NEST ZERO
single family - retrofit
Artist retreat?

Bird-watching sanctuary?

Shelter for unhoused?
Three fishing shanties
Two run down
One burnt down
Disassemble buildings
Rebuild on wood piles
Charred wood cladding
Re-use clapboards
Re-use chimney bricks for patio
New observation tower
Connect with platform
Shelter with roof
Collect rainwater
Connect to the grid
Move in
50 Year Flood Risk:
1% chance

8ft. above sea level
Foundation:
treated wood piles
Structure:
open web trusses
osb sheathing
Air + Vapor Control:
osb sheathing
Air + Vapor Control:
service chase
Thermal Control:
wood fiber insulation
Thermal Control:
wood fiber insulation
blown cellulose
Thermal Simulation:

Temperature

0°F 68°F

*generated with THERM 7.8
Water Control:
cedar rainscreen
parrafin wax coating
epdm roof
Interior Finishes:
installed over furring strips
Interior Furniture:
bamboo plywood
low voc materials
Exterior:
wood deck
Visual Comfort:
even daylighting
Visual Comfort:

even daylighting

average lux: 300
Visual Comfort:
insulated cellular shades
Visual Comfort:
dimmable electric lighting
90+ color rendering index
Thermal Comfort: motorized awning
Thermal Comfort: motorized awning
hot weather
Thermal Comfort: passive ventilation
hot weather
Thermal Comfort:
awning windows
passive ventilation

*based on Grasshopper OpenFoam plugin for Rhino
Thermal Comfort: motorized awning cold weather
Acoustic Comfort:
- acoustic wood ceiling
- heavy curtains
- upholstered furniture
Storm Resilience:
window shutters
Storm Resilience: window shutters
Storm Resilience:
window shutters
Photovoltaics: roof mounted 40° most efficient angle
Photovoltaics:
roof mounted 1°
14% less efficient
Section Detail:
dining room / art studio
Kitchen elevation
View from street

Flooded street
Floor Plan:
first floor
Sophia’s watchtower
Floor Plan:
mini-split system
Mechanical Closet
elevation view
Mechanical Closet
elevation view

heat pump
water heater
Mechanical Closet
elevation view

heat pump
water heater
(ducted)
Mechanical Closet
elevation view

energy recovery
ventilator
Mechanical Closet
elevation view

washing machine ventless
dryer
Mechanical Closet + Bathroom
elevation view

- Shower
- Composting toilet
- Sink
Typical Single Family House
Construction cost:
$300 / ft²

Nest Zero House
Construction cost:
$250 / ft²

Utility Costs Per Season

*Cost estimate based on RSMeans data*
Embodied Carbon & Stored Carbon

- Code Typical Home: 184 kgCO2e
- Nest Zero: 140 kgCO2e
- Nest Zero w/ Stored Carbon: -30 kgCO2e
Operational Carbon

- **PV**
- **Natural Gas**
Massachusetts Stretch Code:
HERS max score:
55 – January 1, 2023
45 – July 1, 2024

Nest Zero:
HERS score:
32 – without PV
0 – with 320 ft² PV
-18 – with 500 ft² PV

* HERS score based on REMRate report
Future Scalability: Lease-to-Own Houses

Option A  Option B  Option C
Future Scalability:
Lease-to-Own Houses
Thank You!