



Middlebury Elementary

By MiddZEST





Context



Building



Systems



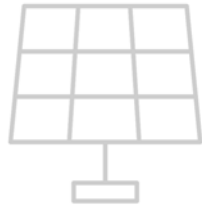
Energy



Finance



Affordable
Efficiency



Visible
Engineering



Inspirational
Beacon



Experiential
Collaboration

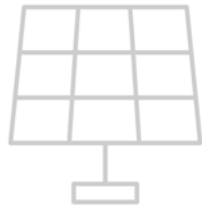


Resilient
Design





Affordable
Efficiency



Visible
Engineering



Inspirational
Beacon



Experiential
Collaboration

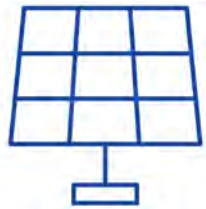


Resilient
Design





Affordable
Efficiency



Visible
Engineering



Inspirational
Beacon



Experiential
Collaboration

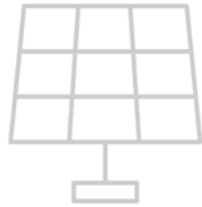


Resilient
Design





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Efficiency



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Experiential
Collaboration

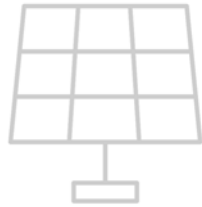


Resilient
Design





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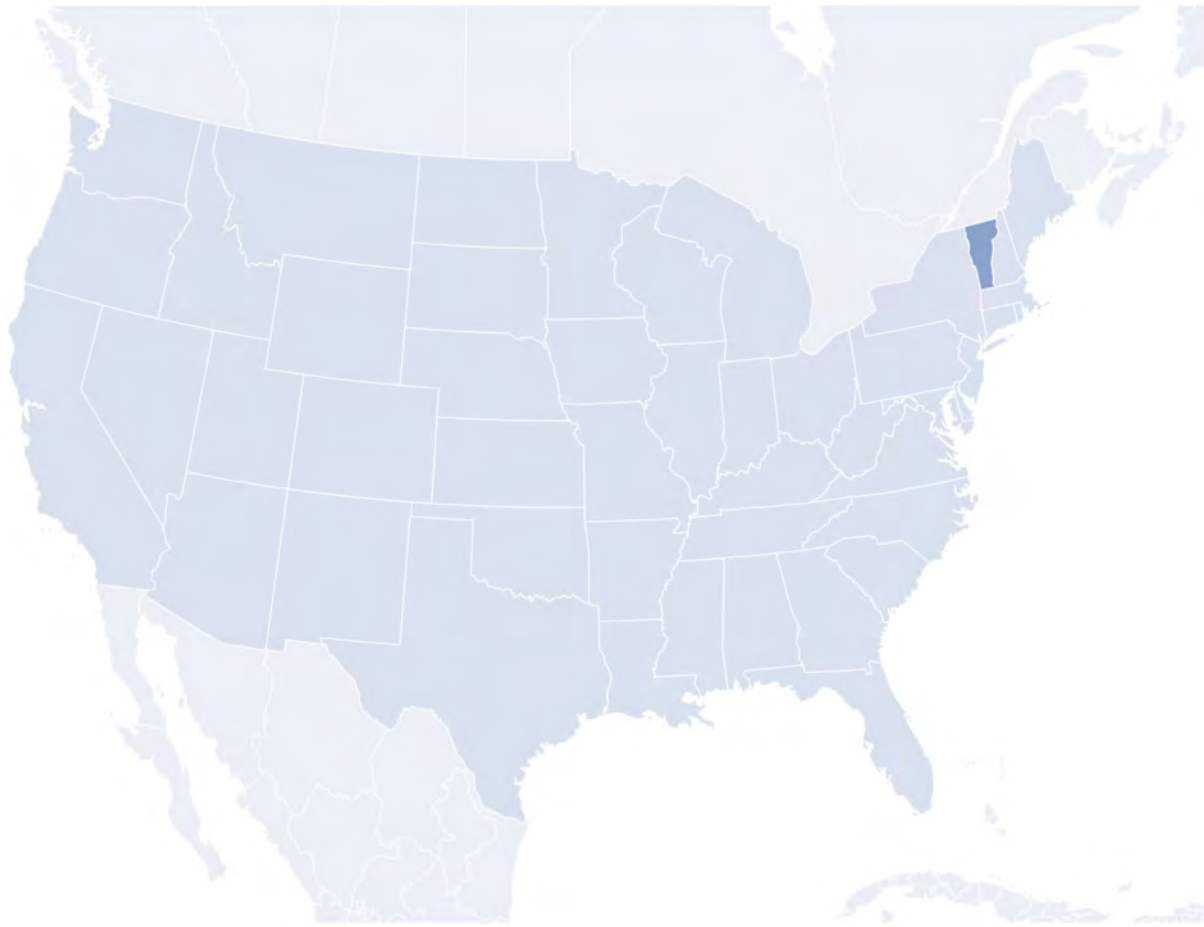


Experiential
Collaboration



Resilient
Design





**Middlebury,
Vermont, USA**



Location





Middlebury,
Vermont, USA



Location





Location





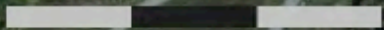
Middlebury Union
Middle School

Jeffrey Murdock
Nature Preserve

Middlebury
Elementary

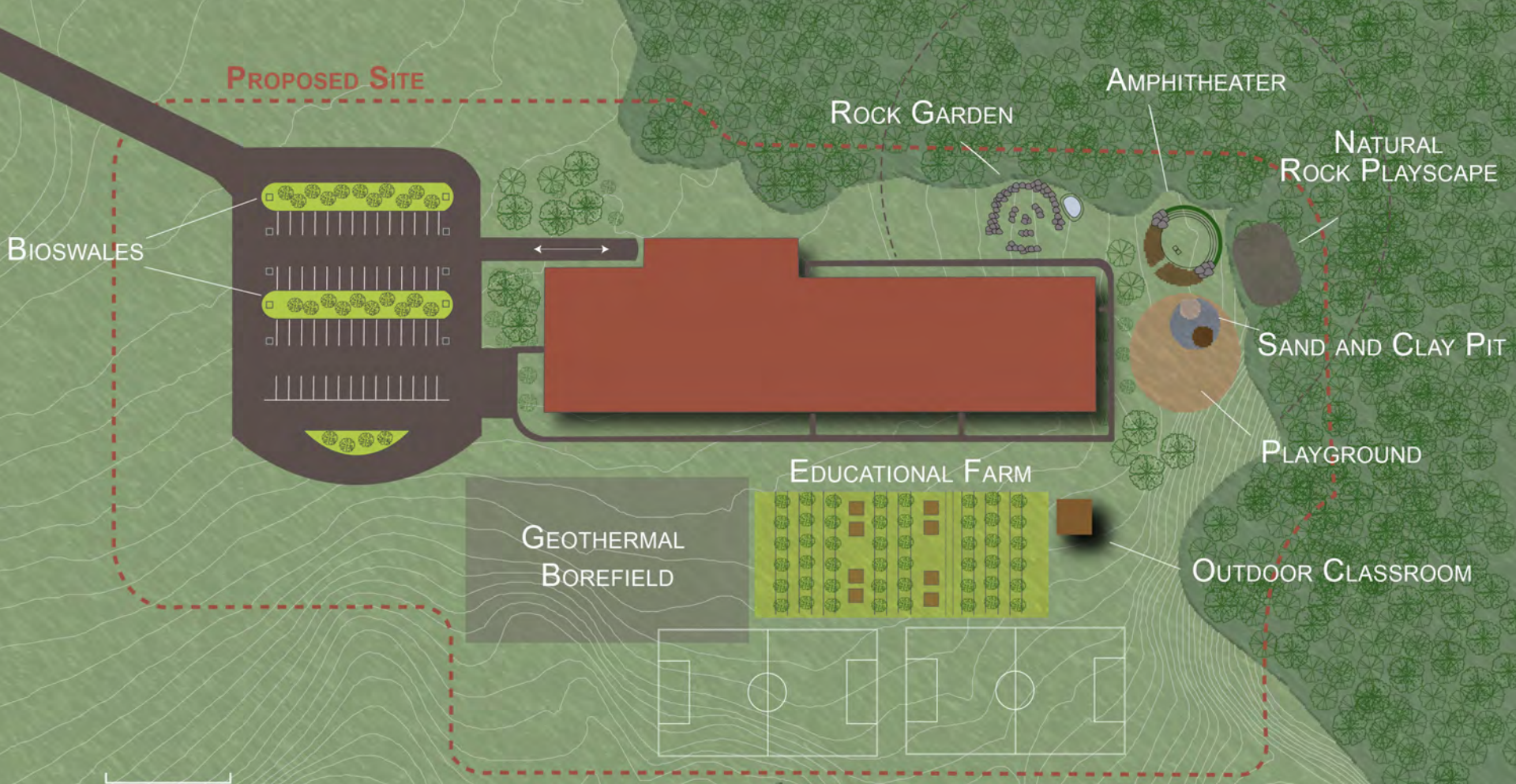


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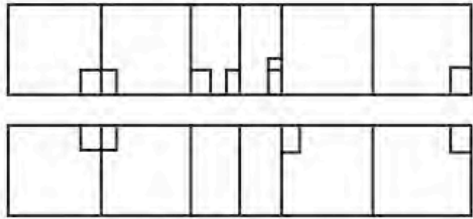
Location



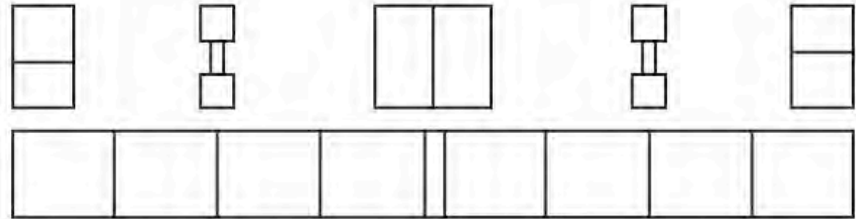


Site Plan





Traditional Hall



Class Neighborhoods

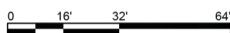
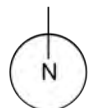
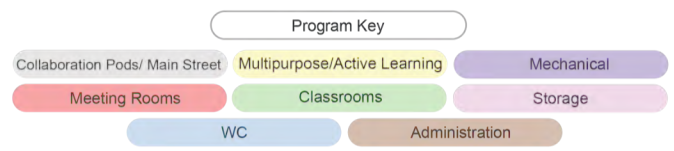
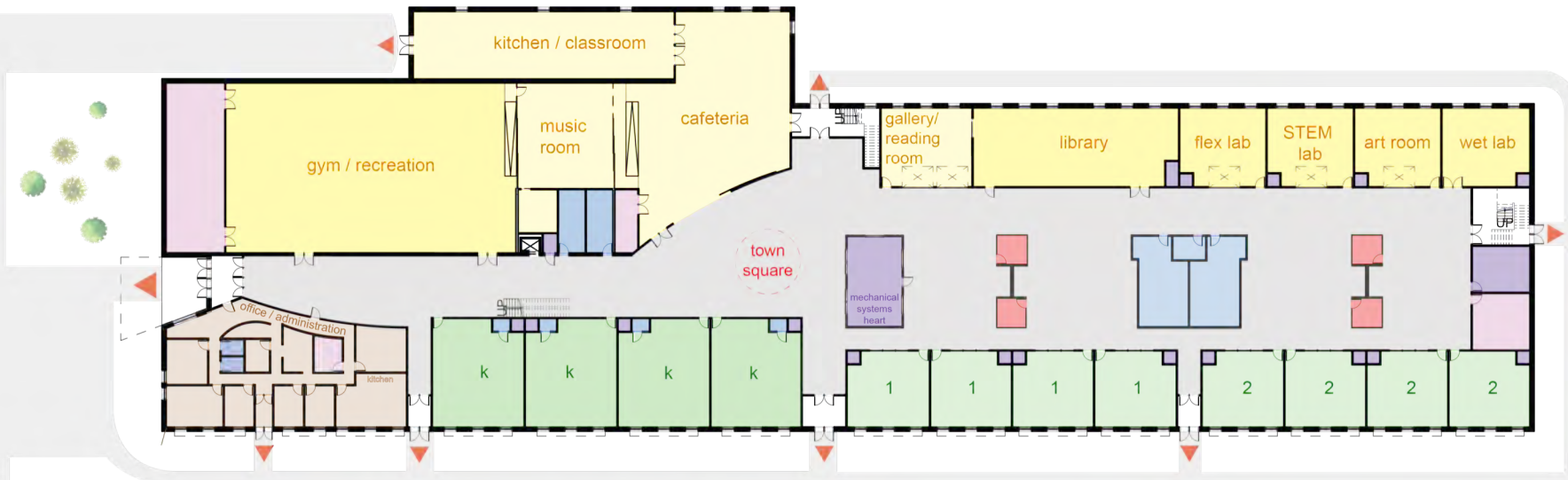
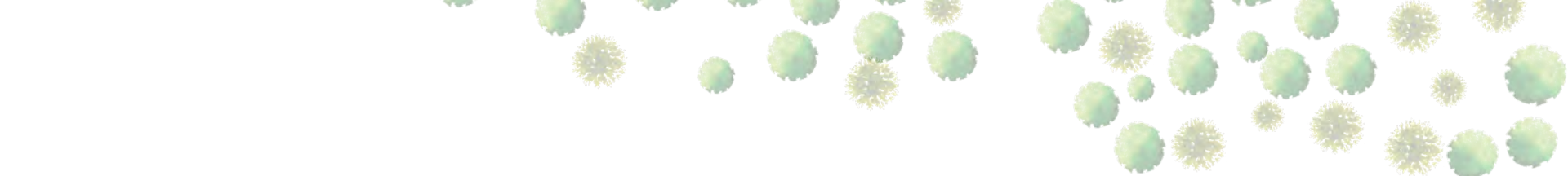


Mary Hogan Design



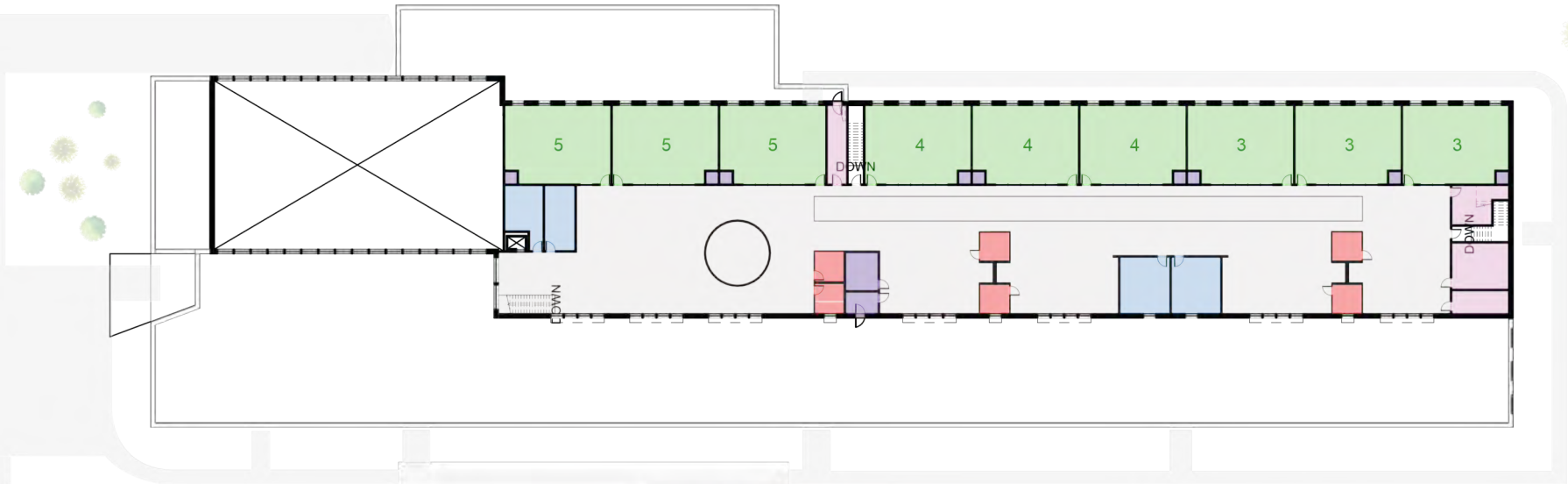
Middlebury Elementary Design

- Shared + Gathering
- Administrative
- Class Spaces



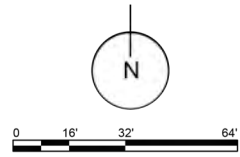
First Floor Plan





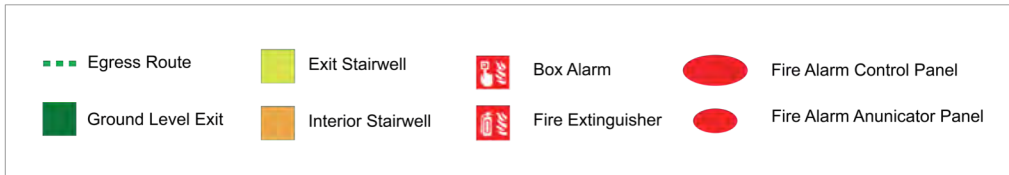
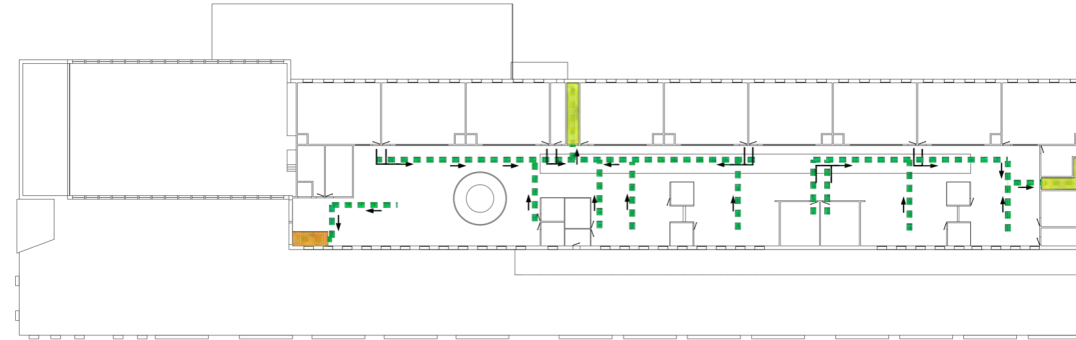
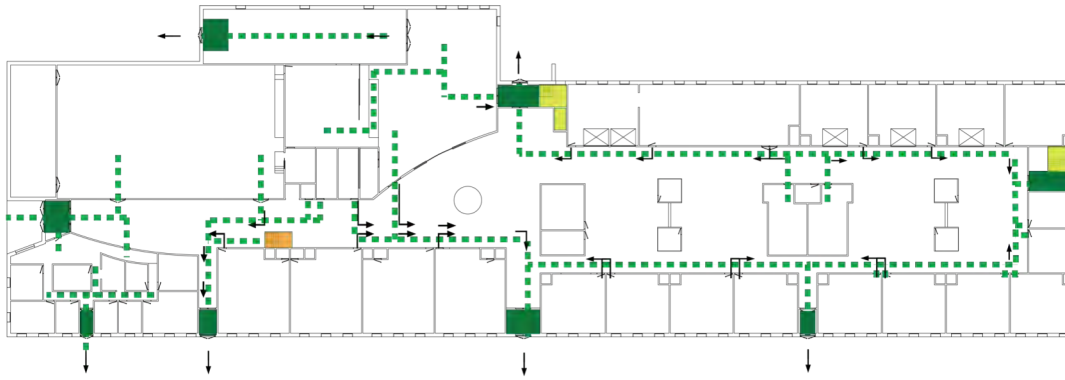
Program Key

Collaboration Pods/ Main Street	WC
Meeting Rooms	Mechanical
Classrooms	Storage



Second Floor Plan





NFPA 101

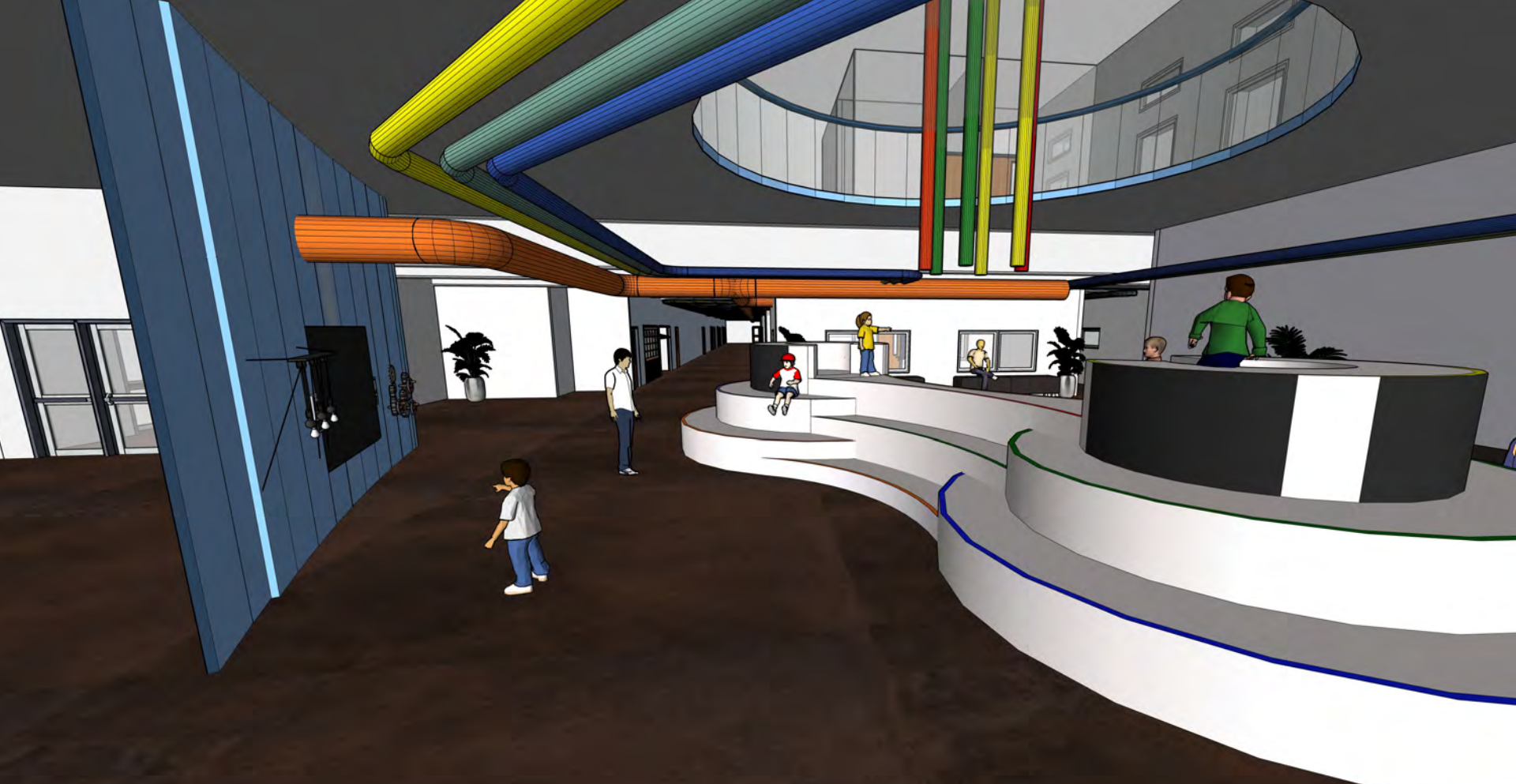
National Electrical Code

Uniform Plumbing Code

International Building Code

Vermont Accessibility Codes

ADA Compliant





Main Street





Collaboration Spaces





Collaboration Spaces





Classrooms





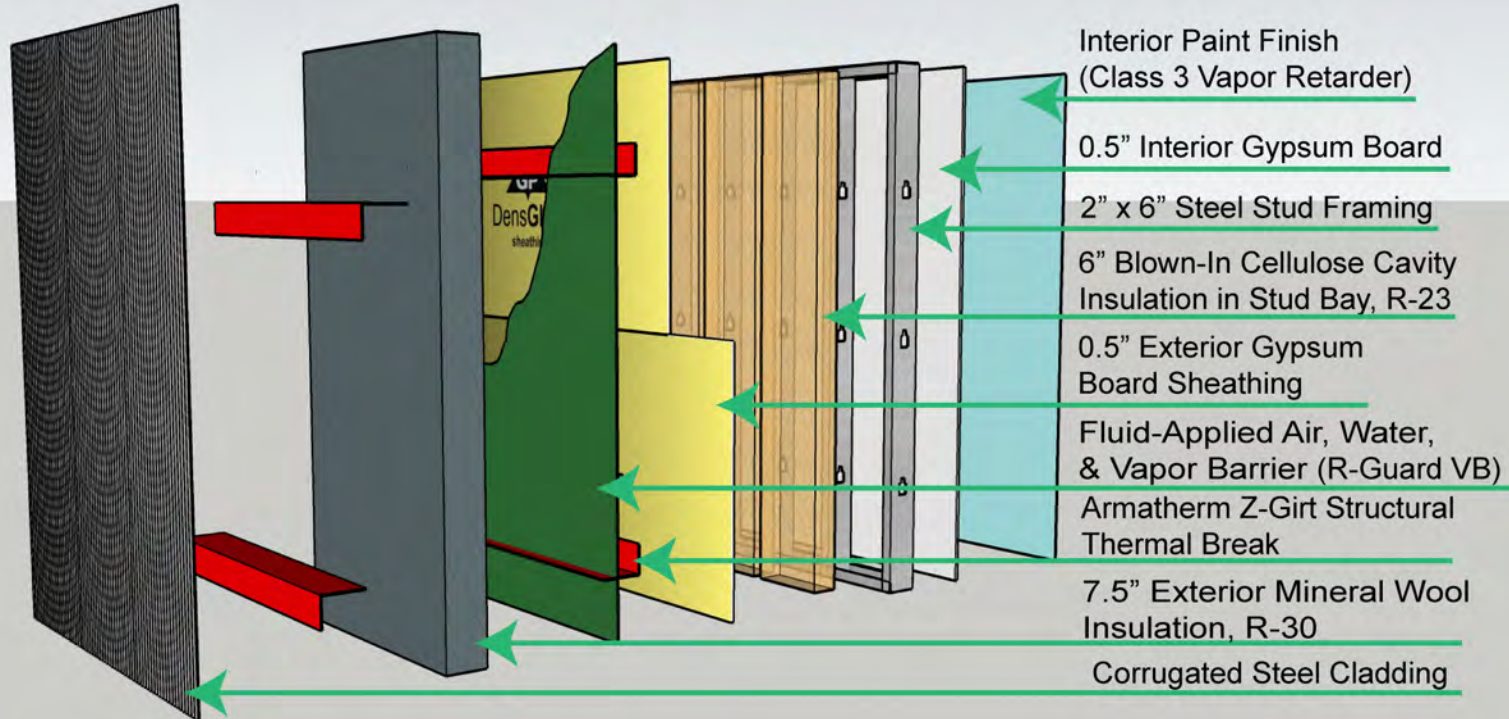
Classrooms

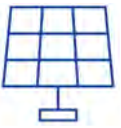




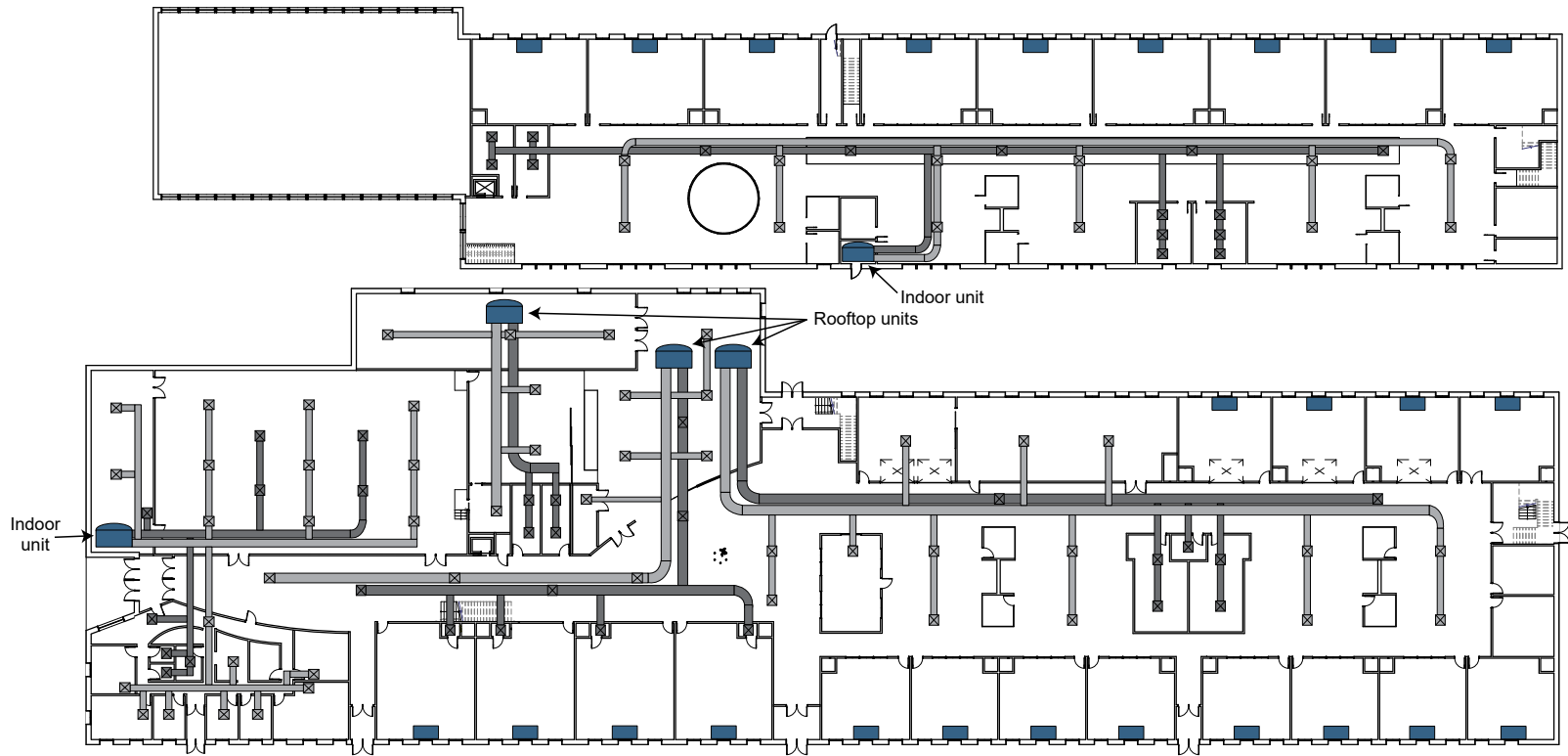
Exterior







Visible
Engineering



Indoor unit

Indoor unit
Rooftop units



- Legend
- Ventacity VS 500 SQ
 - Ventacity VS 3000 RT
 - Supply Ductwork
 - Return Ductwork
 - Supply Vent
 - Return Vent

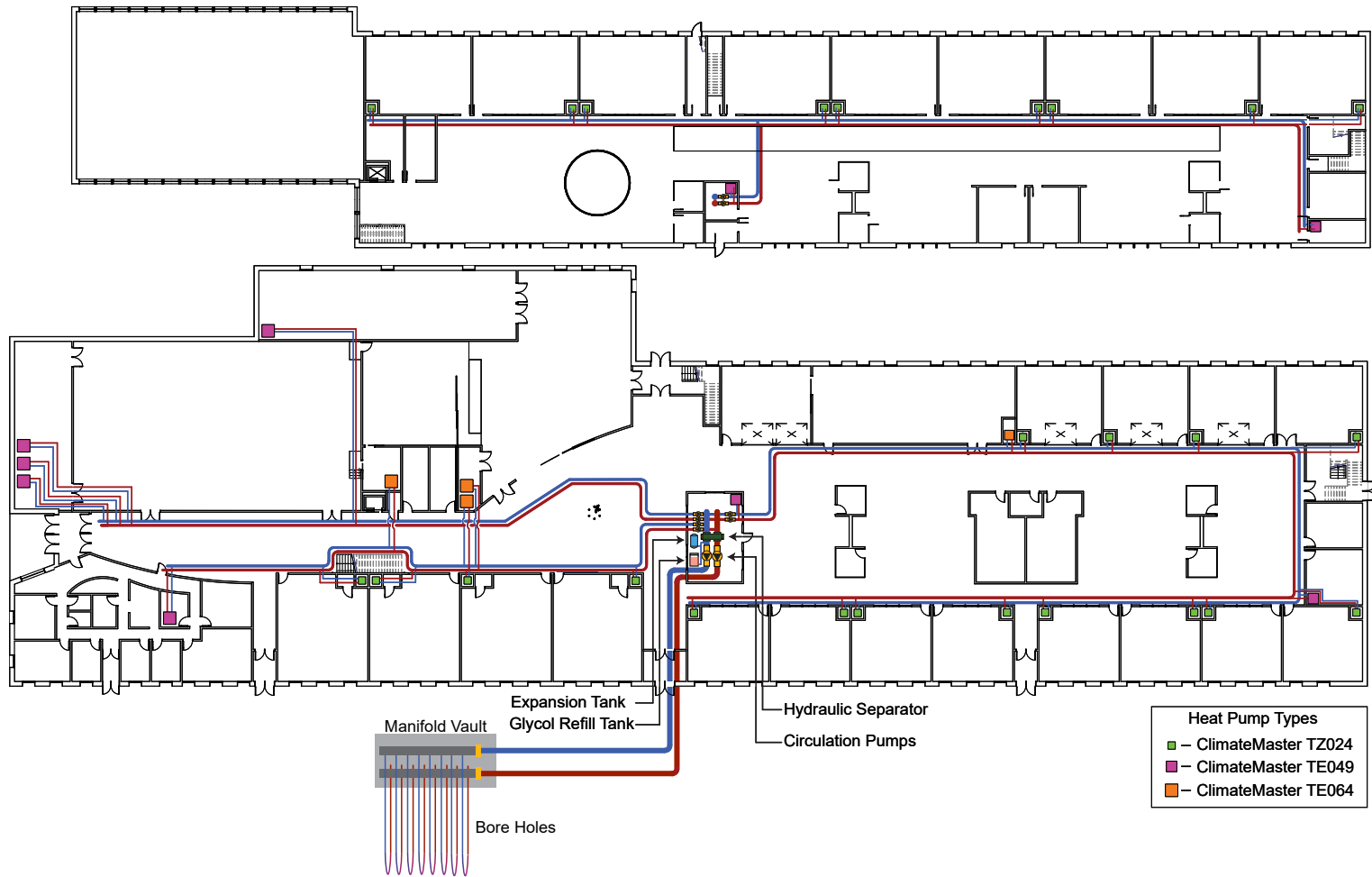


Ventilation





Resilient
Design



- Heat Pump Types**
- ClimateMaster TZ024
 - ClimateMaster TE049
 - ClimateMaster TE064

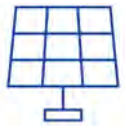
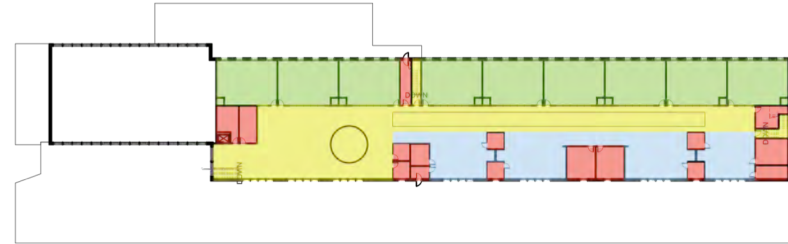


Heating and Cooling



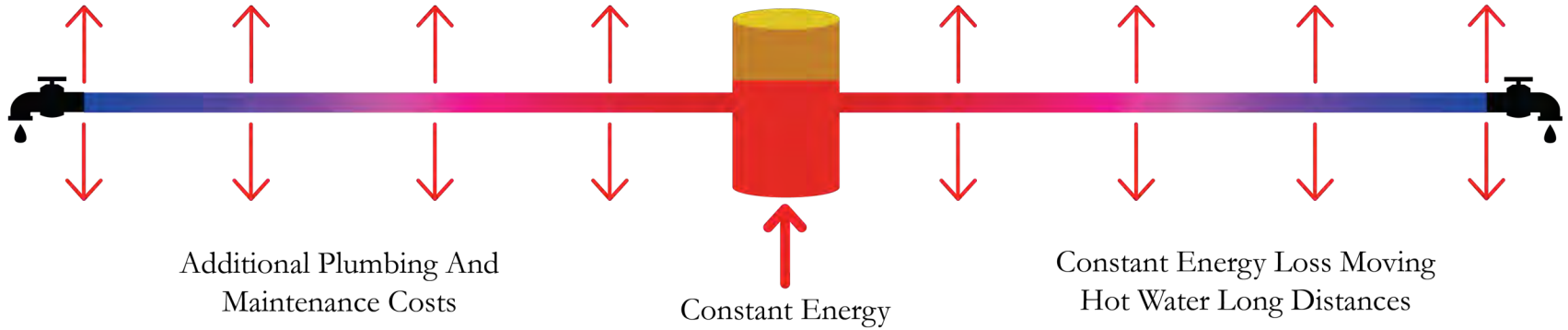
Reduce Electrical Loads

- Thoughtful Daylighting
- Efficient Light Fixtures
- An Intelligent Control System
- Centralized Appliances



Visible Engineering

Traditional Tank Based Hot Water



Decentralized Point Source Hot Water

Demand Based Energy Use

Minimal Energy Loss In Hot Water Delivery

Longer Lifespan





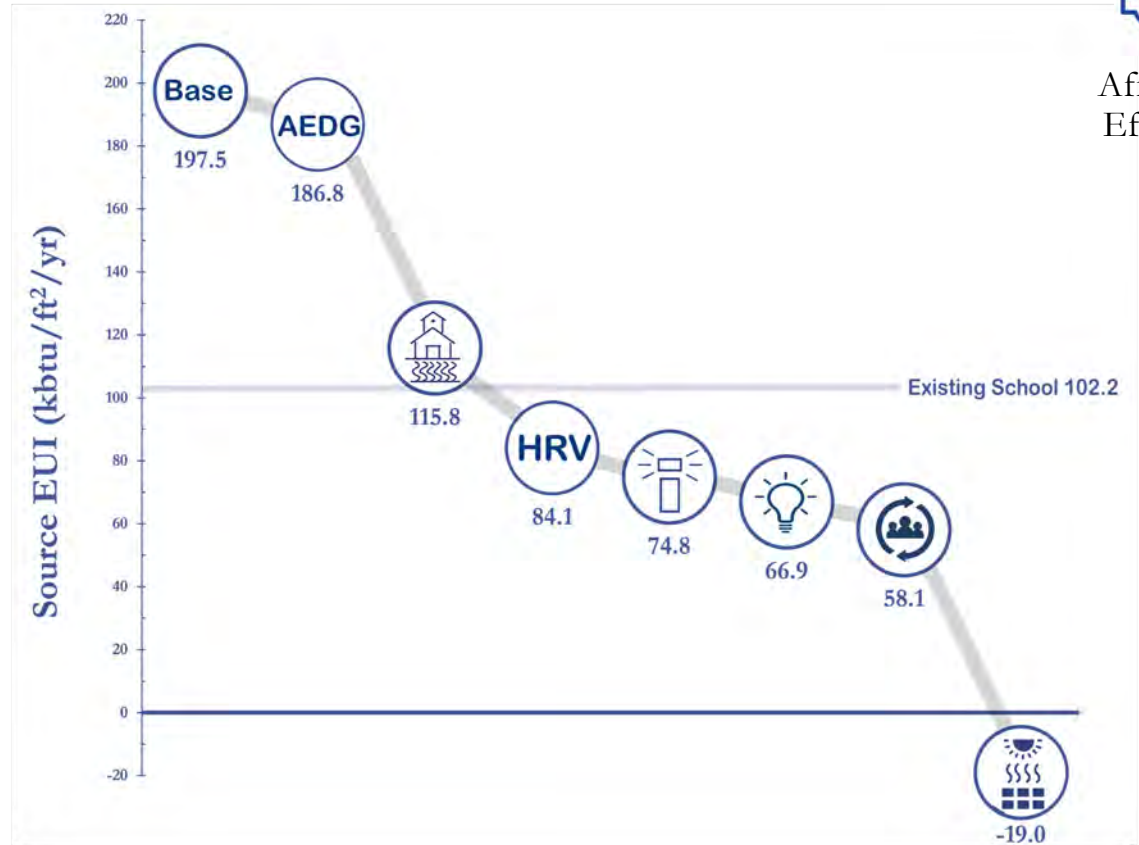
Affordable
Efficiency

Design Parameters

Climate Zone **6A**

7,186 Heating Degree Days

677 Cooling Degree Days

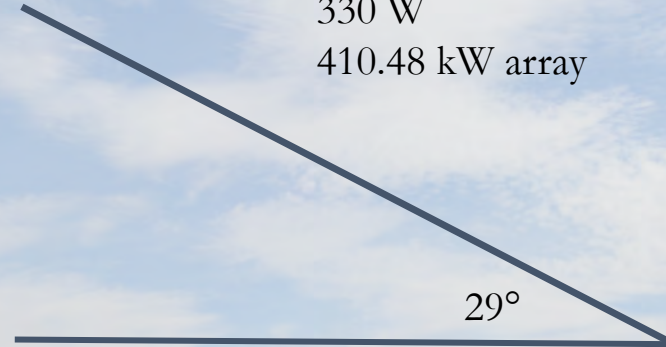




Panasonic HIT N330
19.7%

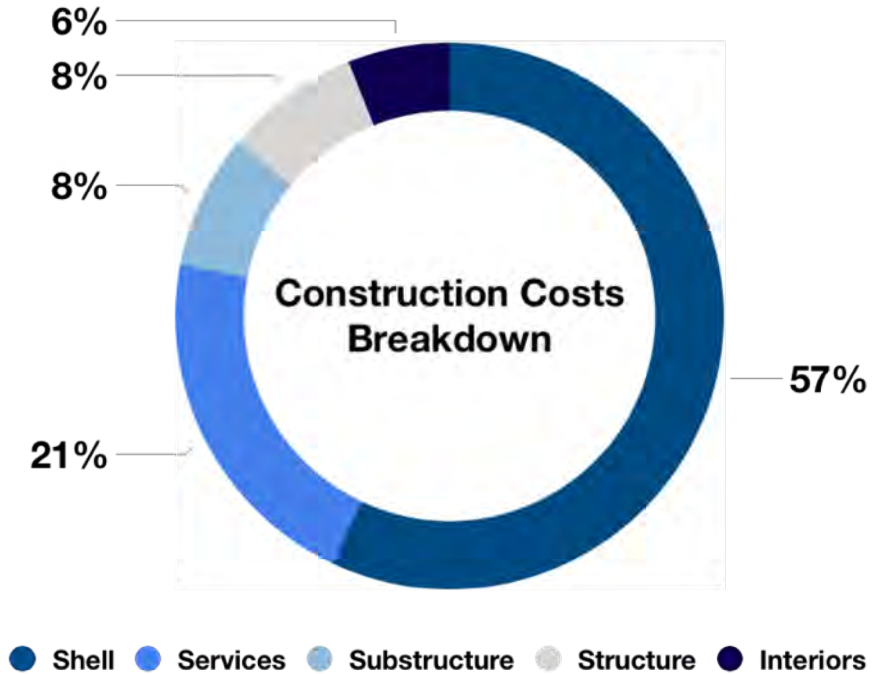


1,244 panels
330 W
410.48 kW array





Affordable
Efficiency



Total Construction
Costs: **\$17.8 Million**

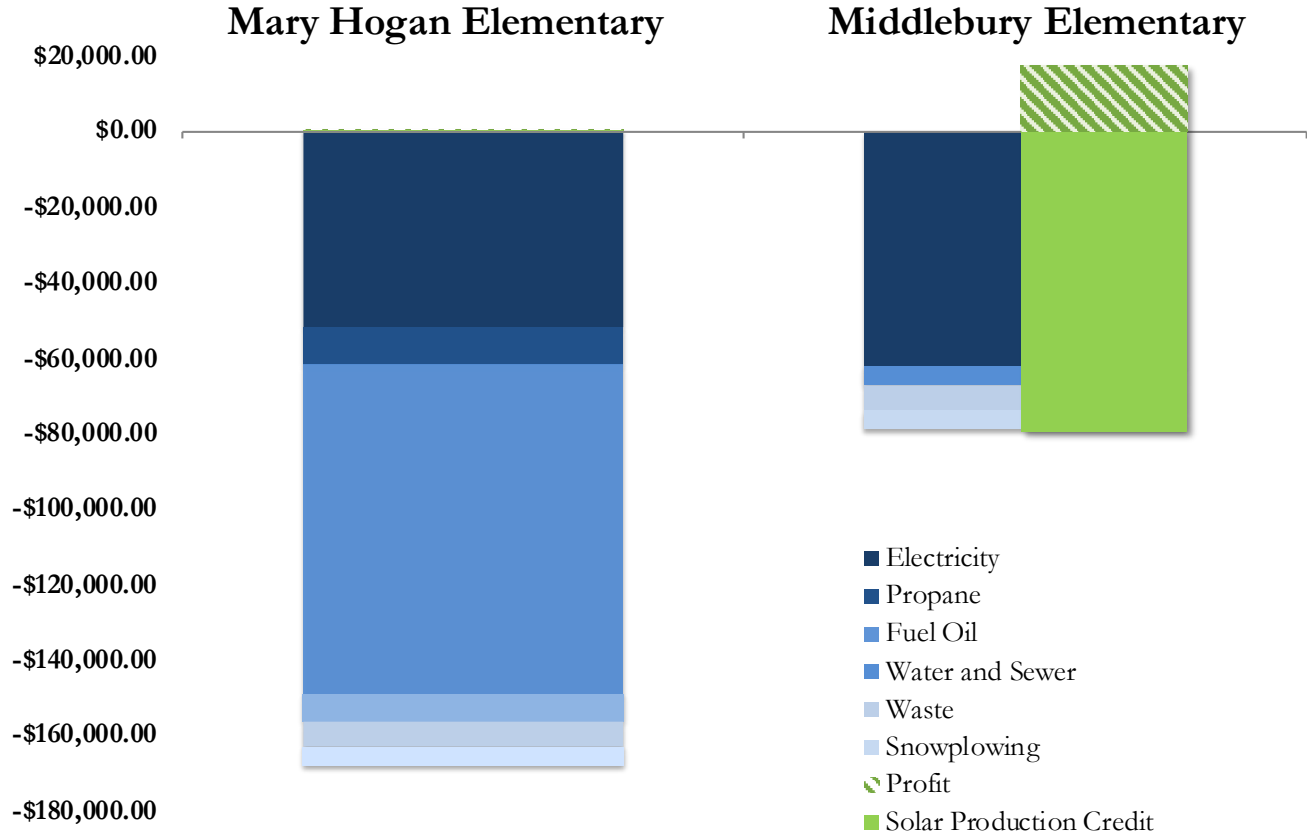
Median New England
Elementary School
Cost¹: **\$400/ft²**

Middlebury Elementary
Cost: **\$250/ft²**





Affordable
Efficiency





Zach Berzolla
Physics '18
**Team Lead and
Project Manager**



Amanda
Kirkeby
Physics '19
Energy Model



Bennett Doherty
Physics '18
MEP



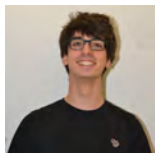
Alex Browne
Physics '18
Building Codes,
MEP



Ben Belinski En-
glish '18.5
MEP



Priyanjali Sinha
SOAN '18
**Envelope &
Landscape De-
sign**



Max Lutzius
Economics &
Physics '20.5
Envelope



Jack Allnut
HARC '20.5
**Envelope &
Architecture**



Evan Weinman
HARC '18
Architecture



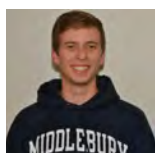
Karen
Kobayashi
HARC '18.5
Architecture



Elliott Friedman
HARC '19
Architecture



Emma
McDonagh
HARC '19
**Architecture &
Interior Design**



Thomas
Wentworth
ES/Psych '18
**PV & Interior
Design**



Olivia Ryder
HARC & Studio
Art '19
**Architecture &
Interior Design**



Maria Abragan
ES/Geography
'18
Interior Design



Gigi Miller
Comp. Sci. &
Studio Art '18
Interior Design



Katie Aman
SOAN '19
Deliverables



Ry
Storey-Fisher
ES/Policy '18
Deliverables



Alpen High Performance
Windows provided
guidance in choosing
windows and tuning
glazing.



Tom Buzzell, principal
of Mary Hogan,
provided guidance on
programmatic design and
current operating costs.



Greg Sellers provided
insight on the structural
systems required to
support our building.



Wayne Nelson and Derek
Siegler provided guidance
on choosing our HVAC
system and how to create
a system layout.



Jack Kerby-Miller '14.5
provided envelope design
reviews.



Myron Selleck and Spencer
Clark of Middlebury's
Facilities provided electrical
and HVAC design
reviews.



Dennis Senesac
provided guidance on
selecting the GSHP
equipment.



Solatube provided design guidance for using their product to daylight
interior spaces.



Ashley Cadwell '80 is our consultant for sustainable school design that
supports inquiry project-based intra-disciplinary curricula.



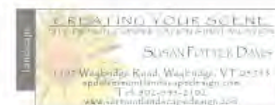
Andrea Kerz-Murray, Sam Ostrow, and Ashar Nelson provided archi-
tecture critiques and design reviews.



BUILDING STEWARDSHIP
Larson Lovdal '15.5, provided design suggestions on the lighting,
BMS,



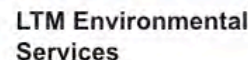
Peter Schneider '97
provided design
review and contacts
with other industry
experts.



Susan Davis,
Landscape design
consultation



Aubrey Gewehr,
DOAS ventilation
system design



Liam Murphy
reviewed the radon
management plan.



Team & Advisors





Middlebury Elementary

By MiddZEST



Thank You!

Funding Provided By:

- Middlebury Undergraduate Research Office
- Middlebury's President
- Middlebury's Office of Sustainability Integration
- Middlebury's Environmental Affairs Department

Works Cited

1. School Planning & Management. 2015. Annual School Construction Report.

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