

HOW WE CAN DO BETTER

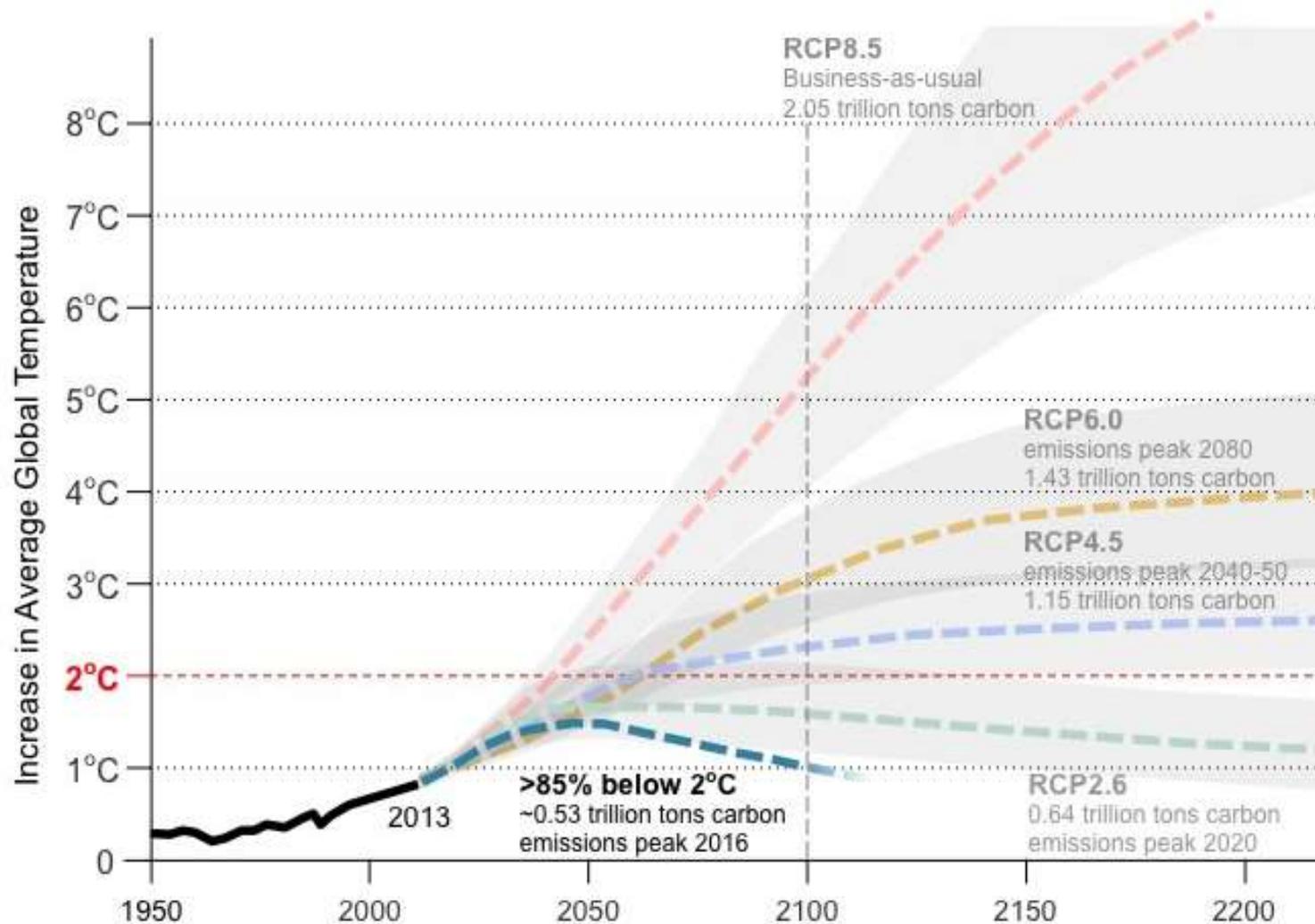


JEREMY AVELLINO | JUNE 25, 2019



“ZERO fossil fuel CO₂ emissions in the global built environment by about 2050.”

- Architecture 2030



Global Temperature Projections for various RCP Scenarios

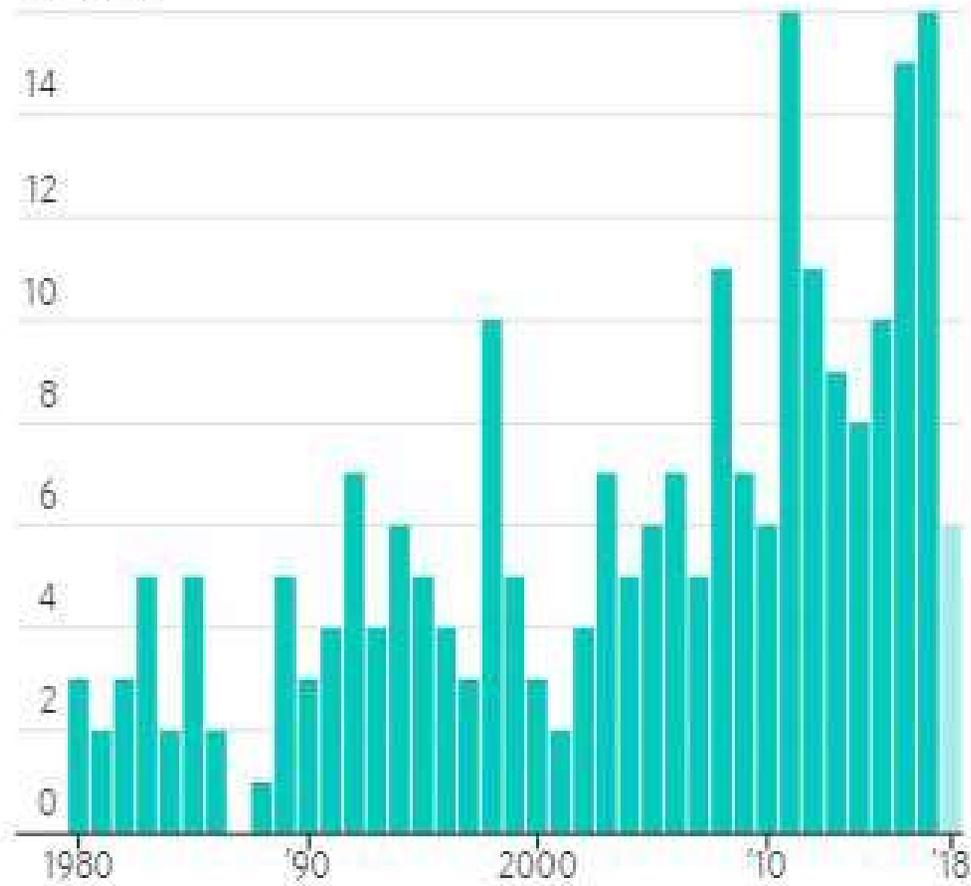
Source: IPCC 2013, Representative Concentration Pathways (RCP); Stockholm Environment Institute (SEI), 2013; Climate Analytics and ECOFYS, 2014.

Note; Emissions peak and cumulative carbon budgets are for fossil fuel CO₂-only emissions.



NATURAL DISASTERS CAUSING AT LEAST \$1 BILLION IN TOTAL DAMAGES

16 events

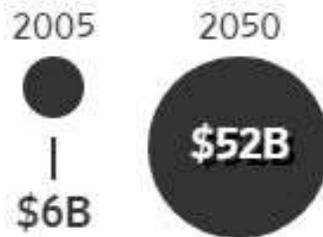


Notes: Data are inflation-adjusted to 2018 dollars; 2018 data as of July 9

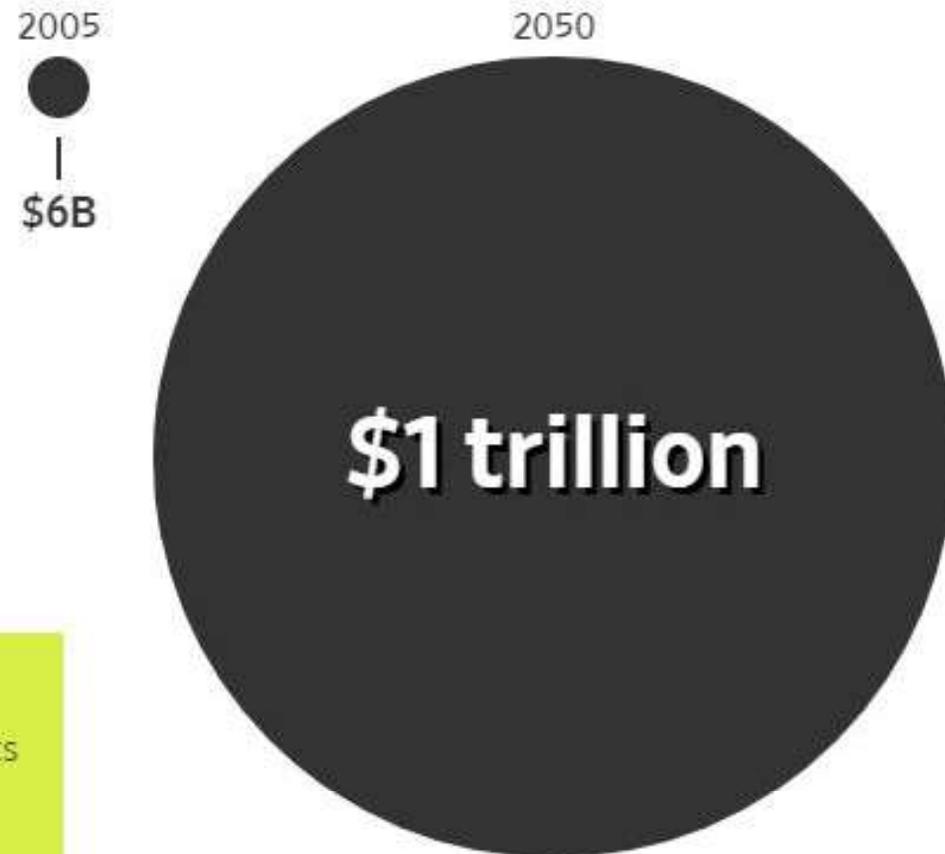
Source: NOAA National Centers for Environmental Information

PROJECTED FLOOD COSTS

WITHOUT CLIMATE CHANGE



WITH CLIMATE CHANGE AND SEA-LEVEL RISE*



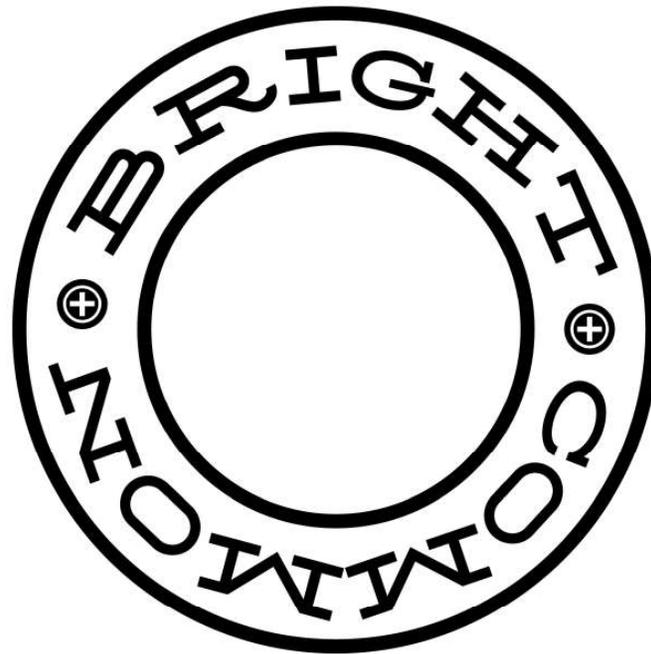
Pricing Disaster

A 2013 study in the journal Nature projects average flood losses for the 136 biggest coastal cities in the world.

* Assumes no adaptation measures taken

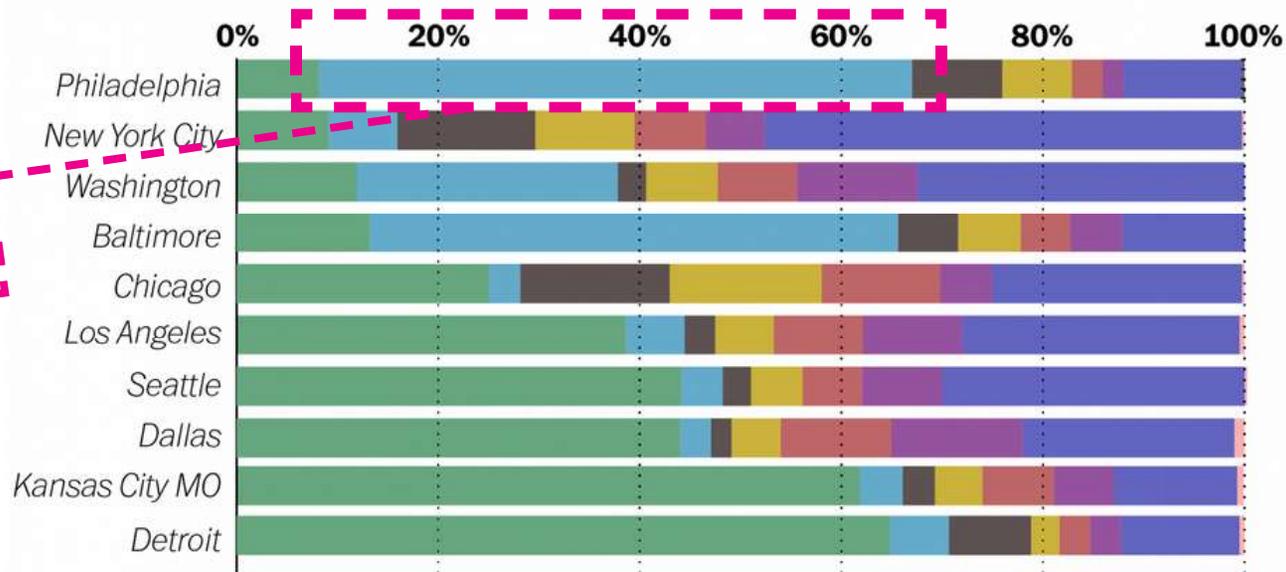
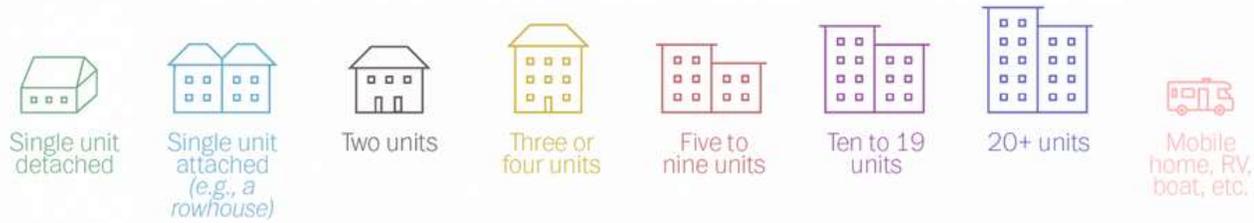
Source: Nature

high concept. low carbon. bright common.



The way we live, city by city

Occupied housing units, by building type



PHILADELPHIA'S
UNIQUE
CHALLENGE

WAPO.ST/**WONKBLOG**

Source: U.S. Census Bureau, American Community Survey

Icons by Martin Lebreton and Arthur Shlain, The Noun Project

MINIMUM VIABLE PRODUCT (MVP): HALF A MILLION CHANCES TO GET IT RIGHT



THINK SMALL ON A HUGE SCALE.

TWO PATHS

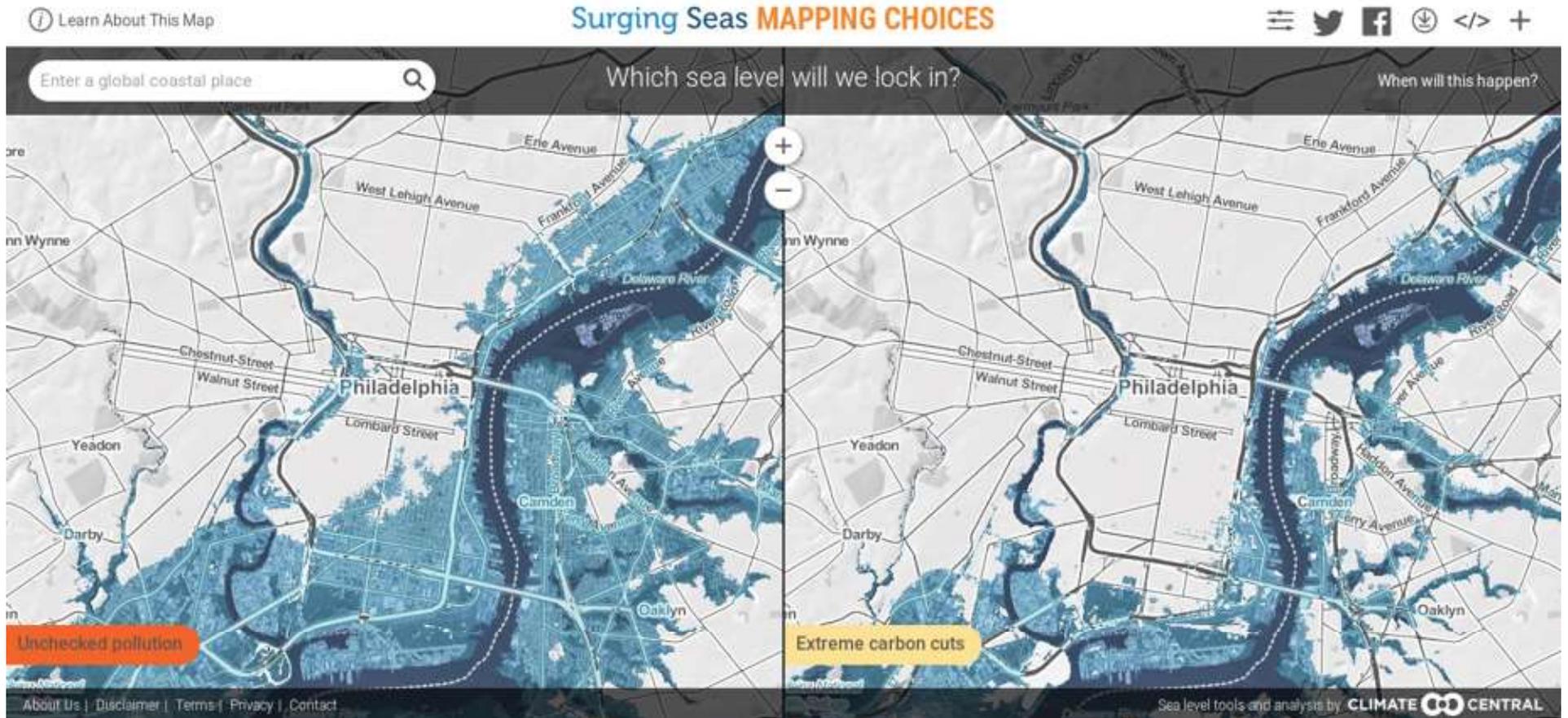
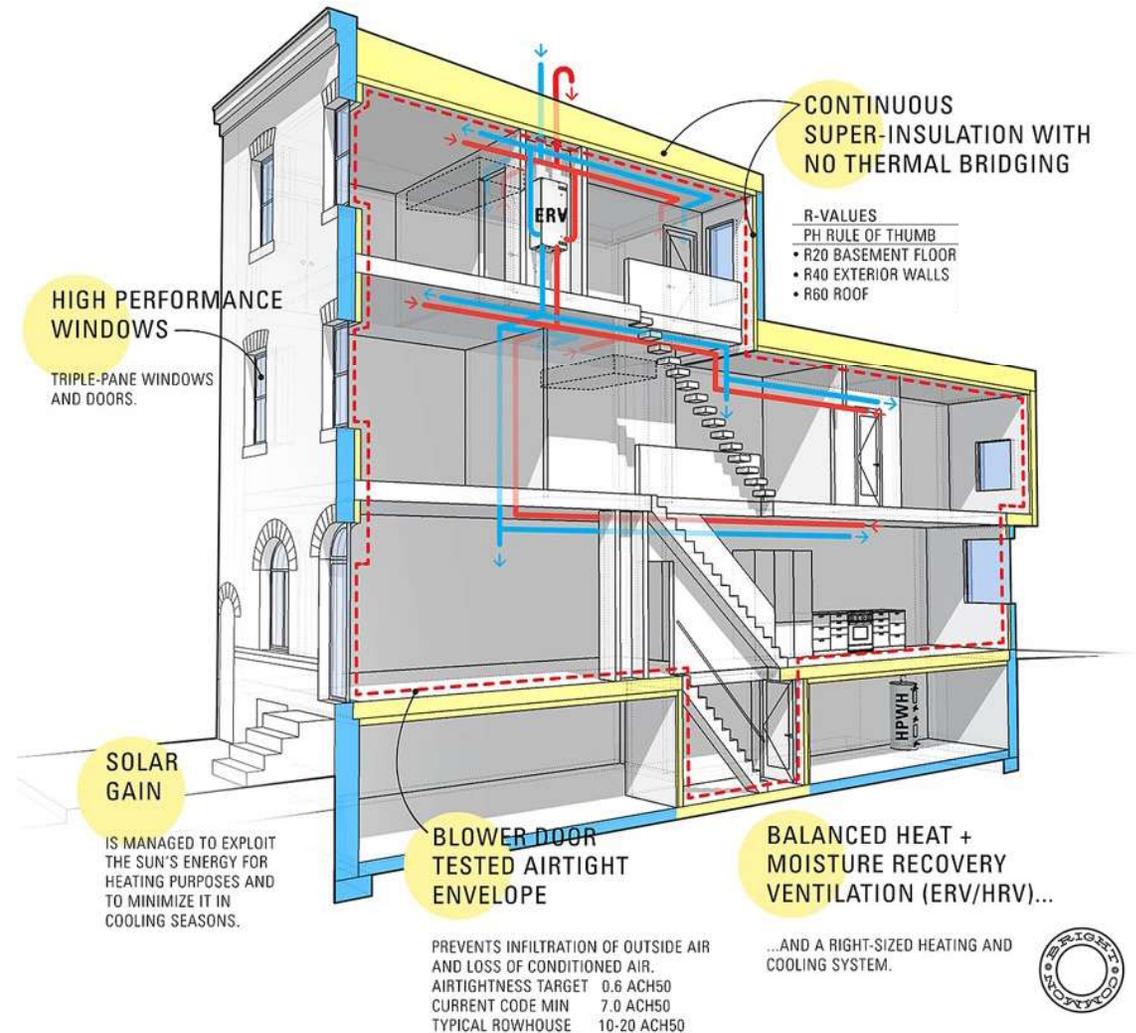


image credit: Climate Central

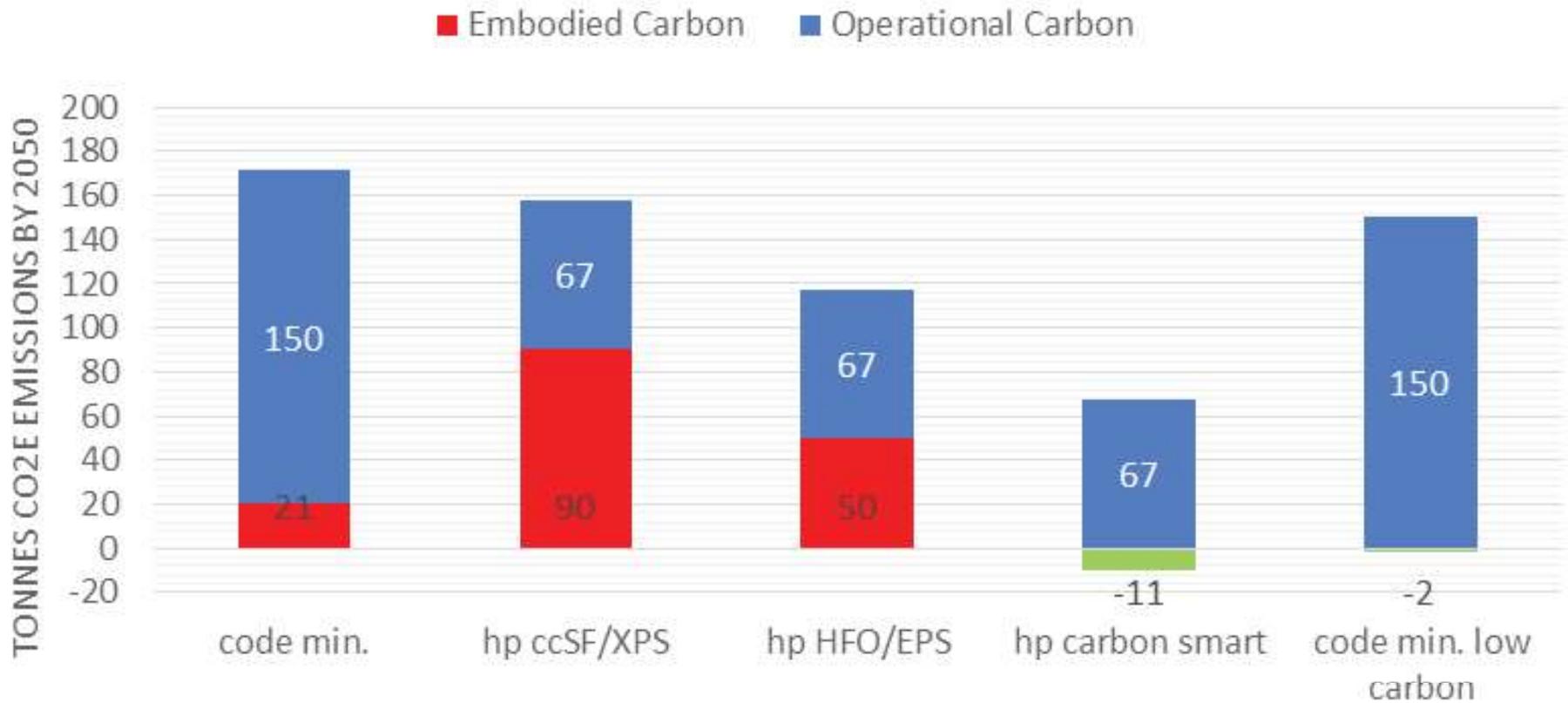
ANATOMY OF A LOW CARBON PASSIVE HOUSE

THE PRINCIPLES:

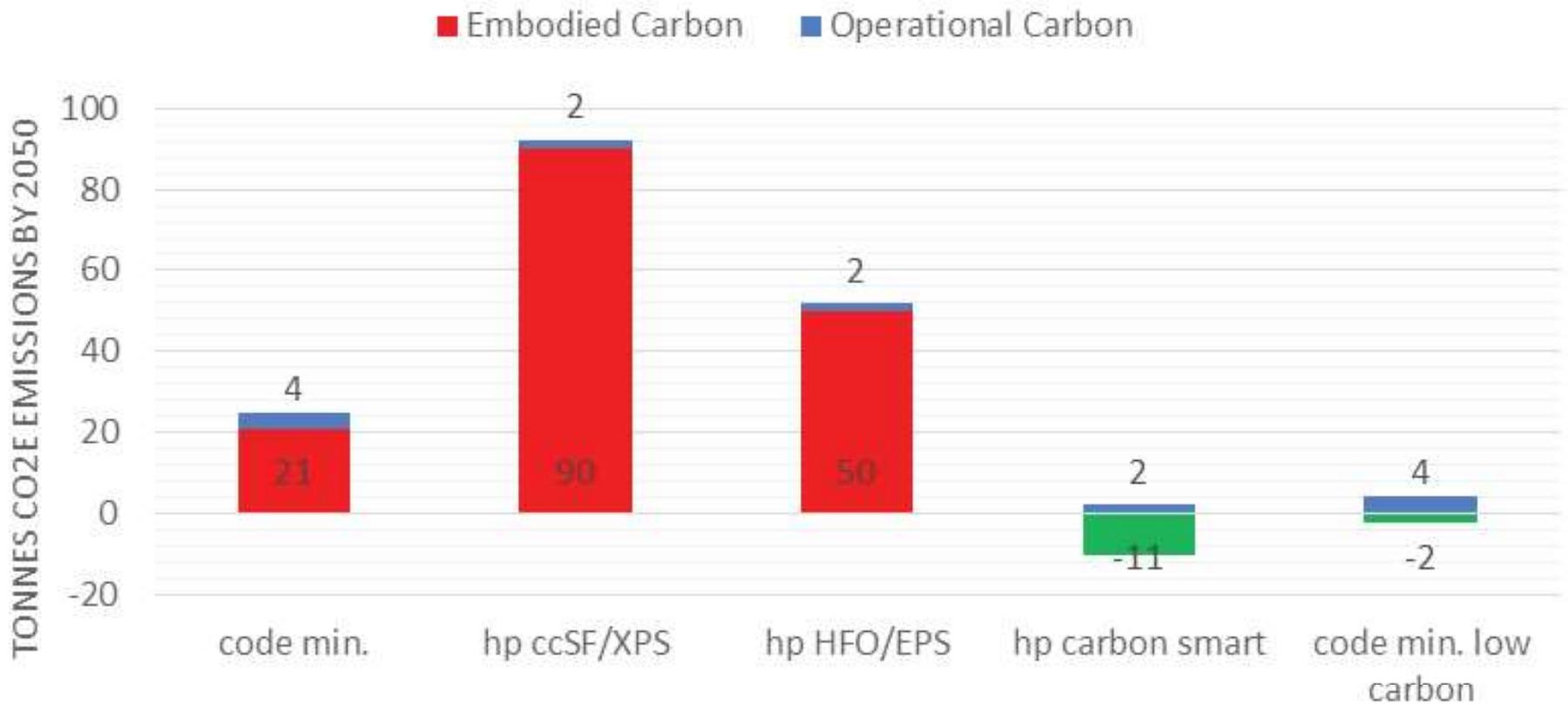
1. continuous super-insulation
2. thermal bridge free construction
3. airtight building envelope
4. high performance glazing
5. balanced heat & moisture recovery ventilation (ERV)
6. optimize gains, minimize losses (solar, internal, etc.) using hygrothermal modeling



Model Buildings, Nat. Gas HE Boiler



Model Buildings, Net Zero (PV) ASHP



HOUSE 8

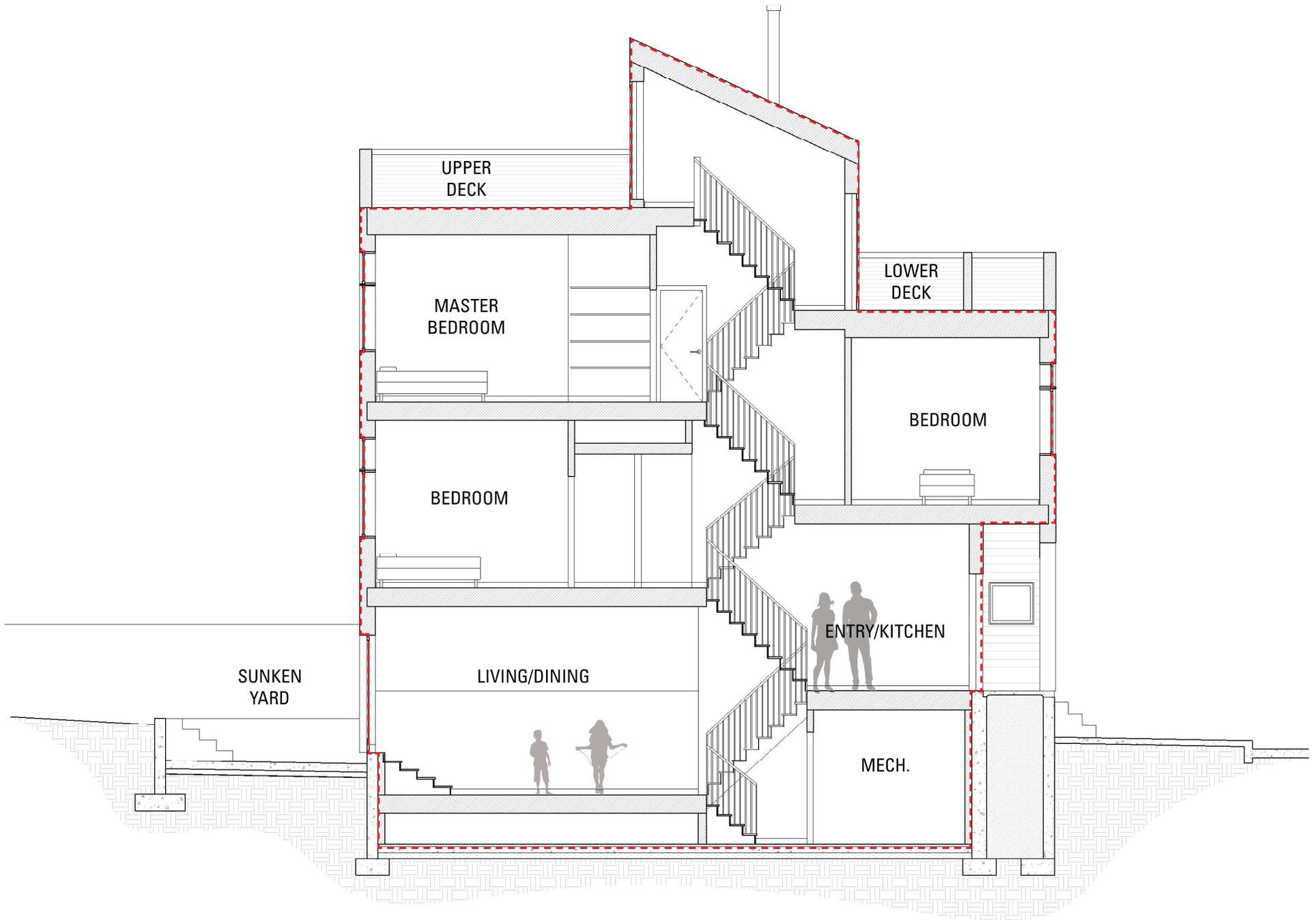




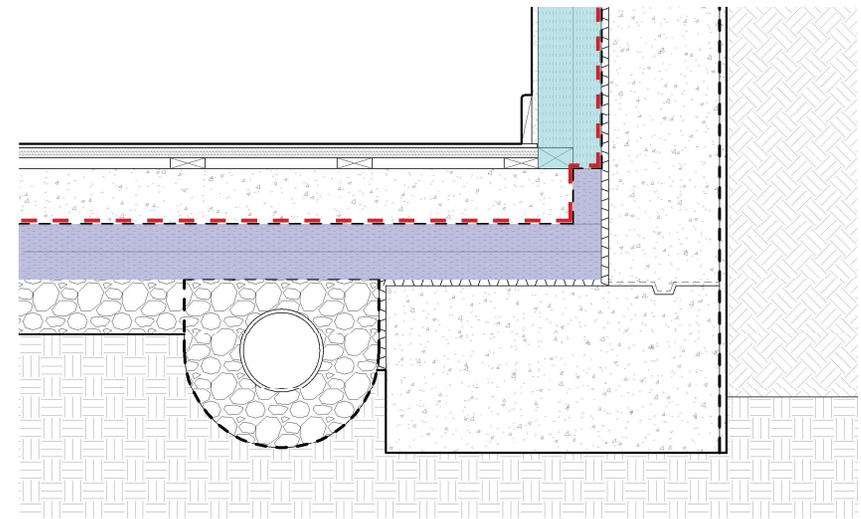
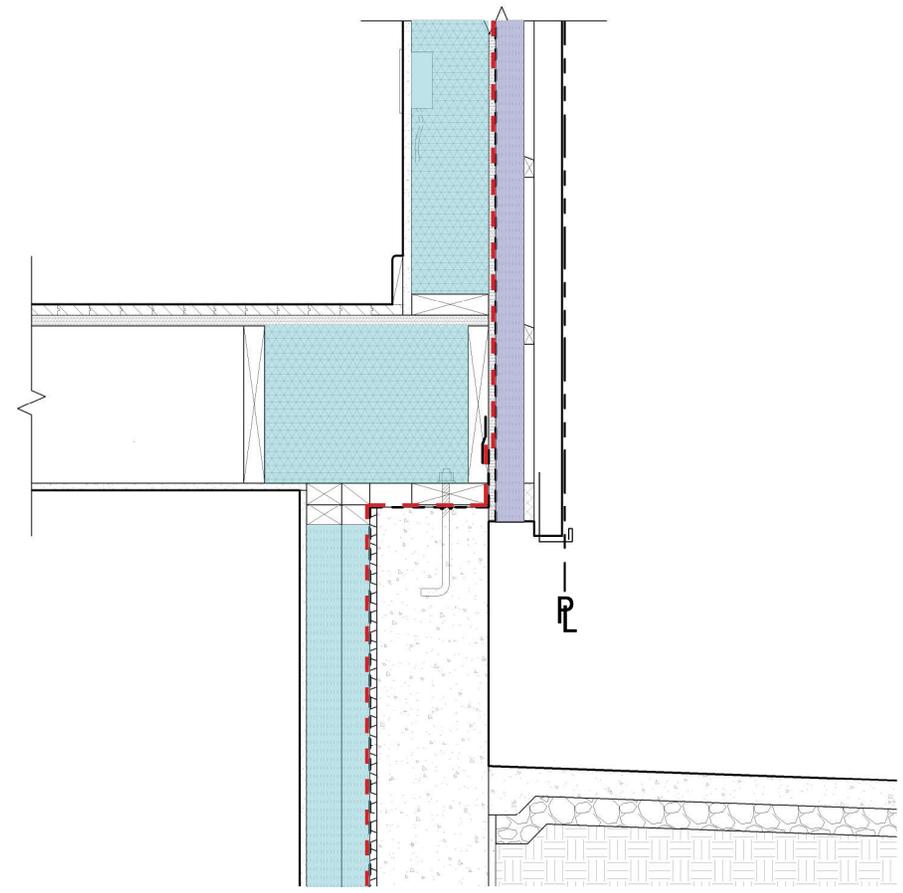
LARRY
215-3

SEE
215

SEE
215



-  WIND-TIGHT + AIR-TIGHT LAYER
-  EXTERIOR THERMAL CONTROL
-  INTERIOR THERMAL CONTROL



















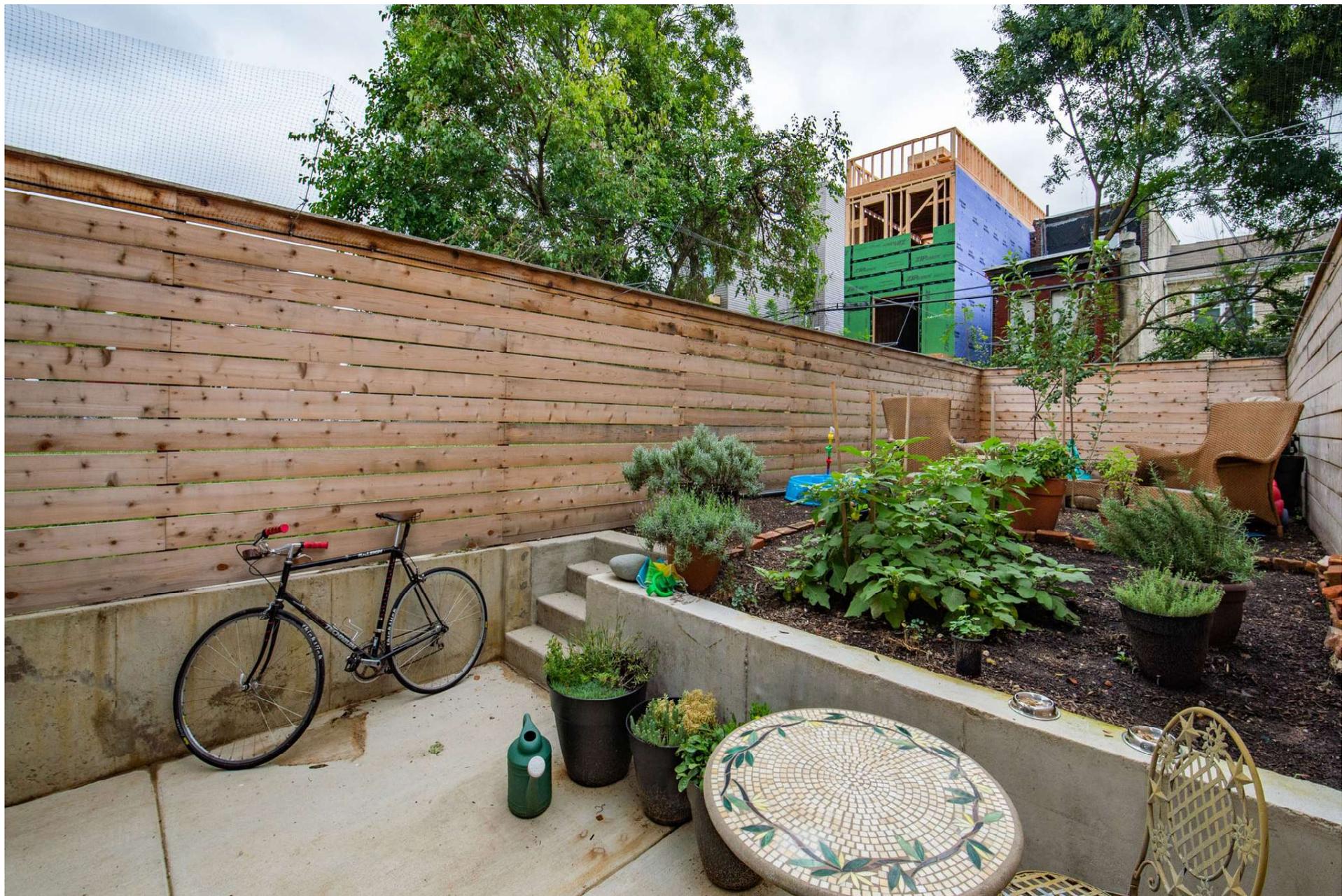


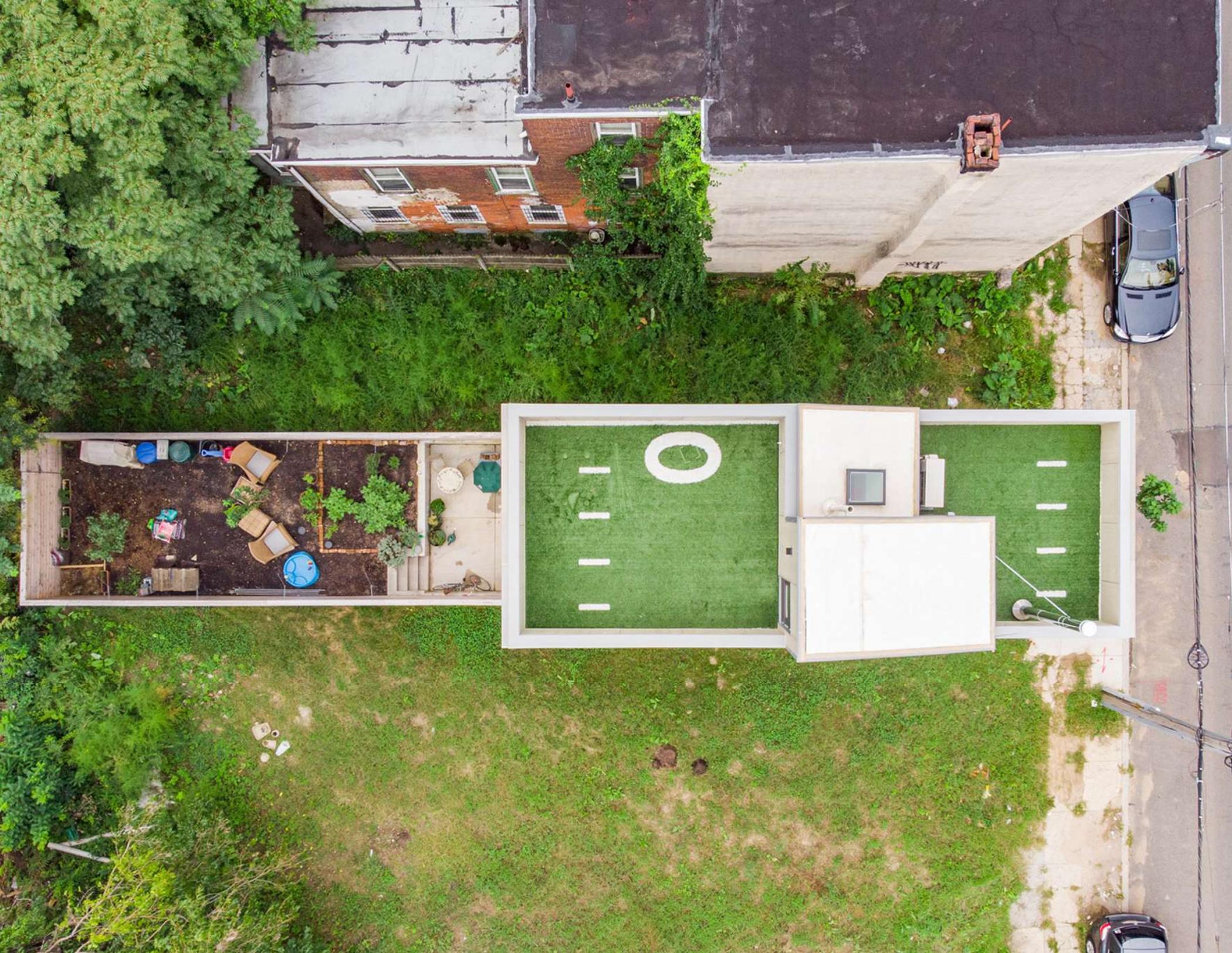












PROJECT STATS

1,877 SF

SINGLE FAMILY HOME (3-BED, 2 BATH)

\$291,215 CONSTRUCTION HARD COSTS = \$155/SF

LOW CARBON NEAR-ZERO ENERGY READY ROWHOUSE

HERS INDEX 43

ENERGY COSTS PER UNIT - TBD

AIRTIGHTNESS - 0.3 ACH50

THE DUBBEL





YOUR HOME WAS DESIGNED, ENGINEERED, AND CONSTRUCTED IN CONFORMANCE TO U.S. DEPARTMENT OF ENERGY (DOE) GUIDELINES FOR EXTRAORDINARY LEVELS OF EXCELLENCE AND QUALITY.

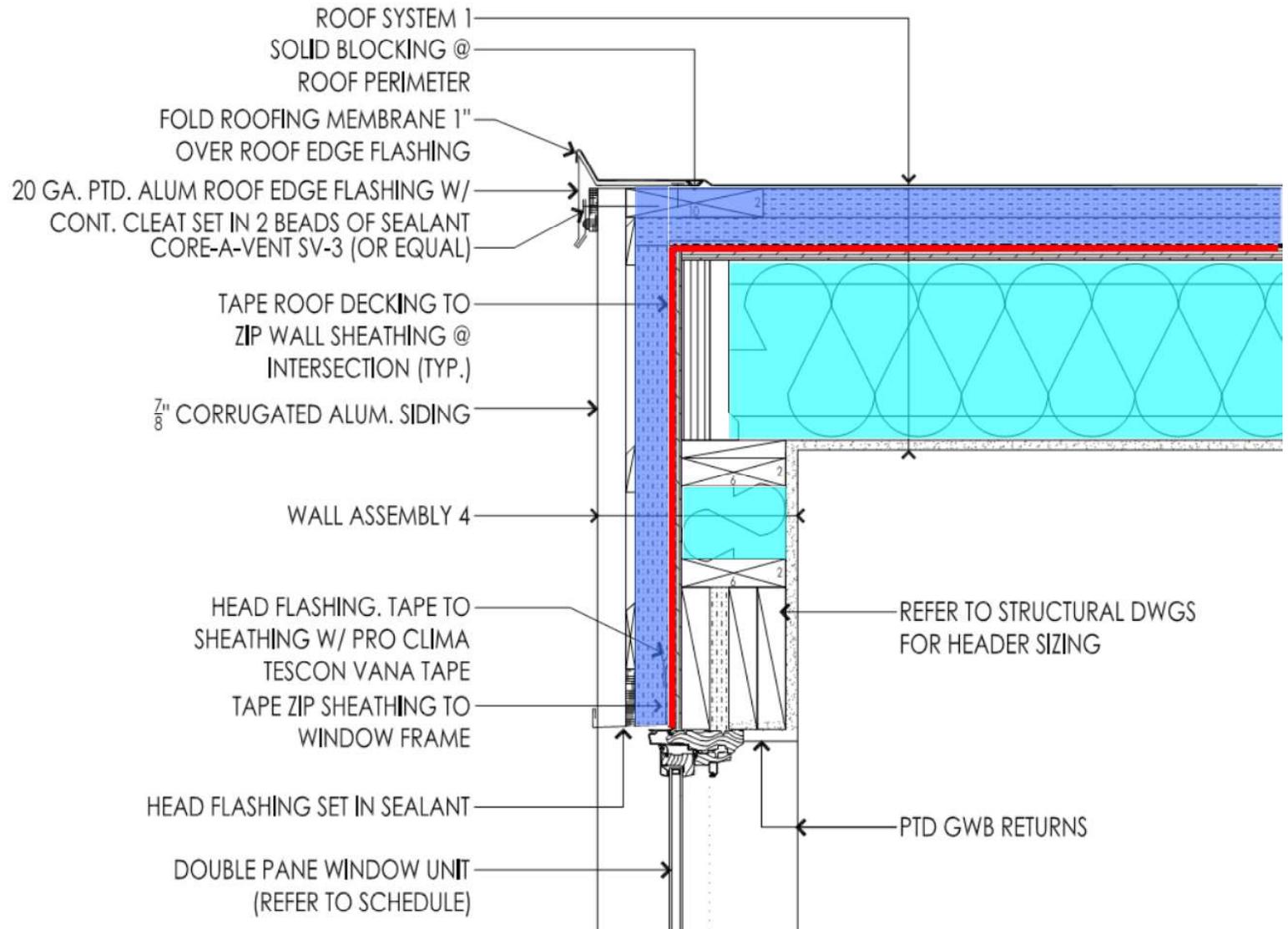
This home built at 1724 N Dover St, Unit 1
By Red Oak Builders
Verified by David Berg
 an independent professional organization, to meet or exceed strict home performance guidelines set by The U.S. Department of Energy on 9/14/2018



THIS HOME MEETS OR EXCEEDS THE MINIMUM CRITERIA FOR THE FOLLOWING:



- WIND-TIGHT + AIR-TIGHT LAYER
- EXTERIOR THERMAL CONTROL
- INTERIOR THERMAL CONTROL













TESTING:

BLOWER DOOR TEST RESULTS...

- 1. 0.6 (ACH @ 50 Pascals)
- 2. 0.3 (ACH @ 50 Pascals)

... THIS WILL BE A NEW
REQUIREMENT WITH IBC 2018...
GET READY.





PROJECT STATS

2,250 SF

TWO 2-BEDROOM UNITS

\$360,000 CONSTRUCTION HARD COSTS = \$160/SF

CERTIFIED ZERO ENERGY READY HOMES DUPLEX

HERS INDEX WITH 5.5 kW PV - HERS 24

ENERGY COSTS PER UNIT - \$862 PER YEAR / \$72 PER MONTH

AIRTIGHTNESS - 0.3 ACH50

THE CLIMATE CHANGE SPECTRUM

1. “WE ARE THE ONLY SPECIES ON THE PLANET WITHOUT FULL EMPLOYMENT. BRILLIANT. WE HAVE AN ECONOMY THAT TELLS US THAT IS CHEAPER TO DESTROY THE EARTH IN REAL TIME THAN TO RENEW, RESTORE, AND SUSTAIN IT. YOU CAN PRINT MONEY TO BAIL OUT A BANK, BUT YOU CAN’T PRINT LIFE TO BAIL OUT A PLANET. AT PRESENT WE ARE STEALING THE FUTURE, SELLING IT IN THE PRESENT, AND CALLING IT “GROSS DOMESTIC PRODUCT.””

- Kathleen Dean Moore, *Moral Ground: Ethical Action for a Planet in Peril*

2. “WE DON’T DISCUSS THE QUESTION ANYMORE OF, ‘IS THERE CLIMATE CHANGE.’ FOR US, IT’S A QUESTION NOW FOR OUR OWN UNDERWRITING.”

- Torsten Jeworrek, Chief Executive for Reinsurance at Munich Re, the world’s largest seller of re-insurance (insurance for insurers)



Questions + Discussion

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