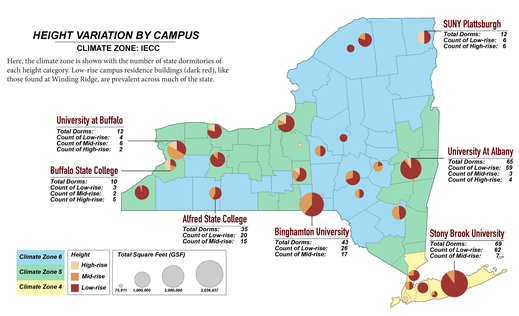
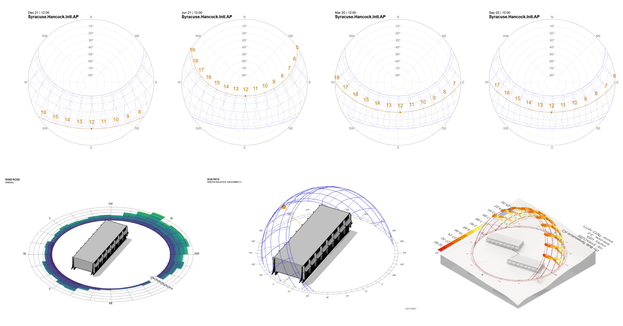
NET ZERO RETROFIT LIVING LAB at WINDING RIDGE ROAD

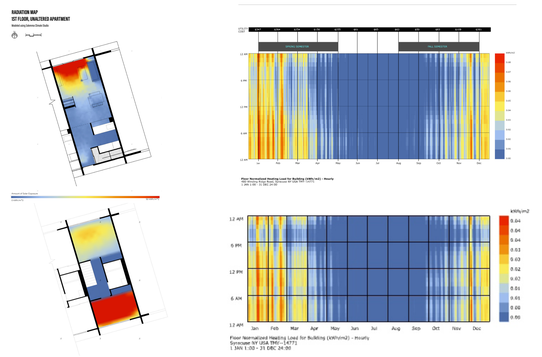
PROJECT OVERVIEW

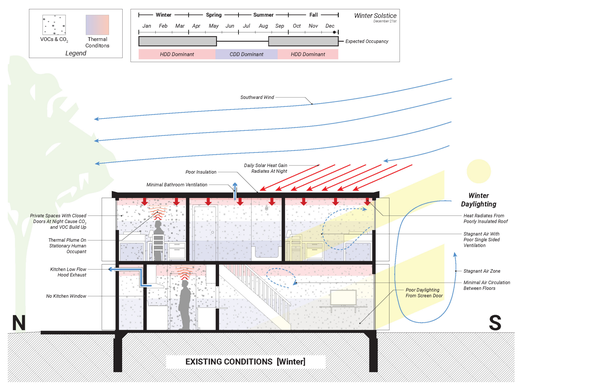
In view of the wider Syracuse University goal of revitalization towards Sustainable Campus Communities, the Net Zero Retrofit Campus Living Lab will research, construct, and evaluate a Net Zero Energy Retrofit (NZER) approach using a 1972 Syracuse University campus dormitory building, which will function as a research-integrated platform and pilot demonstration project for potential wide-scale replication across SU and campus dormitories statewide. The three-year project will assess the effectiveness of retrofit techniques adapted from emerging European approaches, by several key performance metrics: energy savings, indoor air quality, cost-effectiveness, and carbon impact. Post-occupancy evaluation and occupant-centric smart building controls will be integrated to increase project energy savings and demonstrate the dynamic relationship between inhabitants and buildings with interactive digital tools. Throughout the project, students are participating in the research process at multiple points of interface, including integration of retrofit study into curriculum, energy modeling and simulation activities in the lab, participatory design competitions, knowledge-sharing symposia, and participation in post-occupancy survey processes. Finally, the project will present, in partnership with the Syracuse Museum of Science and Technology, a public exhibit communicating research findings and the potential impacts of retrofits across not only Syracuse University campus, but statewide.

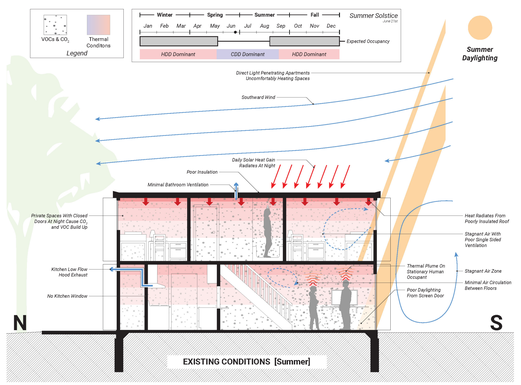


CLIMATE ANALYSIS OF EXISTING BUILDING AT WINDING RIDGE

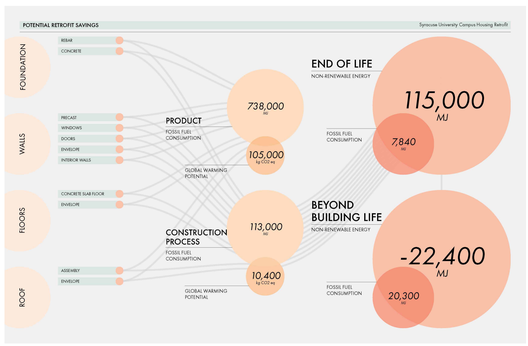


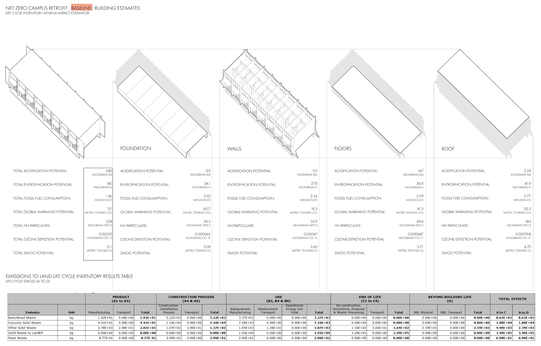






LIFE CYCLE CONSIDERATIONS OF EXISTING BUILDING





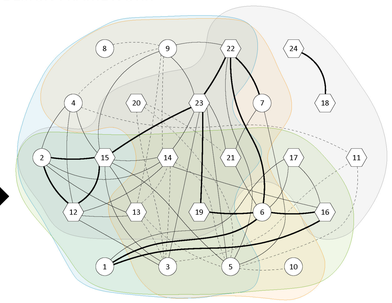
AN APPROACH OF INTEGRATED PERFORMANCE DESIGN

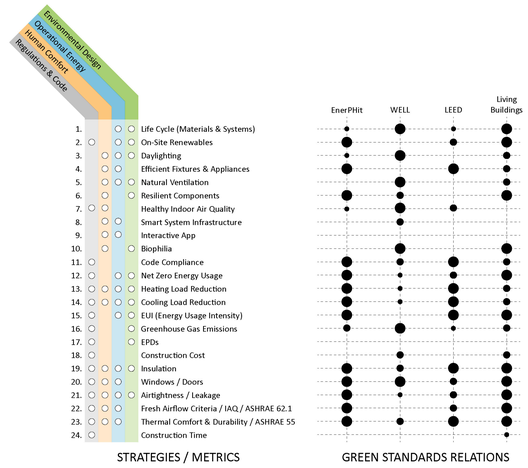
THE WINDING RIDGE NET ZERO RETROFIT INTEGRATED PERFORMANCE DESIGN FRAMEWORK

PROJECT GOALS
- Fight Climate Change
- Improve Accuracy Of Models
- Improve Human Health

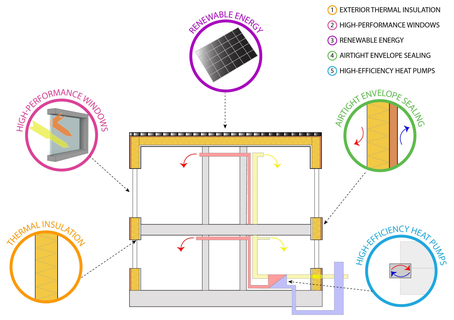
KEY DESIGN CONSIDERATIONS
- Environmental and Energy Driven Design
- Occupant Comfort and Wellness
- Resilience and Replicability/ Constructability

STAKEHOLDERS
- NYSERDA
- Design Team
- Syracuse University
- S.U. Student Residents





MERGING PASSIVE HOUSE-INSPIRED DESIGN PERFORMANCE GOALS WITH MULTIPLE PROJECT CRITERIA THROUGH INTERDISCIPLINARY WORKFLOWS



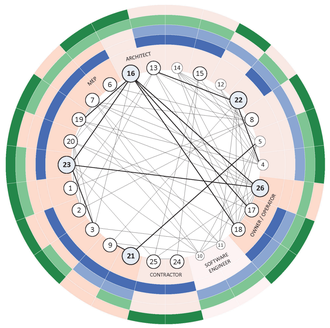
DESIGN STRATEGIES

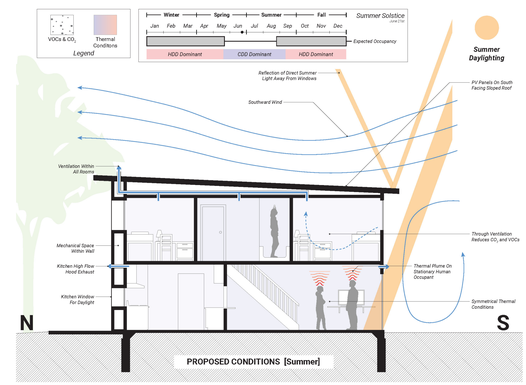
1. Perform Life Cycle Analysis (Materials & Systems)
2. Compare Material EPDs
3. Install On-Site Renewable Energy Generation
4. Provide Access to Natural Daylighting
5. Provide Access to Natural Ventilation
6. Implement Low Flow Fixtures
7. Implement Energy Efficient Appliances & Lighting
8. Utilize Resilient Building Components
9. Install Efficient Air Filters to Improve Indoor Air Quality
10. Integrate Whole-Building Scale Smart Systems
11. Create an Interactive App for Facilities and Residents
12. Incorporate Aspects of Biophilic Design
13. Install High Thermally-Resistive Insulation
14. Install Low Heat-Transfer Windows & Doors

MEASURABLE METRICS

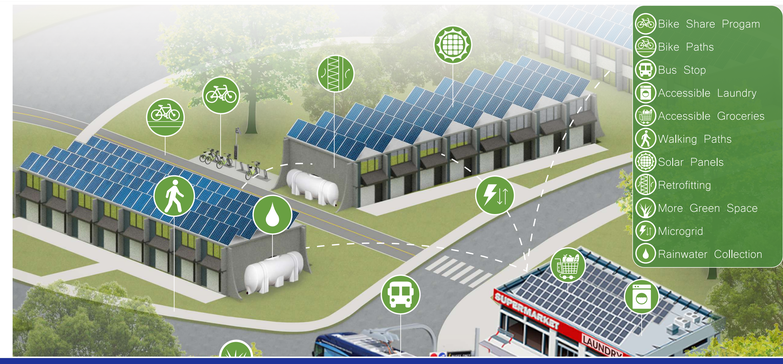
15. Comply with Building Codes
16. **Achieve Net Zero Energy Usage**
17. Reduce Heating Load
18. Reduce Cooling Load
19. Reduce Energy Usage Intensity (EUI)
20. Reduce or Negate Greenhouse Gas Emissions
21. **Fresh Airflow Criteria / IAQ / ASHRAE 62.1**
22. **Thermal Comfort & Durability / ASHRAE 55**
23. **Renewable Primary Energy Sources**
24. Comparable Construction Time
25. Comparable Construction Cost
26. **Operational Cost**

Environmental Impact
Operational Energy
Human Comfort
Regulations & Code
Significant Connections





LONG-TERM INTEGRATION OF SUSTAINABLE CAMPUS PRINCIPLES



SYRACUSE UNIVERSITY RESEARCH TEAM:
Principle Investigator: Nina Sharifi, PhD, School of Architecture
Co-PIs: Elizabeth Krietemeyer, PhD, Architecture; Bing Dong, PhD, Engineering; Jason Dedrick and Jeff Hemsley, iSchool
Research Assistants: Mason Malsegna / Eve Miserlian / Julia Chou / Wesley Feero / Shiori Green / Angelina Zhang / Kaicheng Zhuang
Design and Construction Partners: Ashley McGraw Architects, Northland Construction, TAITEM Engineering

Funded by: New York State Energy Research & Development Authority and Syracuse University Climate Neutrality
Co-Sponsors: Modular Comfort, Erie Materials, Daikin, and Quality Mechanical Services

NEW YORK STATE OF OPPORTUNITY. REV Campus Challenge

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