

Passive Building & Wildfires

Living Through, Living With, Living Well

Graham Irwin, AIA, Essential Habitat Architecture



phius con

MILWAUKEE 2025



This building designed on the Passive House concept survived the Cali wildfire.



Massimo (@Rainmaker1973)

x.com



“We live in a benign climate here in Southern California,” Chasen says. “A lot of the measures used in Passive House become overkill.” - *These Homes Withstood the LA Fires. Architects Explain Why*, Kriston Capps, Bloomberg CityLab, January 13, 2025





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Christina Kunneke @AMCKunneke · Jan 10

You have a sterile perimeter: no vegetation, except for the planters. You probably have a fire resistant roof and siding. You have a brick and mortar retaining wall. Those are all good safeguards against fire. There is no luck involved.

32

226

16K

929K



g chasen @ChasenGreg · Jan 10

Also no vents or eaves and tempered glass windows. Lucky that there was bit more space from the neighbors - but unlucky that the neighbor pulled his car into driveway. Solid concrete perimeter wall probably saved us there.

80

188

14K

682K



2:13 PM · Jan 9, 2025 · 14.2M Views

“We live in a benign climate here in Southern California,” Chasen says. “A lot of the measures used in Passive House become overkill.” - *These Homes Withstood the LA Fires. Architects Explain Why*, Kriston Capps, Bloomberg CityLab, January 13, 2025



Analyze Challenges, Identify Opportunities



Leverage what's required to achieve what's optimal.



Living Through wildfire

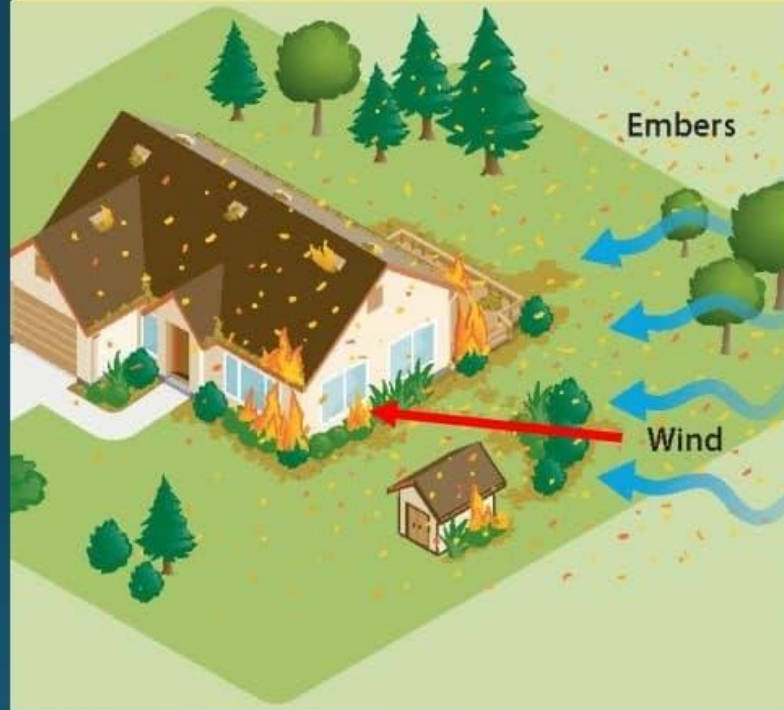
- Building & Life Safety = Critical & Mandatory (Code)
- Top of Mind (for Now)
- Small % of Population Affected
- Localized Impact
- Rare Occasion, Worst Case Scenario
- Delivers Less Worry, Not More Joy!
- There is no “Fire Proof,” but there is “Highly Fire Resistant”

Three types of fire exposures

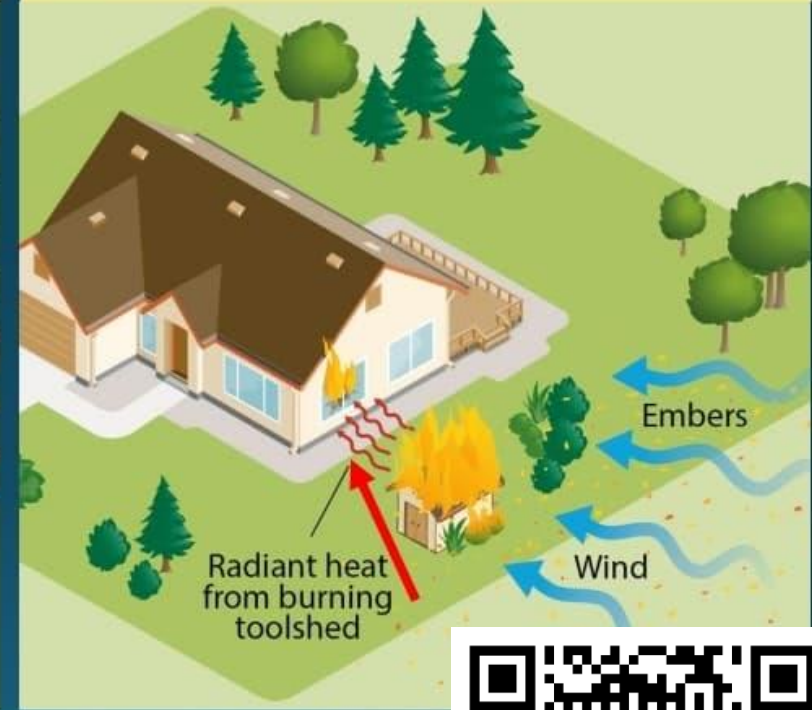
Direct flame contact



Embers



Radiant heat



- Defensible space strategies have focused on how to reduce direct flame contact.
- Preparing for embers and radiant heat exposures takes a different approach.



Defensible Space



References: California Code

1. California Residential Code, Section R337, Materials & Construction Methods for Exterior Wildfire Exposure
2. California Building Code, Chapter 7A, Materials & Construction Methods for Exterior Wildfire Exposure
3. SFM Standard 12-7A

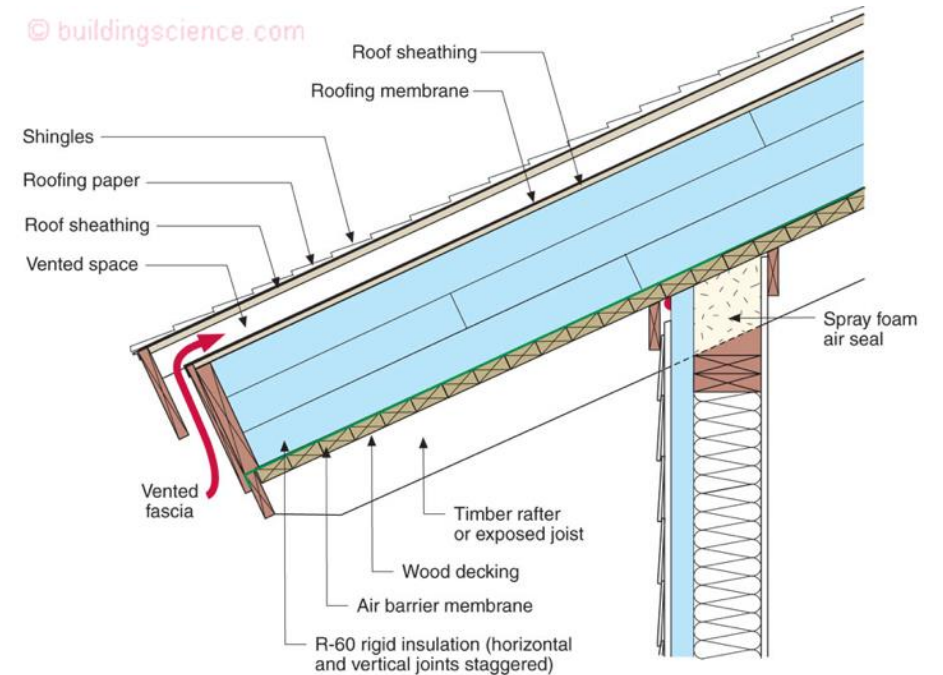
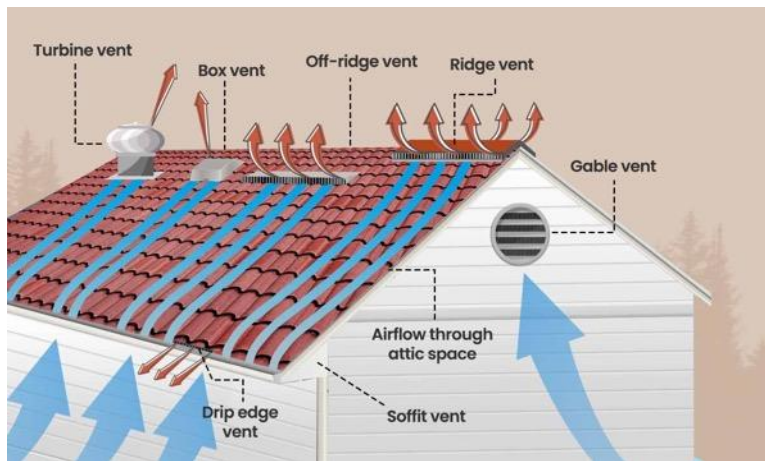


CRC Section R337.5 Roofing

- Class A Roofing
- Spaces between roofing & decking constructed to resist the intrusion of flames and embers, fire stopped with approved materials, or one layer of 72-pound cap sheet.
- Valley flashing: #26 gage galvanized sheet metal over 72-pound cap sheet.
- Roof gutters: prevent accumulation of leaves and debris.

Section R337.6 Vents

- Vents listed to ASTM E2886
- Openings 1/16 to 1/8 inches
- Noncombustible



BSI-046: "Dam Ice Dam"

BSI-141: "Shakespeare Does Roofs"



Section R337.7 Exterior Covering

Exceptions: Solid wood rafter tails & blocking, 2" min. (nominal)

Walls, Eaves, Porch Ceilings, Cantilevers, etc.

- Noncombustible
- Ignition-resistant
- Fire retardant treated wood (CBC 2303.2)
- Heavy timber
- Log wall
- Assemblies tested with 10-minute direct flame contact (ASTM E2707 or SFM Standard 12-7A-1)
- 5/8" Type X gypsum on exterior of framing
- 1-hour fire resistance rating

Section R337.8 Windows, Skylights & Doors

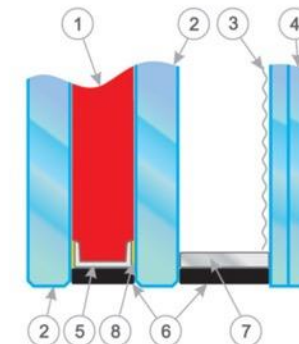
- Multi-pane glazing (one tempered pane minimum)
- Glass block units
- 20-minute fire-resistance rating (NFPA 257)
- SFM Standard 12-7A-2 (3x5 ft maximum)
- Exterior door surface/cladding
 - Noncombustible
 - Ignition resistant
 - Solid core wood (stiles & rails 1-3/8", panels 1 1/4")
 - ASTM E2707 or SFM Standard 12-7A-1

More on Windows

- Zola Firewall Window
 - Australian BAL40 “Bushfire Standard”
- Pivot Windows
 - Frame resilience an issue (PVC, uPVC?)
 - Tempered glass 4x resistant to thermal stress
 - Interior pane most important
 - Double pane may not protect interiors from ignition
 - European fire-rated glazing



1. Fire-resistant gel (6 - 28mm)
2. Tempered safety glass (5 - 6 mm)
3. Metal coating
4. Laminated safety glass
5. Spacer
6. Polyurethane
7. Aluminium, stainless steel or plastic spacer
8. Sealant



Section R337.9 Decking

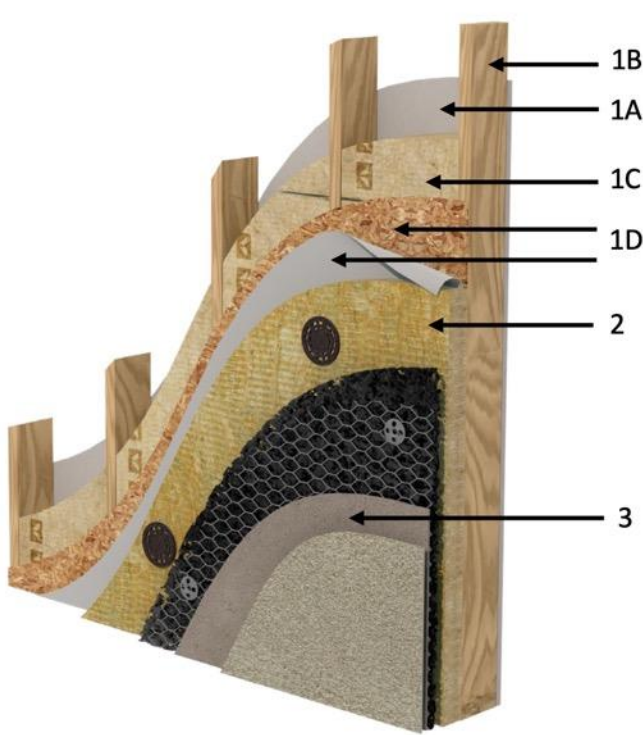
Walking surfaces of decks, porches, balconies & stairs

- ASTM E2632 & ASTM E2726
- Ignition-resistant (ASTM E84 or UL 723)
- SFM 12-7A-4 & 12-7A-5
- Exterior fire-retardant treated wood
- Noncombustible
- SFM 12-7A-4A (attached exterior wall noncombustible or ignition-resistant. Wall may any material that otherwise complies when decking meets ASTM E84 with a Class B flame spread rating.)

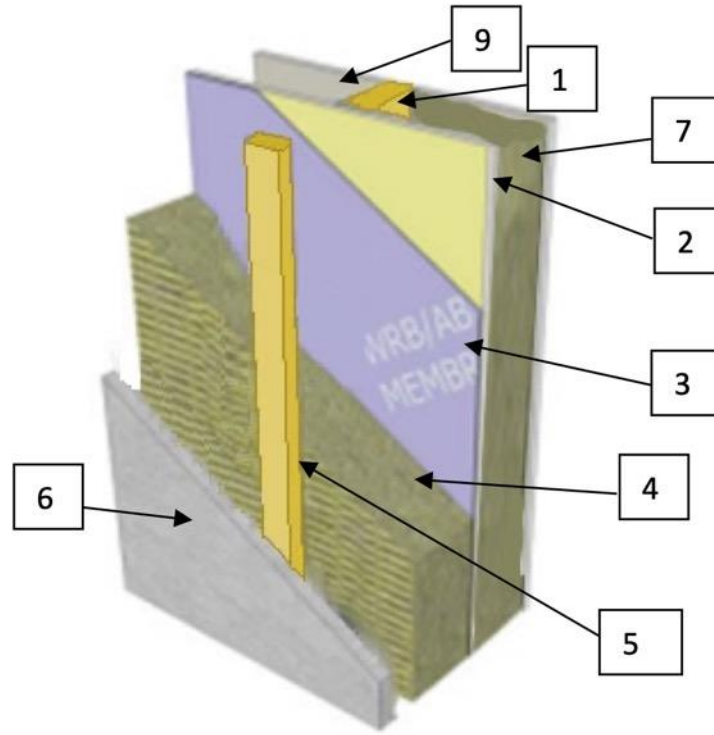
Financial Benefit (Insurance)?



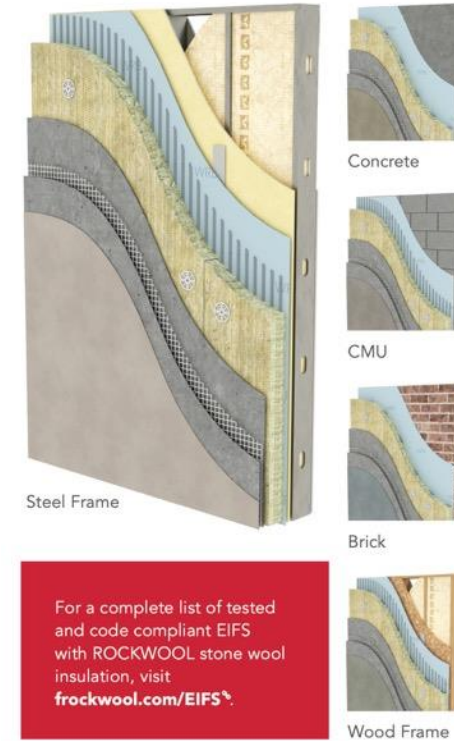
Rock Wool: Fire-Rated, Insulated Walls



1 HR - Stucco



1 HR – Fiber Cement

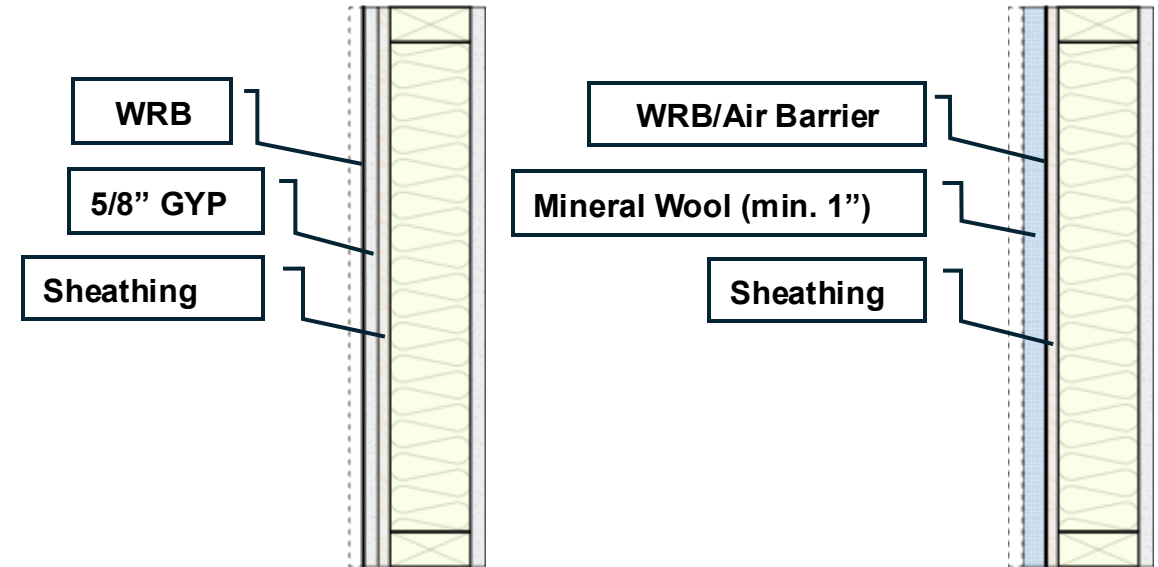


Class A - EIFS



Living With wildfire

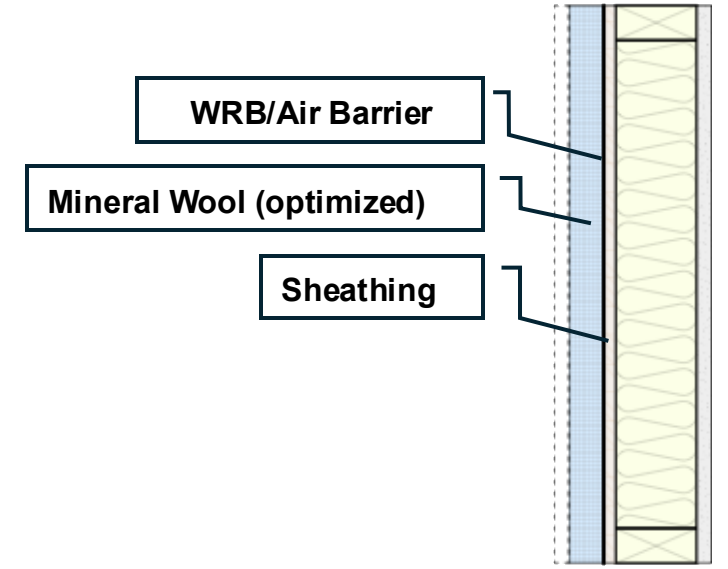
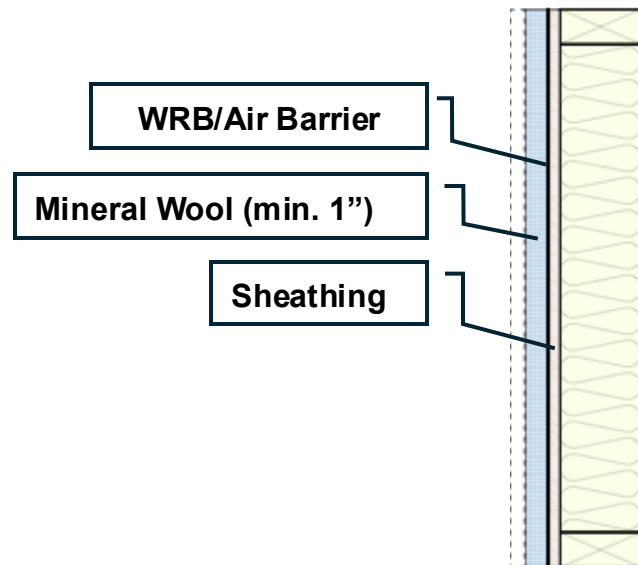
- Exposure to Wildfire Effects (Smoke & Grid Interruption)
- Large % of Population Affected
- Widespread Impact
- Increasingly Frequent
- Mitigation Improves Quality of Life



Air Tightness = "Smoke Tightness"
(w/ Ventilation & Supplemental Filtration)
Insulation = Better in Grid Outages



- Leverage Benefits from 1st Two Categories AND...
- Maximize Fire Hardening, IAQ, & Resilience in Grid Outages
- Optimize for Health, Comfort, Quiet, & Efficiency (Phius/passive)



**Comfortable, Healthy, Quiet, Durable
Resilient in Grid Outages**

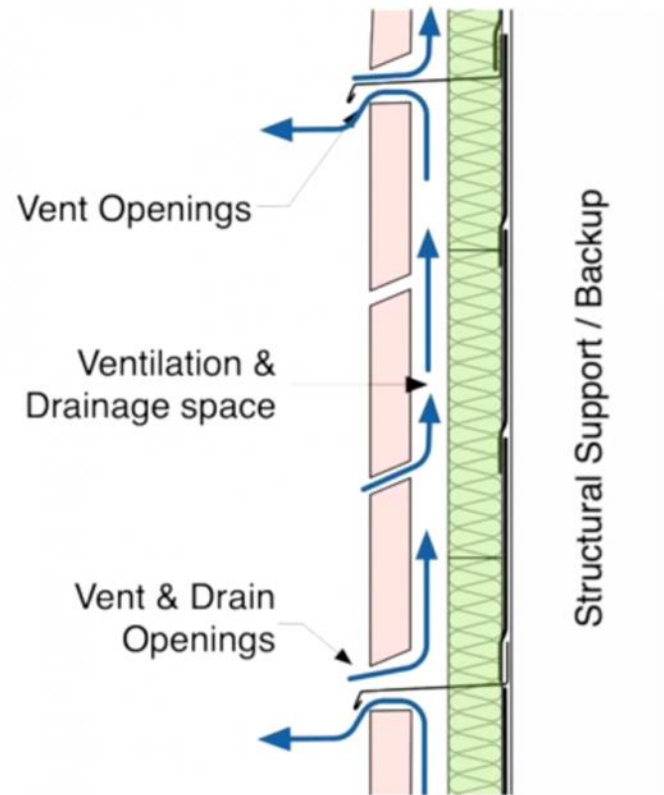
Alternatives to Stone Wool?

Hempcrete Passes 1-Hour ASTM Fire Test

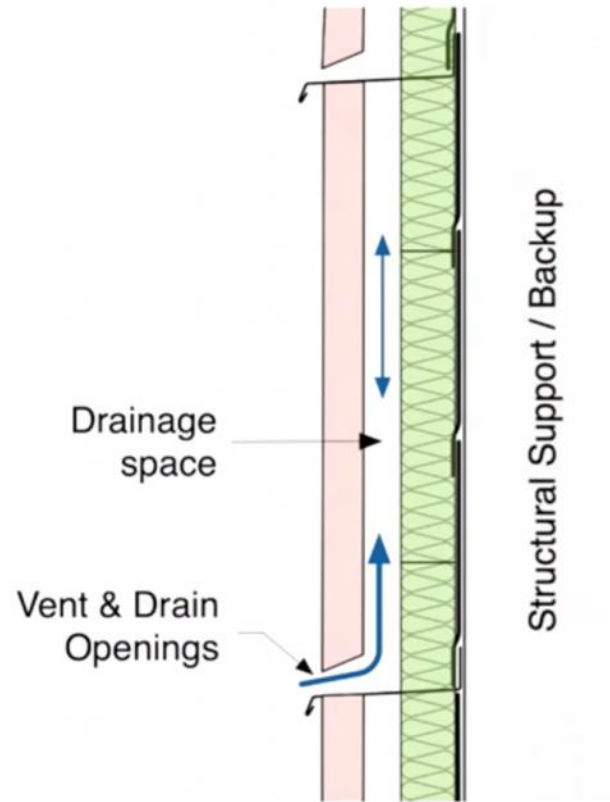


ASTM E84-19B: '0' (perfect score) on two indices, "Flamespread" & "Smoke Developed"

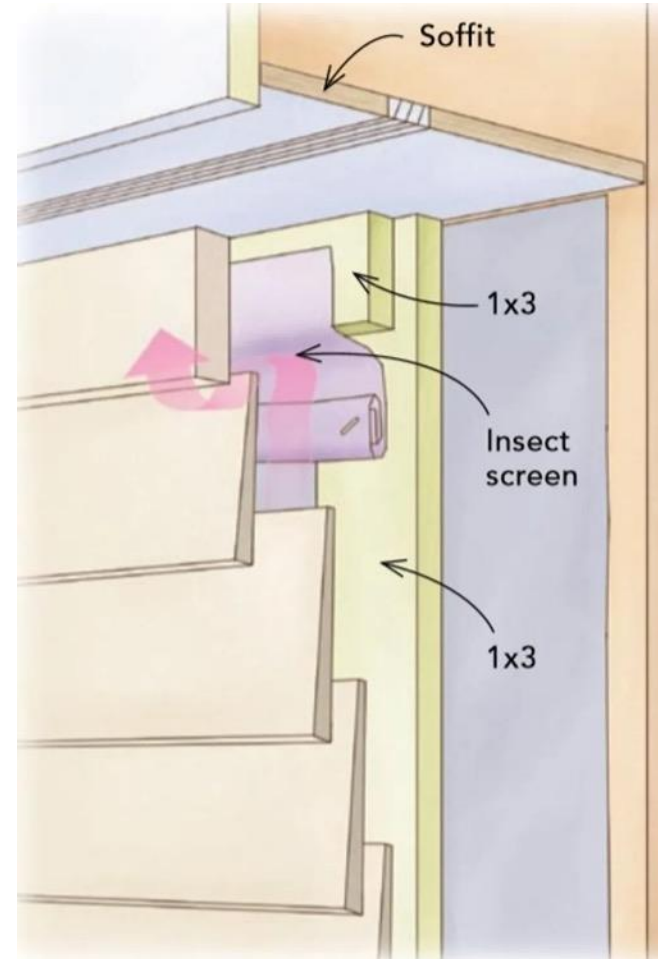
Rain Screen, Drained or Vented?



Drained & Ventilated



Drained & Vented



HRV & Plumbing Vents (Plastic?)



Premium Wall Vent



Fresh Vent



Dektite Silicone Roof Boot



DryerJack



ERV "Snow Snorkels," Lake Tahoe, CA

Defensible Space with Graywater?

‘Zone zero’ rule could be California’s wildfire savior — or its environmental undoing



The Saroyan Stairs in L.A.'s Beachwood Canyon are in an area where the proposed "zone zero" rules would require all plant materials to be removed within five feet of a home or other structure. (Myung J. Chun / Los Angeles Times)



By Jeanette Marantos
Staff Writer | [Contact](#)

Sept. 15, 2025 Updated 10:15 AM PT

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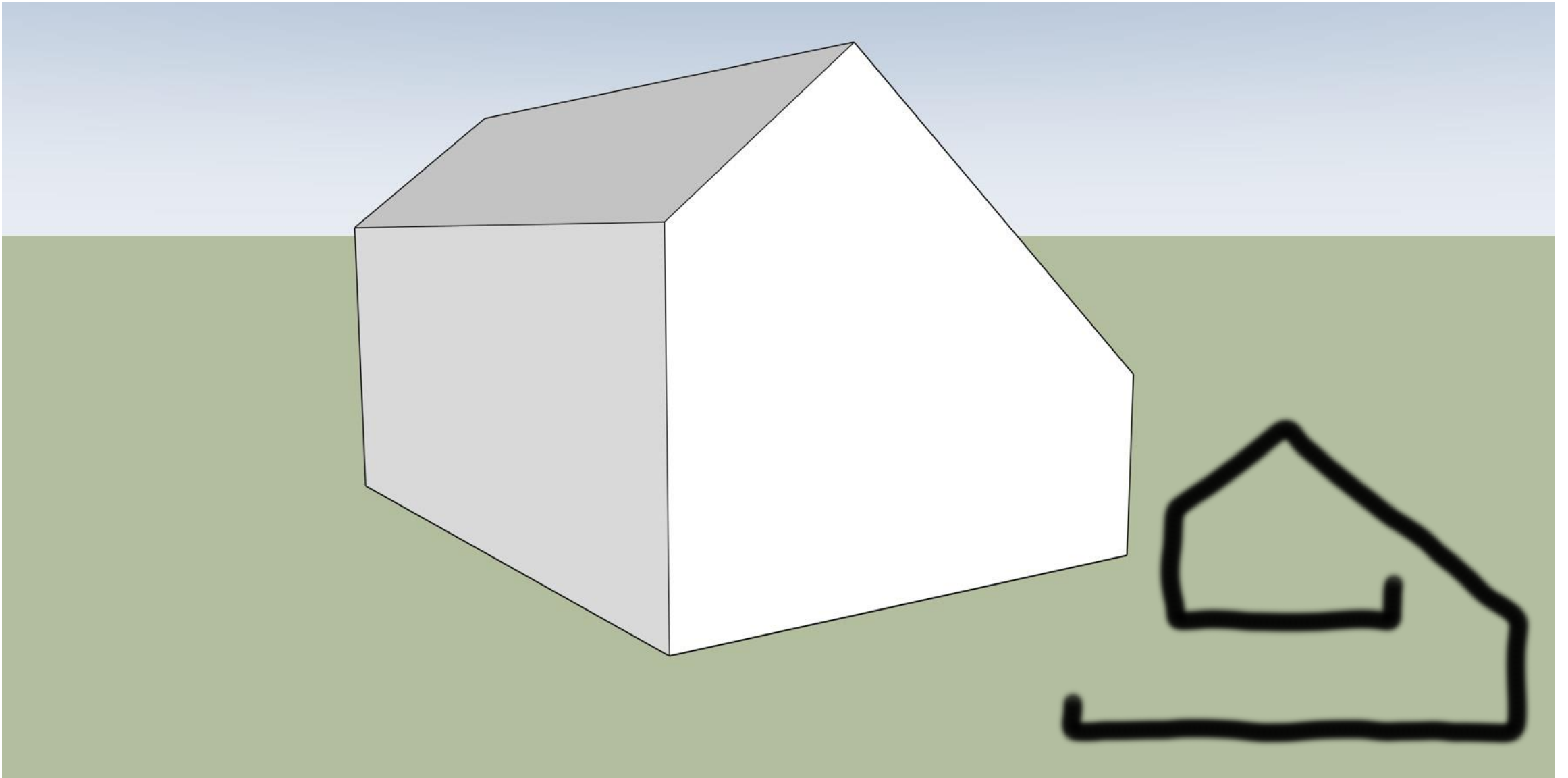
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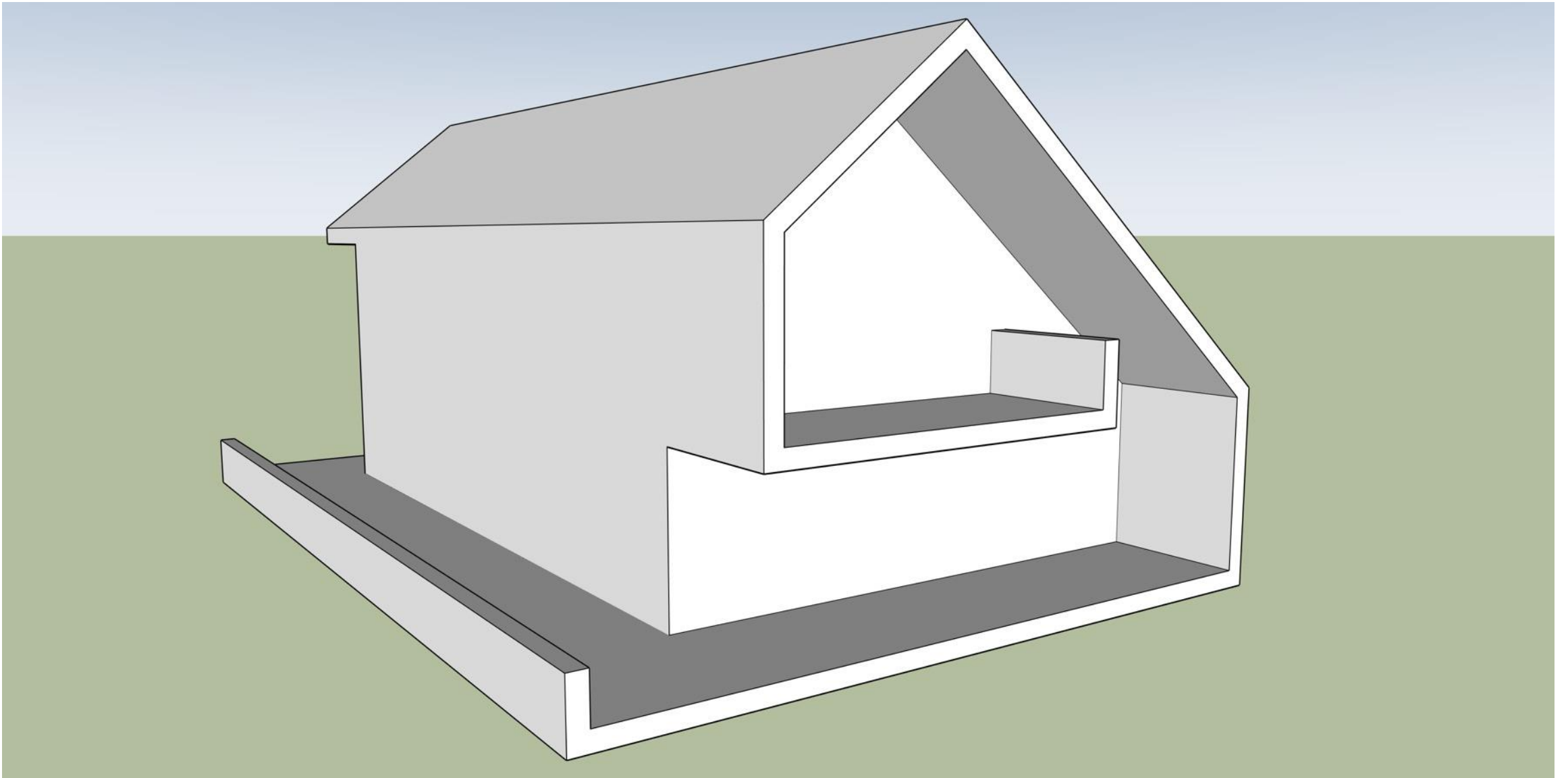
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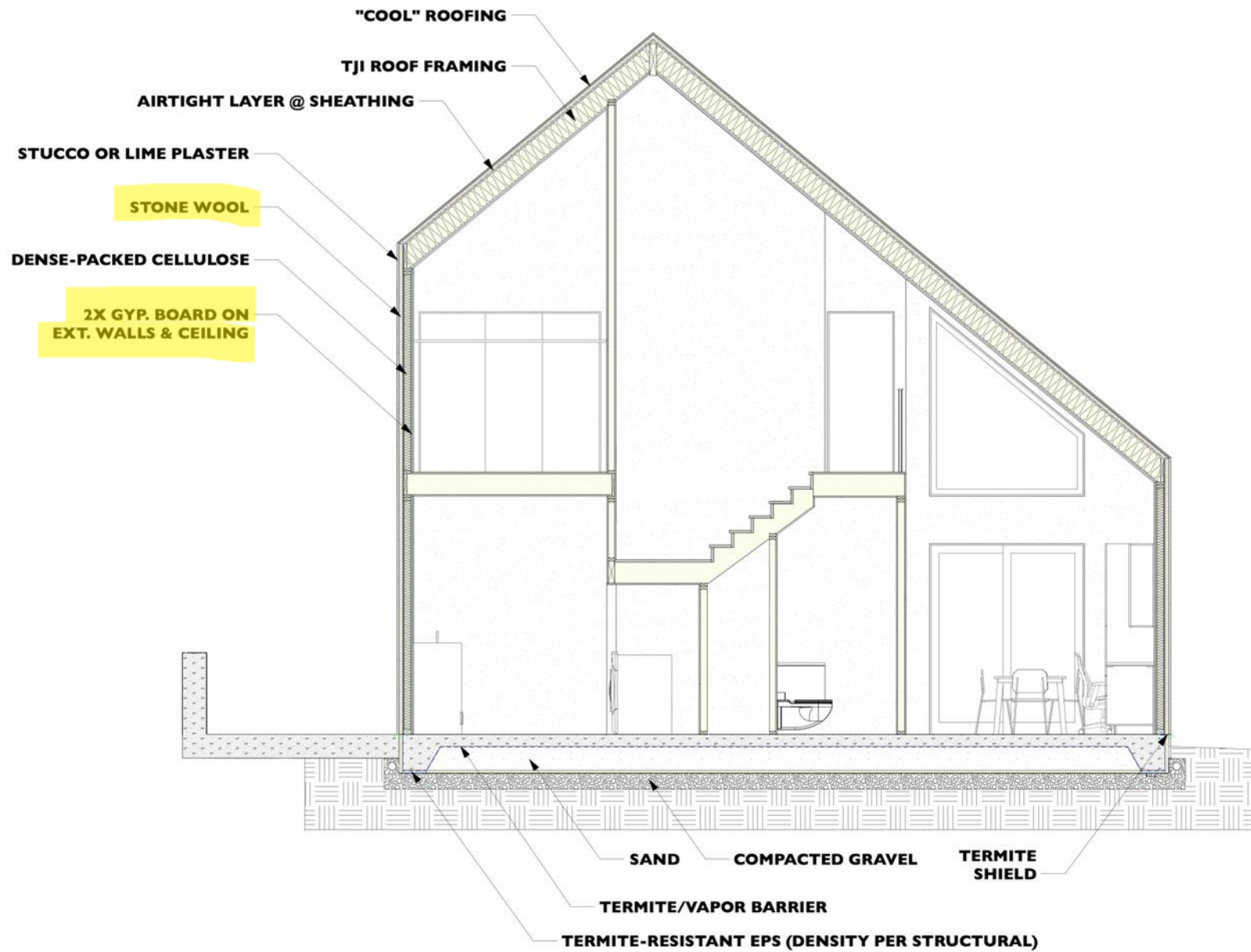
Fire Rebuild Design: “The Altadena”



Fire Rebuild Design: “The Altadena”







Defensible
Space

Outside Thermal
Envelope





Graham Irwin  · You

High-Performance Homes for Californians ...

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5mo · Edited · 



Here's a peek at the 2nd of our pre-designed, high-performance homes for the Los Angeles fire rebuilds. Like the 1st (posted last week), it's compatible with R-1 zoning on 50-foot-wide lots, but can also be lovely with more landscaping around it.

Other commonalities:

- Unvented, ignition-resistant building shell, spec-ed to exceed building code requirements.
- High-performance, smoke-tight envelope with centralized ventilation & supplemental filtration for wildfire smoke events. Inherently comfortable, quiet, & efficient. Constructed of low impact & healthy building materials.
- High-quality, fire-resistant windows & doors ...more

  204

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Eloise Takaki  · 1st

5mo ...

Director of Program Management | Drivin...

Graham- thank you for designing a home that is beautiful, high-performing, and fire resilient. As someone with a lot to learn about building a home, your sharing is not only educational but

Thank you! Questions?



Graham Irwin, AIA

Principal, Essential Habitat Architecture

