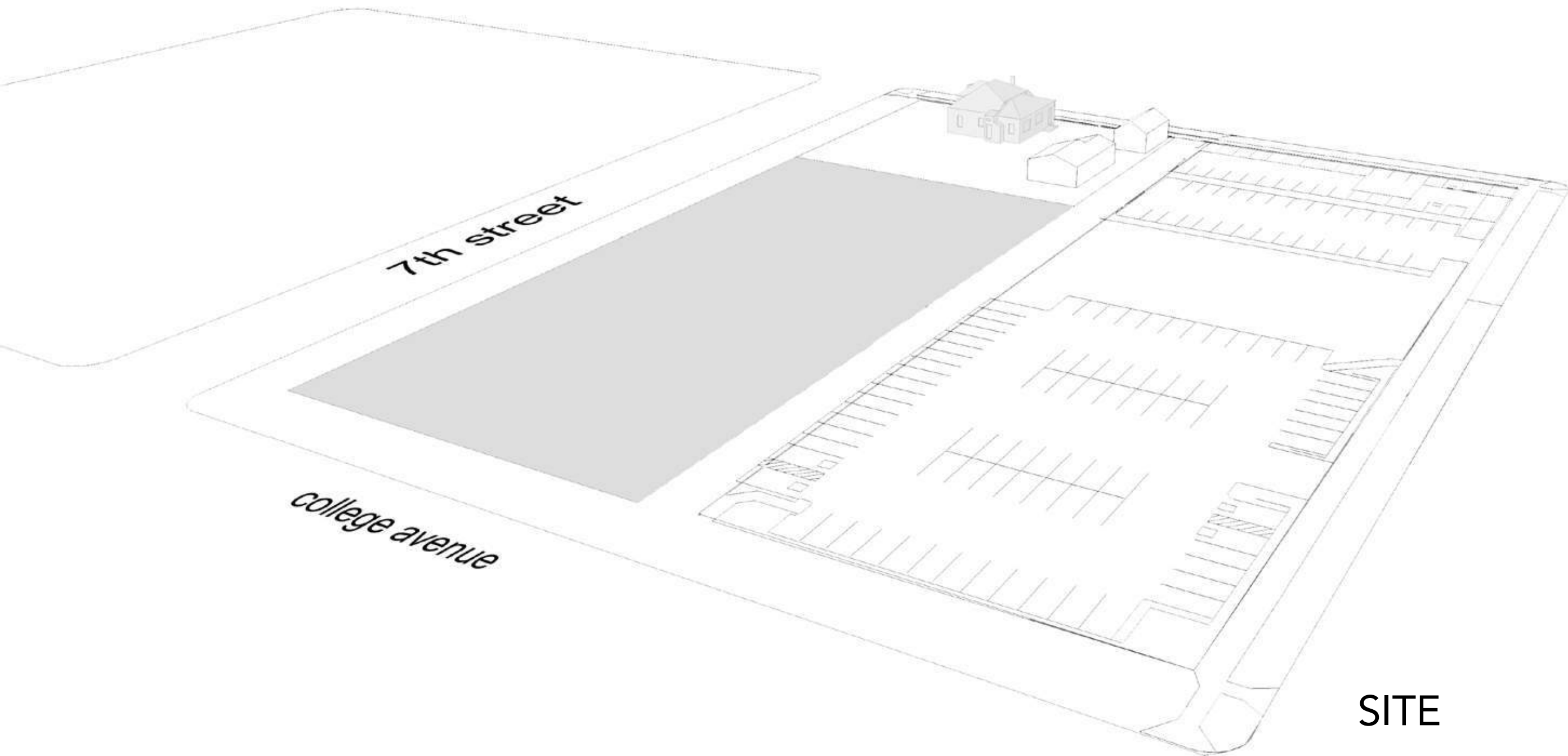
+

UNIVERSITY
TOURS

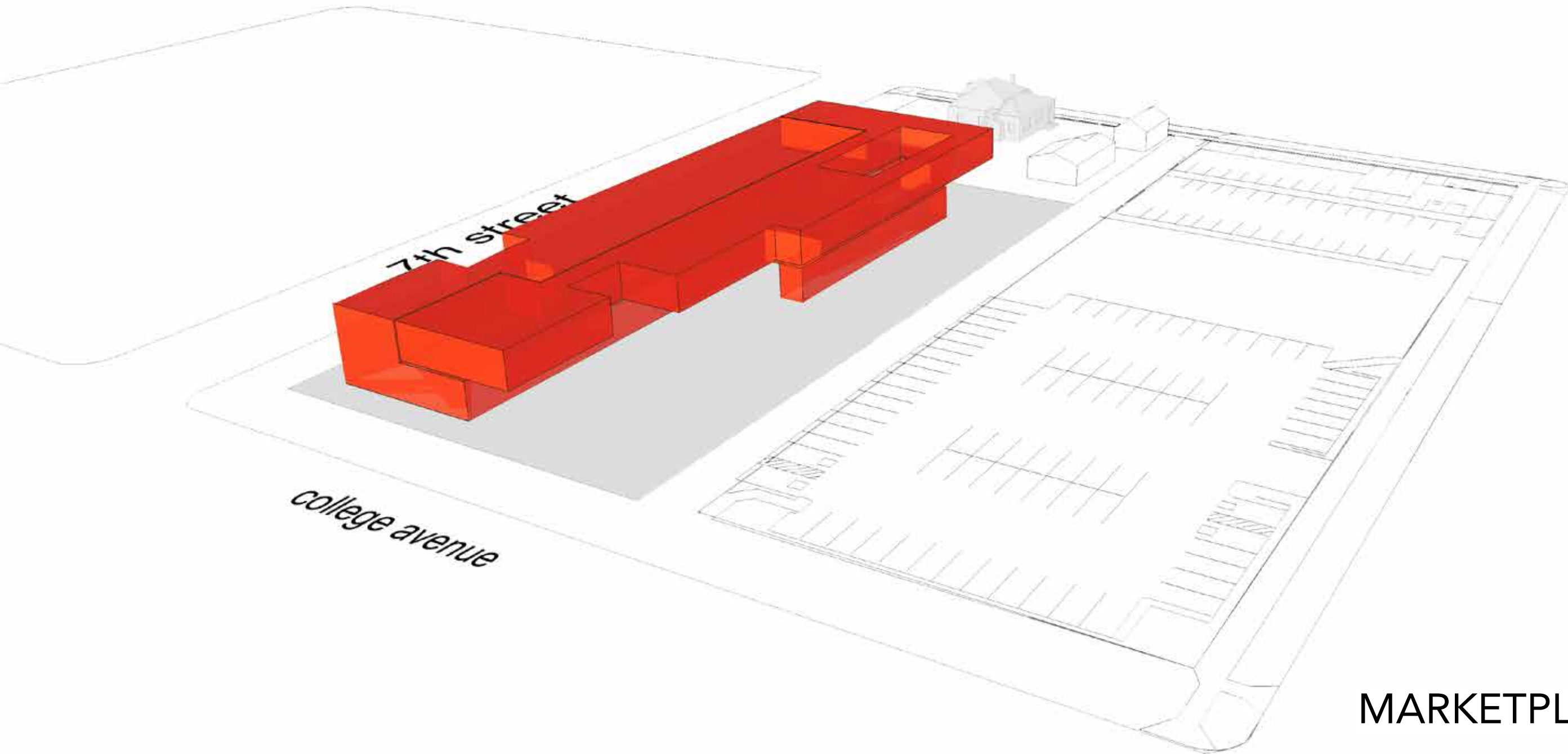
URBAN CONNECTIONS



MASSING STRATEGY

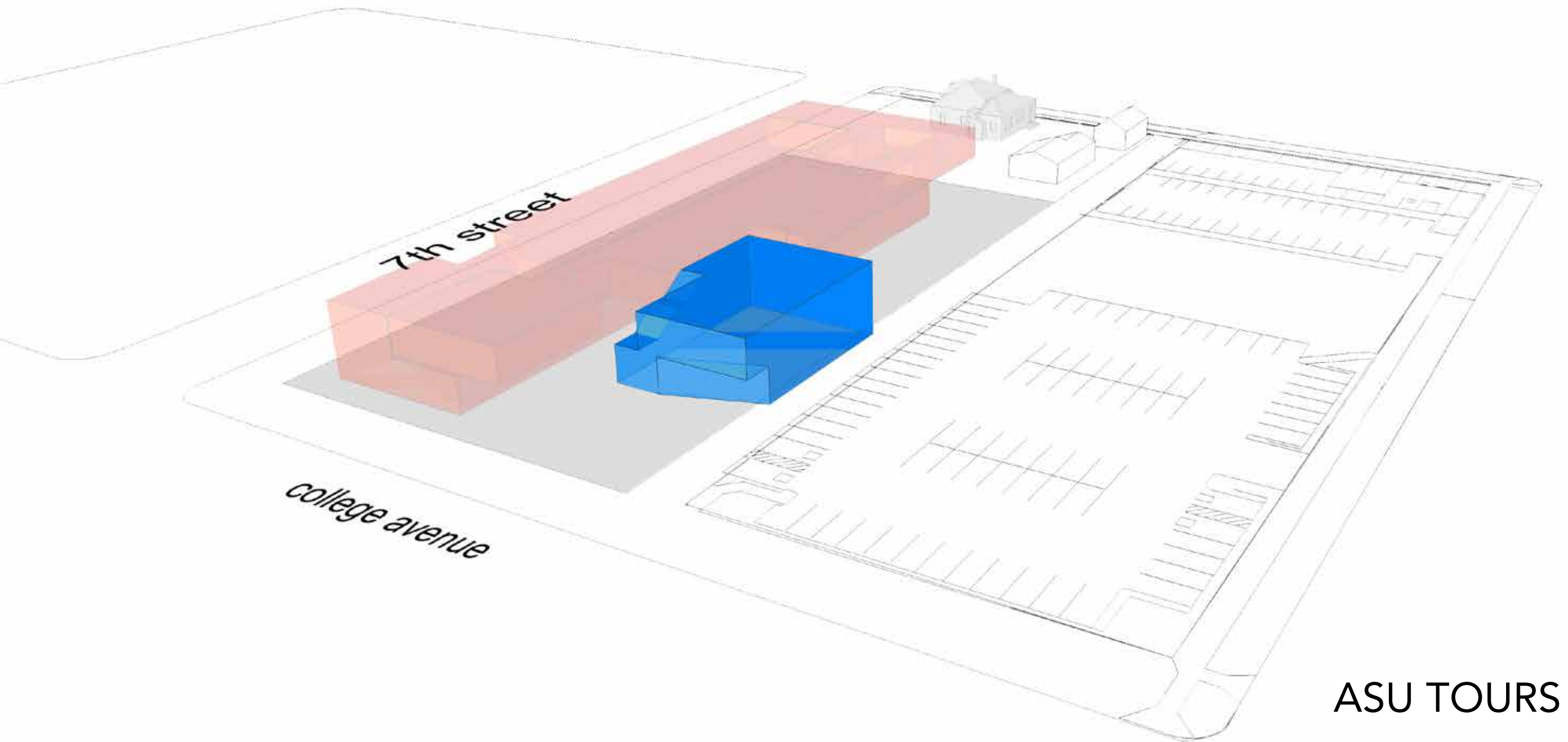


MASSING STRATEGY



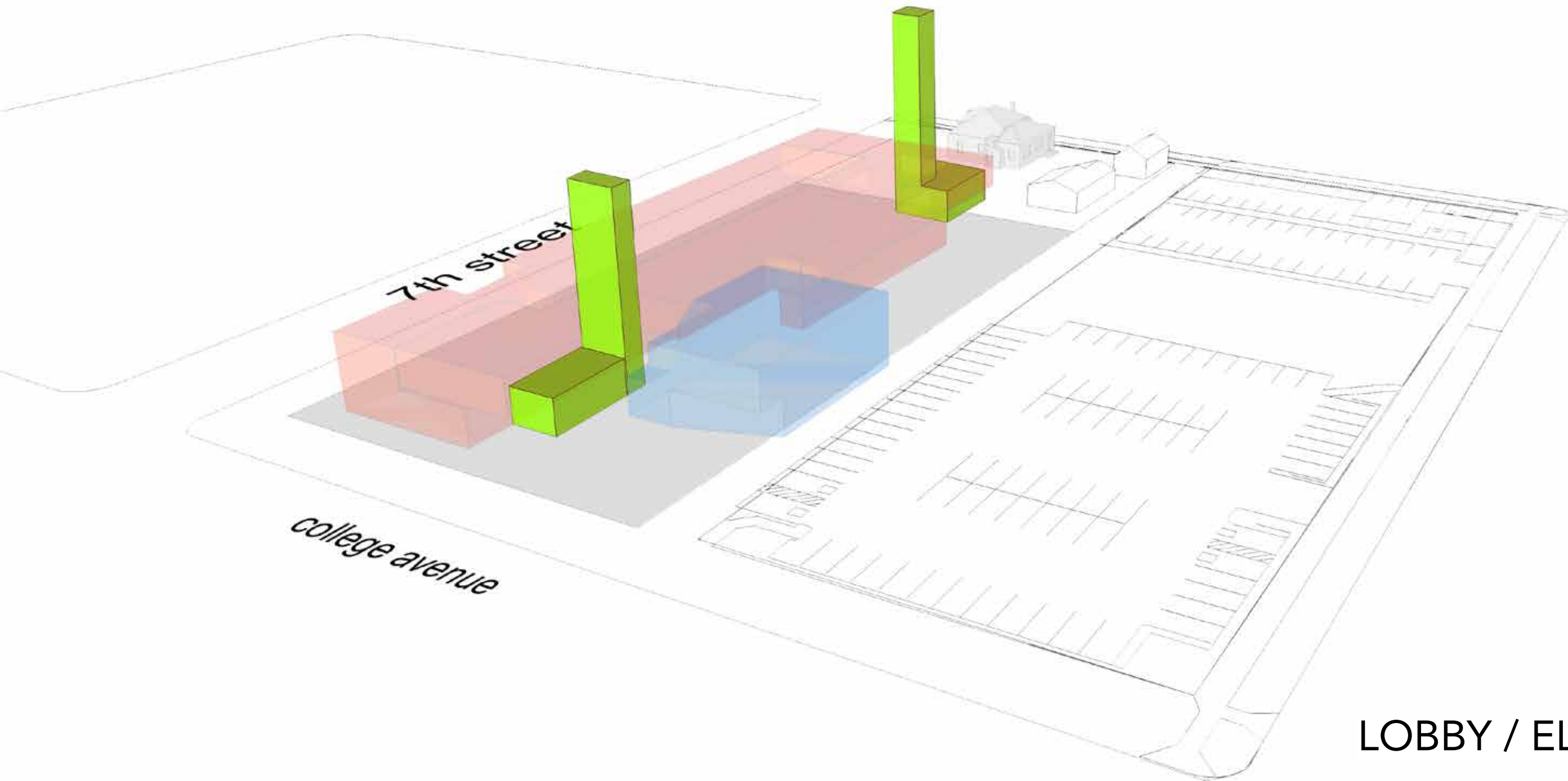
MARKETPLACE

MASSING STRATEGY



ASU TOURS

MASSING STRATEGY



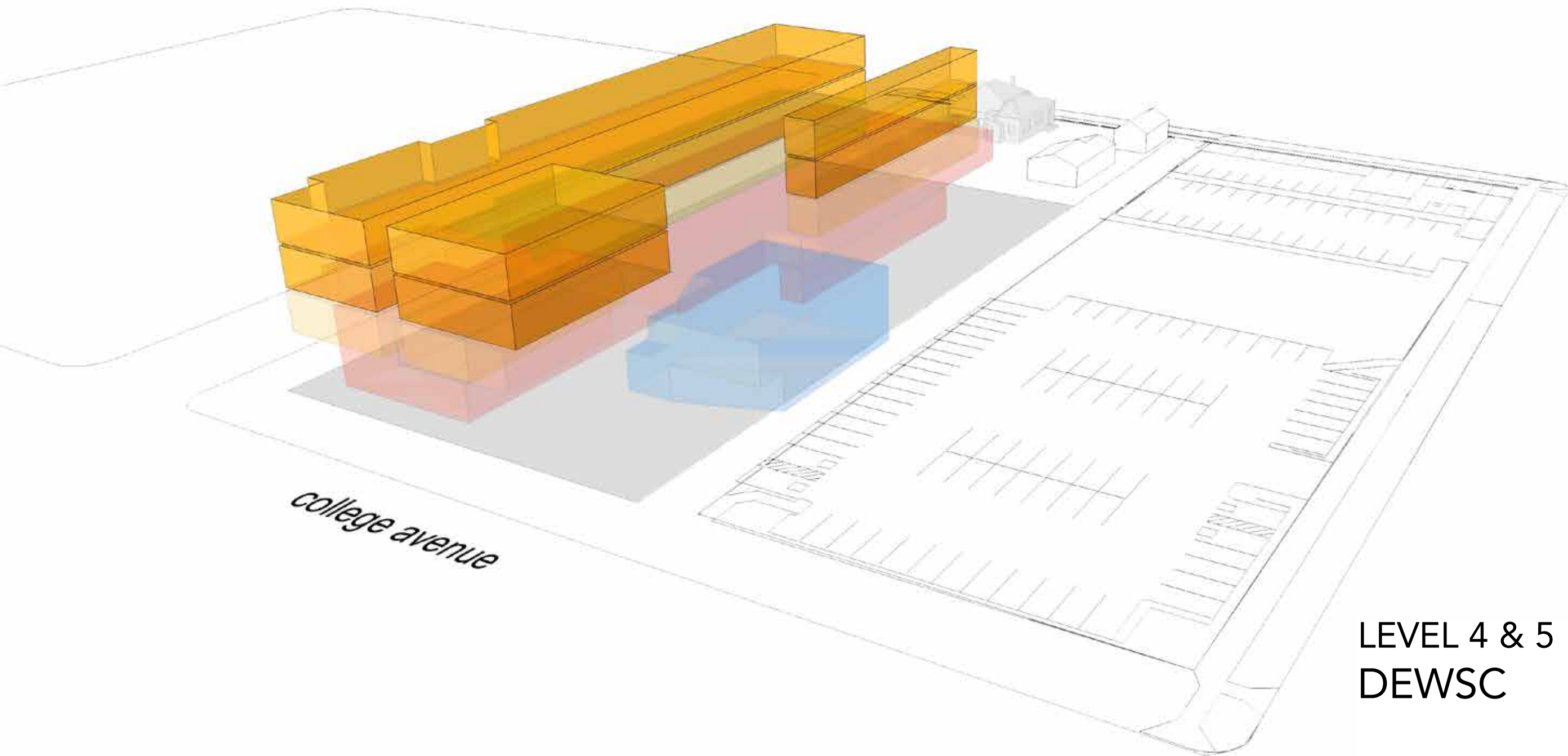
LOBBY / ELEVATORS

MASSING STRATEGY



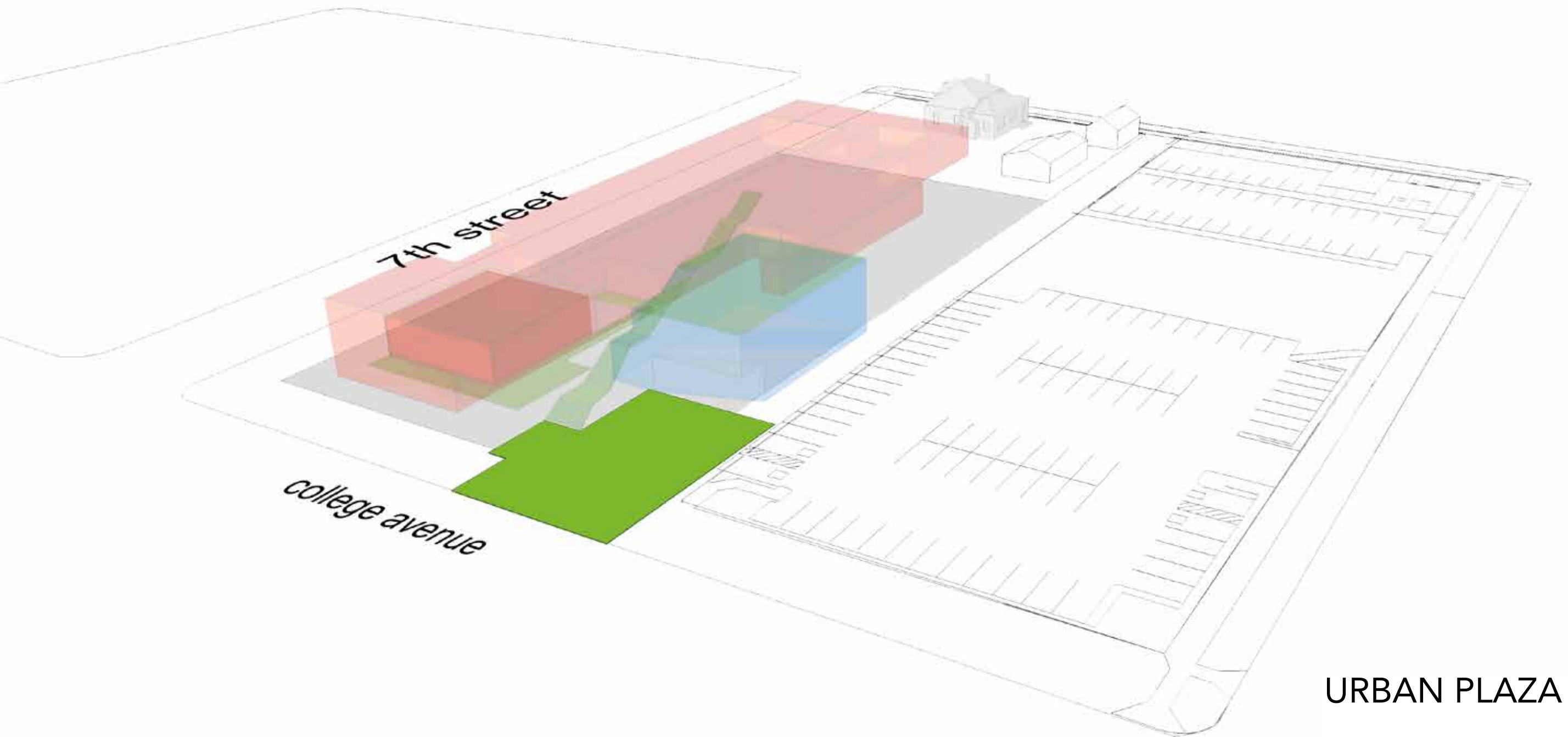
LEVEL 3
ASU CLASSROOMS/
DEWSC

MASSING STRATEGY



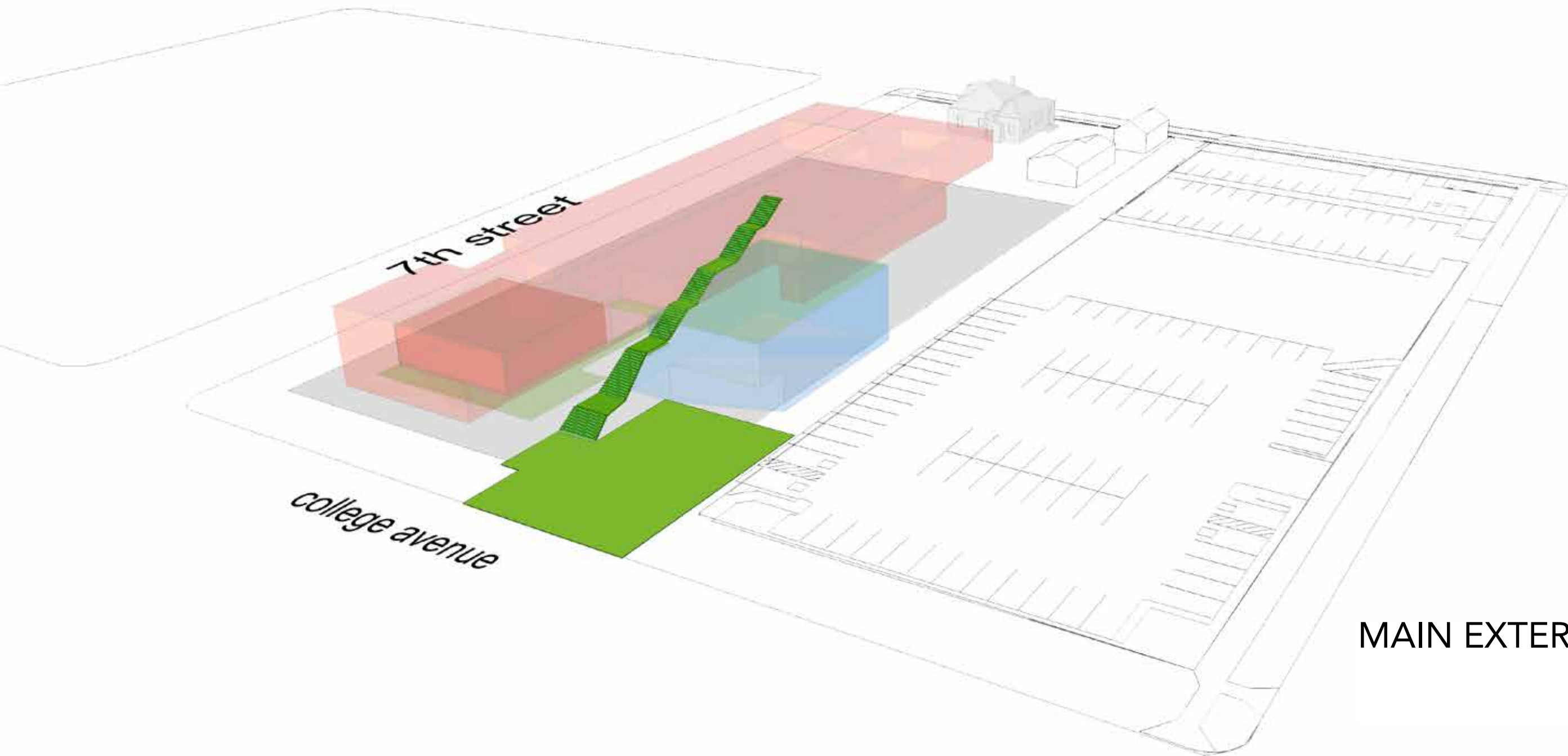
LEVEL 4 & 5
DEWSC

VERTICAL STREET



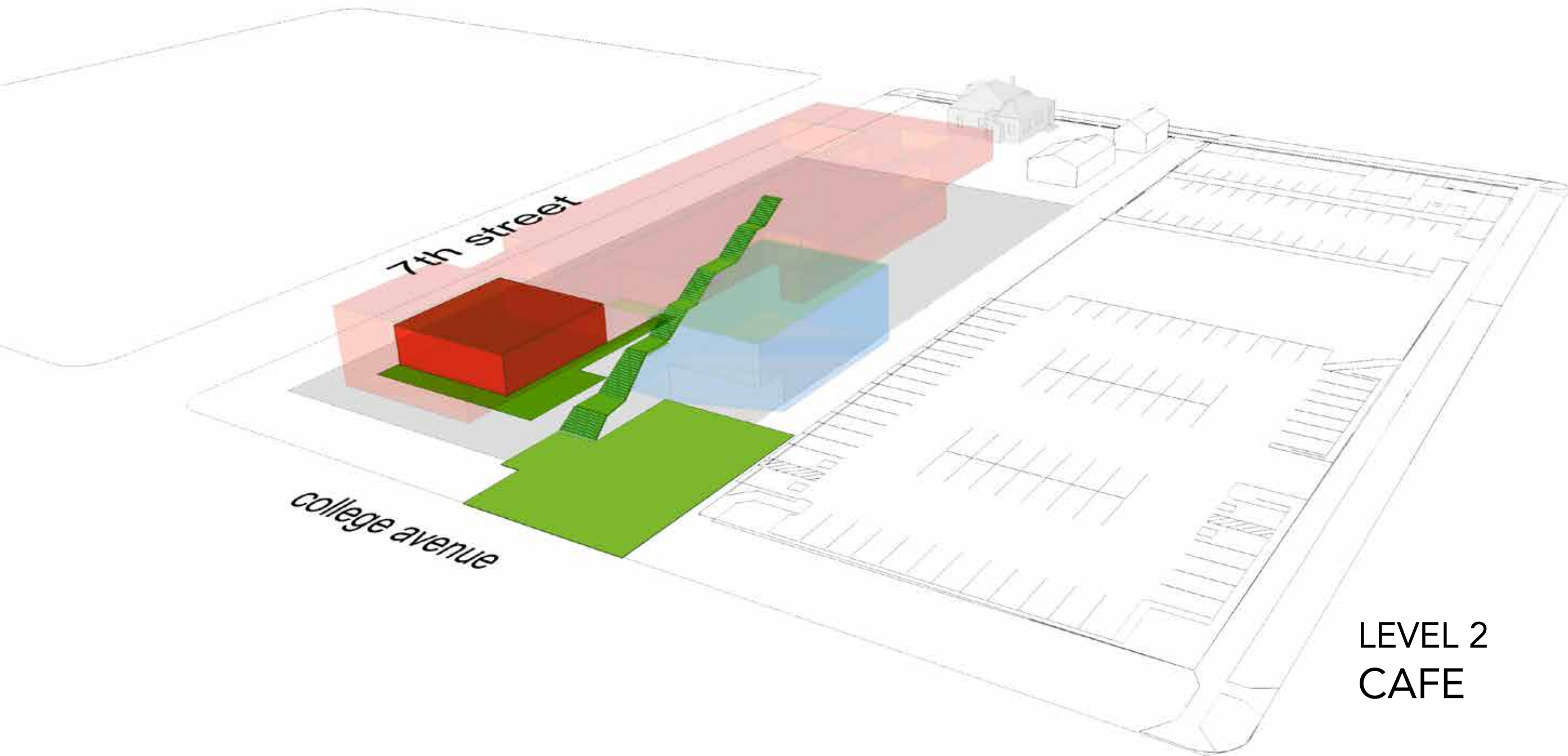
URBAN PLAZA

VERTICAL STREET



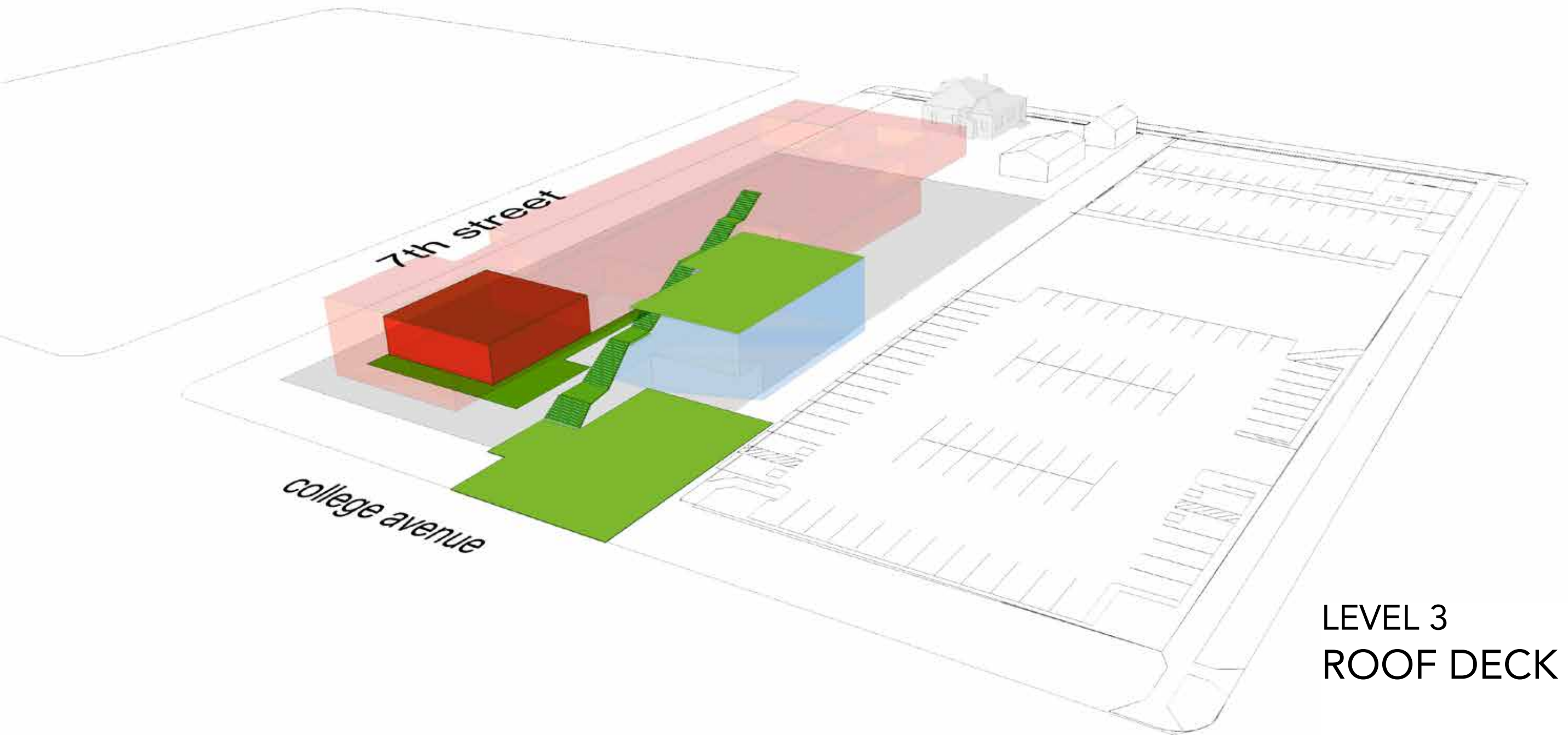
MAIN EXTERNAL STAIR

VERTICAL STREET



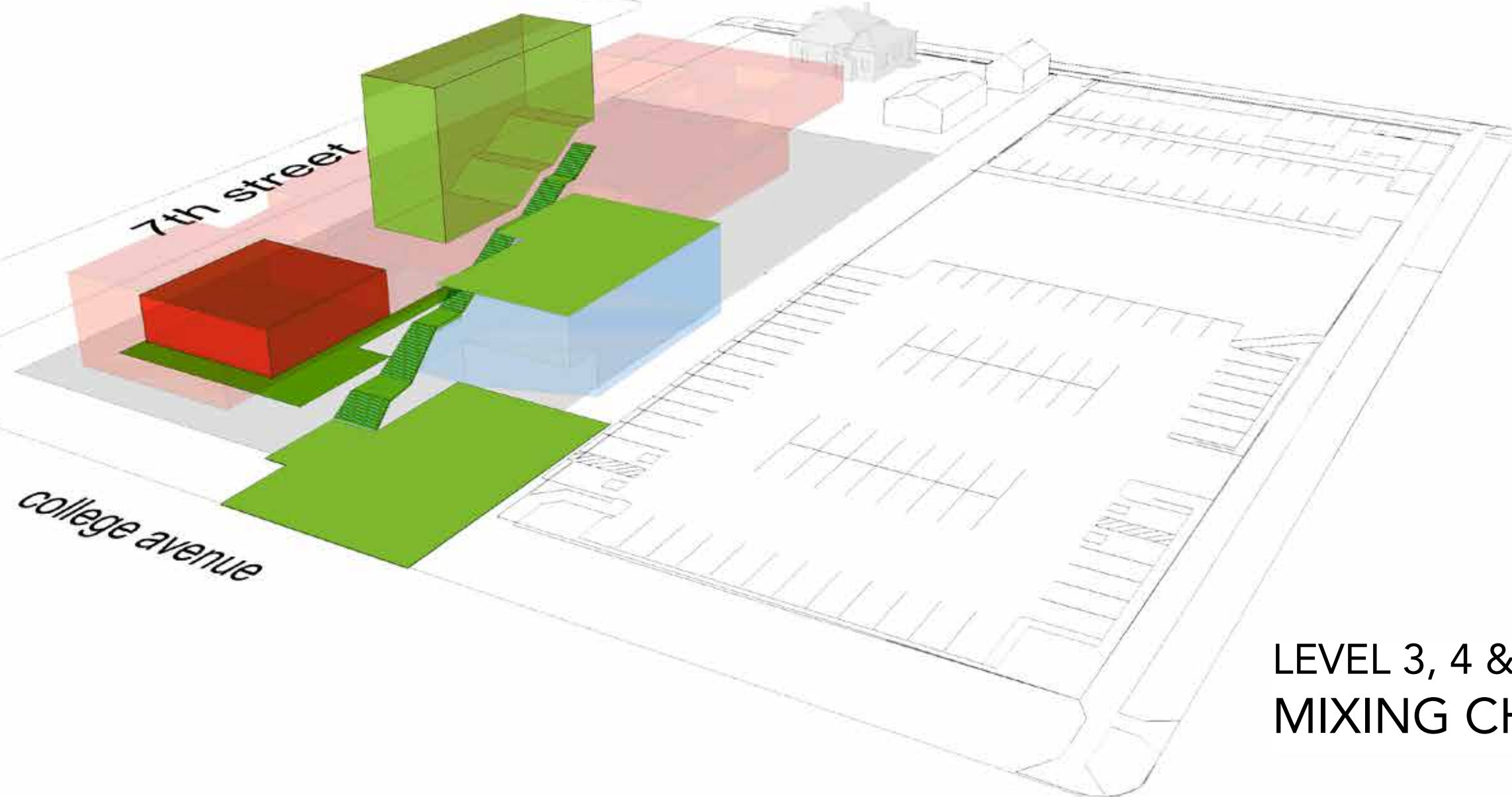
LEVEL 2
CAFE

VERTICAL STREET



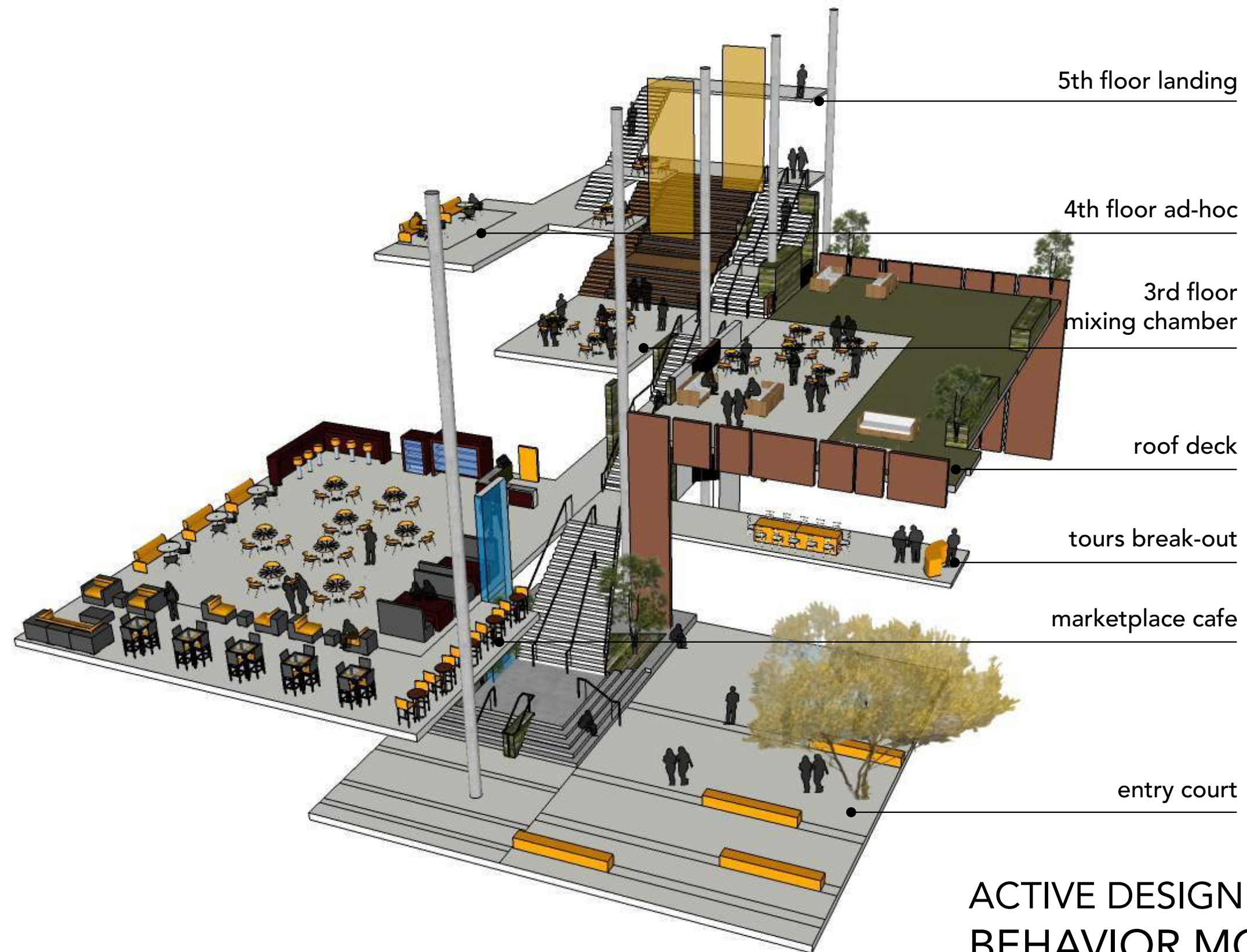
LEVEL 3
ROOF DECK

VERTICAL STREET



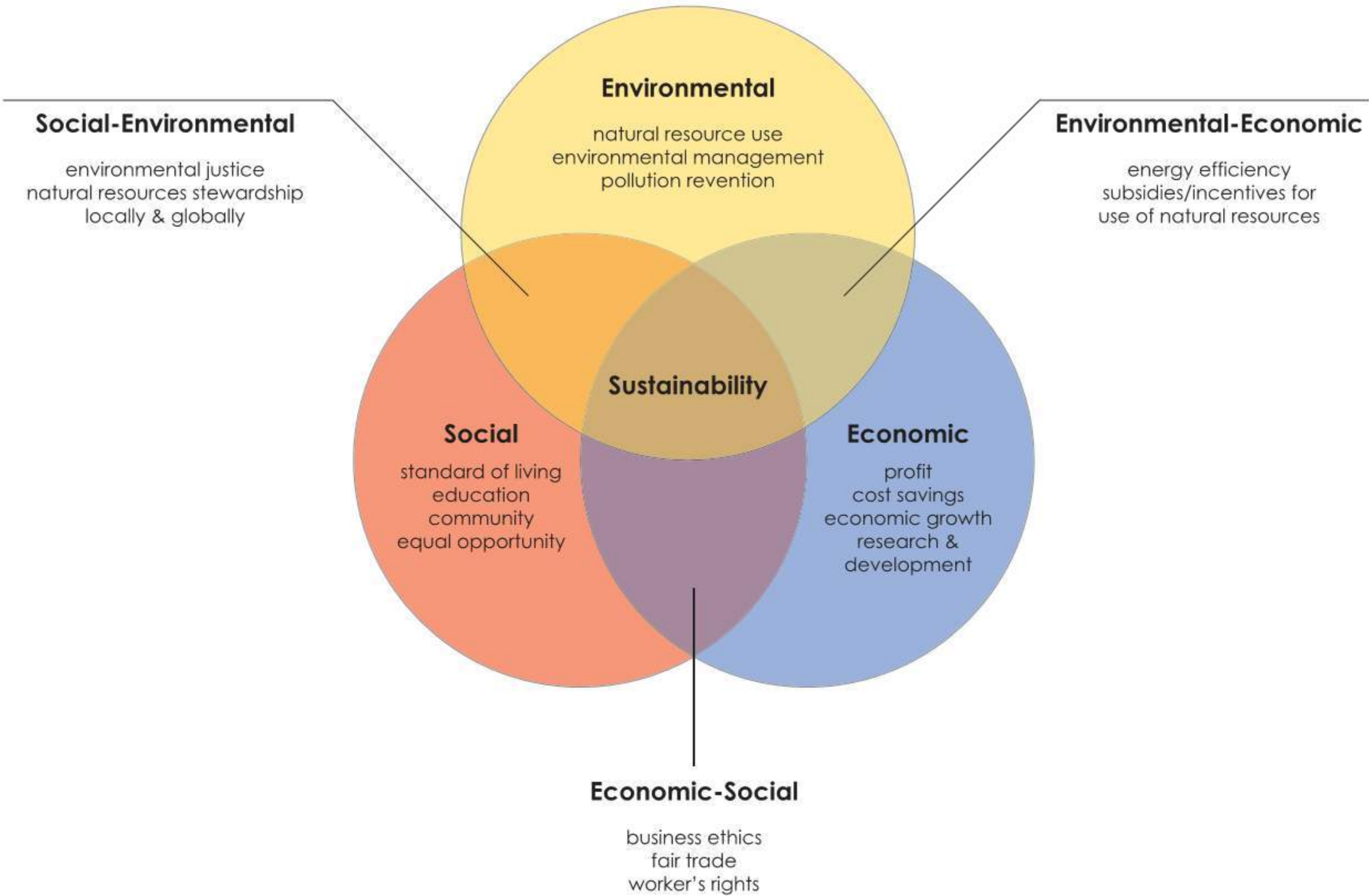
LEVEL 3, 4 & 5 MIXING CHAMBER

VERTICAL STREET

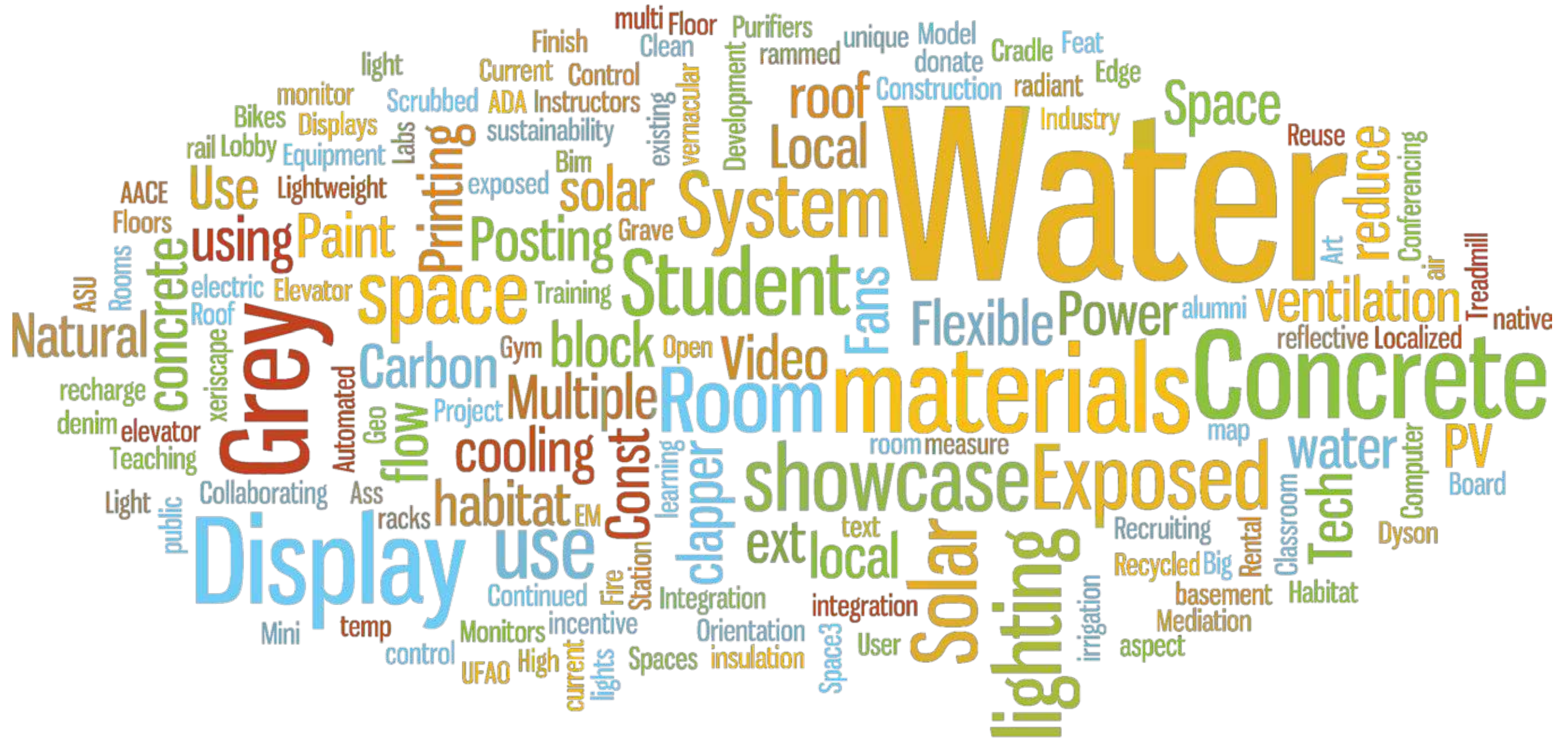


ACTIVE DESIGN
BEHAVIOR MODIFICATION

SUSTAINABLE STRATEGIES



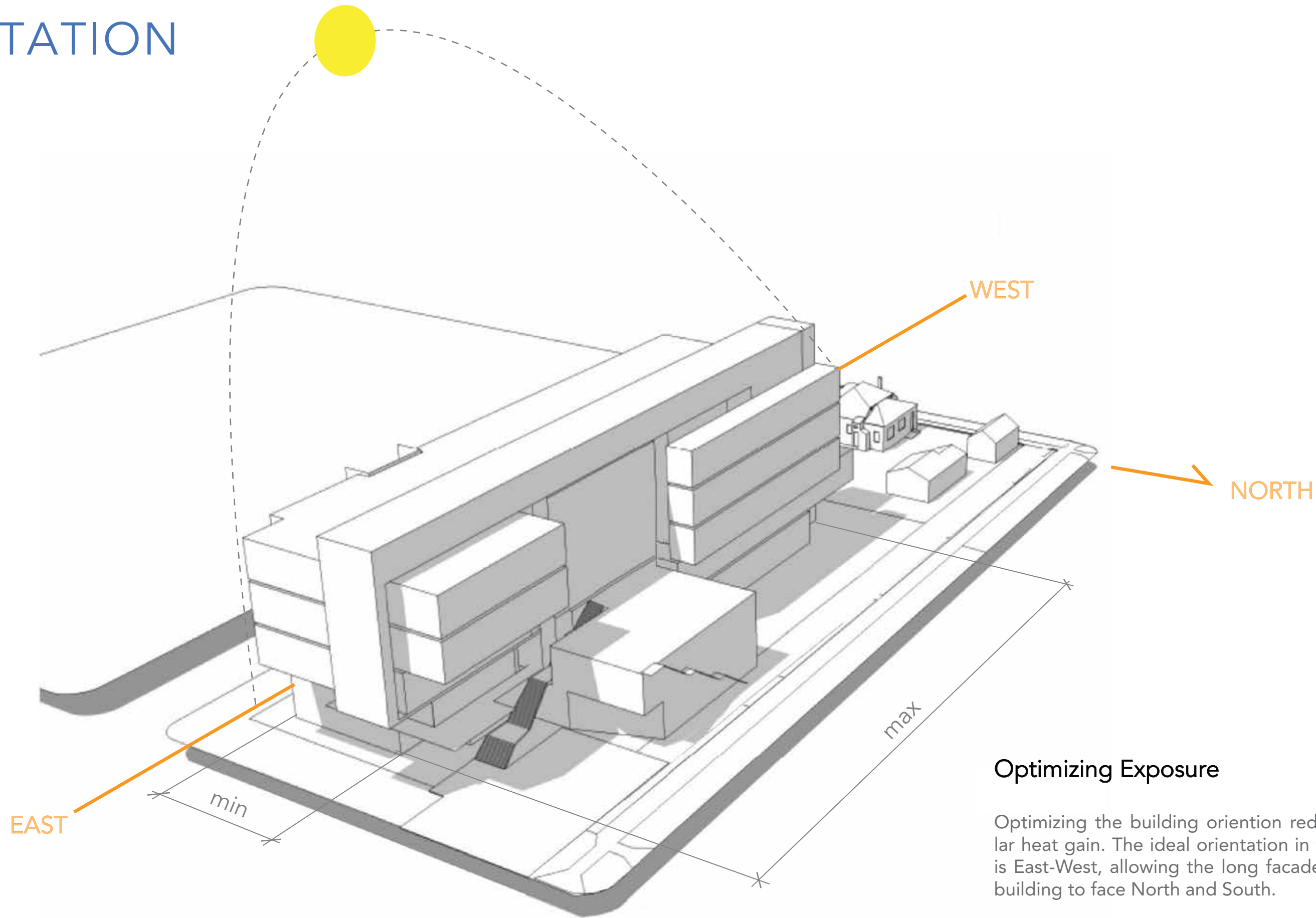
SUSTAINABLE STRATEGIES



SUSTAINABLE STRATEGIES

- 1. Natural Light
- 2. Orientation
 - 3. Solar panels
 - 4. Solar Water Power
- 5. LED Lighting
- 6. Teaching Aspect
- 7. Expose Structure and Materials
 - 8. Natural Ventilation or Air Flow
- 9. Outdoor Space
- 10. No Asbestos
- 11. Enough Space
- 12. Local Materials
- 13. Recycled Materials
 - 14. Donate Beer Cans
- 15. Bike Racks
- 16. Auto Control of Lights
 - 17. Clapper
 - 18. Green Roof
- 19. Teachable Sustainability
 - 20. Automated Solar Control
 - 21. Reuse of Water
 - 22. PV Panel Curtain Wall
 - 23. Carbon Scrubbed Concrete
 - 24. Pervious Concrete
- 25. Flexible spaces
 - 26. UFAO
- 27. Architectural Feat
- 28. Concrete Structure
- 29. Exposed Aggregate
 - 30. Multiple Structural Systems
- 31. Food / Restaurant
- 32. Mediation/ Video Conferencing
- 33. Construction Project Camera
- 34. Collaboration w/ DEWSC Students / Instructors
- 35. Recruiting Spaces
- 36. ADA 100%
- 37. Interconnecting Floors
- 38. Open Atrium
- 39. Learning Displays
- 40. Video of Block 12 Construction
- 41. Integration of Glass and Steel
 - 42. Photovoltaic Glazing
 - 43. Unique Integration of Solar and PV
 - 44. Habitat Roof
 - 45. Pool on Roof
 - 46. Lightweight Insulating Concrete
- 47. Collaborating with Alumni
- 48. Student-Use Monitors
 - 49. No Textbooks
- 50. Clean Bathrooms
- 51. Waterless Urinals
- 52. Dyson
 - 53. Student Design Space
 - 54. Local Art
- 55. Local Cutting-Edge Tech Gallery
- 56. Trophy Case
- 57. Student Posting Location
- 58. Grey Water System
- 59. Water Purifiers
- 60. Exposed Mechanical
 - 61. Water-Cooled Condensors
- 62. Radiant Heating and Cooling
- 63. Running Water
- 64. Napping Zone
- 65. Rental Bikes
- 66. Skateboard Parking
- 67. Tailgating - Alcohol Permitted
- 68. Interior Lockers
- 69. Workout Gym
- 70. Exposed Fire Command Board
- 71. HVAC Dashboard
- 72. Electrical Dashboard
- 73. Water Dashboard
- 74. BIM Model for EM showcase
- 75. Public Space Monitor
- 76. Track per Room or Floor
- 77. Energy Use Competition
- 78. Signs at Elevator & Lobby
 - 79. Post Electrical Bill = Decreased Tuition
 - 80. Power Meter on Elevator = Link to \$
- 81. Display Current Research and Development
 - 82. Ext Color of Lighting Linked to Elec Use
 - 83. Show Energy Use in Carbon Credits
 - 84. Map of Where People Are
 - 85. Incentive for Using Light Rail/Bus/Walk/Bike
 - 86. Schedule Rooms Via Text
- 87. Room Dedicated for Skype Interviews
- 88. Cooling Room/Vestibule
- 89. Localized Network to Reduce Printing
- 90. Multiple Computer Labs
 - 91. Distributed Printing Station
- 92. "Mini" Excavation/Demonstration
- 93. Equipment Simulators
- 94. Local Temp Control within Rooms
- 95. Grey Water Sprinkler System
- 96. Transformative Building
- 97. Classroom Connection/Exterior Ventilation
- 98. Exterior Sun Control
- 99. Elect Current Glass/Translucent
- 100. Light Tubes/Skylights
- 101. Xeriscape
- 102. High Tech Ventilation Smokers
- 103. Grey Water for Irrigation
- 104. Encourage Native Habitat
- 105. Fans "Big Ass Fans" Air flow
- 106. Geo-Thermal
- 107. 2-Stage Cooling/Reduce Electrical Power
- 108. Use Existing ASU Central Plant
- 109. Reflective Paint/Reduce Heat Gain
- 110. Idea Paint/White Wall/Writable Walls
- 111. Finishes as Education/Variety
 - 112. Denim Insulation
- 113. Vernacular Materials
 - 114. Historical Construction Context
 - 115. Rammed Earth
- 116. AACE block
- 117. Stained/Exposed Concrete
- 118. Industry Touch Down Space
 - 119. Thermal Zoning in Classrooms
- 120. Misters
 - 121. Aquarium Wet/Dry
 - 122. Living Wall
 - 123. H2o Habitat on Roof
 - 124. Solar Recharge Stations
 - 125. Hamster-Charging Bikes
 - 126. Blue Box
 - 127. Treadmill Classrooms
- 128. Arch/Engineering/Construction Clubs
- 129. Multi-Use Space
 - 130. Basement
 - 131. Display Foundations
 - 132. Display Soil
 - 133. Underground Parking
- 134. Flexible/Adjustable Lighting
- 135. Continued Measuring of Systems
- 136. User Training
- 137. Lifecycle - Cradle to Grave/Cradle
- 138. 100-Year Building

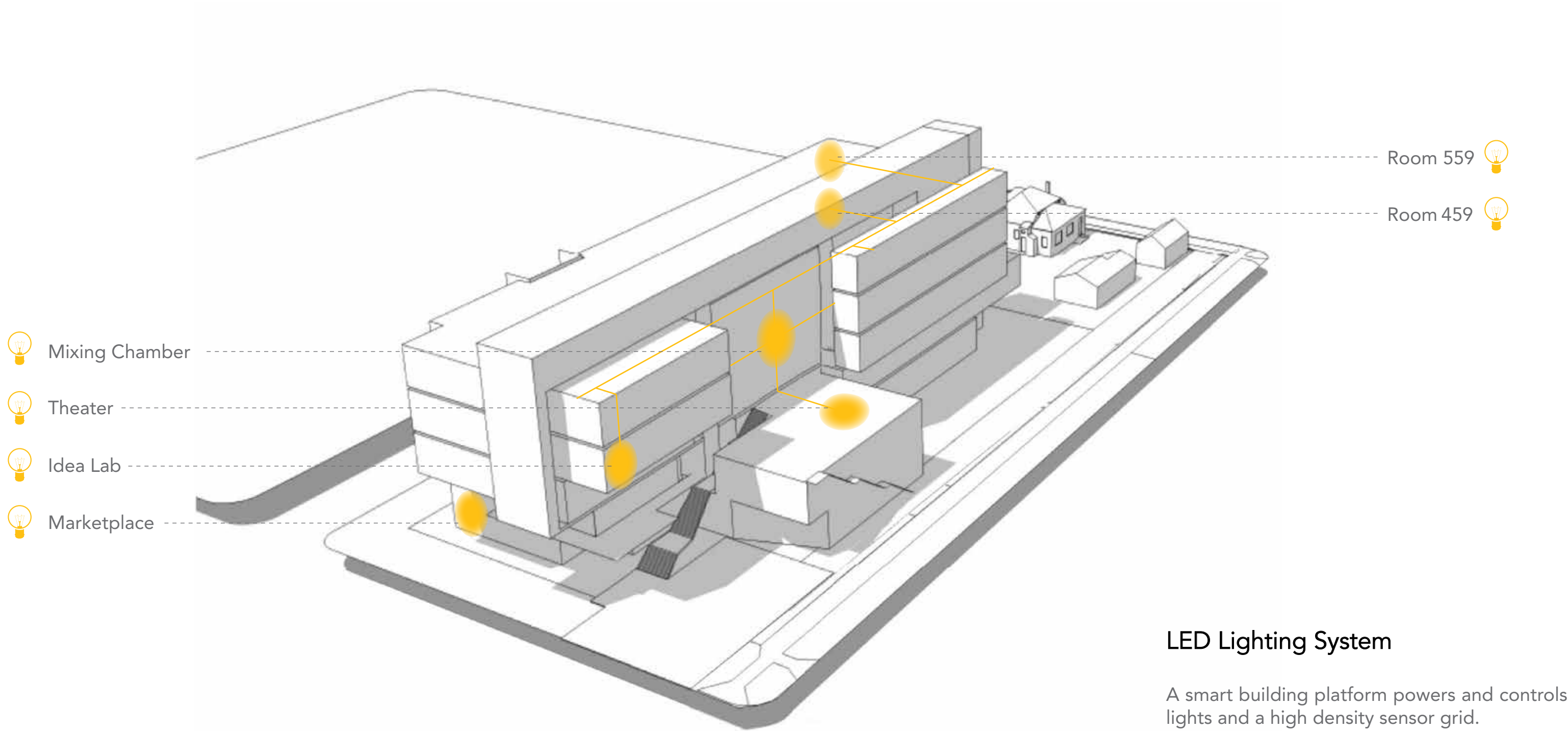
ORIENTATION



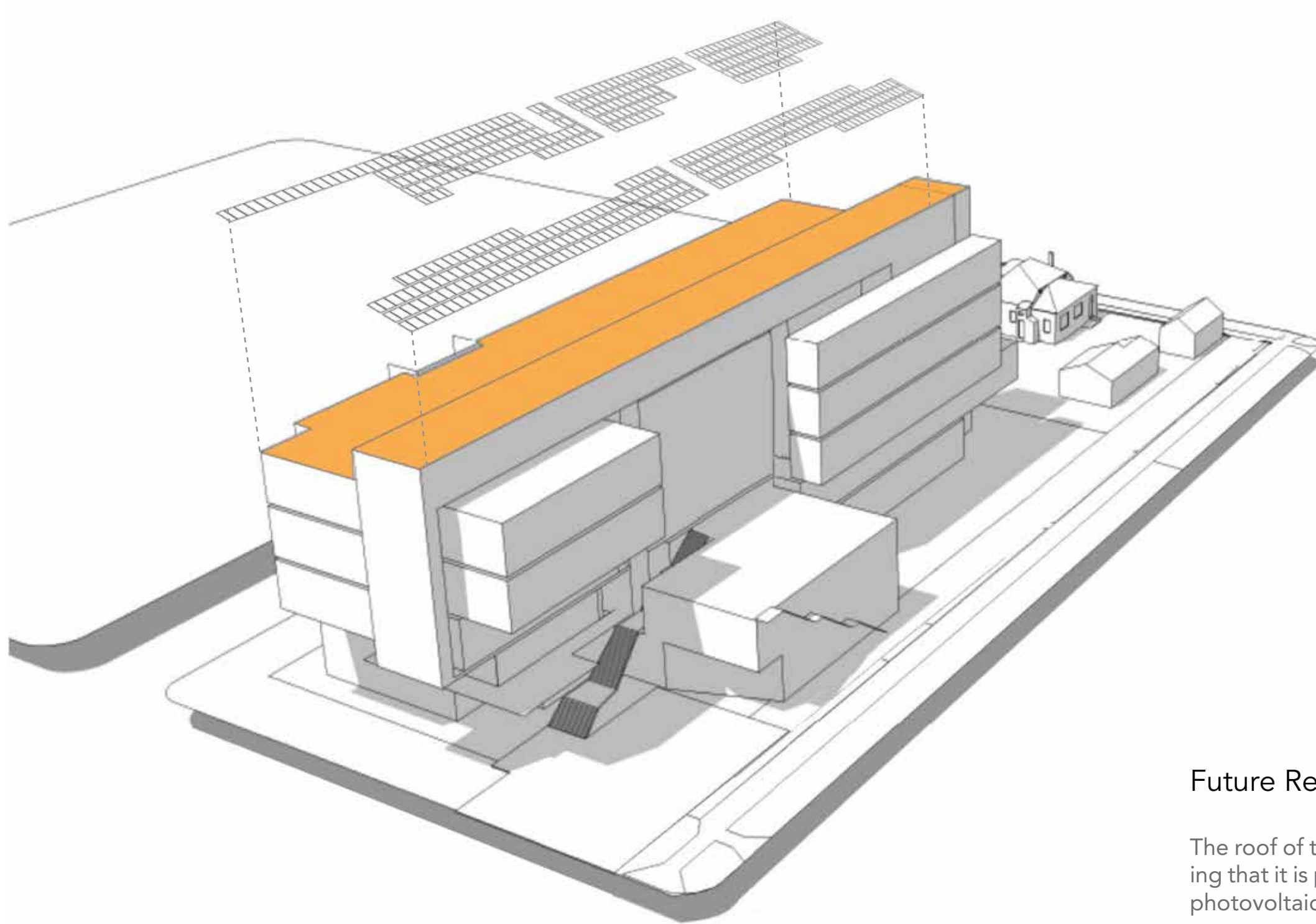
Optimizing Exposure

Optimizing the building orientation reduces solar heat gain. The ideal orientation in this case is East-West, allowing the long facades of the building to face North and South.

LED LIGHTING



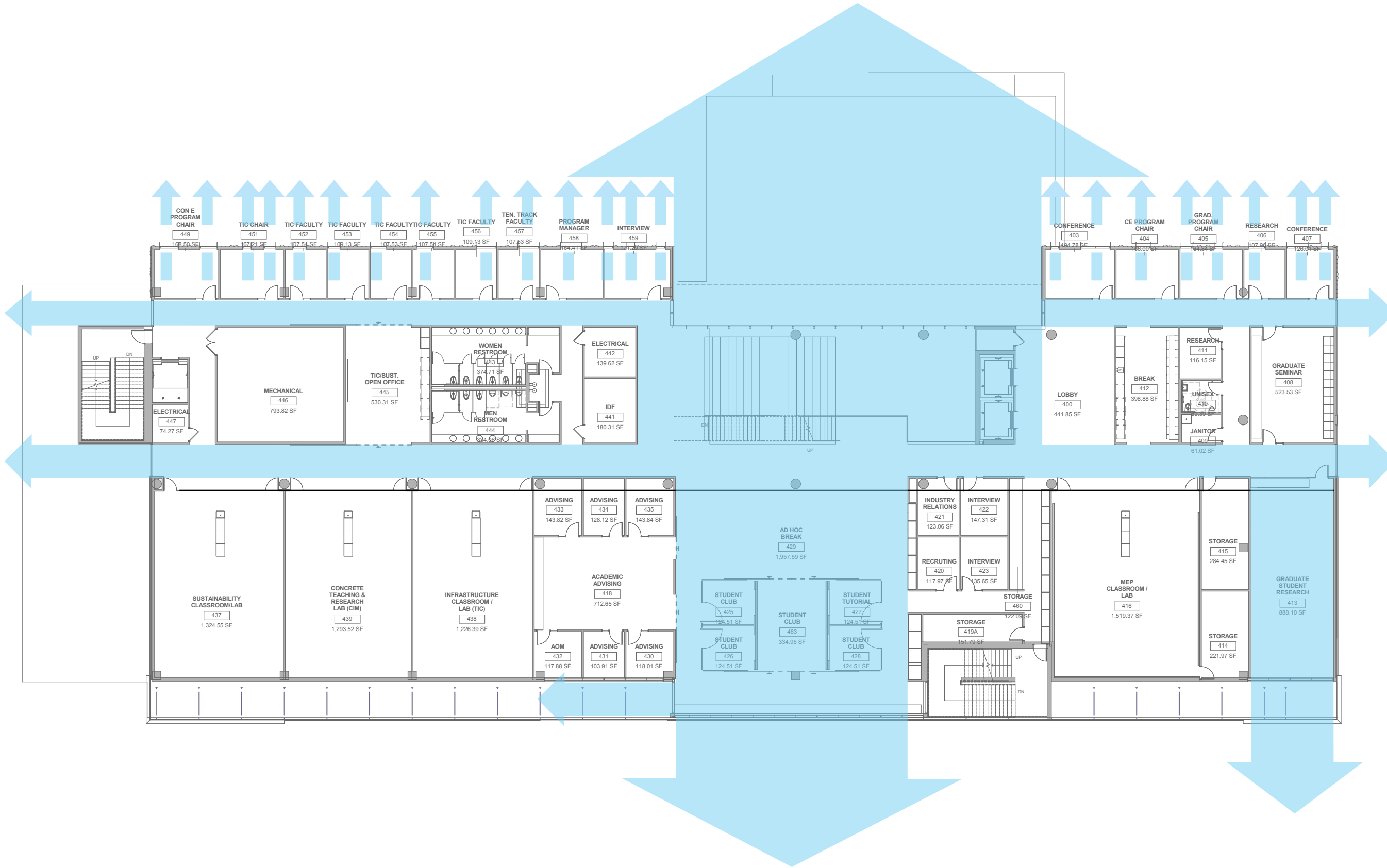
PHOTOVOLTAICS



Future Ready

The roof of the building is a “clean roof”, meaning that it is prepared for future incorporation of photovoltaics and the necessary infrastructure.

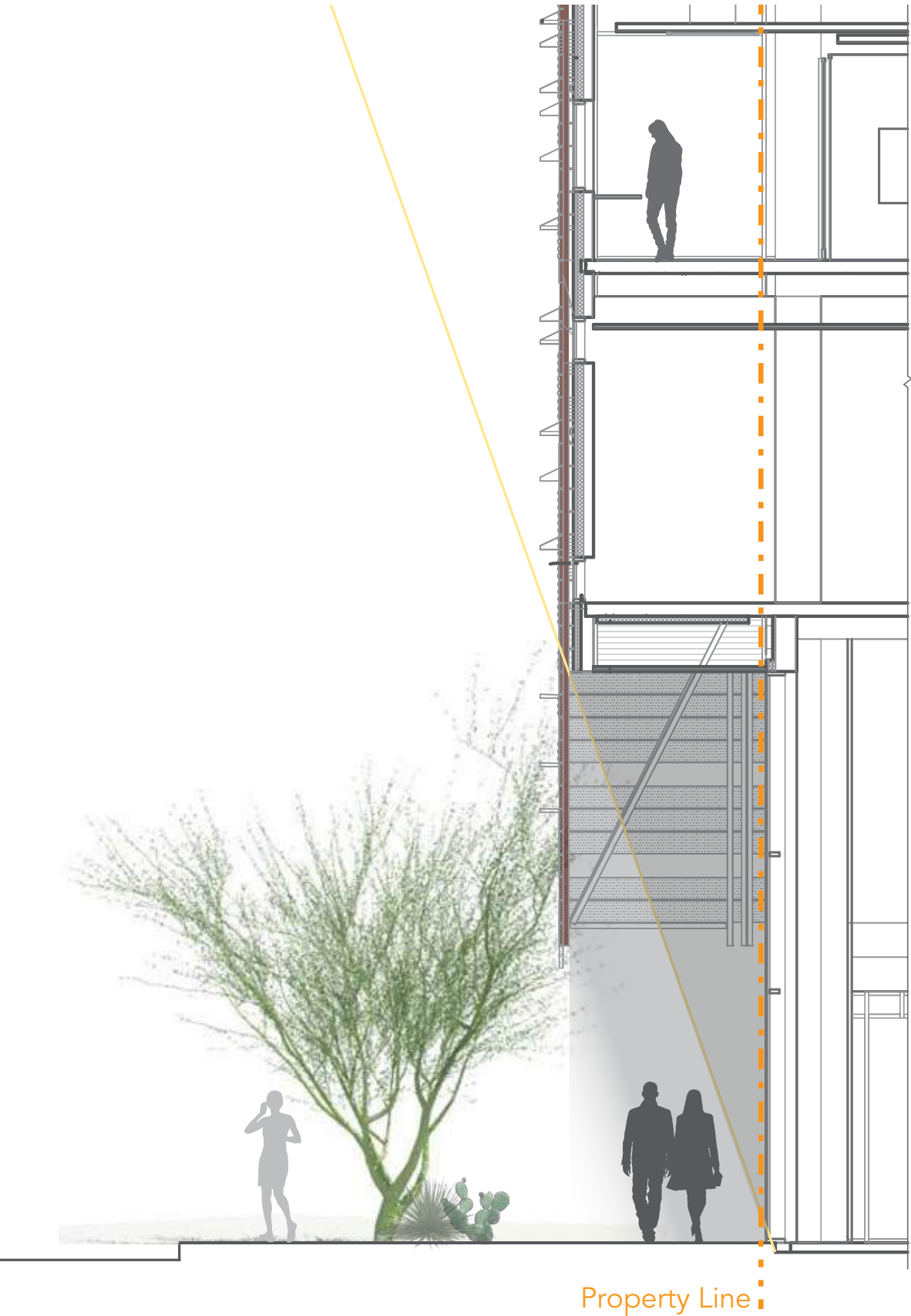
VIEWS



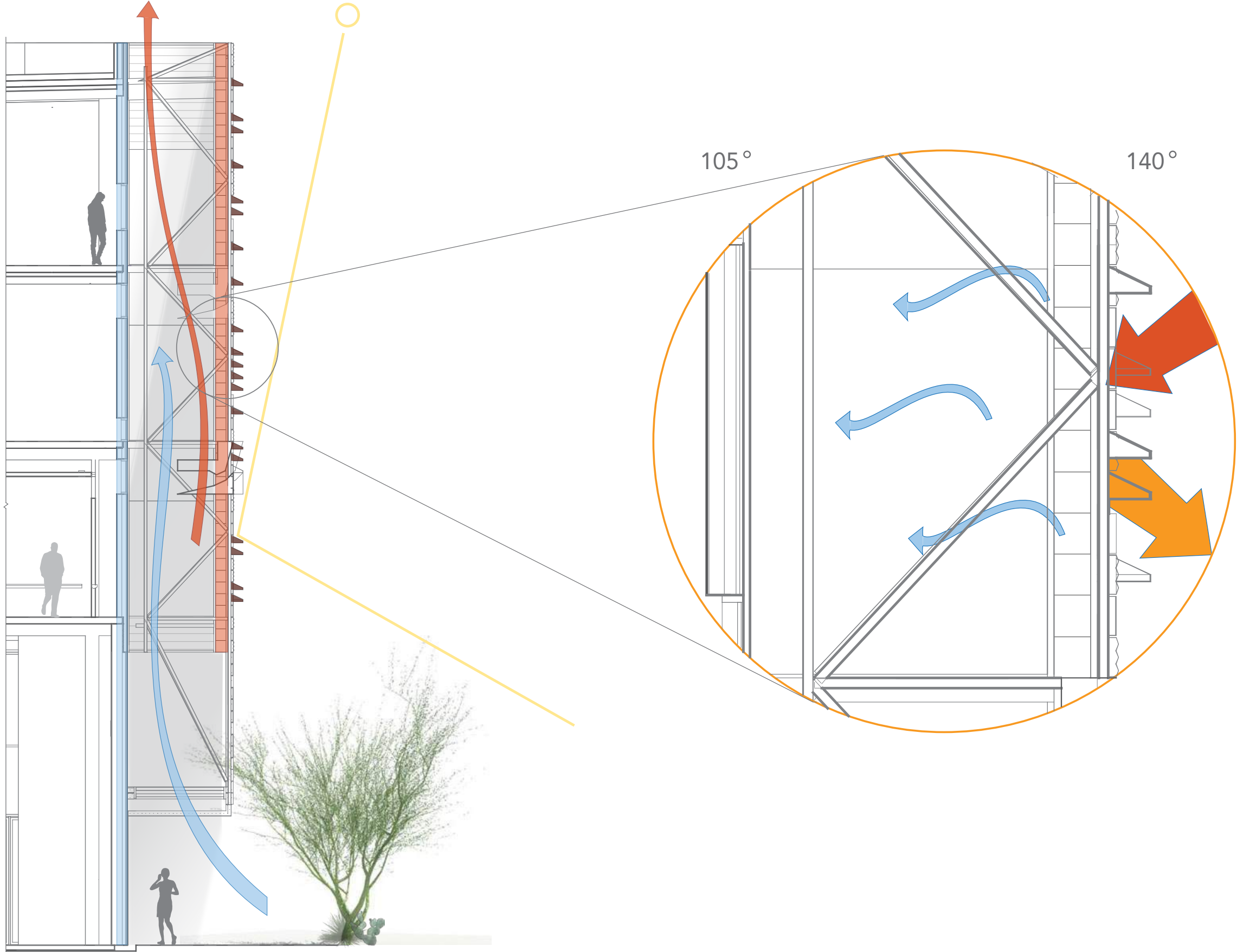
DAYLIGHTING STRATEGY



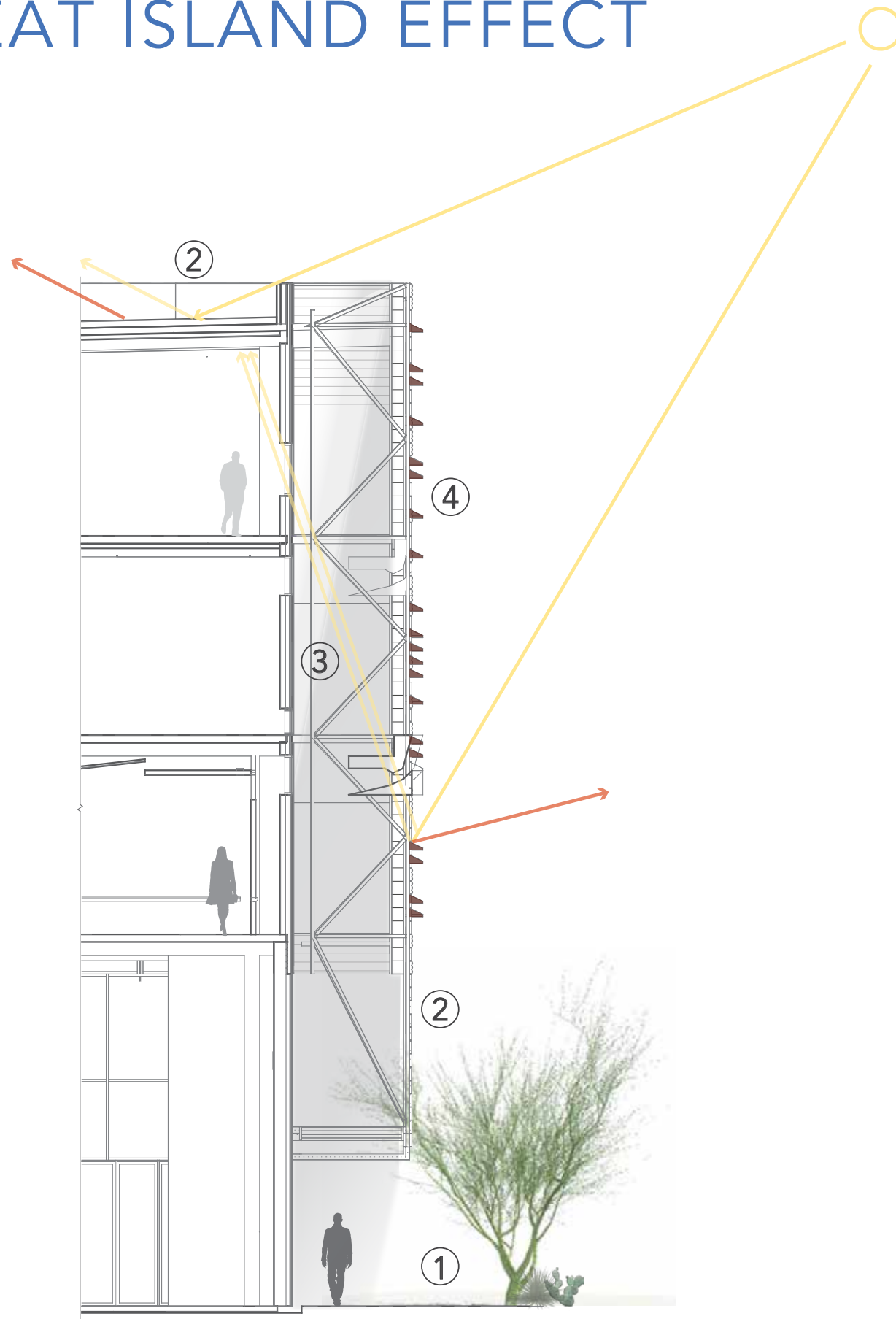
PEDESTRIAN SHADING



SHADED FACADE



URBAN HEAT ISLAND EFFECT



① Shaded concrete walks

- Overhangs
- Landscape

② Heat dissipating surfaces

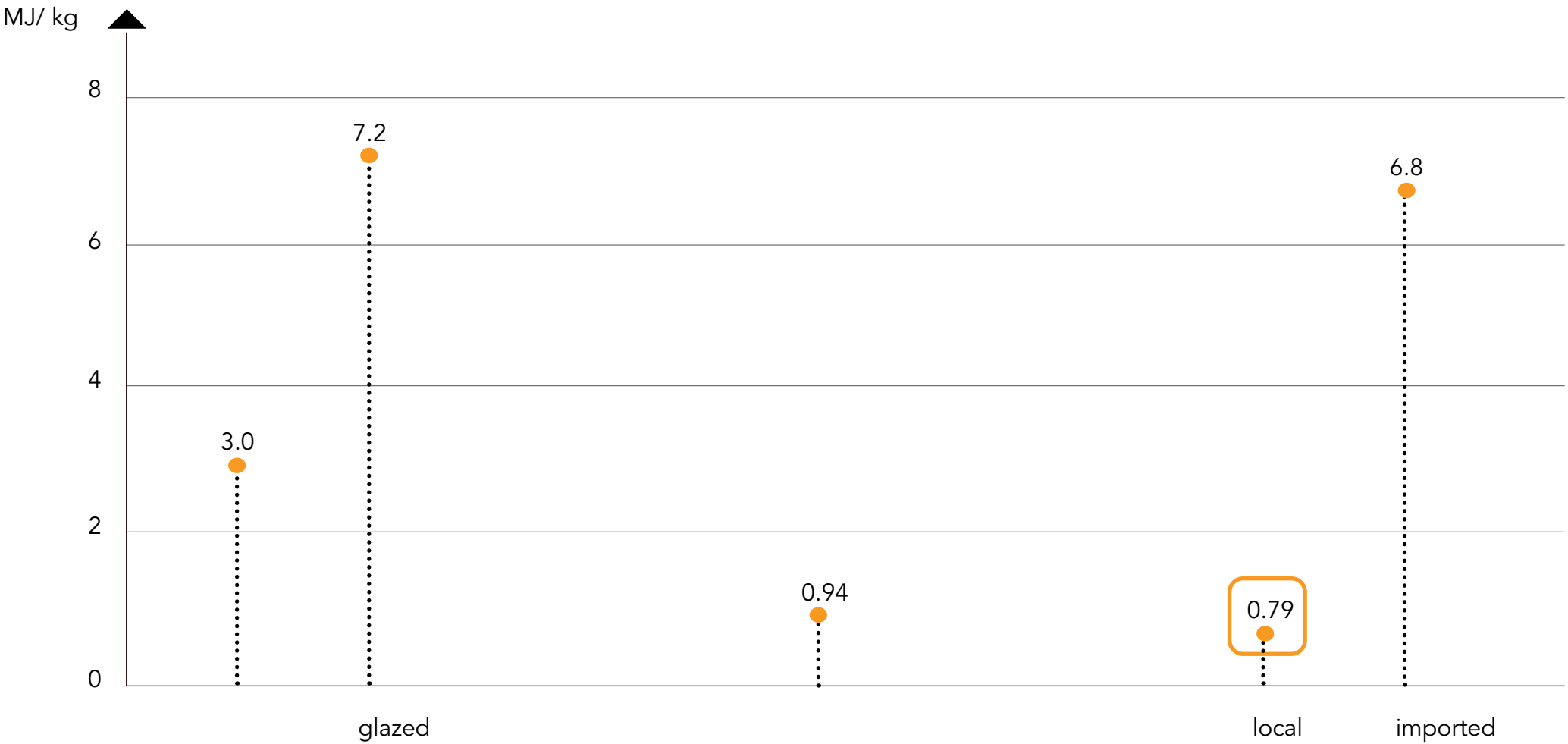
- Metal panel
- Reflective roofing

③ Shaded low albedo surfaces

④ Perforated skin

- Surface to air ratio
- Natural daylight

EMBODIED ENERGY



Clay Brick



Concrete Block



Sandstone



Winner!

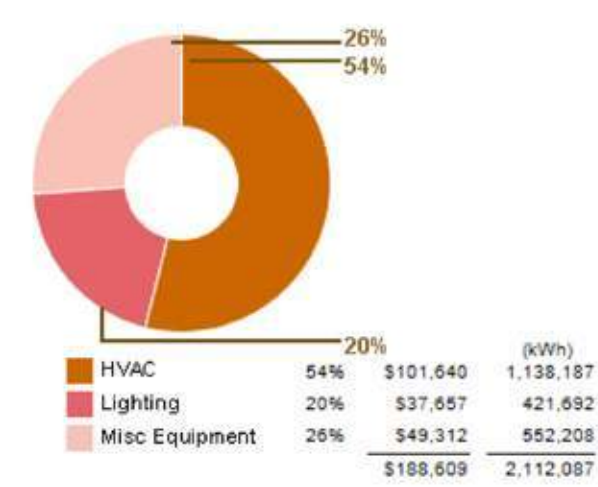
Embodied energy is the **energy used in the manufacture** of materials and is important to know in the construction of a building.

It has been estimated that at least **40%** of the **world's materials** and energy **is used in buildings** (Roodman & Lensson, 1995).

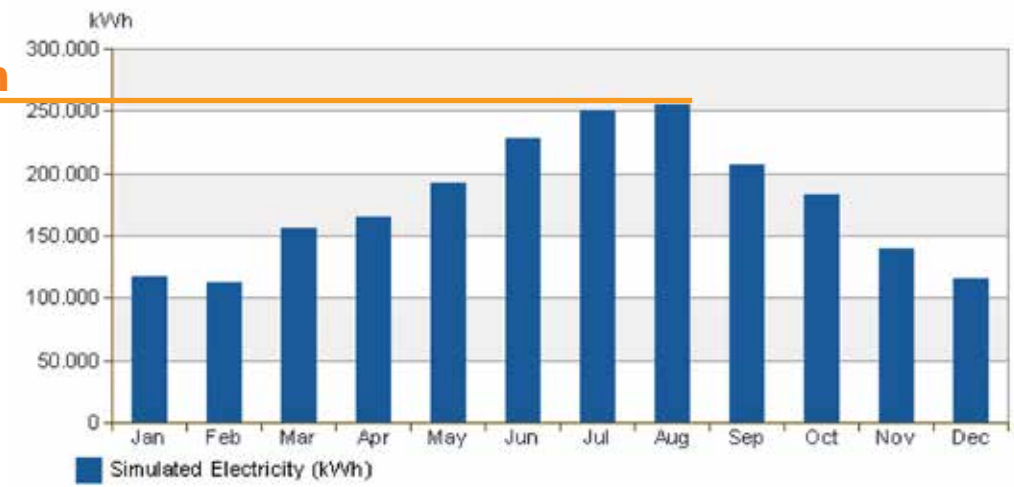
Values are predominantly **"cradle to gate"** estimates of embodied energy, i.e. do not reflect energy used for delivery transport.

CONCEPTUAL ENERGY ANALYSIS

Baseline

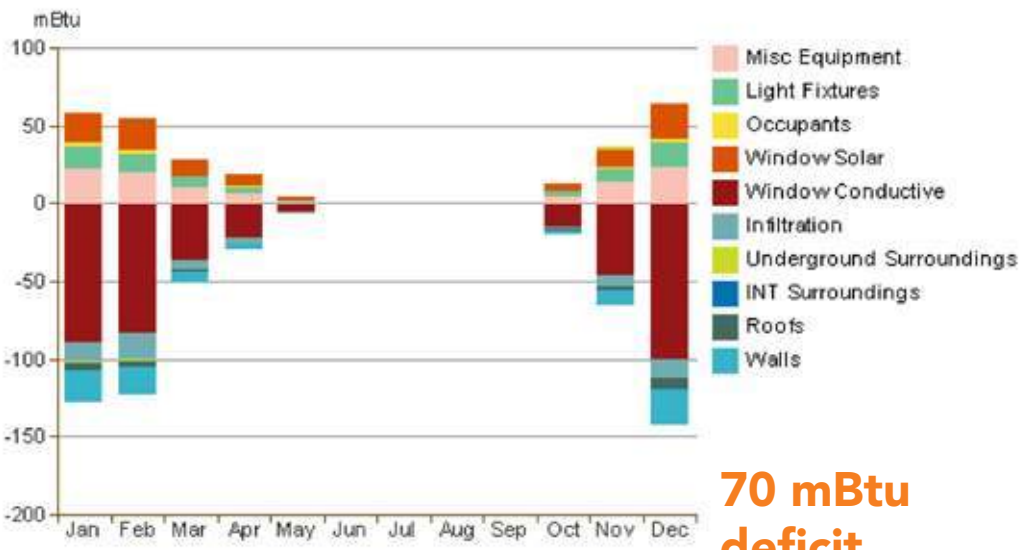


256,000 kWh
peak



Monthly Heating Load

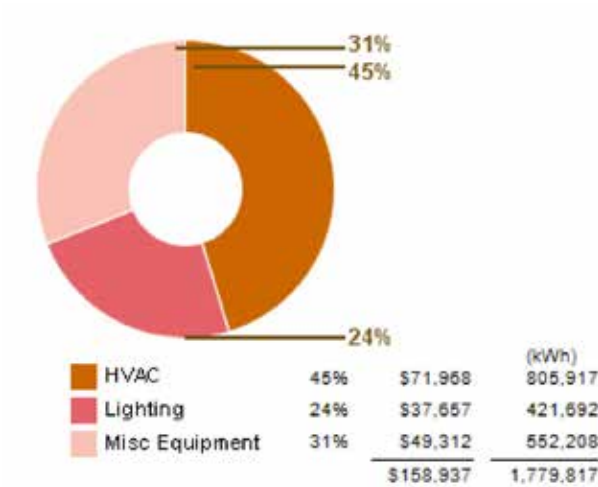
Monthly Peak Demand



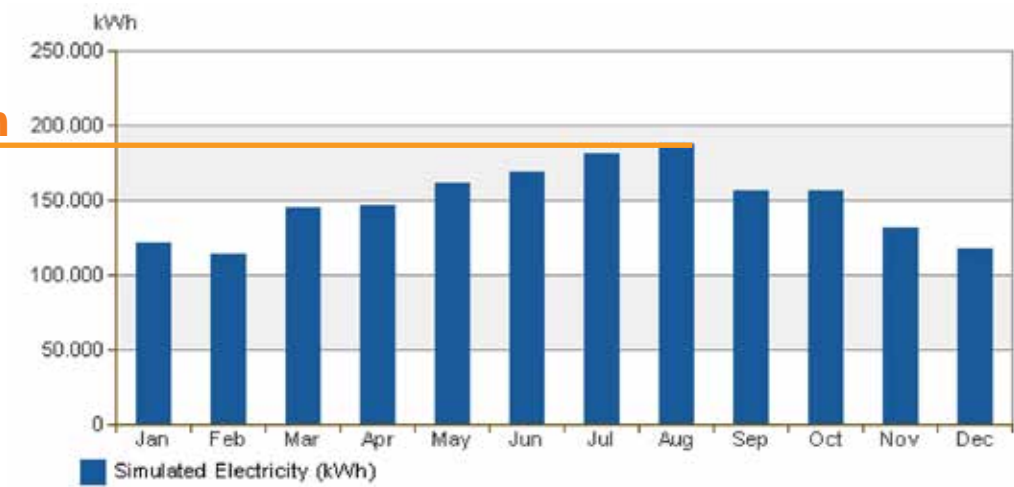
70 mBtu
deficit

Monthly Cooling Load

Design Alternative

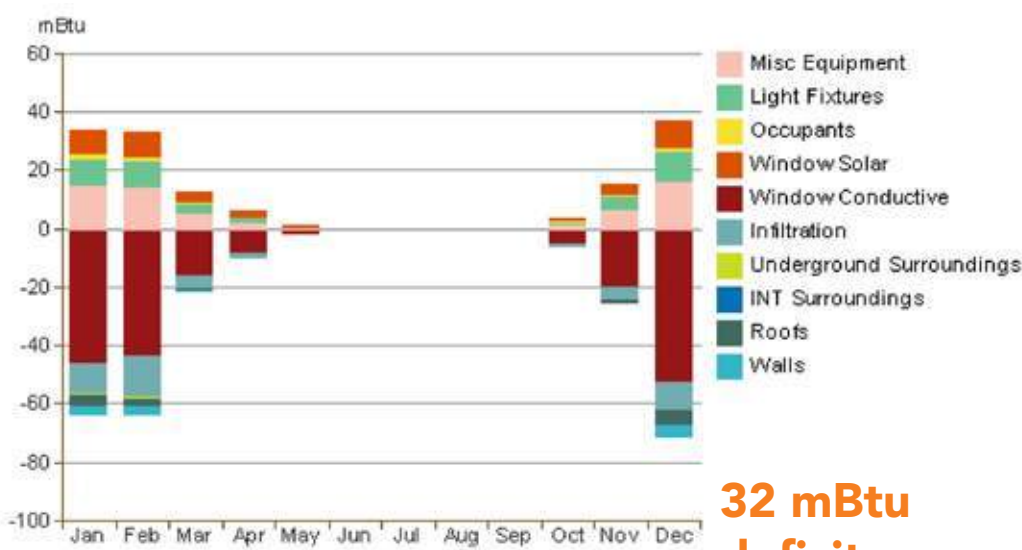


192,000 kWh
peak



Monthly Heating Load

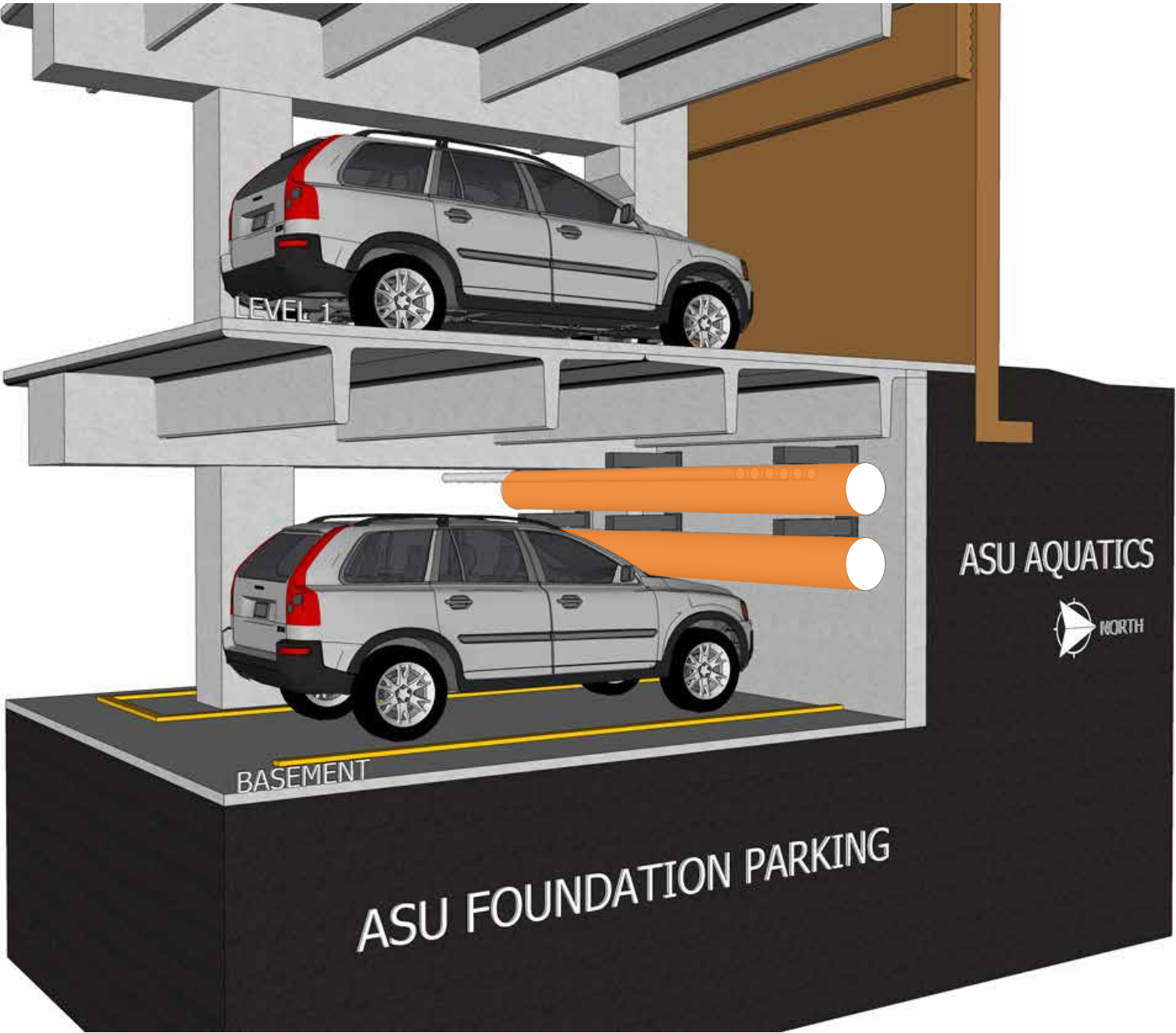
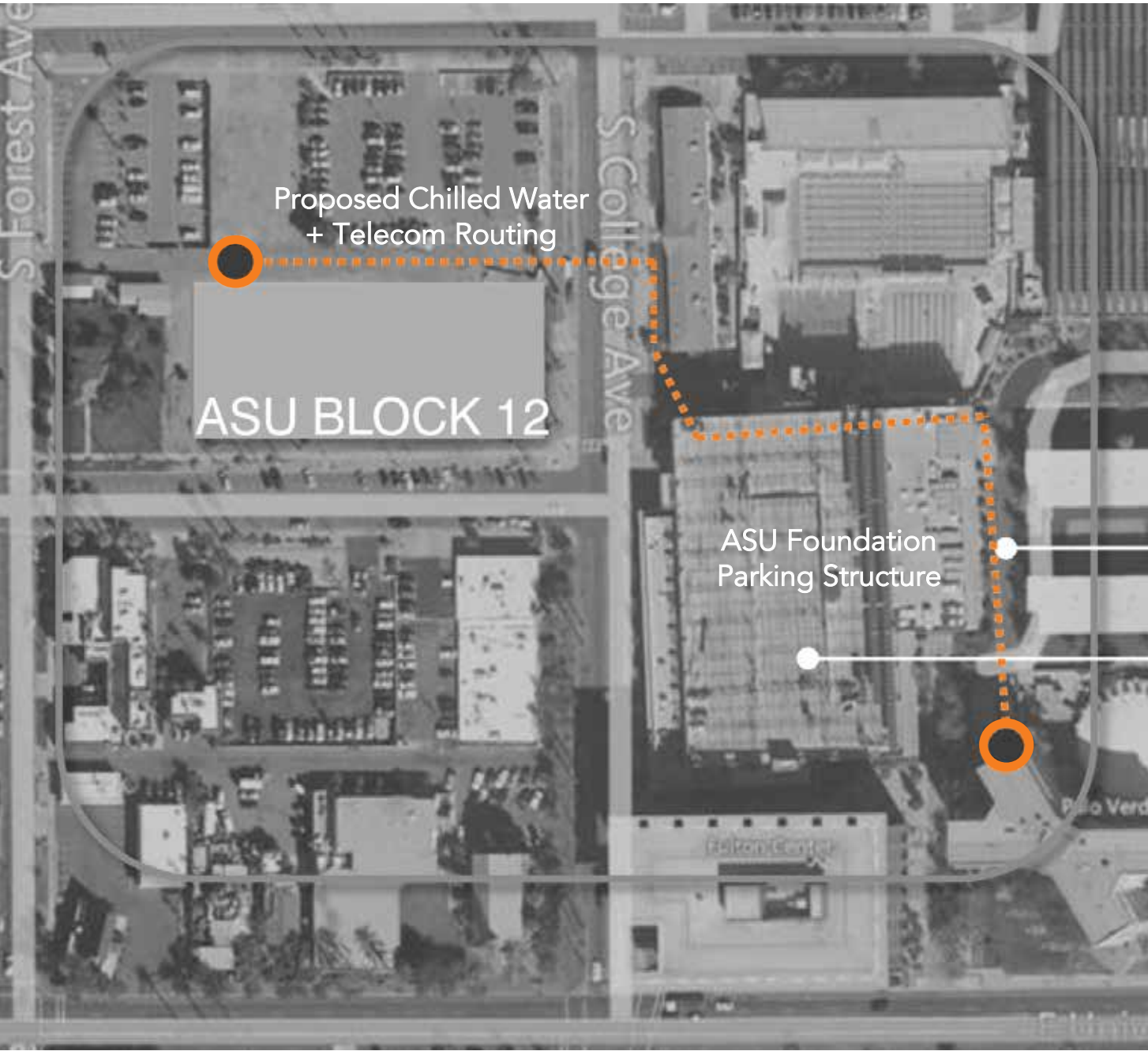
Monthly Peak Demand



32 mBtu
deficit

Monthly Cooling Load

CHILLED WATER CONNECTION



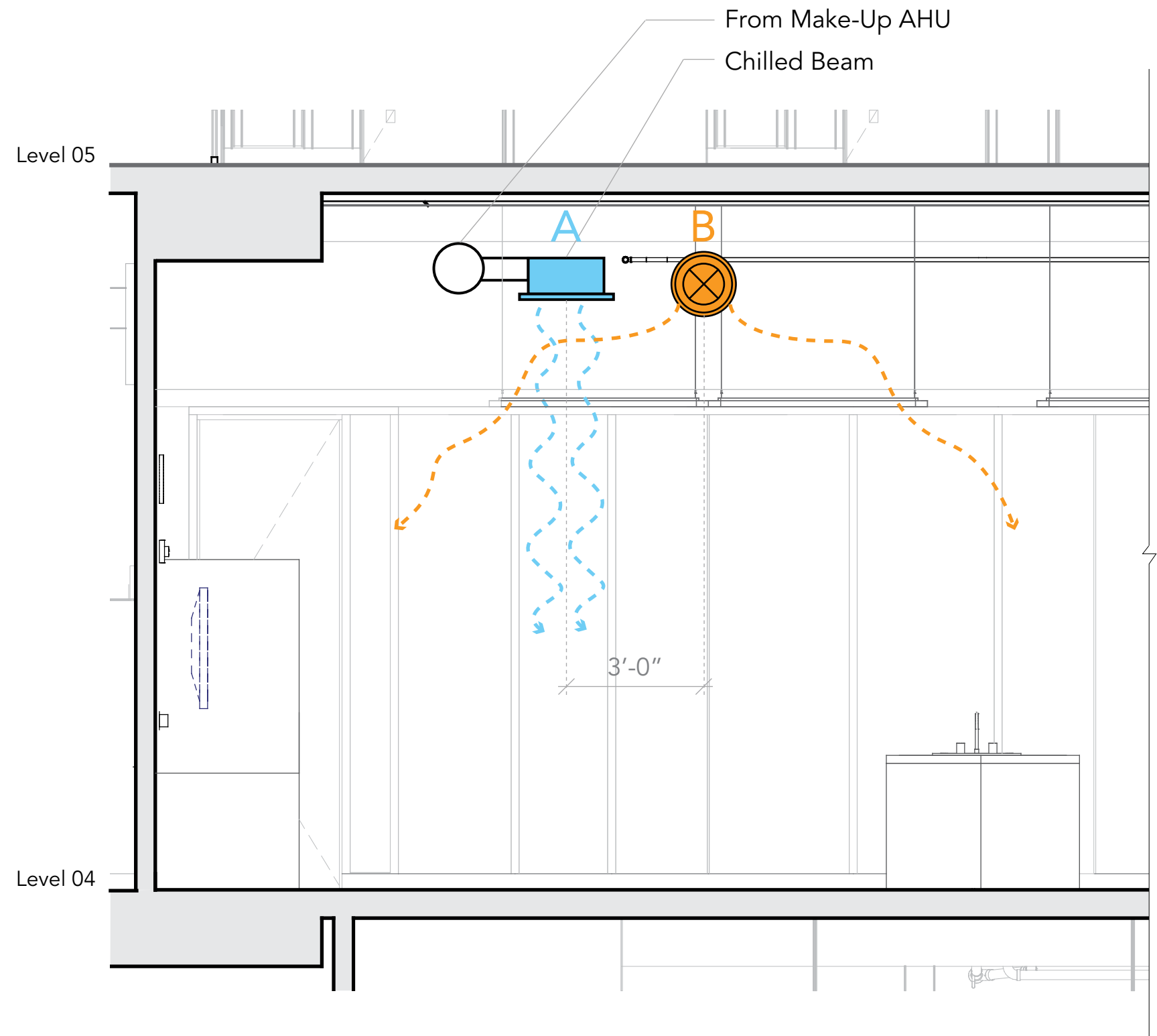
HVAC SYSTEMS

→ A: Chilled Beam System

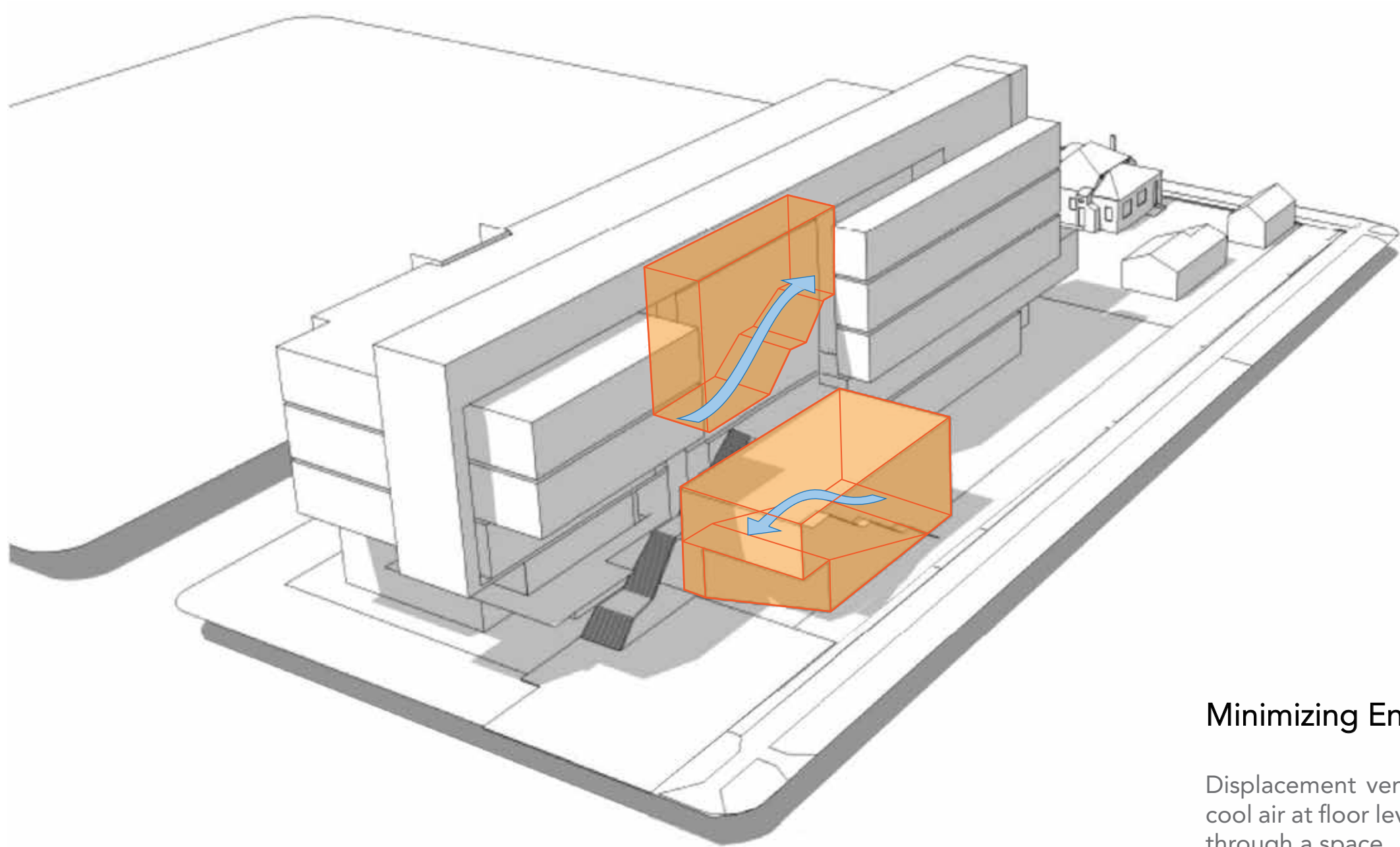
- Active
- Air supply from make-up AHU

→ B: Forced Air System

- VAV System with Reheat
- Two-Pipe System



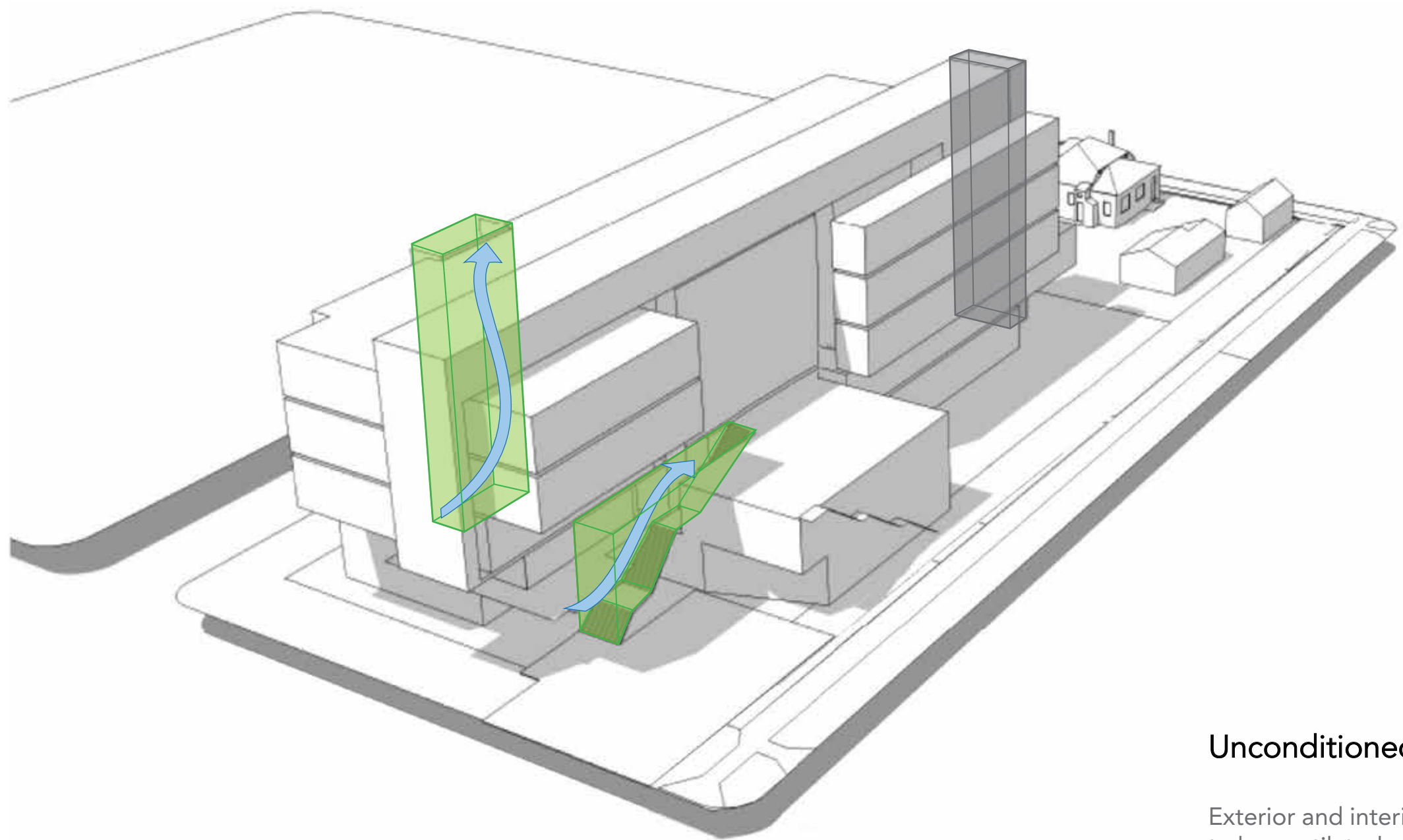
DISPLACEMENT AIR



Minimizing Energy Load

Displacement ventilation supplies conditioned cool air at floor level, allowing it to naturally rise through a space.

VERTICAL CIRCULATION

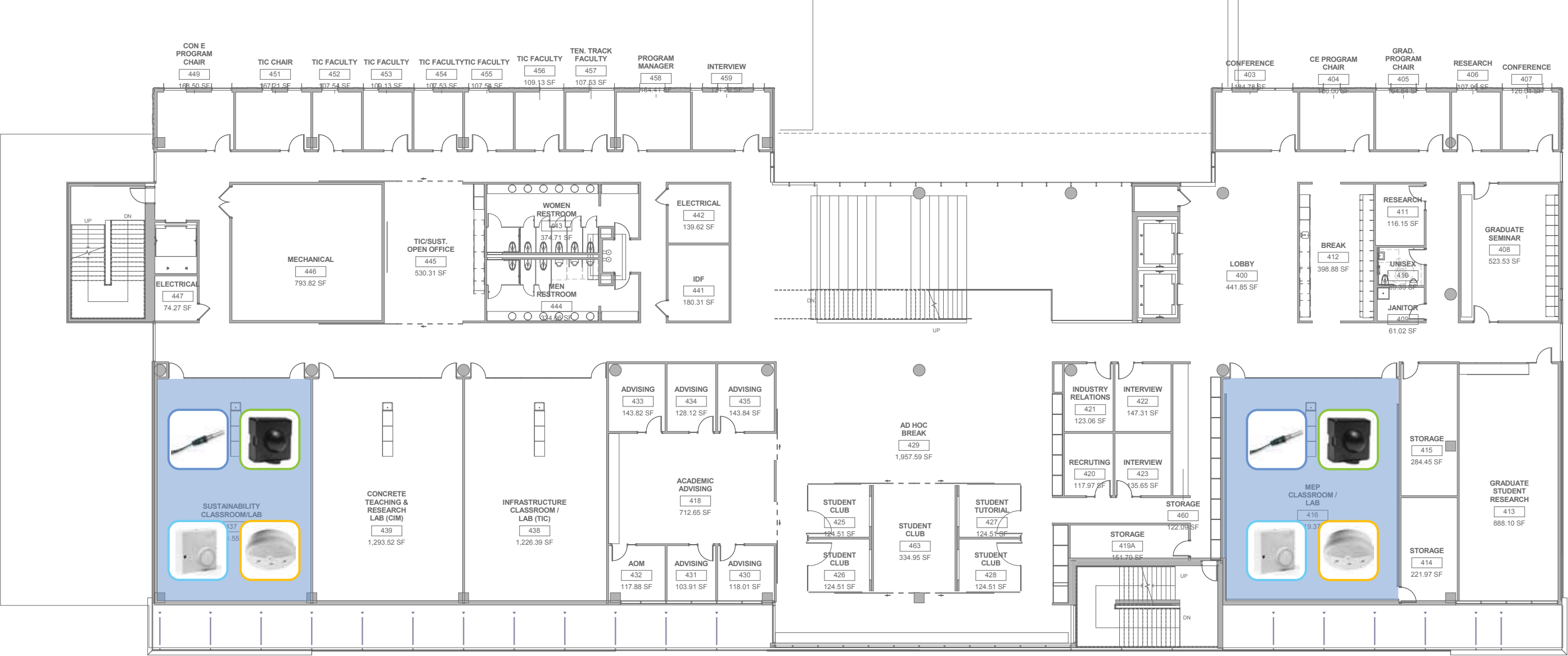


Unconditioned Stairs

Exterior and interior circulation spaces allow air to be ventilated naturally without adding to the building's energy load.

SMART SENSING

Marcus Muiers - ASU Grad Student



thermocule



air temp sensor



radiant temp sensor



weather station



humidity sensor

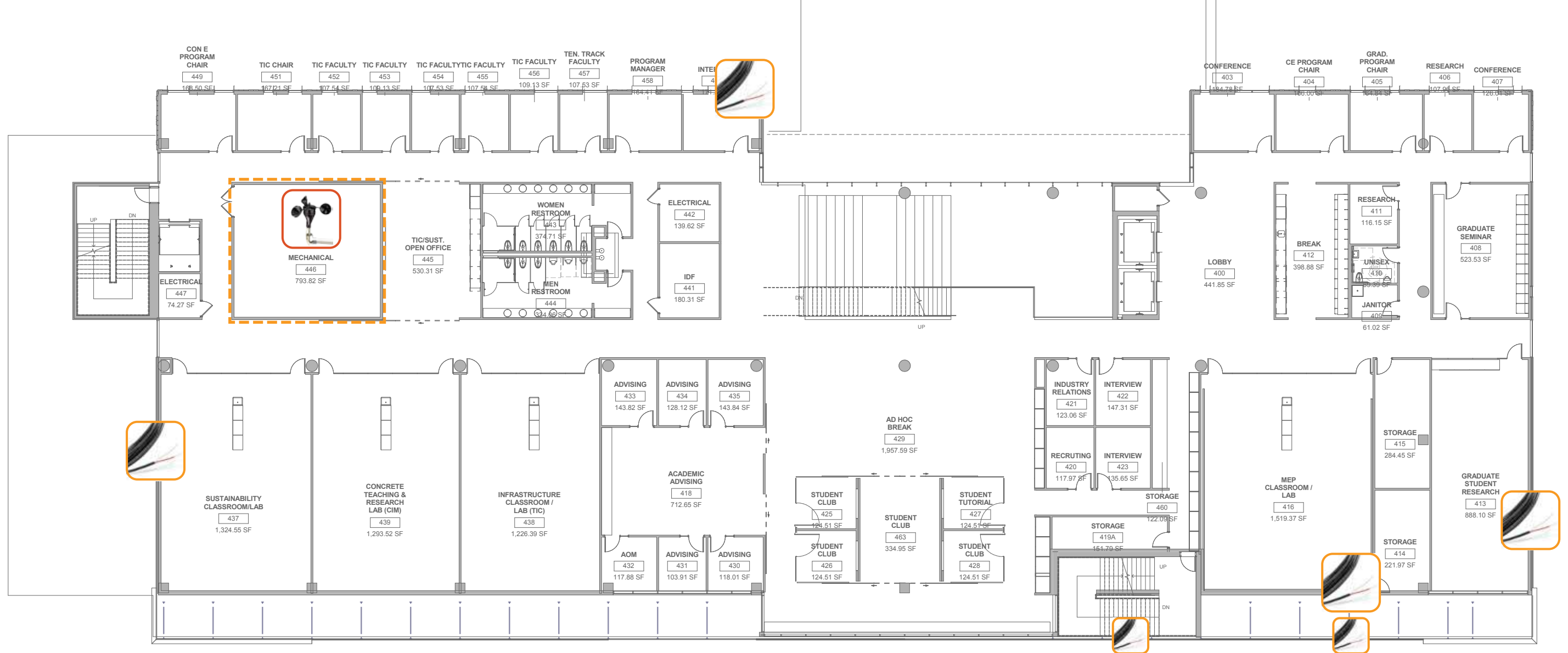


daylight sensor

Individual Classroom Monitoring

- Electrical lighting, plug, HVAC
- Daylighting
- Temperature
- Humidity
- Chilled Water

Marcus Myers - ASU Grad Student



thermocouple



air temp sensor



radiant temp sensor



weather station

humidity sensor

daylight sensor

Building Utilities Metering

- Domestic Water
- Natural Gas
- Chilled Water
- Electrical (per floor)

LEED BEST PRACTICES

- Developing project on an **infill urban site**
- Encouraging alternate transportation with access to **public transportation** and support for **cycling**, thereby reducing parking
- Providing **underground storage** for **stormwater** that replenishes the aquifer
- Reducing both the site and the roof **heat island effect**
- Reducing water consumption through **low-water landscape** and **low-flow fixtures**
- Reducing typical **energy demand** by **30-40%**
- Using enhanced commissioning to ensure **optimal operation** at **start-up**
- Local building materials** received preference to reduce transportation costs
- HVAC system includes **CO2 monitoring** to minimize/optimize the quantity of outside air
- Indoor Air Quality Plan** was initiated both during construction and just prior to occupancy and included a complete building flush.
- Only **low-emitting materials** were used on the interior
- Includes **lighting controls and sensors** to turn lights off in unoccupied spaces and allow the user to lower the lighting levels when daylight is sufficient
- Building will be monitored after occupancy to **optimize thermal comfort**
- Sustainability approach** will be documented and available for a variety of **educational opportunities**

