...teaching the building
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 configurable** 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
URBAN CONNECTIONS
MASSING STRATEGY

MARKETPLACE
MASSING STRATEGY

LOBBY / ELEVATORS
MASSING STRATEGY

LEVEL 3
ASU CLASSROOMS/DEWSC
VERTICAL STREET

MAIN EXTERNAL STAIR

7th street

college avenue
VERTICAL STREET

LEVEL 3, 4 & 5
MIXING CHAMBER
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. ArchitecturalFeat
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. Historirical 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
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 System

A smart building platform powers and controls lights and a high density sensor grid.
The roof of the building is a “clean roof”, meaning that it is prepared for future incorporation of photovoltaics and the necessary infrastructure.
PEDESTRIAN SHADING
URBAN HEAT ISLAND EFFECT

1. Shaded concrete walks
   - Overhangs
   - Landscape

2. Heat dissipating surfaces
   - Metal panel
   - Reflective roofing

3. Shaded low albido surfaces

4. Perforated skin
   - Surface to air ratio
   - Natural daylight
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

Monthly Heating Load

256,000 kWh peak

Monthly Peak Demand

Monthly Cooling Load

70 mBtu deficit

Design Alternative

Monthly Heating Load

192,000 kWh peak

Monthly Peak Demand

Monthly Cooling Load

32 mBtu deficit
CHILLED WATER CONNECTION

Proposed Chilled Water + Telecom Routing

ASU BLOCK 12

ASU Foundation Parking Structure

ASU FOUNDATION PARKING

ASU AQUATICS
A: Chilled Beam System
- Active
- Air supply from make-up AHU

B: Forced Air System
- VAV System with Reheat
- Two-Pipe System
Minimizing Energy Load

Displacement ventilation supplies conditioned cool air at floor level, allowing it to naturally rise through a space.
Exterior and interior circulation spaces allow air to be ventilated naturally without adding to the building’s energy load.
Individual Classroom Monitoring

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

SMART SENSORING
Marcus Muyers - ASU Grad Student
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 flue.
- Only **low-emitting materials** were used on the interior
- Includes **lighting controls and sensors** to turn lights off in unoccupied spaces and allow the used 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