

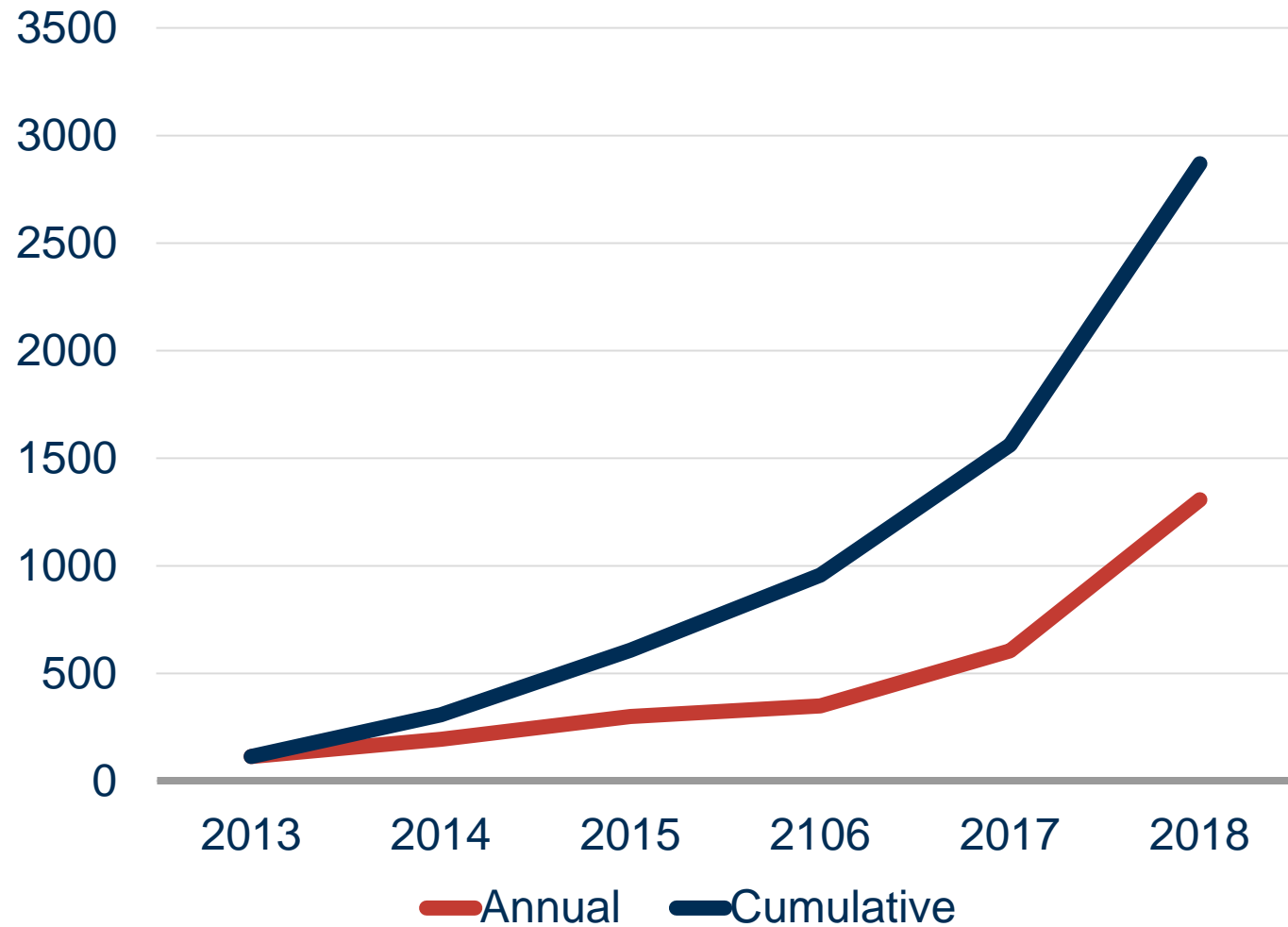


# What is Good Housing Design

**SAM RASHKIN**  
Chief Architect  
Building Technologies Office

Zero is the Future:  
**What, Why, and How**

# Signs Zero is Here: ZERH Growth



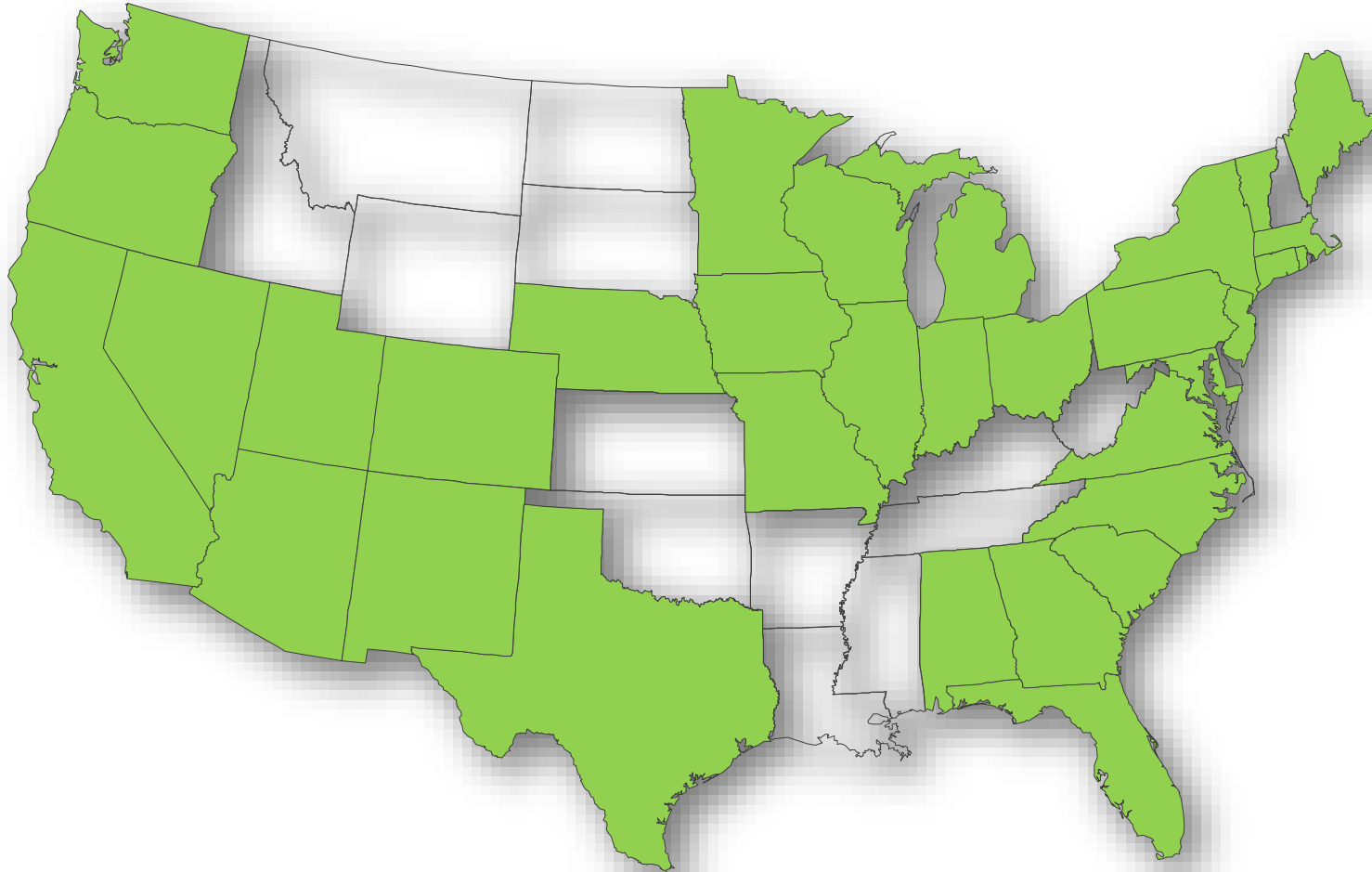
# Signs Zero is Here: ZERH Infrastructure

- 1000's Certified Homes
- 10,000+ Homes in Pipeline
- ~400 Builder Partners
- Fully Vetted National Program Requirements
- Marketing/Sales Resources
- Technical Resources

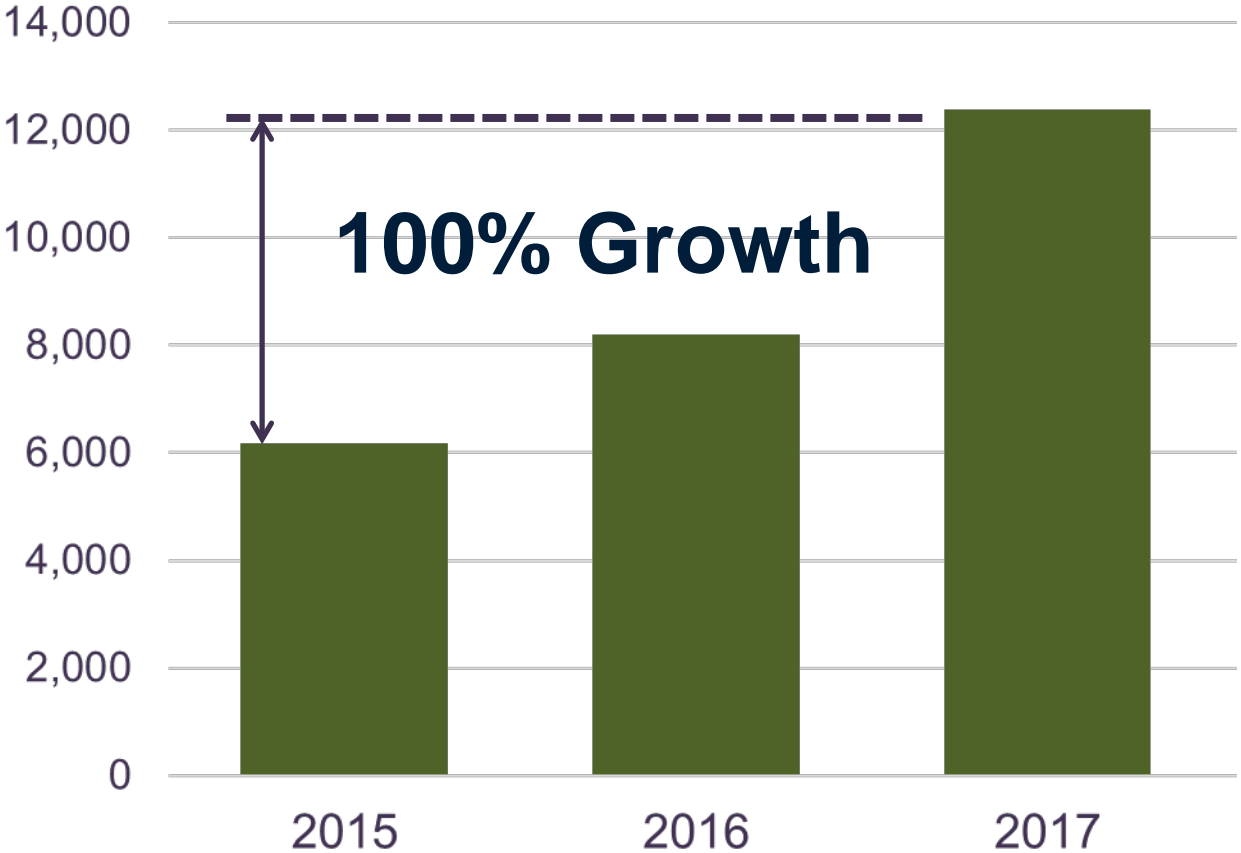




# Signs Zero is Here: States with ZERH



# Signs Zero is Here: Zero Residential Unit Growth



**Source:** “To Zero and Beyond, Zero Energy Residential Buildings Study, 2016 Inventory of residential projects on the path to zero in the U.S. and Canada, Net Zero Energy Coalition, June 2017, call with Shipa Sankaran, February 16, 2018

# Signs Zero is Here: Zero Residential Unit Growth

**PARKS**  
ASSOCIATES

*Providing market intelligence  
for more than 30 years*

**Company**

**Research**

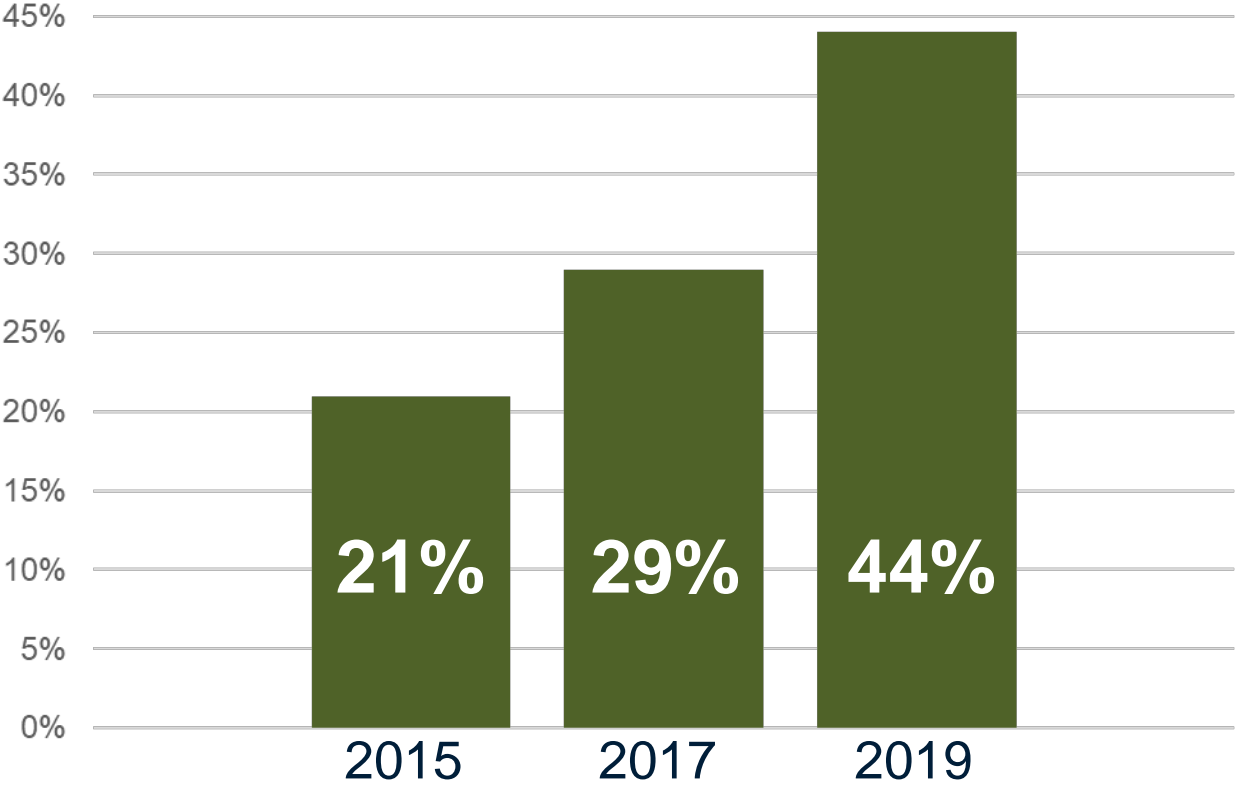
THURSDAY, JUNE 28, 2018

## Zero net energy home construction increases 75% from 2016 to 2017

*New industry report examines energy-efficiency investments by builders*

A new industry report from international research firm Parks Associates shows that construction of zero net energy (ZNE) homes increased by 75% from 2016 to 2017. According to [Home Energy Management: Road to Net Zero](#), this growth aligns with increases in expressed consumer demand, as Parks Associates' consumer segmentation regarding energy efficiency estimates 42% of all U.S. consumers classify as energy-efficient techies.

# Signs Zero is Here: Builder Commitments



Built or Plan to Build a Net Zero,  
Near Net Zero, or Net Zero Ready Home

Source: Dodge Data & Analytics, October 2017



# Signs Zero is Here: Local Govt. Commitments

Mayors from 19 cities around the world signed a pledge to enact regulations and/or planning policy to ensure new buildings operate at net zero carbon by 2030 and all buildings by 2050.

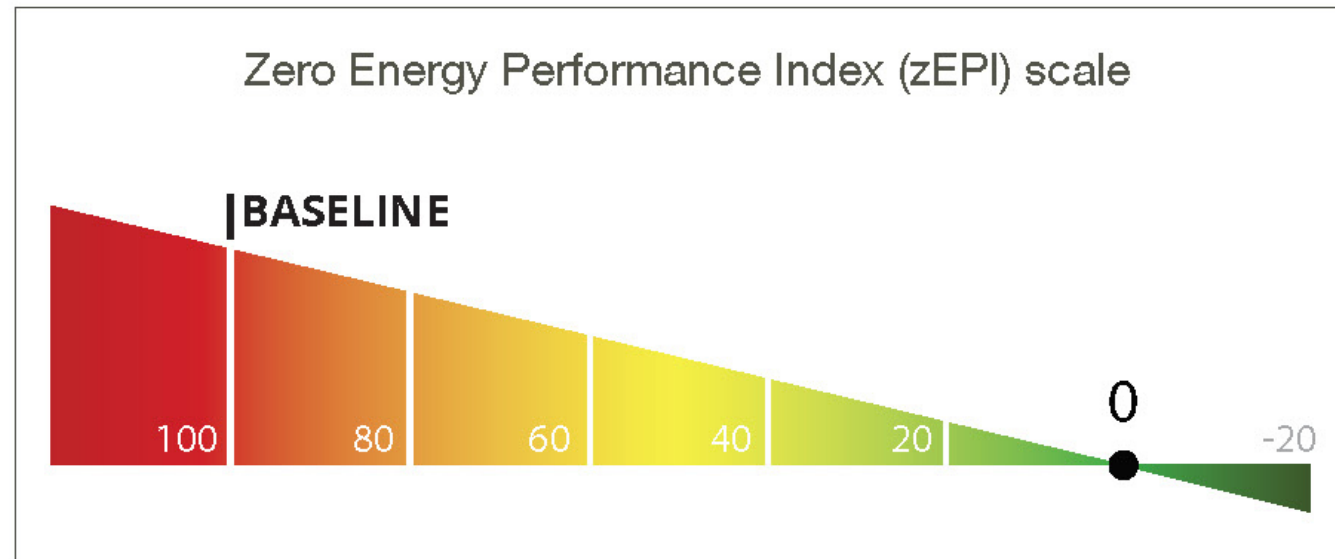
**Source:** Smart Energy Decisions, August 28, 2018

# Signs Zero is Here: State Govt. Commitments

## A NEW METRIC FOR TRACKING ENERGY CODES DRIVING TOWARD ZERO

October 10, 2017 / Zero Net Energy / Energy Codes

[ACEEE's 2017 State Energy Efficiency Scorecard](#) was released in late September with Massachusetts leading based on six categories including utility programs, transportation, building energy codes, combined heat and power, state initiative and appliance standards, according to ACEEE. Looking ahead, there are changes afoot for the 2018 Scorecard ranking methodology that will incorporate a new metric: the zEPI Jurisdictional Scores.



# Zero Context: Rigorous Codes

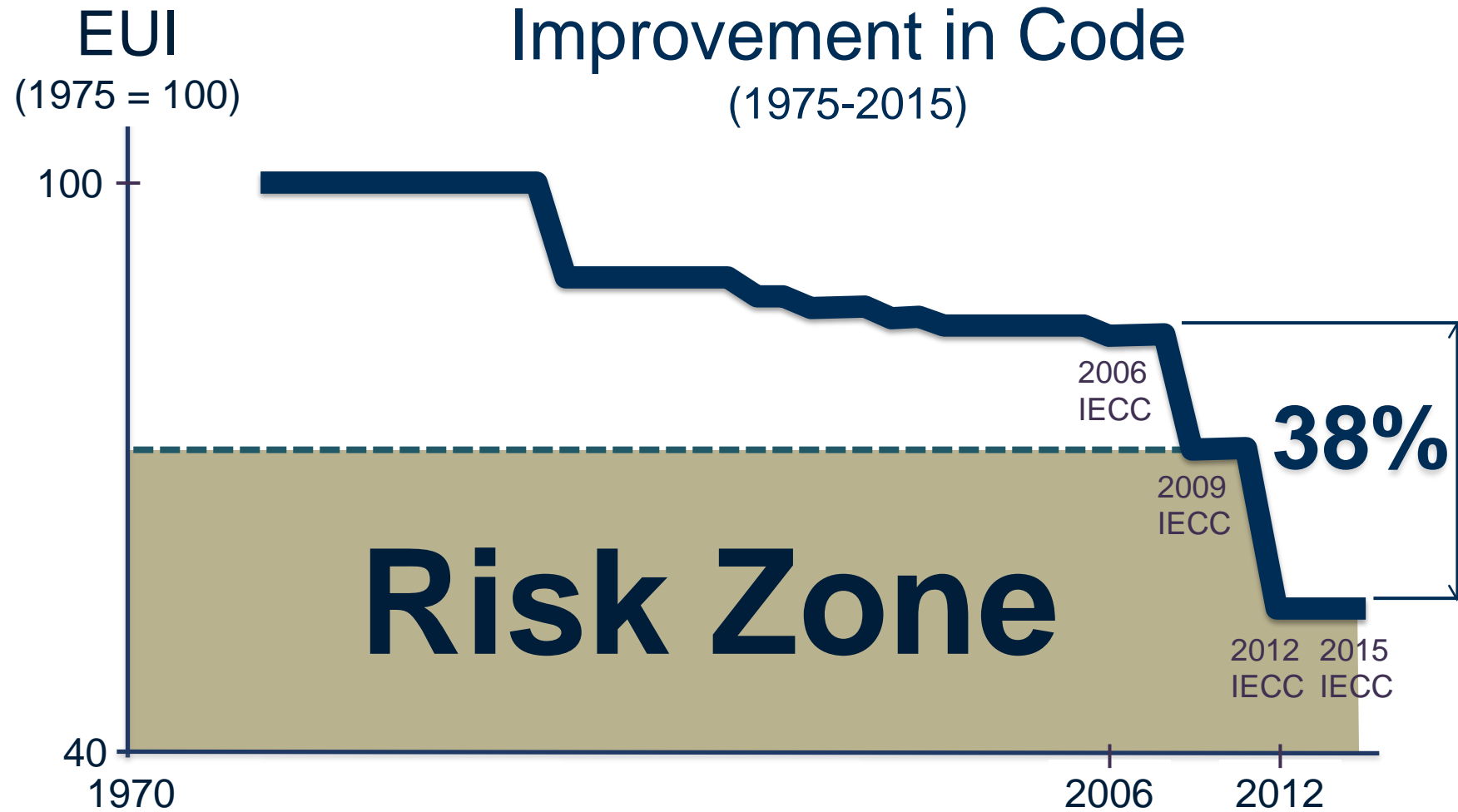
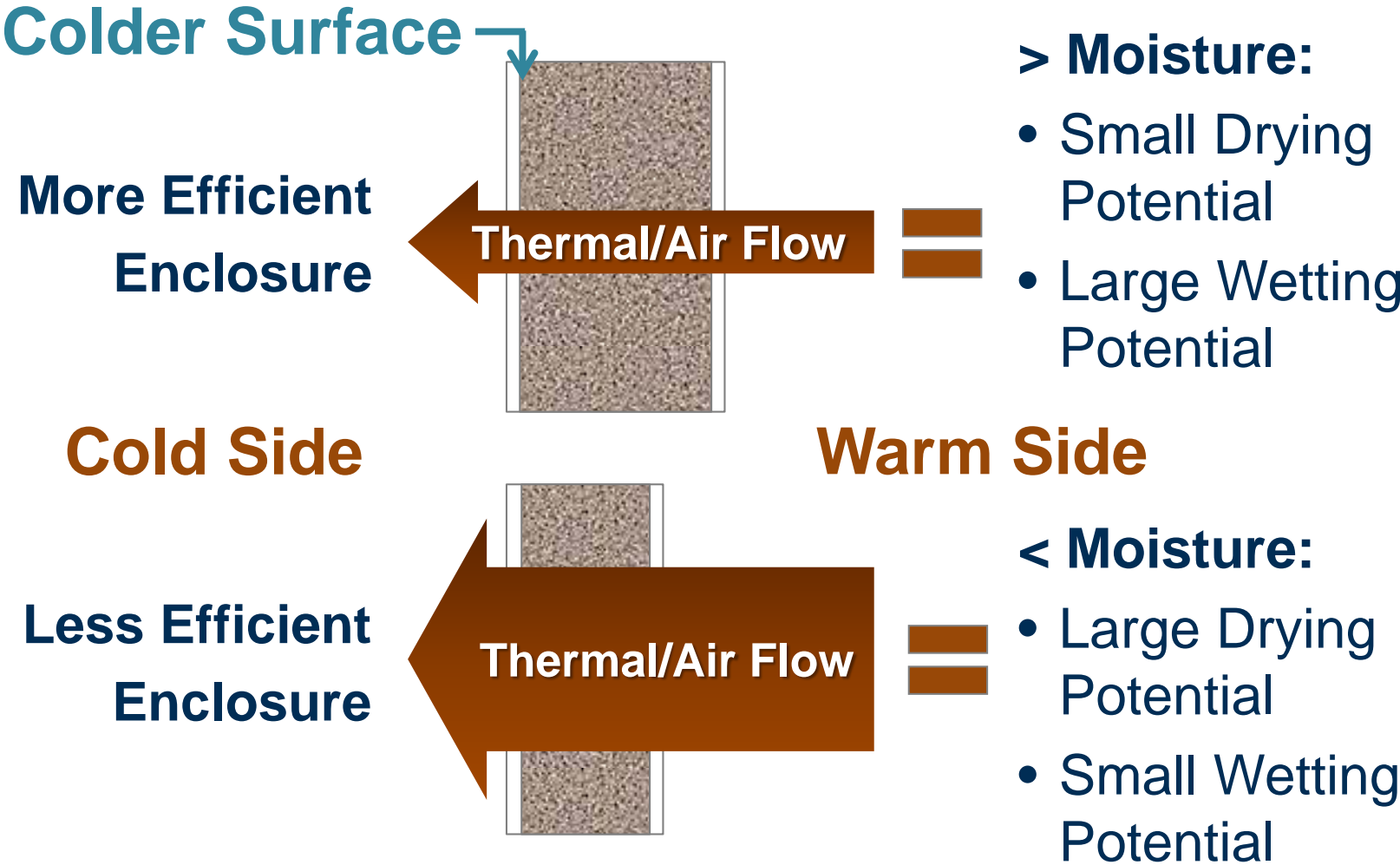


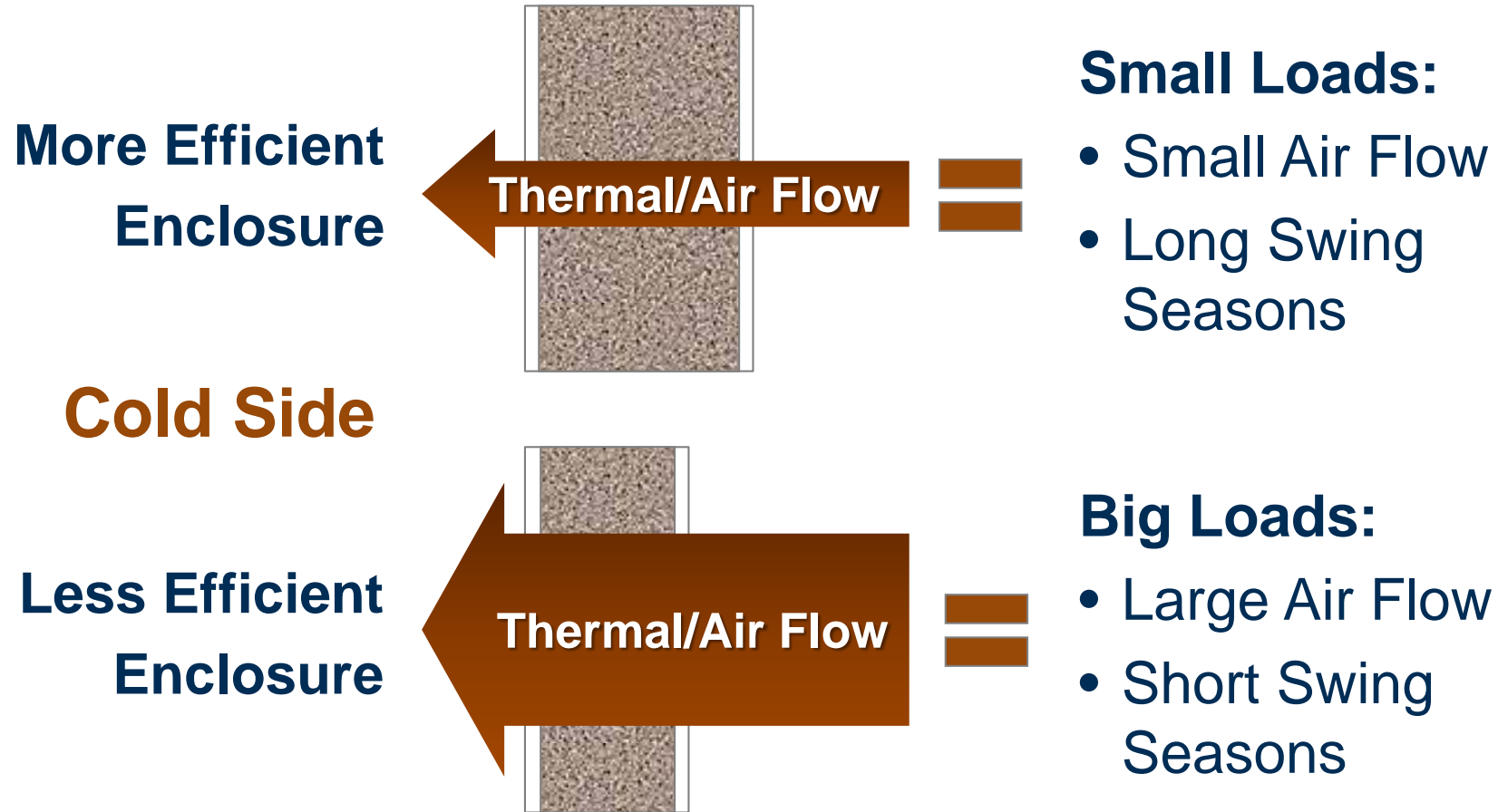
Image Basis: Building Energy Codes Program: National Benefits Assessment, 1992-2040,  
[https://www.energycodes.gov/sites/default/files/documents/BenefitsReport\\_Final\\_March20142.pdf](https://www.energycodes.gov/sites/default/files/documents/BenefitsReport_Final_March20142.pdf)

# Risk 1: Water Protection

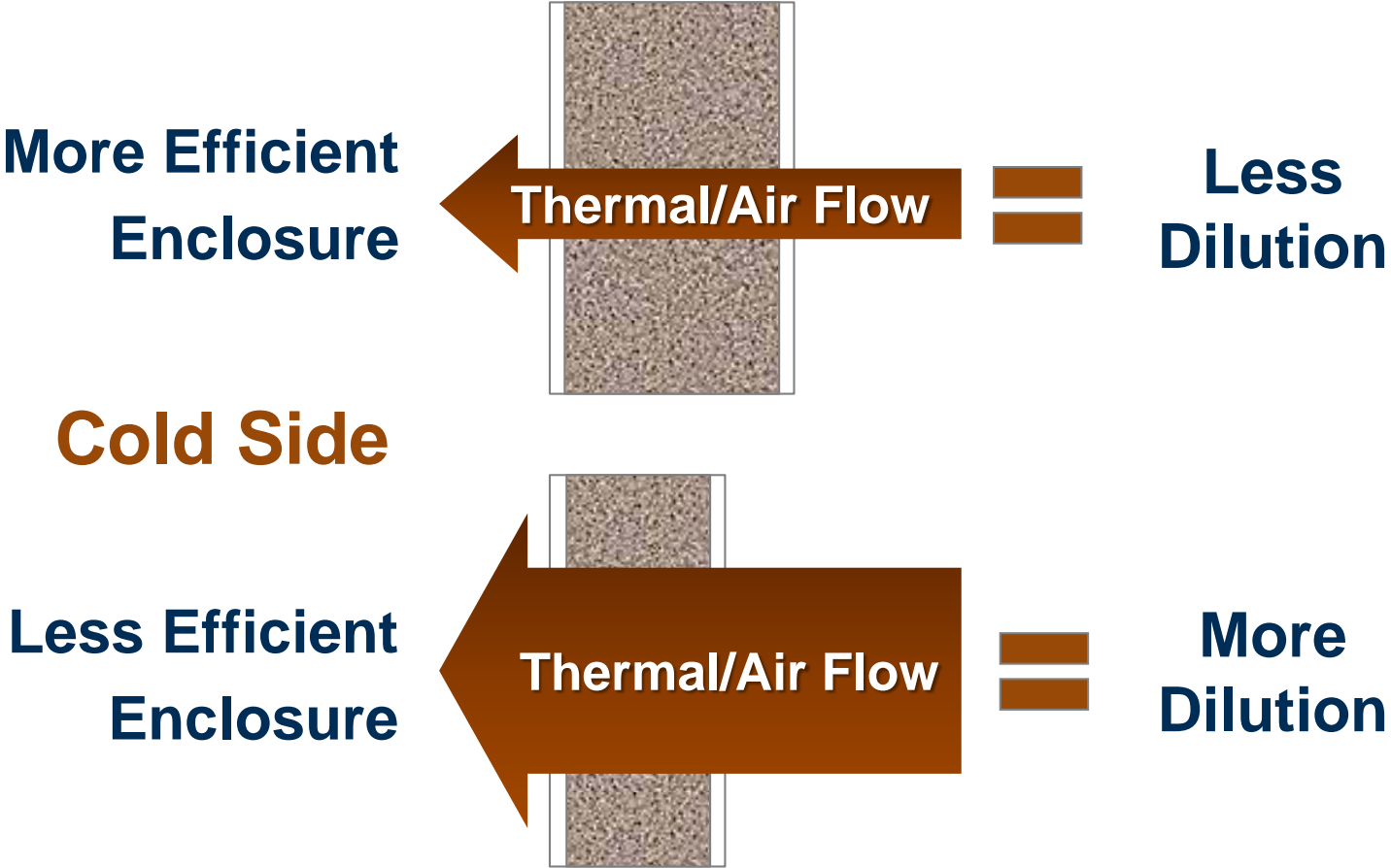




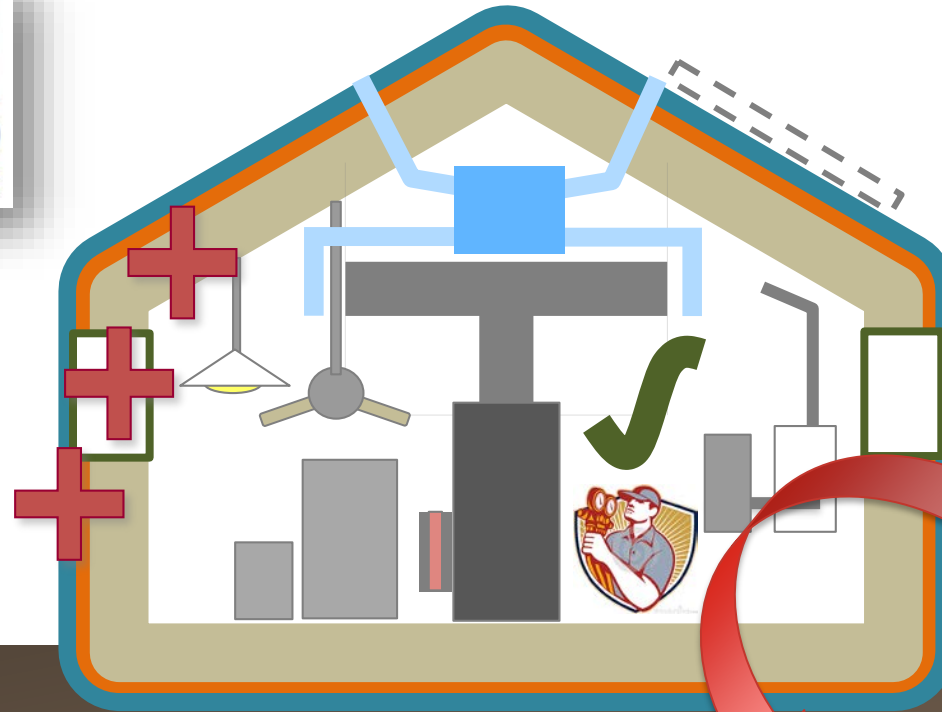
# Risk 1: Ensured Comfort



# Risk 3: Indoor Air Quality



# What is Zero: Risk Management



Resilience

Water Conservation

Optimized Enclosure

Efficient Components

Water Protection

Ensured Comfort

Indoor Air Quality

Solar Ready

Energy Efficiency

Performance

Zero Ready

# What is Zero: 2025 Vision

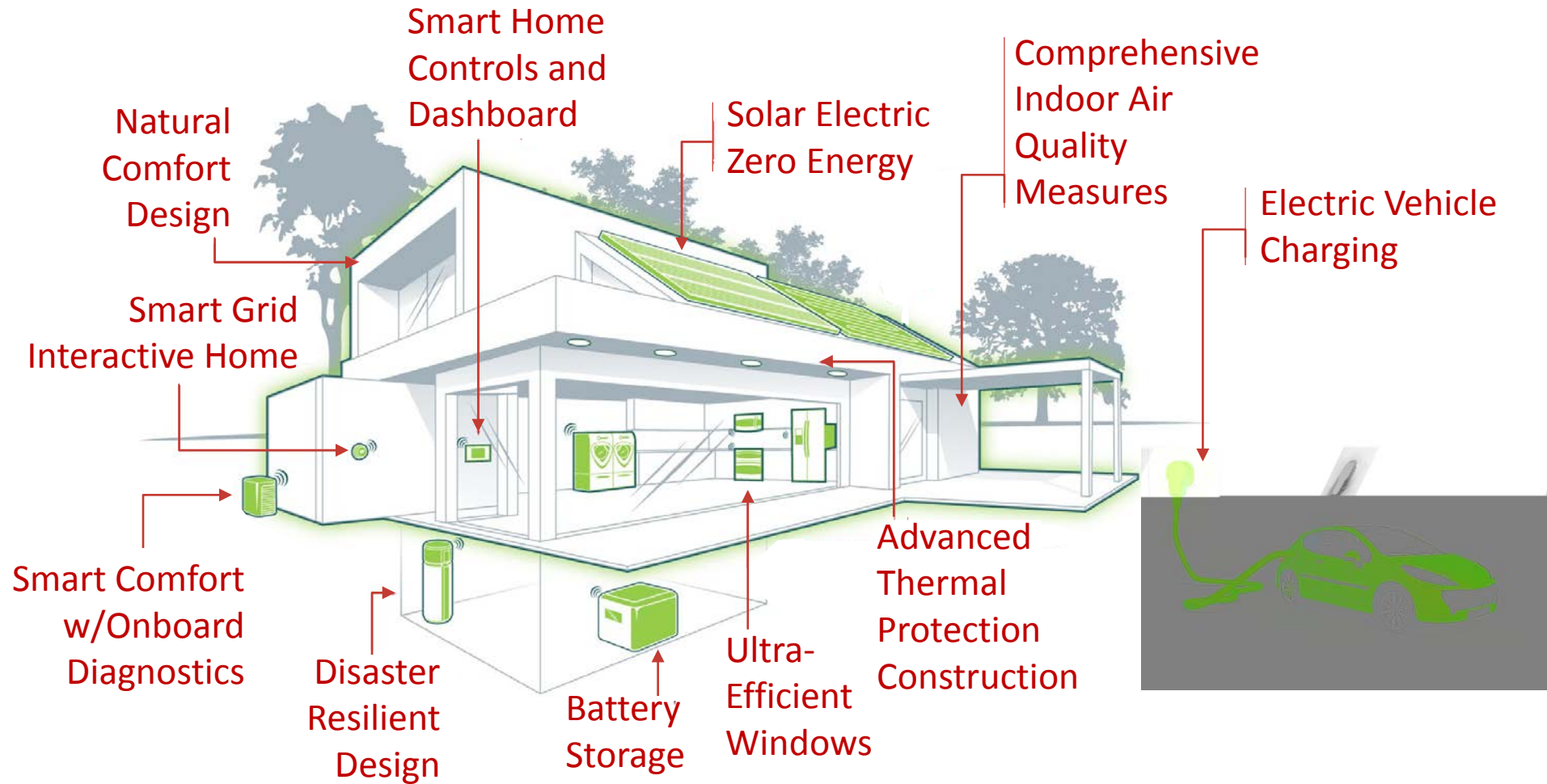


Image Source: <http://www.santamonicapropertyblog.com/more-green-building-codes-in-january/>



# Why Zero: Superior Homebuyer Experience

- **Better Experience**
  - Health
  - Comfort
  - Peace-of-Mind
  - Quality
  - Future Ready
- **Lower Ownership Cost**
  - Monthly Cash-Flow
  - Maintenance Expenses
  - Health Expenses

# Why Zero: Superior Builder Experience

- **Greater Customer Satisfaction**
  - Better Living Experience
  - Lower Ownership Costs
- **Less Liability**
  - Customer Service Costs
  - Quality Management (3<sup>rd</sup> party verification)
- **Market Differentiation**
  - Zero Leadership
  - New Sales Force (homebuyers)

# Why Zero: Superior Societal Experience

**~\$150 Billion** Utility Bill Savings

**~1 Million** Job-Years of Work

**~1,100 MMTCe** <Carbon Emissions = Cleaner Air/Water

**~\$Billions** Local Government Revenue

\* Impacts based on internal DOE analysis assuming  
30% high-performance new homes by 2030

# How Zero: Integrate with Disruption Ahead

- 3 New Realities
- 5 Housing Crises
- 3 Housing Disruptions

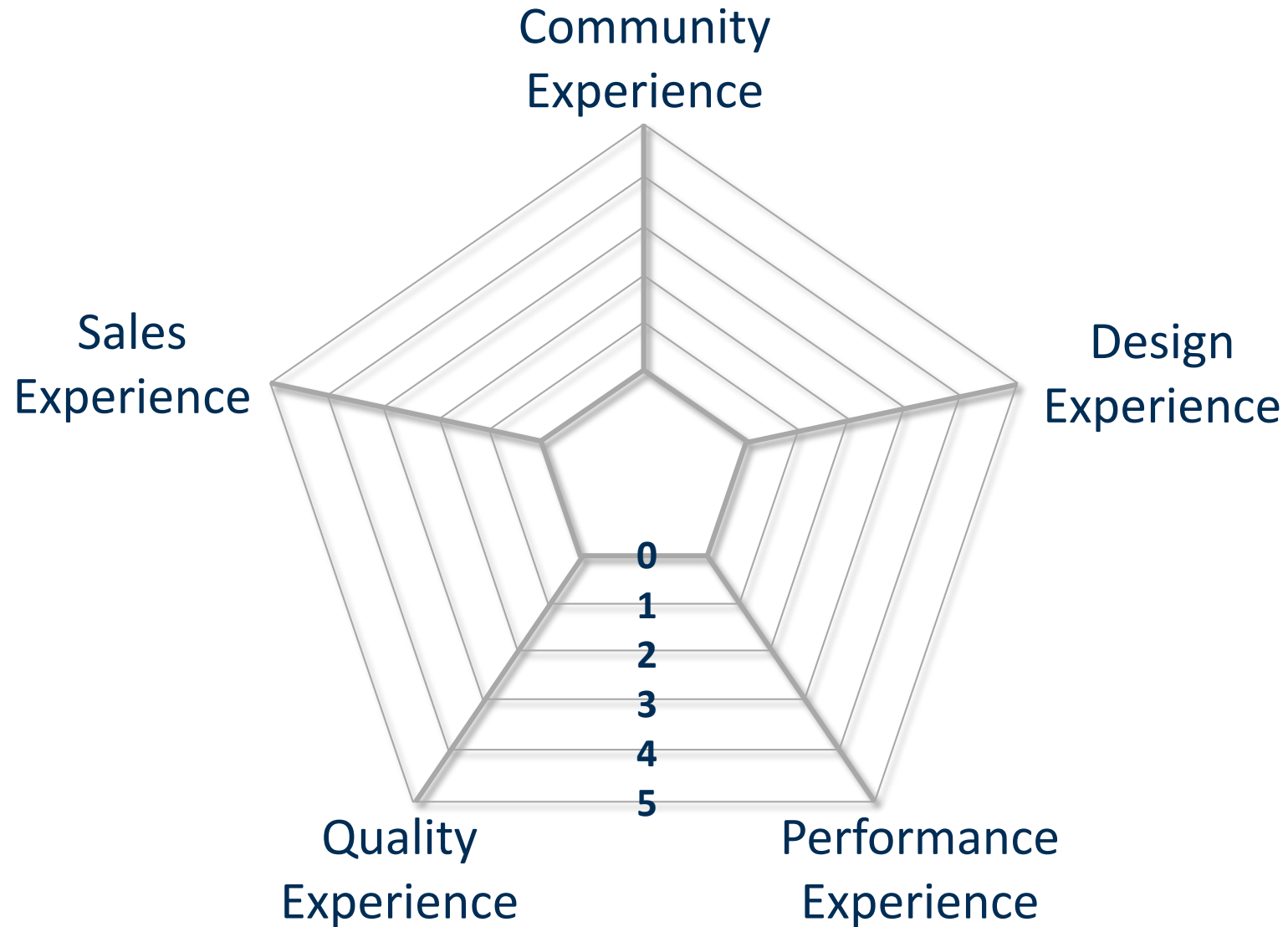
Subject for  
Another Time



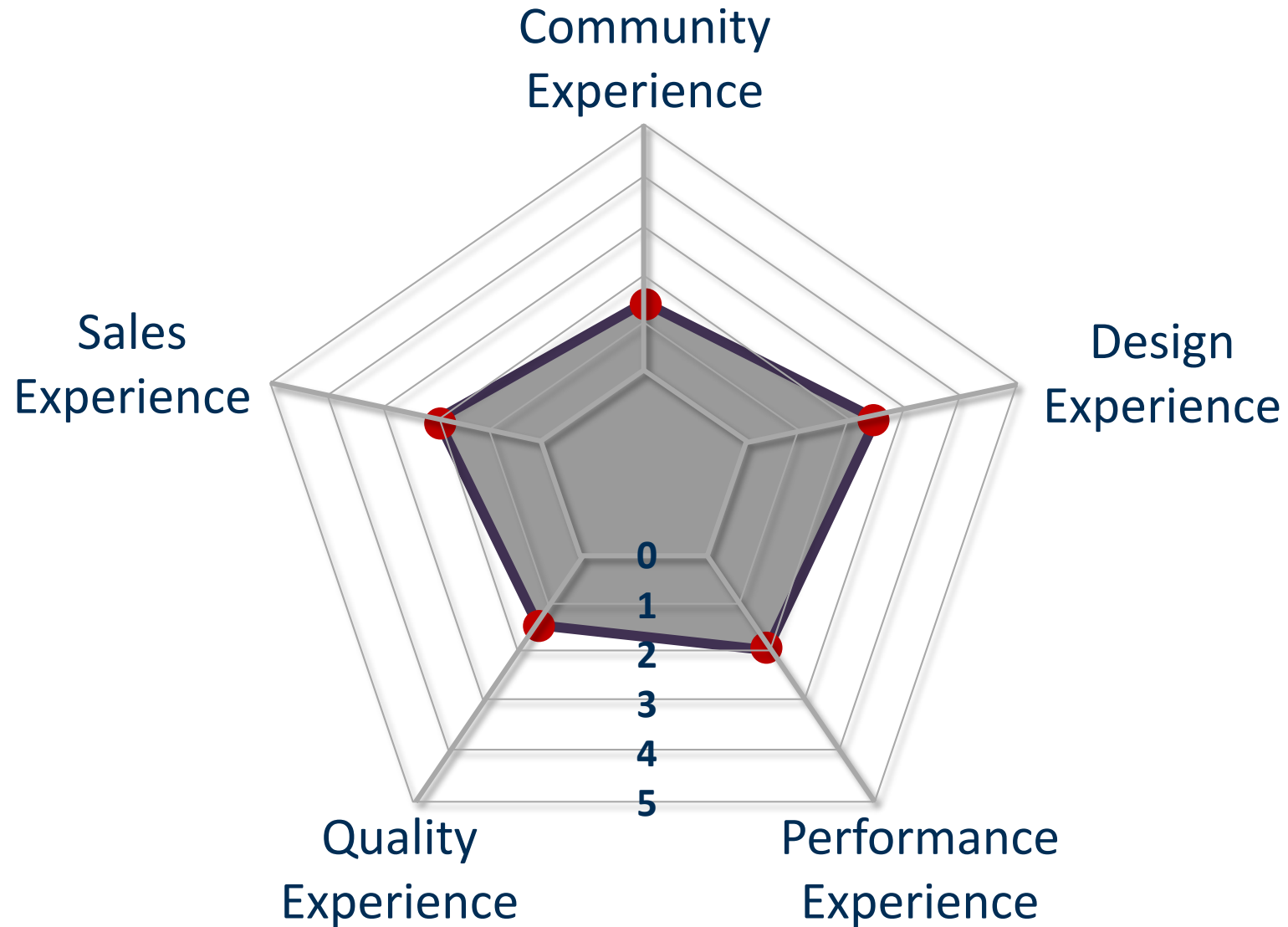
# Zero is a Superior Consumer Experience....

-  \$100,000+ Savings
-  Cozy Indoors
-  Total Comfort
-  Healthy Living
-  Peace-of-Mind
-  Quality Assurance
-  Enhanced Future Value

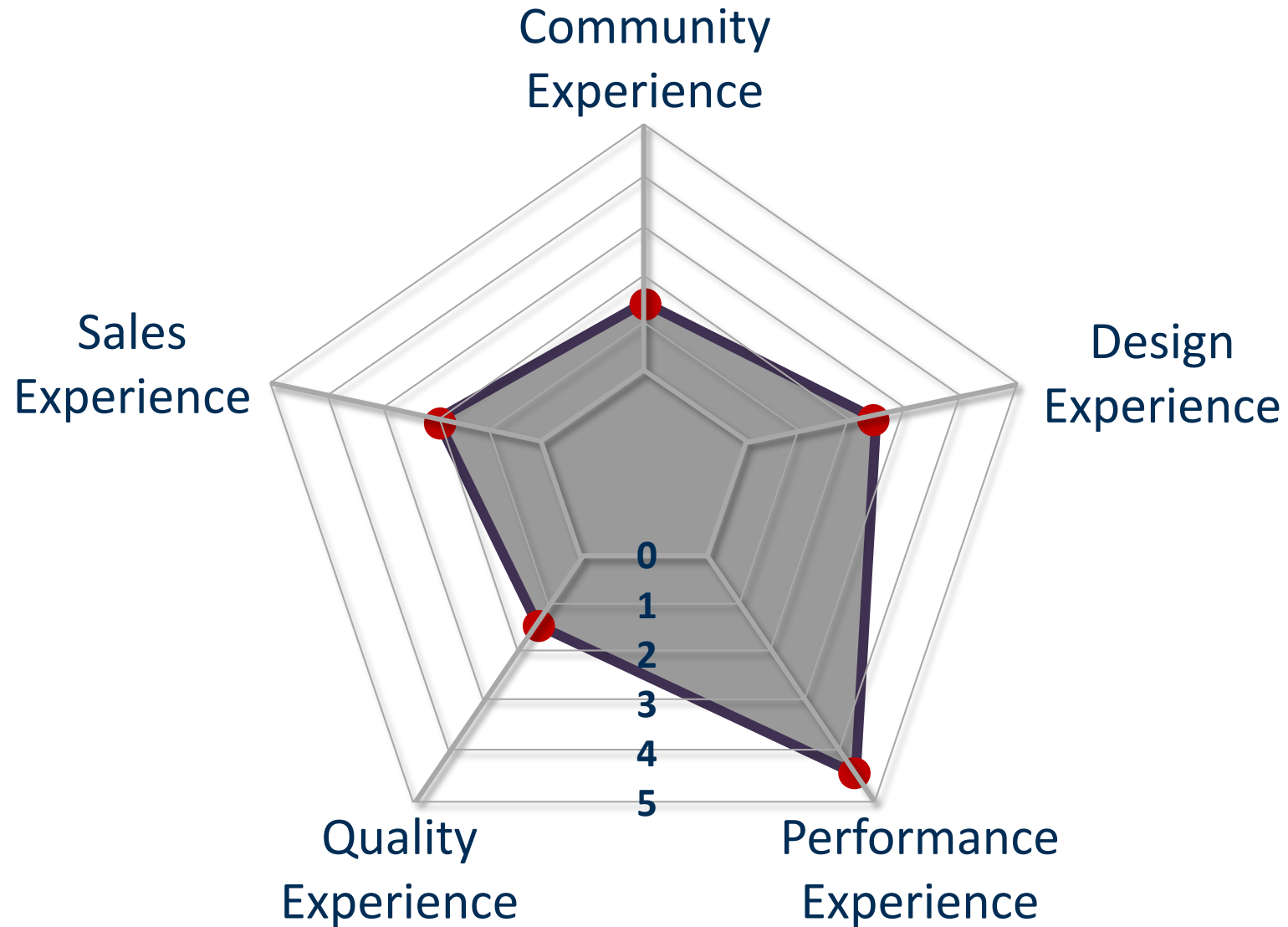
# ...But It's Not Enough!



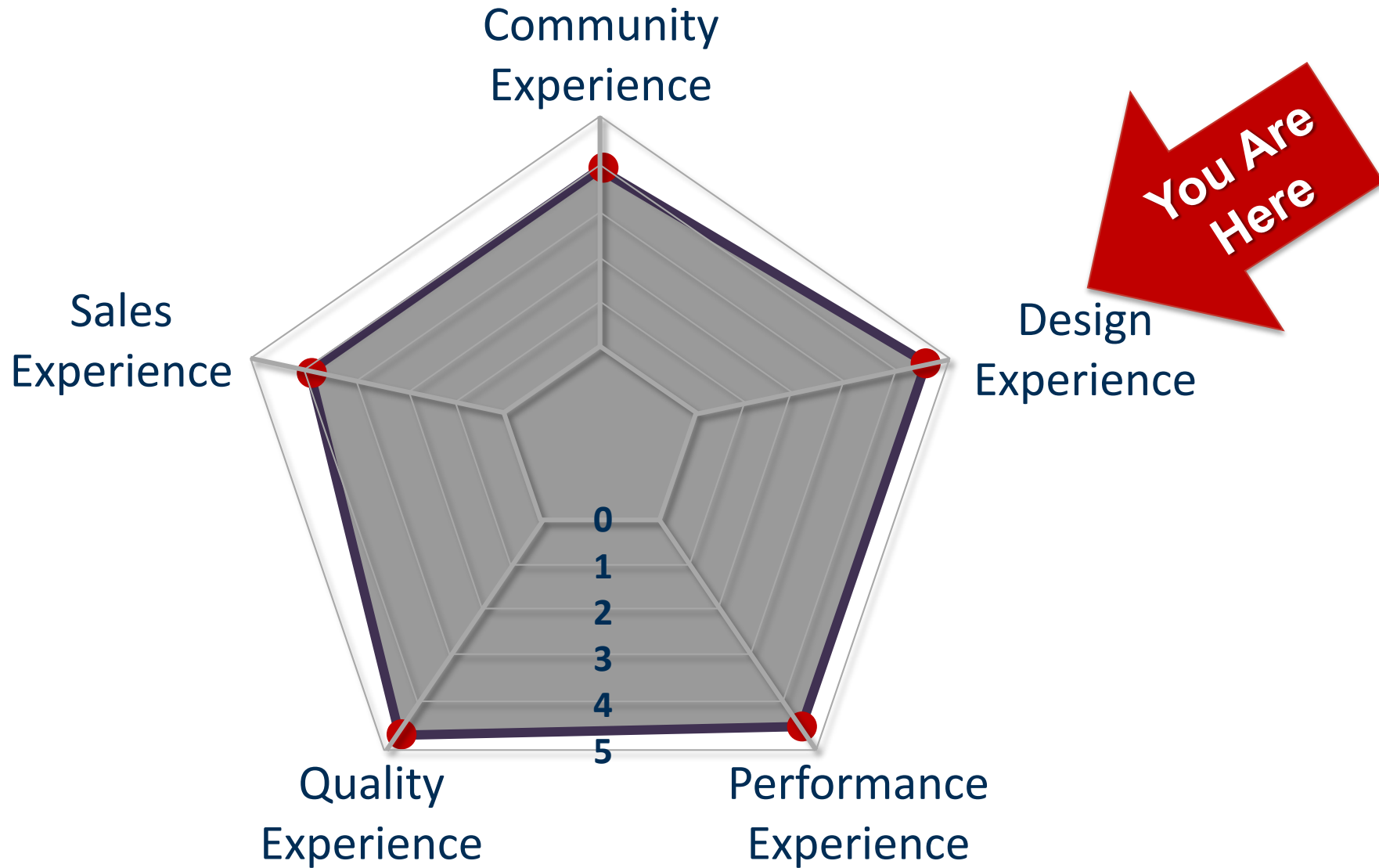
# Typical Home Builder



# Zero Energy Ready Home Builders



# Retooled Home Builder





**Executive Workshop:**

Module 2:

# **Design Experience**

**Sam Rashkin**

# Optimizing Housing Design

## What

Optimize  
Location

Optimize  
Nature

Optimize  
Space

Optimize  
Form

Optimize  
Function

## How

Fit to  
Site

Natural  
Comfort

Right Size  
Right Way

Architectural  
Integrity

Integrated  
Systems

## Why

How You Live  
Matters

- Outside
- Inside
- Details

# Optimizing Housing Design

	<b>5 Concepts</b>	<b>Fit to Site</b>
	<b>5 Concepts</b>	<b>Natural Comfort</b>
	<b>2 Strategies – 10 Concepts</b>	<b>Right Size, Right Way</b>
	<b>3 Concepts</b>	<b>Architectural Integrity</b>
	<b>12 Systems in 3 Groups</b>	<b>Integrated Systems</b>



# *Fit to Site: 5 Concepts*

1. Optimized View
2. Effective Drainage
3. Regionally Appropriate Materials
4. Regionally Appropriate Resilience
5. Community Connection

## **Fit to Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Falling Water – Fit to Site?*



**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Philip Johnson Glass House – Fit to Site?*



**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Optimized View Ignored*



**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Optimized View Created*



**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Effective Drainage Ignored*



**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Effective Drainage Ignored*



**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Effective Drainage Ignored*



**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Regionally Inappropriate Materials*



**Santa Fe, NM**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# *Regionally Appropriate Materials*



**Santa Fe, NM**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# *Regionally Inappropriate Materials*



**Ceramic Tile Roof in Cold Climates**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# *Regionally Inappropriate Materials*



**Melborne, Australia**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Regionally Appropriate Materials*



**Bermuda**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Regionally Inappropriate Resilience*



**Oakland Hills, CA Fire Storm - 1991**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Regionally Appropriate Resilience*



**Oakland Hills, CA Fire Storm - 1991**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Regionally Inappropriate Resilience*



**New Jersey after Hurricane Sandy**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Regionally Appropriate Resilience*



**Kiawah Island, SC**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Community Connection Missing*



**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# Community Connection



**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Community Connection*



**Fit to  
Site**

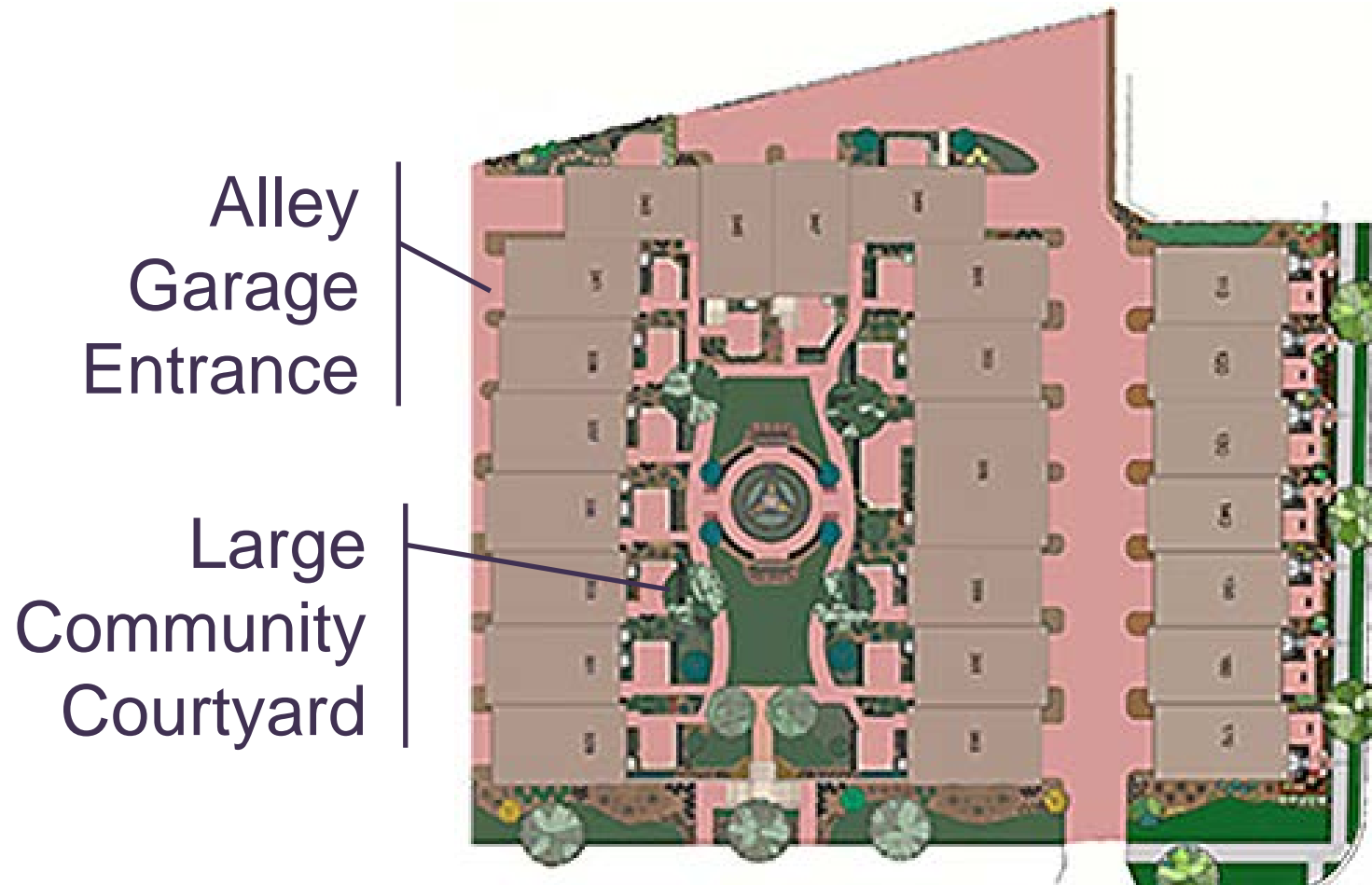
Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# Community Connection



**Courthouse Square, Wheaton, IL**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# Community Connection



**Courthouse Square, Wheaton, IL**

**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# Community Connection



**Fit to  
Site**

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# Community Connection



**Fit to  
Site**

Natural  
Comfort

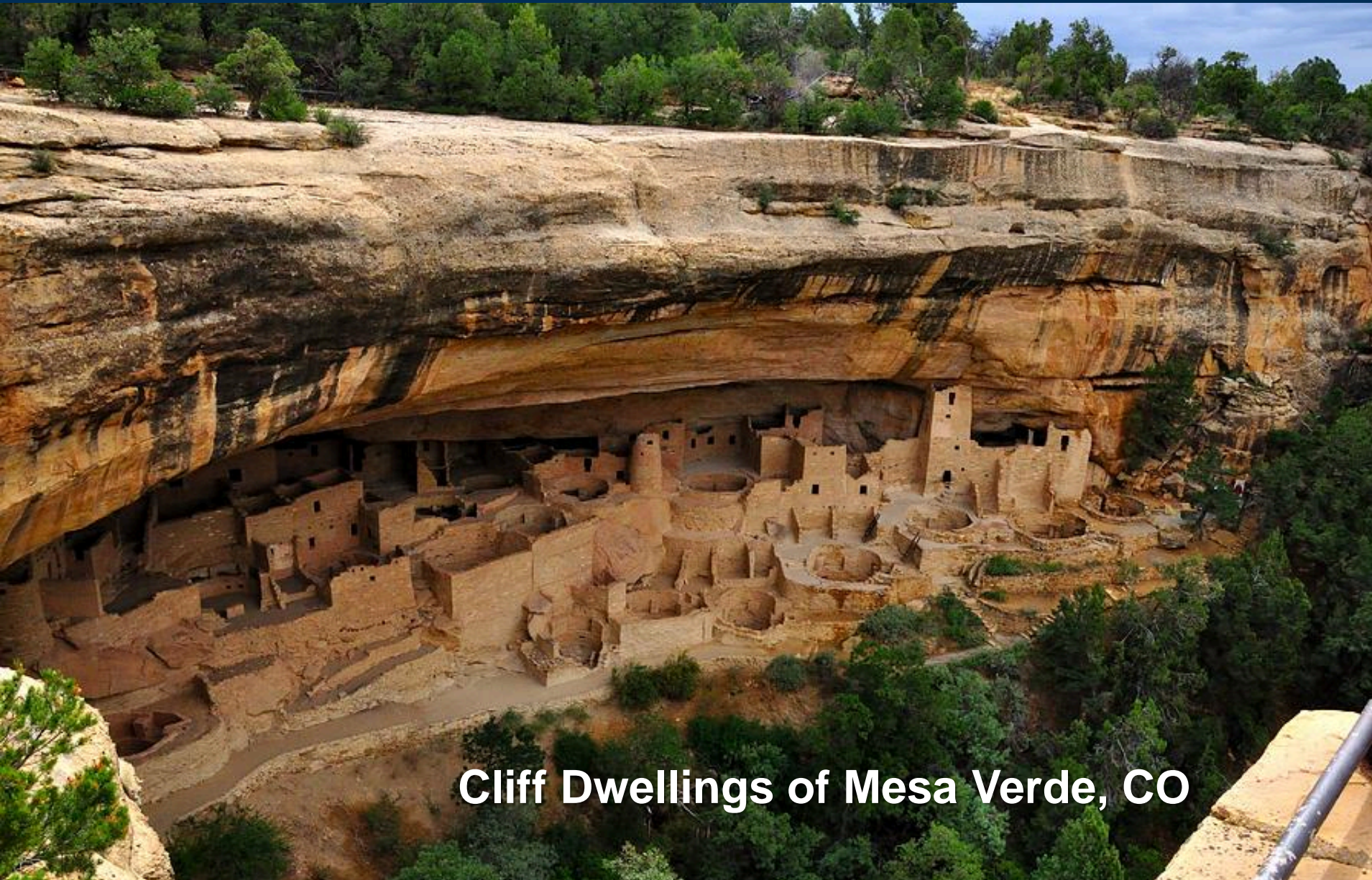
Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Natural Comfort: Ancient Origins*



**Cliff Dwellings of Mesa Verde, CO**

Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Natural Comfort: Ancient Origins*



**Taos Pueblo, Taos, NM**

Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# *Natural Comfort Ignored*



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# *Natural Comfort Experience*

1. Glare-Free Views
2. Free Heating and Cooling (~25%)
3. Superior Comfort (Radiant)
4. Natural Light
5. Fresh Air

Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# Glare-Free Views



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Superior Comfort (Radiant)*



Fit to  
Site

**Natural  
Comfort**

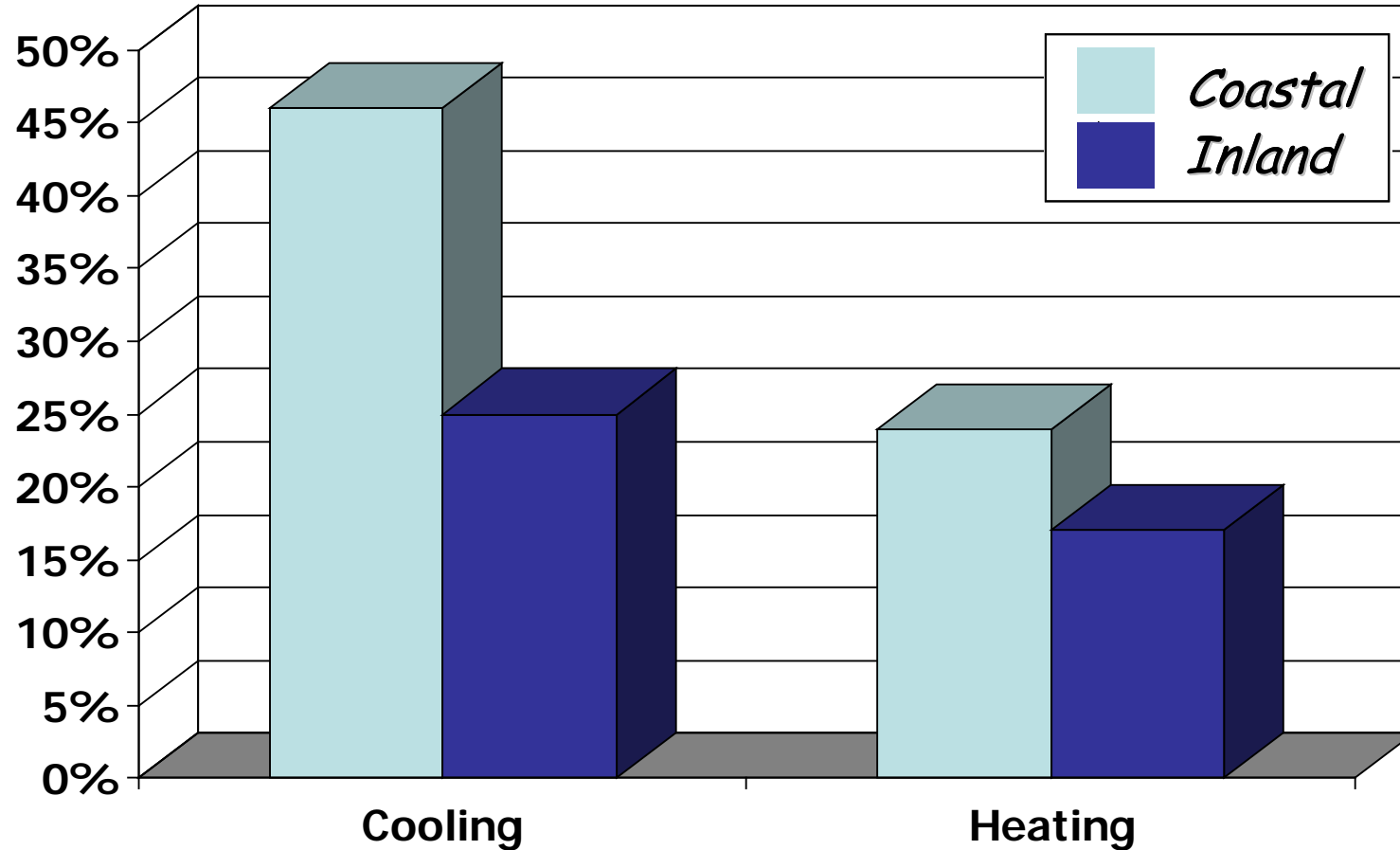
Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# Free Heating and Cooling (~25%)

## Solar Orientation Savings: California Single-Family Homes



**Source:** Evaluation Measurement and Verification of California ENERGY STAR Homes Strategic Research & Evaluation; ENERGY STAR for Homes Utility Stakeholder Meeting – April 26-27, 2007

Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Natural Light*



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Natural Light*



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# Natural Comfort: 5 Concepts

1. Natural Heating
2. Natural Cooling
3. Natural Fresh Air
4. Natural Comfort Control
5. Natural Lighting



**\$0\***

\*Possibly small added resources for design/planning

Fit to Site

**Natural Comfort**

Right Size, Right Way

Architectural Integrity

Integrated Systems

# Natural Comfort: 5 Design Tools

1. Solar Orientation
2. Solar Shading
3. Thermal Mass Storage
4. Cross Ventilation
5. Prevailing Breeze Orientation

**\$0\***

\*Possibly small added resources for design/planning

Fit to Site

**Natural Comfort**

Right Size, Right Way

Architectural Integrity

Integrated Systems



# Natural Comfort Design

Natural Comfort Design Tools					
Natural Comfort Concepts	Solar Orientation	Solar Shading	Thermal Mass Storage	Cross Ventilation	Prevailing Breeze Orientation
Natural Heating					
Natural Cooling					
Natural Fresh Air					
Nat. Comfort Control					
Natural Lighting					

Fit to Site

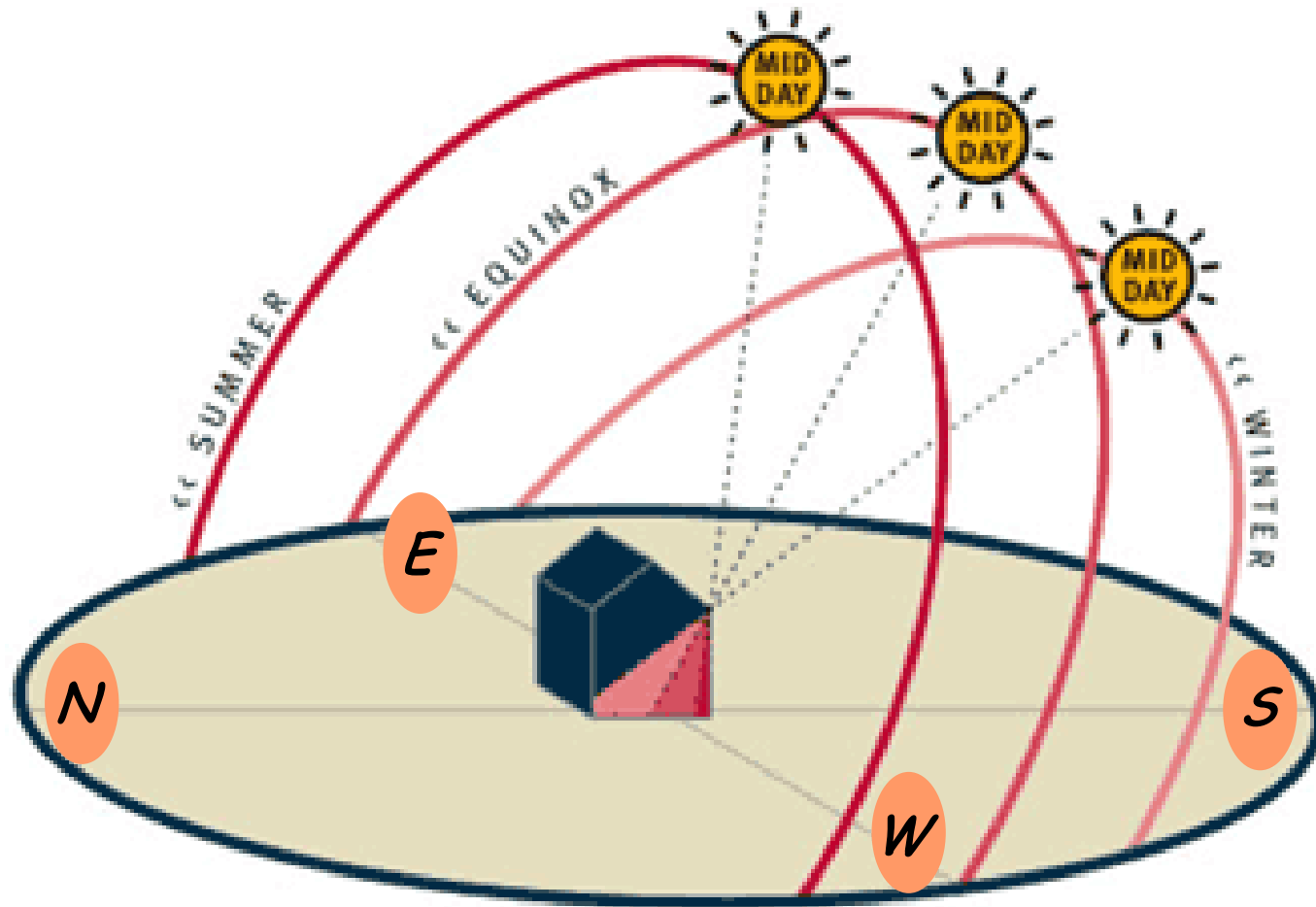
**Natural Comfort**

Right Size, Right Way

Architectural Integrity

Integrated Systems

# Solar Orientation



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# *Solar Orientation/Solar Shading Missing*



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Solar Orientation/Solar Shading*



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

**Torcellini House – Winter: Eastford, CT**



# *Solar Orientation/Solar Shading*



**Torcellini House – Summer: Eastford, CT**

Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Solar Orientation/Solar Shading*



Fit to  
Site

**Natural  
Comfort**

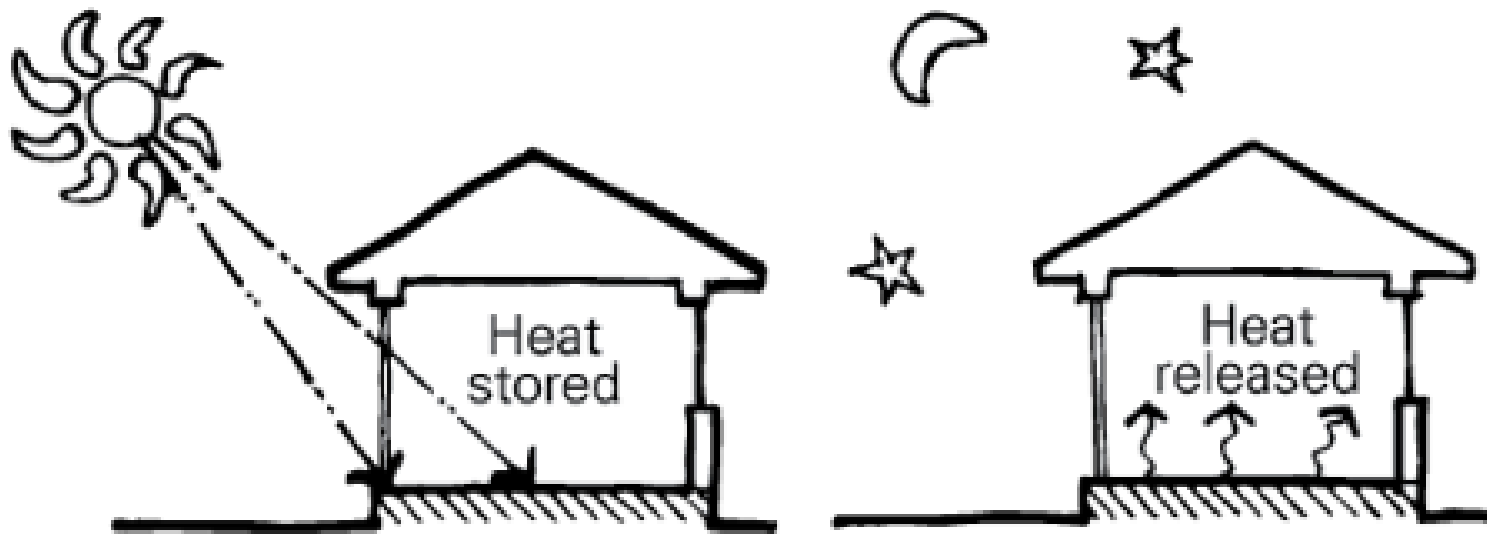
Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# Thermal Mass Storage



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# *Thermal Mass Storage*



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Thermal Mass Storage*



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Thermal Storage*



Fit to  
Site

**Natural  
Comfort**

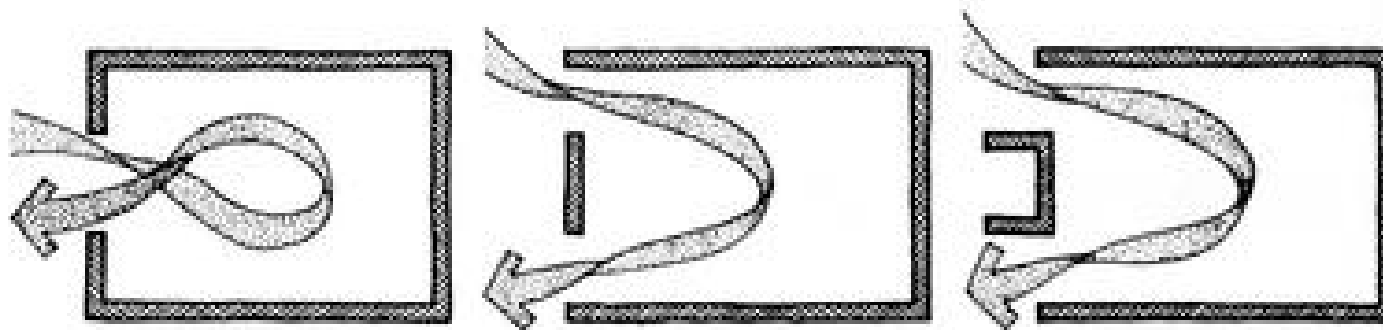
Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# Prevailing Breeze Orientation/Cross Ventilation

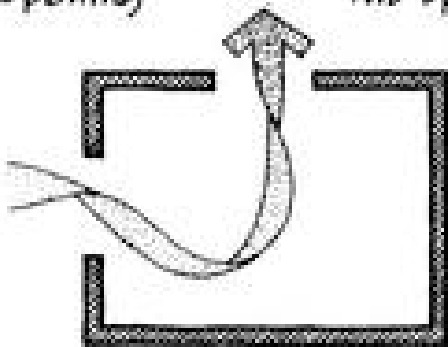
## Plan Orientation



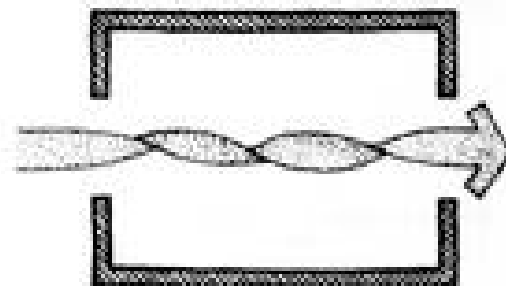
Single Opening

Two Openings - Same Wall

Two Openings With Wings



Two Openings - Adjacent Walls



Two Openings - Opposite Walls

Fit to Site

**Natural Comfort**

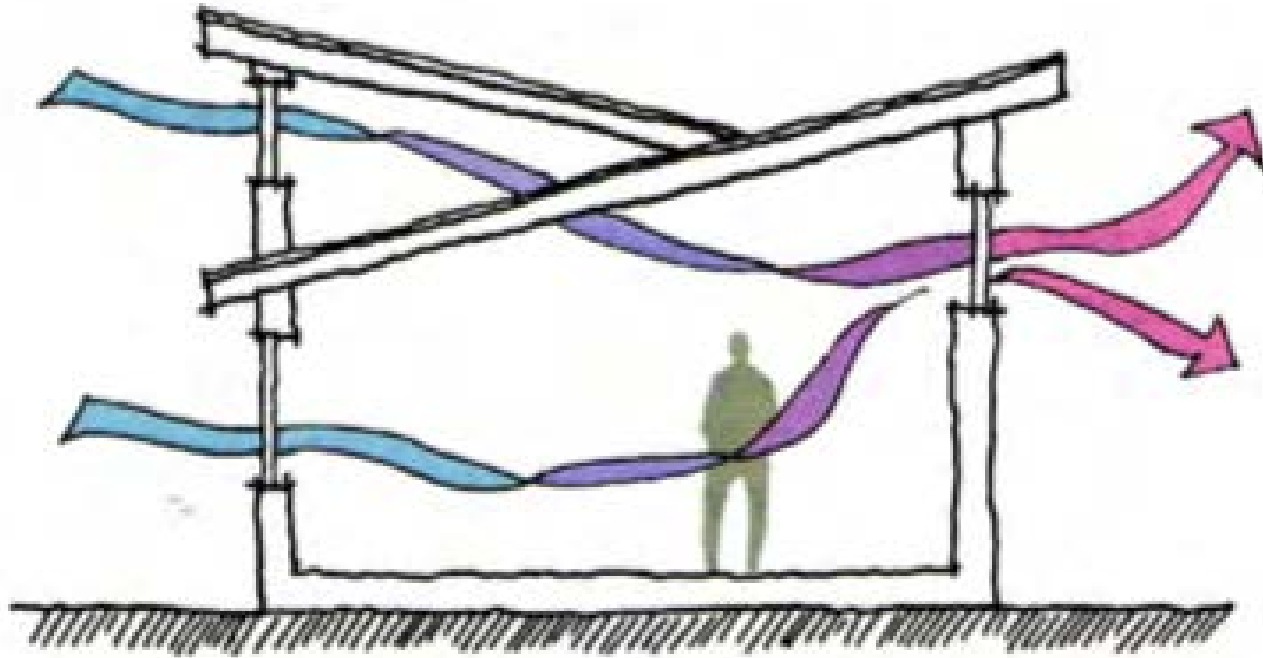
Right Size, Right Way

Architectural Integrity

Integrated Systems

# *Prevailing Breeze Orientation/Cross Ventilation*

## High-Low Cross Ventilation



Fit to  
Site

**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems



# *Prevailing Breeze Orientation/Cross Ventilation*



Fit to  
Site

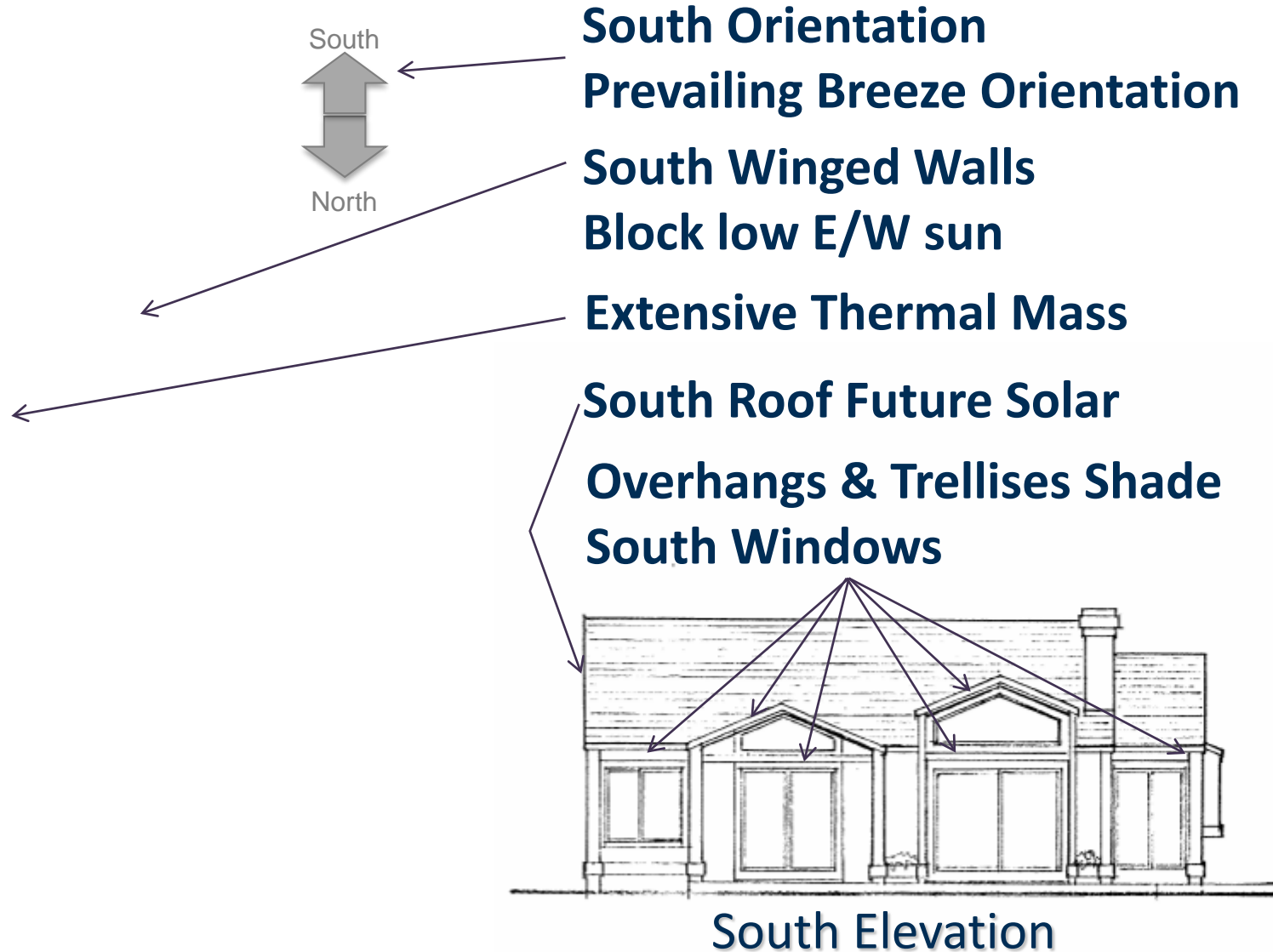
**Natural  
Comfort**

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# Natural Comfort Design Tools Applied



Fit to Site

**Natural Comfort**

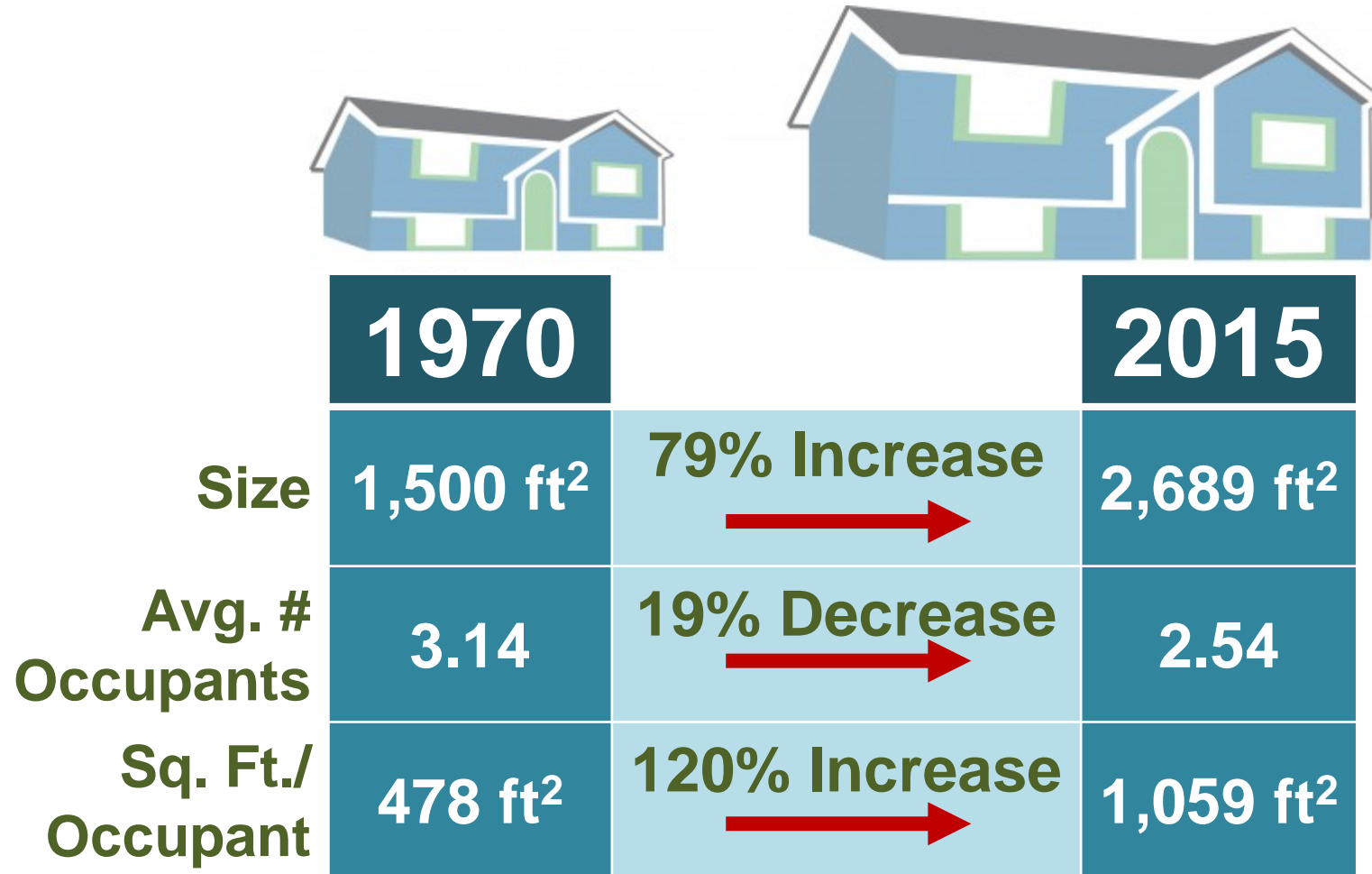
Right Size, Right Way

Architectural Integrity

Integrated Systems



# Average Size New Single-Family Home in U.S.



Fit to Site

Natural Comfort

**Right Size, Right Way**

Architectural Integrity

Integrated Systems

**Sources:** National Association of Home Builders (2007) "Housing Facts, Figures and Trends and Single-Family Square Footage By Location."  
U.S. Census Bureau (2015) 2015 Quarterly Starts and Completions by Purpose and Design



# Right Size, Right Way: 2 Strategies - 10 Concepts

## Leverage Space:

1. Open Layouts
2. Eliminate or Combine Rooms
3. Built-in Furniture
4. Minimal But Generous Circulation
5. Indoor-Outdoor Linkages

## Enhance Space:

6. Varied Ceiling Heights
7. High-Quality Trim, Hardware, Finishes
8. Effective Use of Colors
9. Natural Lighting
10. Artificial Lighting

Fit to Site

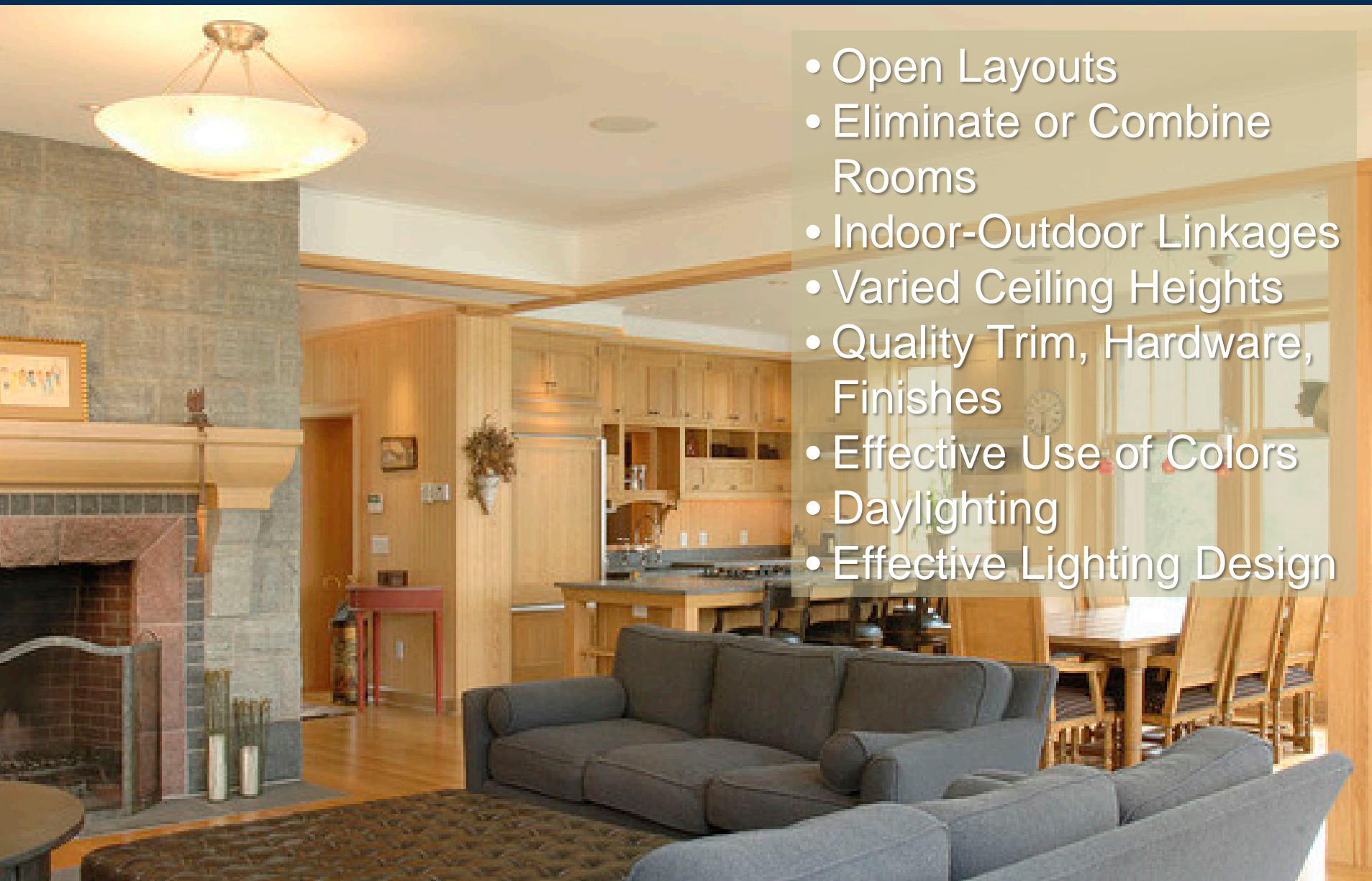
Natural Comfort

**Right Size,  
Right Way**

Architectural Integrity

Integrated Systems

# Leverage Space/Enhance Space



- Open Layouts
- Eliminate or Combine Rooms
- Indoor-Outdoor Linkages
- Varied Ceiling Heights
- Quality Trim, Hardware, Finishes
- Effective Use of Colors
- Daylighting
- Effective Lighting Design

Fit to Site

Natural Comfort

**Right Size,  
Right Way**

Architectural Integrity

Integrated Systems

# *Indoor-Outdoor Linkages*



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems



# *Indoor-Outdoor Linkages*



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems

# *No Built-in Furniture = Clutter*



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems

# *Built-in Furniture*



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems



# *Built-in Furniture*



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems

# *Built-in Furniture*



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems

# Trim and Finish – Consistent Packages



L



LE



LE Eco



S



Special Edition

Fit to  
Site

Natural  
Comfort

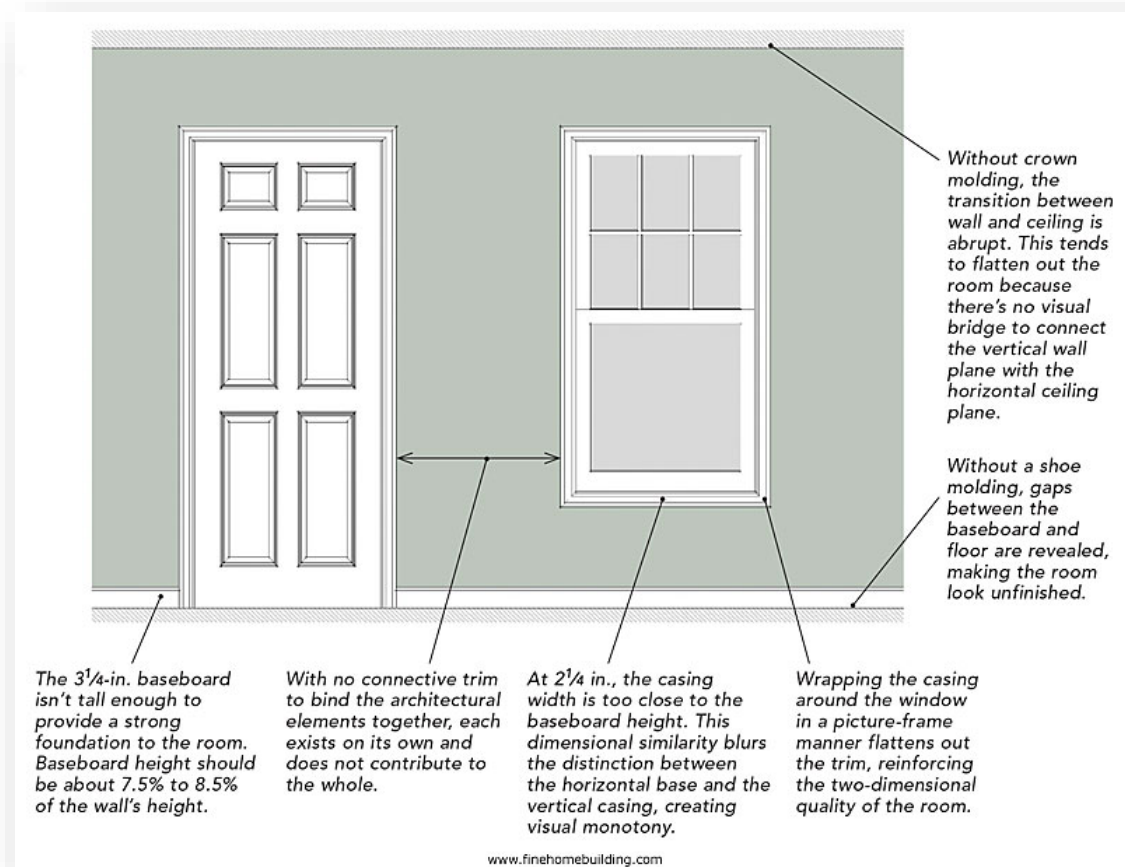
**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems



# Trim – Base Quality



Fit to  
Site

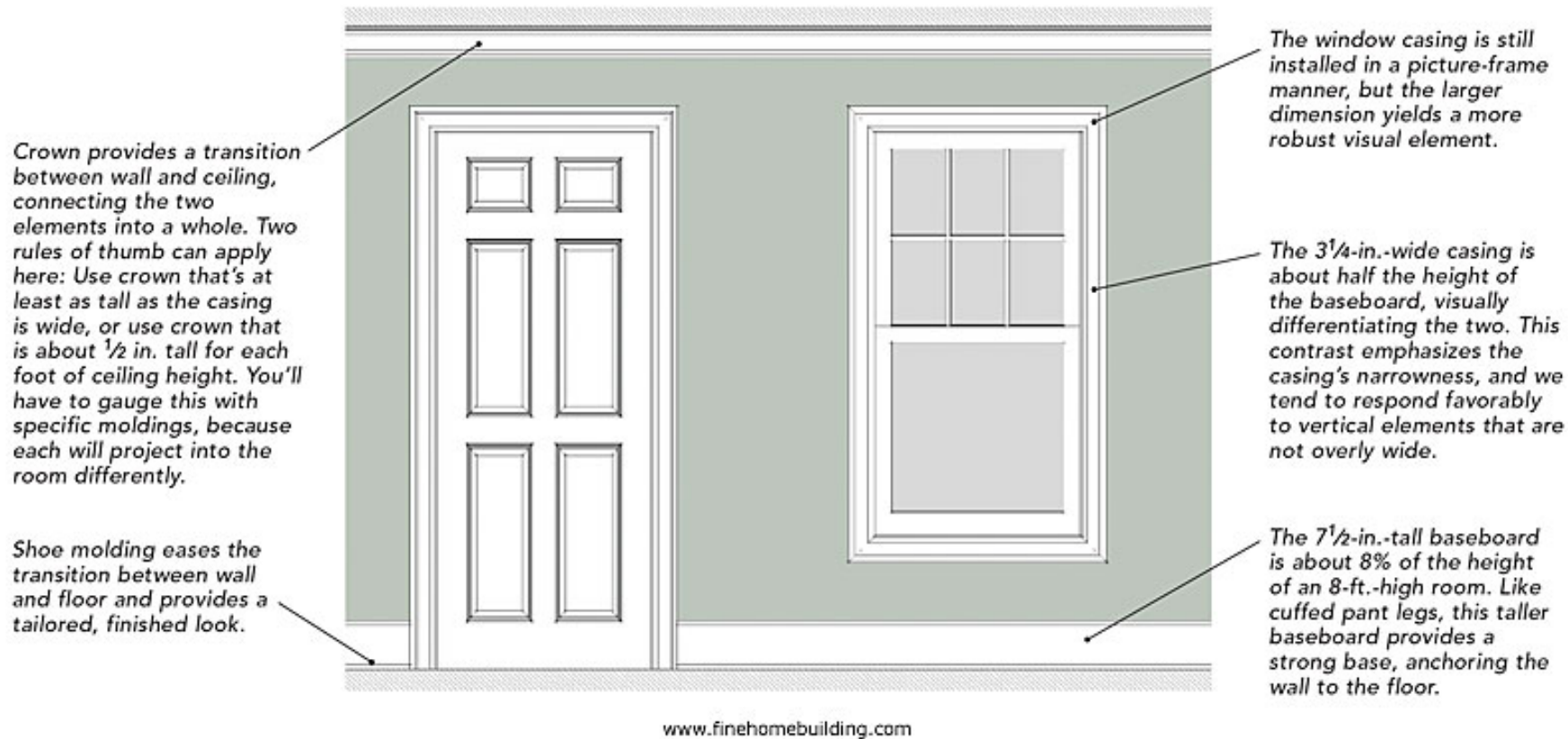
Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

Integrated  
Systems

# Trim – Better Quality



Fit to Site

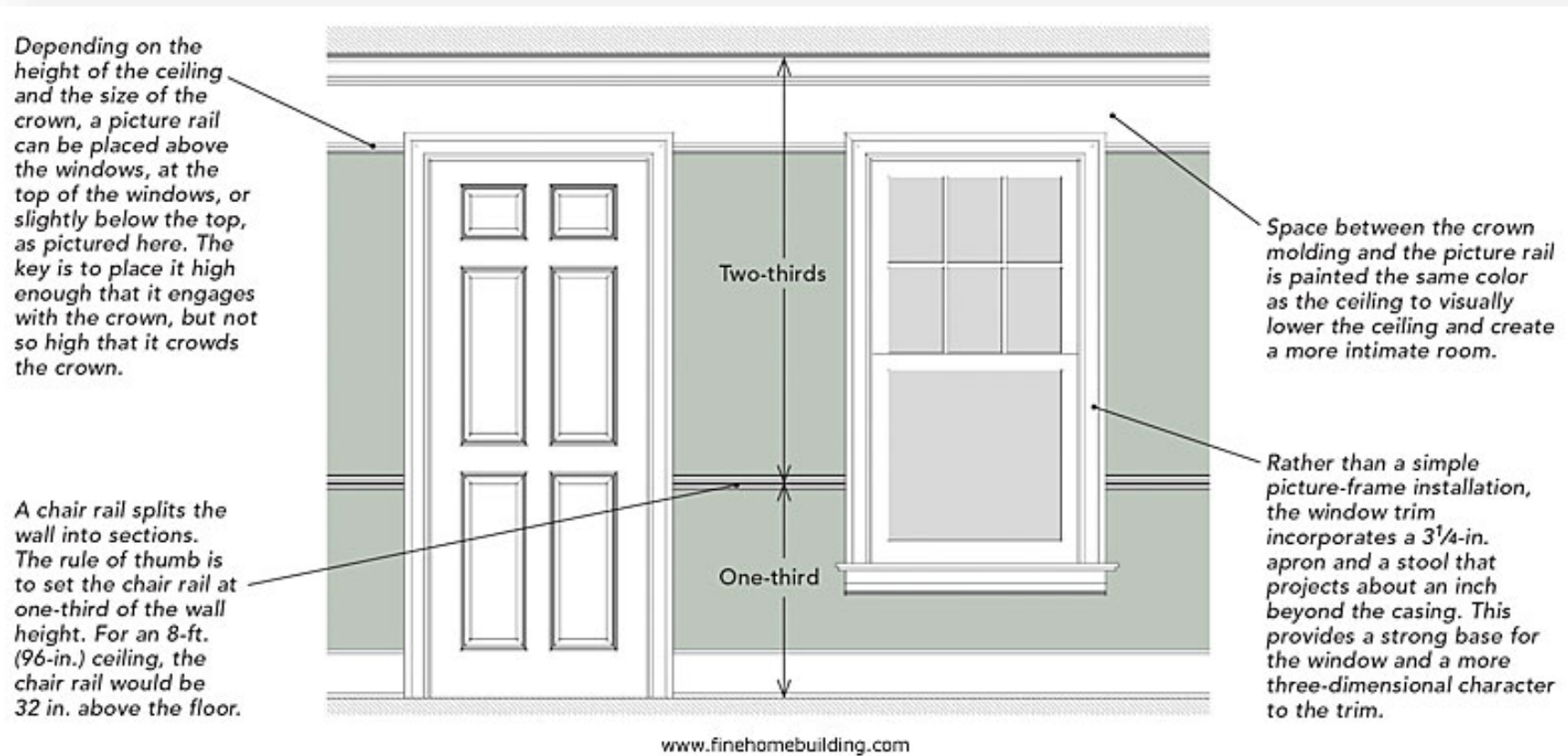
Natural Comfort

**Right Size, Right Way**

Architectural Integrity

Integrated Systems

# Trim – Best Quality



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

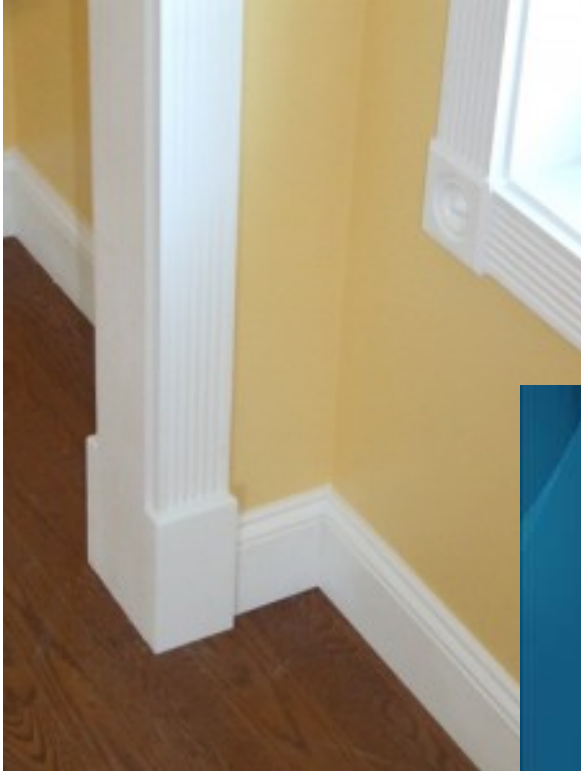
Integrated  
Systems

Drawings by: Bud Dietrich

From *Fine Homebuilding* 253 , pp. 92-94 July 11, 2015



# *Appropriate Quality Trim, Hardware Packages*



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems

# *Color, Trim, Built-in Furniture*



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems

# Color is Transformative

FEATURE ARTICLE / JUN 22, 2017

## HOUSES WITH COOL, NEUTRAL WALL COLORS SELL FOR MORE MONEY, ZILLOW DATA FIND



A new report from real estate firm Zillow finds that houses with rooms painted in shades of light blue or pale blue/gray can sell for as much as \$5,440 more than expected.

The firm's 2017 Paint Color Analysis looked at more than 32,000 photos from sold homes around the country to see how certain paint colors impacted their sale price on average when compared to similar homes with white walls.

Read the full story [here](#)

Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems



# Why a Color Expert



Zillow Porchlight

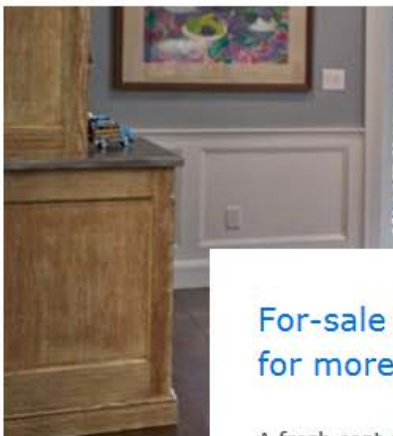
MENU

Home > Home Improvement

YOUR HOME

## Homes With Blue Bathrooms Sell for \$5,440 More Than Expected

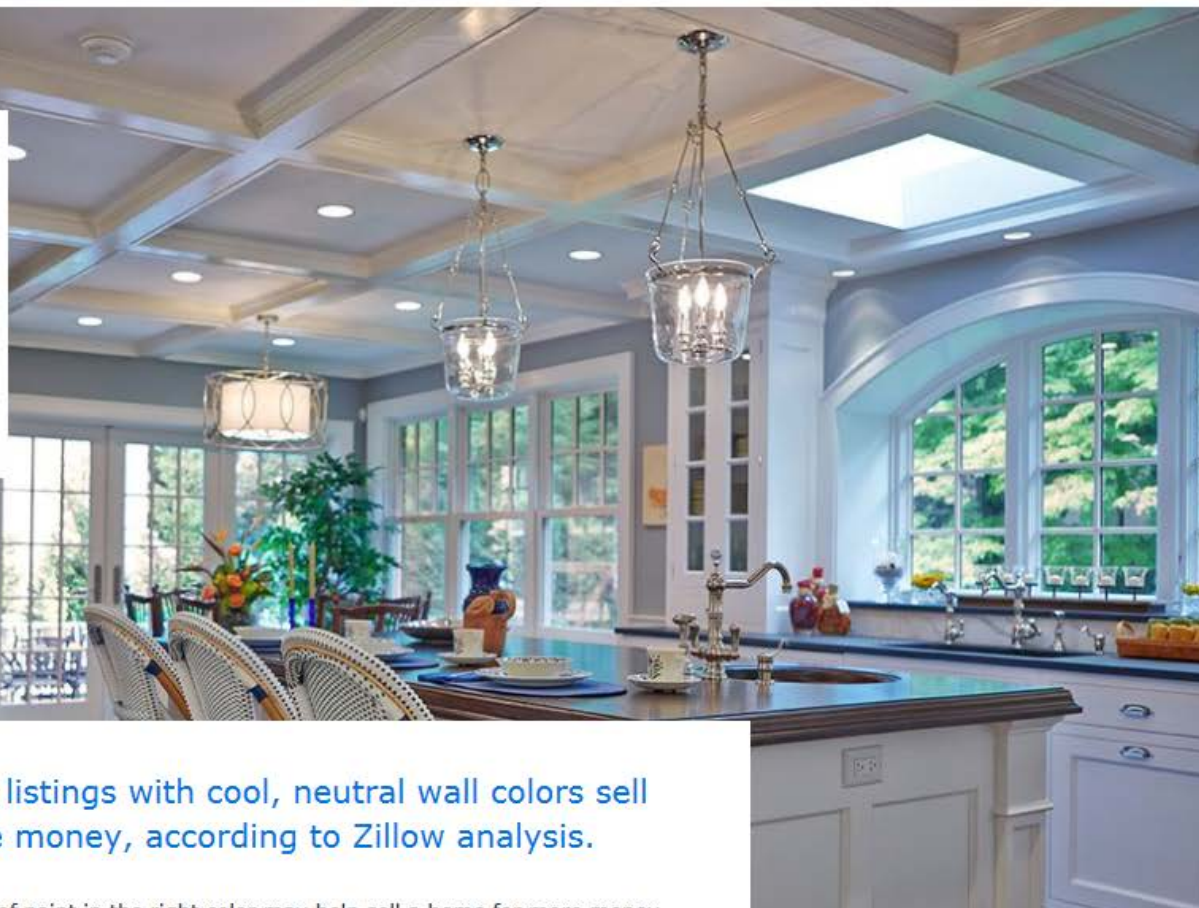
BY ALEXA FIANDER ON 1 JUN 2017



For-sale listings with cool, neutral wall colors sell for more money, according to Zillow analysis.

A fresh coat of paint in the right color may help sell a home for more money.

Homes with rooms painted in shades of light blue or pale blue/gray can sell for



Fit to Site

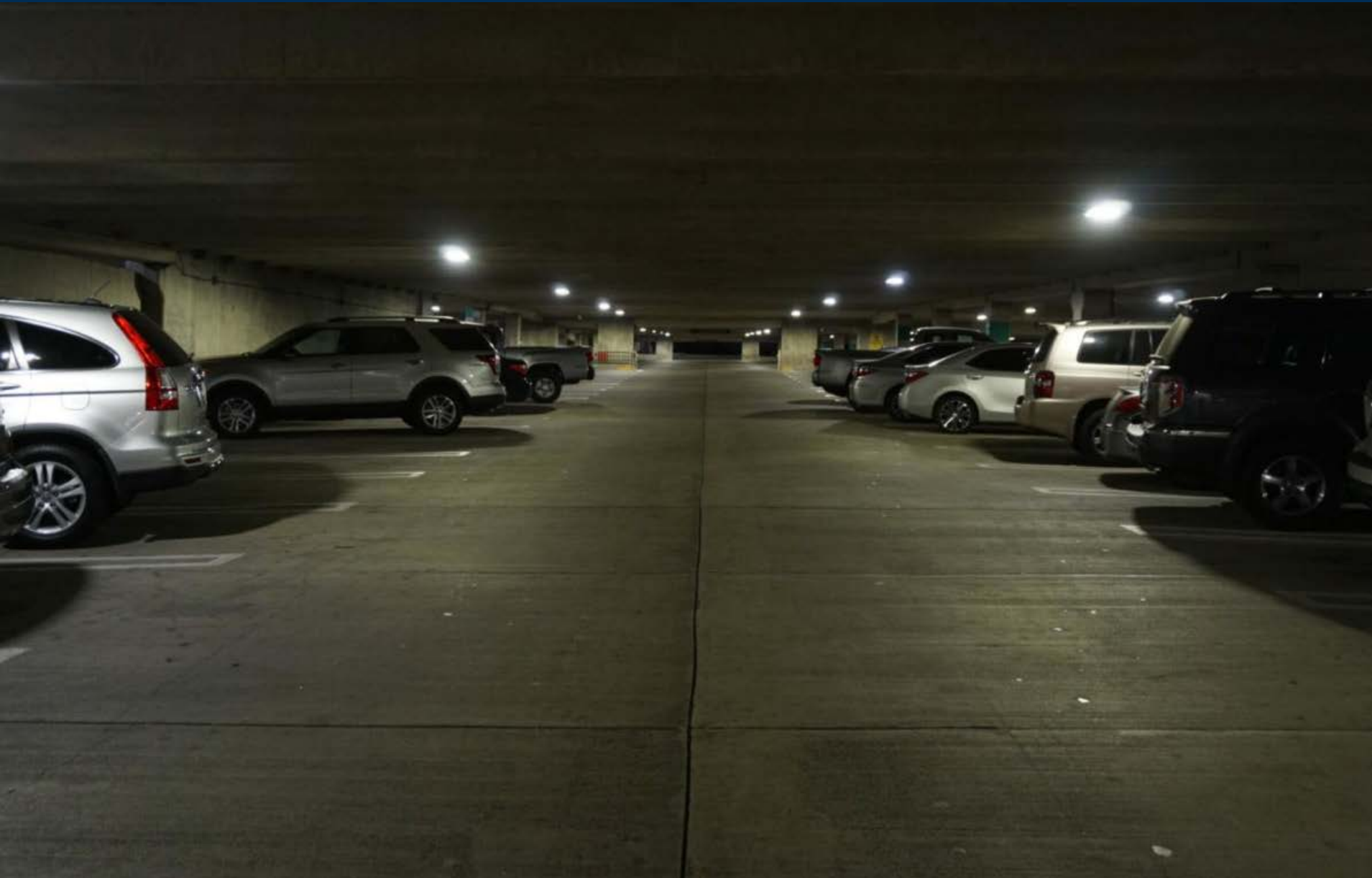
Natural Comfort

Right Size, Right Way

Architectural Integrity

Integrated Systems

# *Lighting is Transformational*



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems

# *Lighting and Color Are Transformational*

**Fluorescent to LED Switch in Los Angeles Parking Garage Saves \$167K Annually**

Fit to Site

Natural Comfort

**Right Size, Right Way**

Architectural Integrity

Integrated Systems





# *Lighting is Transformational*



Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems

# *Lighting is Transformational*



Fit to  
Site

Natural  
Comfort

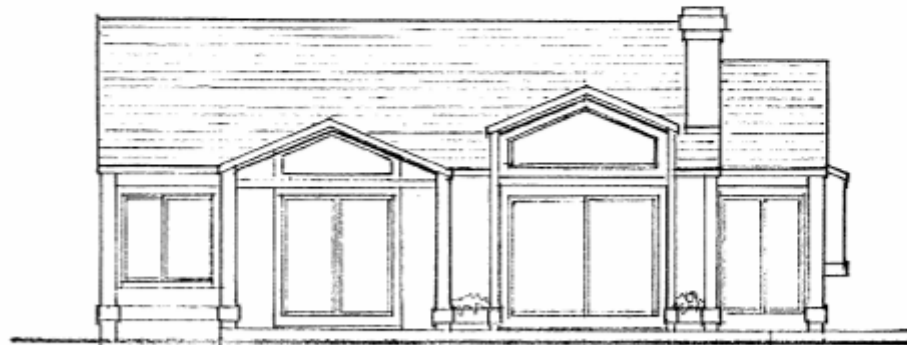
**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems

# *Right Size, Right Way Concepts Applied*

**3 Bedroom  
1,480 sq. ft.**



**South Elevation**

Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

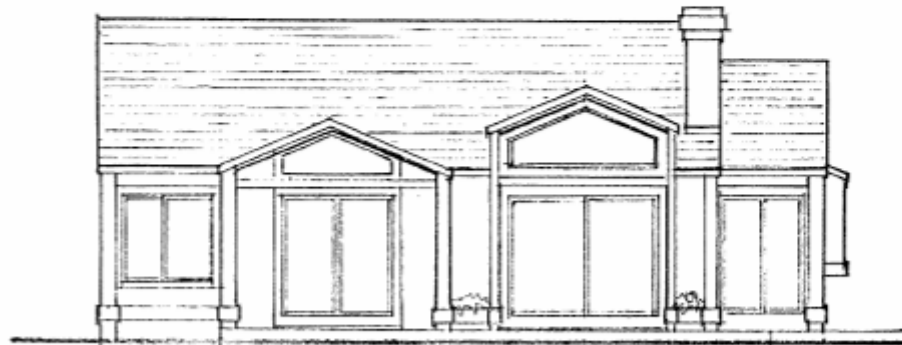
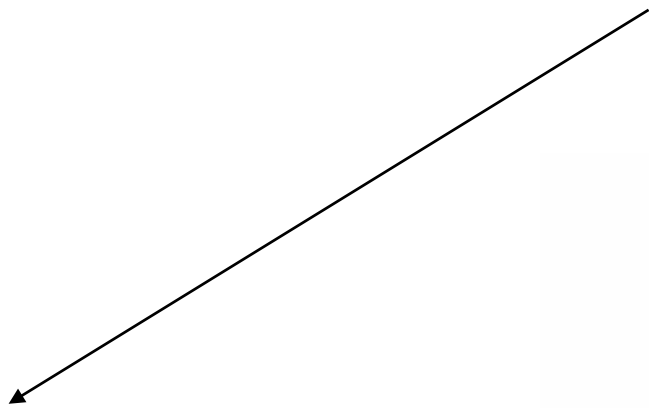
Integrated  
Systems



# *Right Size, Right Way Concepts Applied*

**3 Bedroom**  
**1,480 sq. ft.**

Open Layout



**South Elevation**

Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

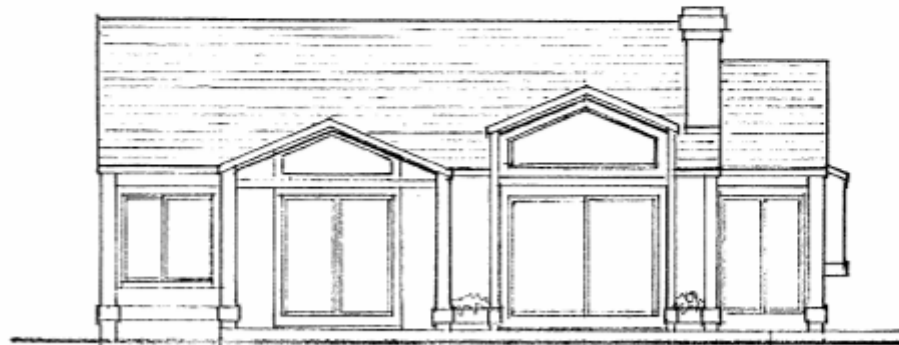
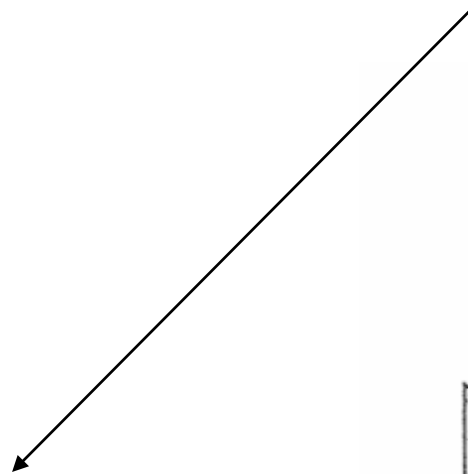
Architectural  
Integrity

Integrated  
Systems

# *Right Size, Right Way Concepts Applied*

**3 Bedroom**  
**1,480 sq. ft.**

Open Layout  
Compact Circulation



**South Elevation**

Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

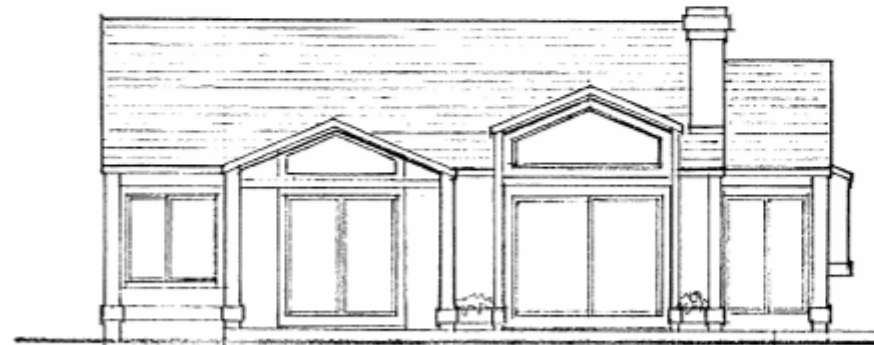
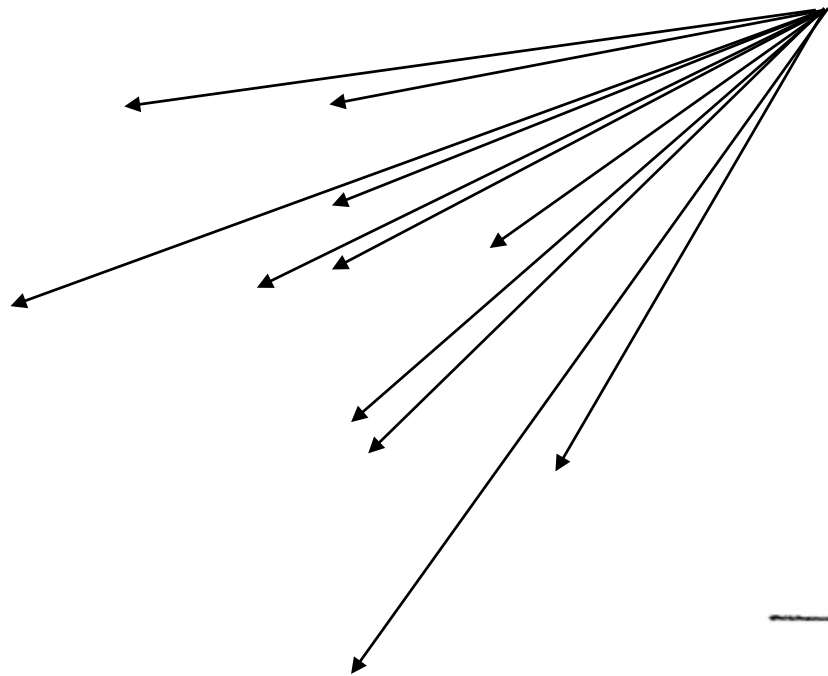
Architectural  
Integrity

Integrated  
Systems

# *Right Size, Right Way Concepts Applied*

**3 Bedroom**  
**1,480 sq. ft.**

Open Layout  
Compact Circulation  
Built-in Furniture



**South Elevation**

Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

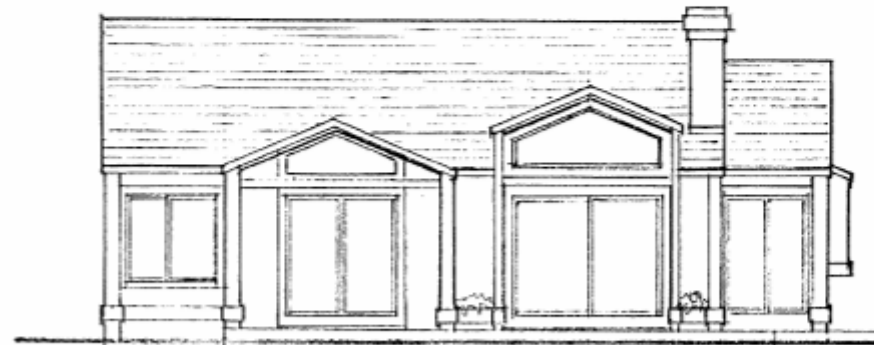
Integrated  
Systems



# Right Size, Right Way Concepts Applied

**3 Bedroom**  
**1,480 sq. ft.**

Open Layout  
Compact Circulation  
Built-in Furniture  
Varying Ceiling Height



**South Elevation**

Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

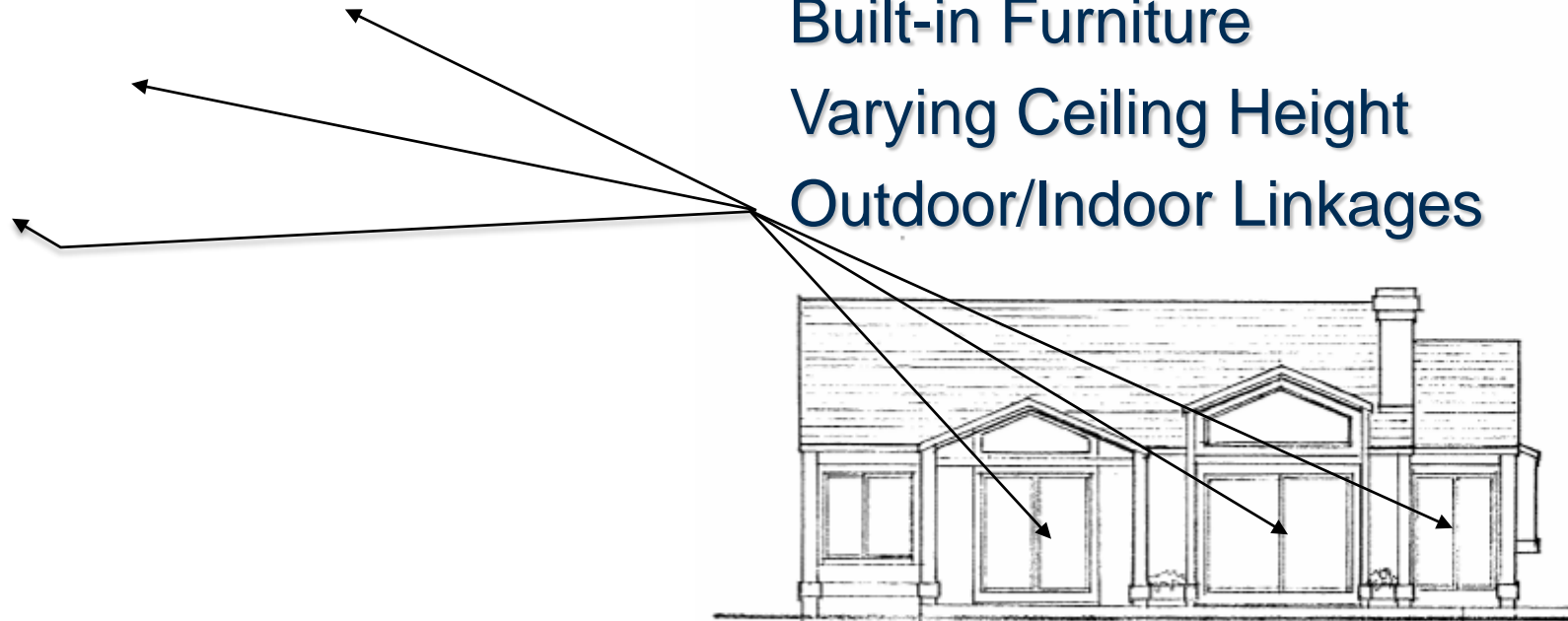
Architectural  
Integrity

Integrated  
Systems

# *Right Size, Right Way Concepts Applied*

**3 Bedroom**  
**1,480 sq. ft.**

Open Layout  
Compact Circulation  
Built-in Furniture  
Varying Ceiling Height  
Outdoor/Indoor Linkages



**South Elevation**

Fit to  
Site

Natural  
Comfort

**Right Size,  
Right Way**

Architectural  
Integrity

Integrated  
Systems

# *Architectural Integrity: 3 Concepts*

1. Simple and Functional Exterior
2. Efficient and Functional Floor Plan
3. Expert Materials/Details/Color

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Simple and Functional Exterior*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems

**Portofino, Italy**

# *Not So Simple and Functional Exterior*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Not So Functional Exterior: Fake Shutters*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Functional Exterior Shutters*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems

# *Functional Exterior Shutters*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Simple and Functional Exterior*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Fake and Nonfunctional Exterior*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Fake and Nonfunctional Exterior*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *More Simple Exterior*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *More Simple and Functional Exterior*



Fit to  
Site

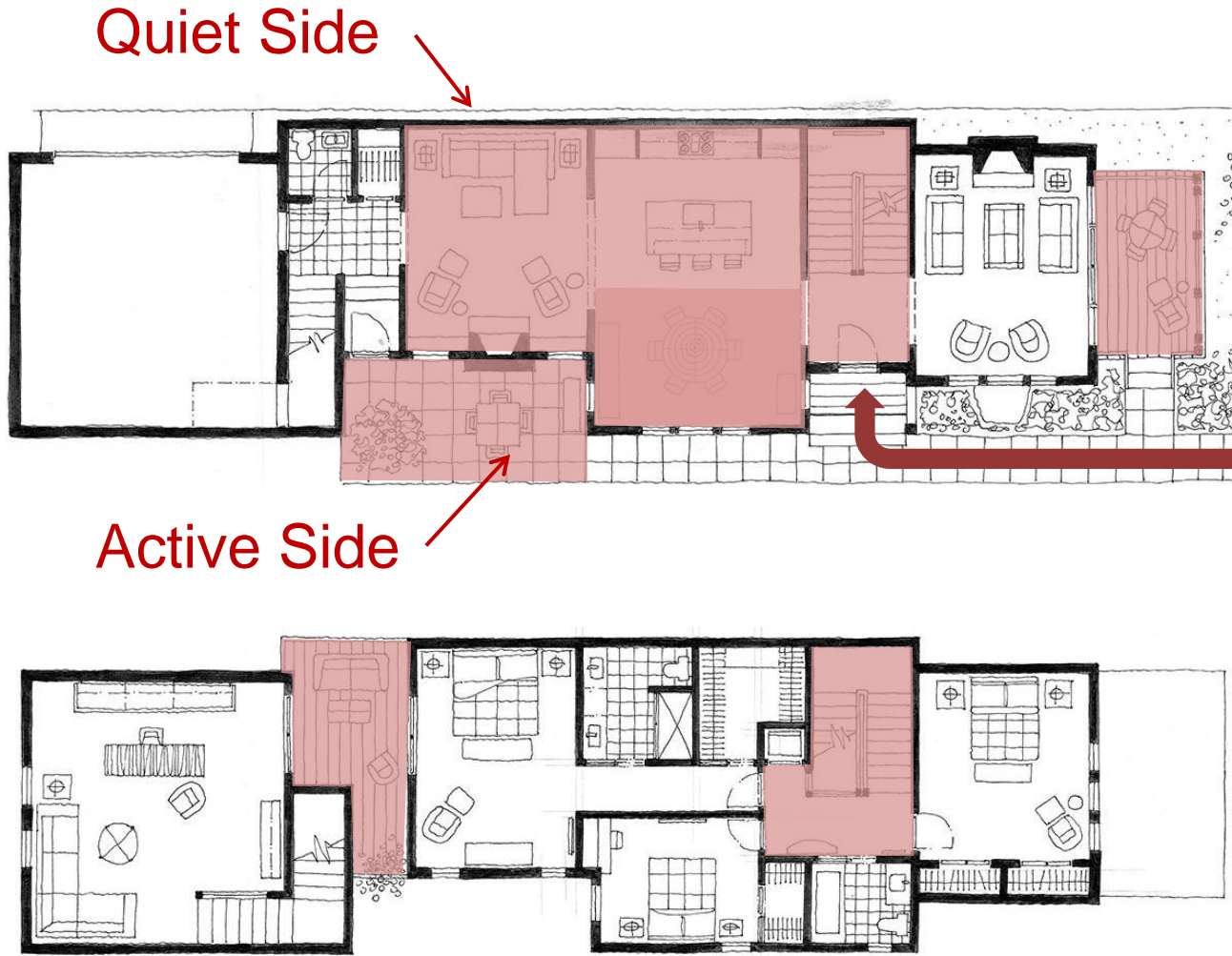
Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems

# Efficient and Functional Floor Plan



- Integrated Furniture
- Open Layout
- Eliminate/Combine Rooms
- Indoor/Outdoor Linkages
- Minimal/Generous Circulation
- Side Entrance

Fit to Site

Natural Comfort

Right Size, Right Way

**Architectural Integrity**

Integrated Systems

# *Nonfunctional Floor Plan*



Typical Townhouse Configuration

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Nonfunctional Townhome Backyard*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems

# *Nonfunctional Townhome Backyard*



Fit to  
Site

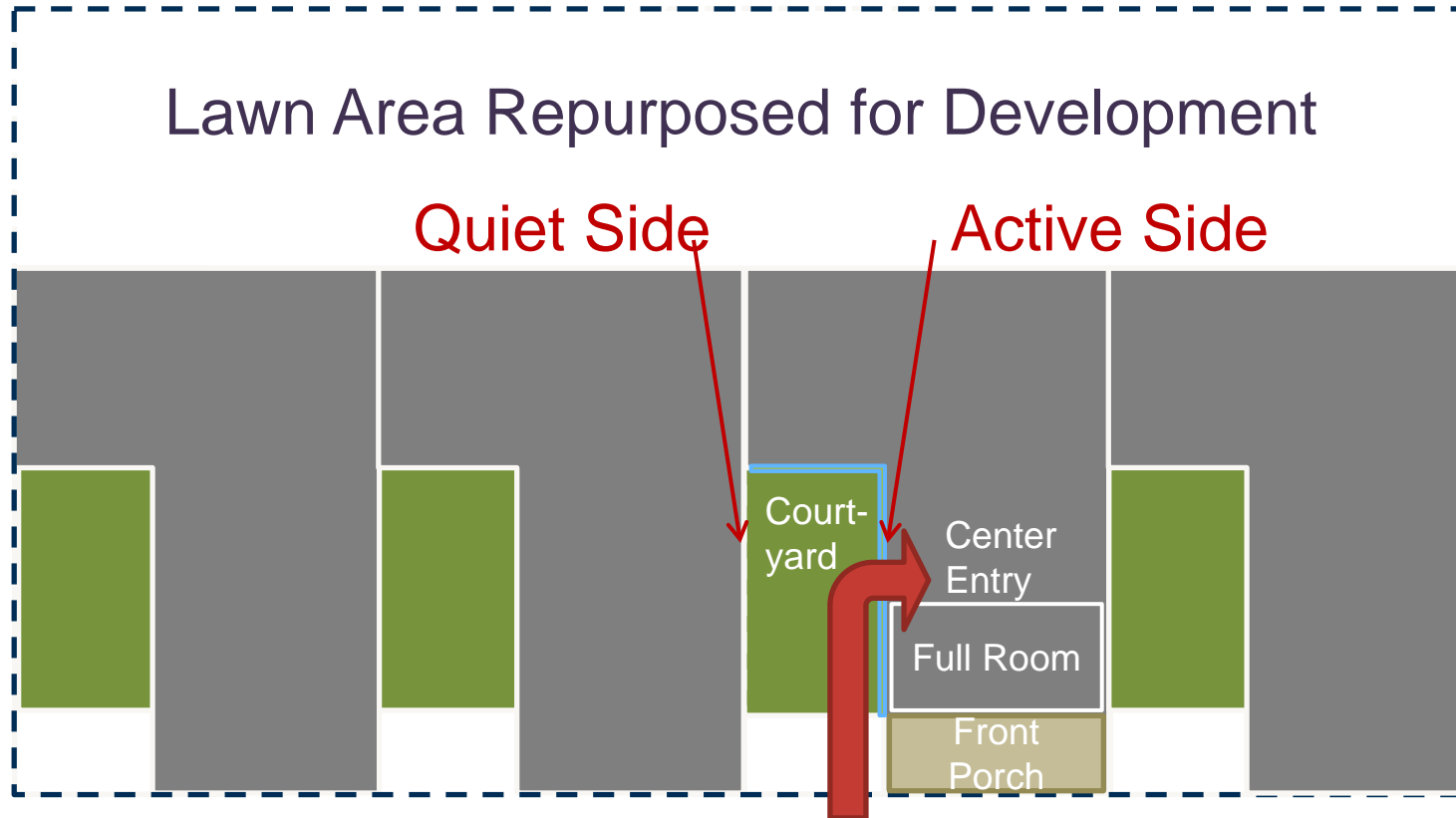
Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems

# Functional Townhome Floor Plan



Townhouse Optimized for Daylight/Outdoor Linkages

Fit to Site

Natural Comfort

Right Size, Right Way

**Architectural Integrity**

Integrated Systems



# *Functional Townhome Floor Plan Applied*



The Waters, Pike Road, AL, Andrew P. Kulp, AIA

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems

# *Functional Townhome Floor Plan Applied*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems

The Waters, Pike Road, AL, Andrew P. Kulp, AIA

# *Functional Townhome Floor Plan Applied*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Functional Townhome Floor Plan Applied*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Functional Townhome Floor Plan Applied*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Expert Materials, Details, Color Missing*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Expert Materials, Details, Color Integrated*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems

*Expert Materials, Details, Color*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# *Expert Materials, Details, Color*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

**Architectural  
Integrity**

Integrated  
Systems



# 12 Systems in 3 Groups Need to be Integrated

<b>Infrastructure</b>	<ol style="list-style-type: none"><li>1. Structural</li><li>2. HVAC</li><li>3. Plumbing</li><li>4. Electric</li></ol>
<b>Liveability</b>	<ol style="list-style-type: none"><li>5. Furniture</li><li>6. Storage</li><li>7. Lighting</li><li>8. Smart Home/Controls</li></ol>
<b>Performance</b>	<ol style="list-style-type: none"><li>9. Water Management</li><li>10. Water Conservation</li><li>11. Solar</li><li>12. Disaster Resistance</li></ol>

Fit to  
Site

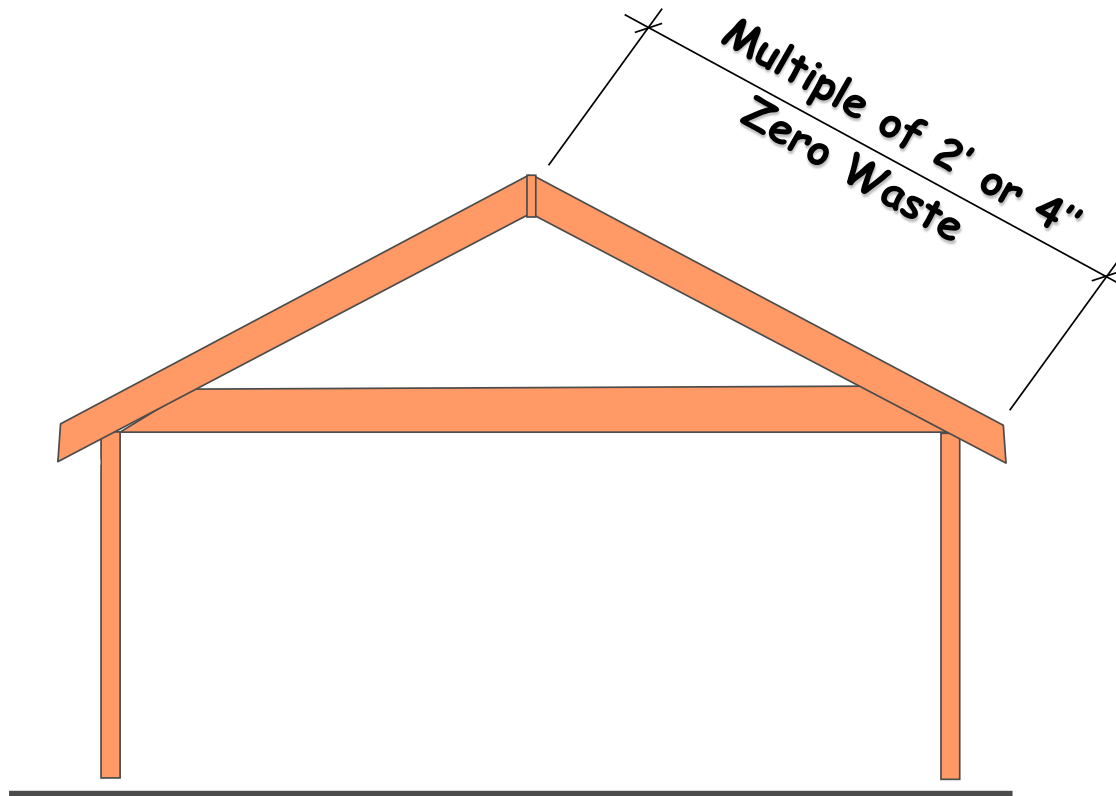
Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# Structural System Integration



WHY NOT 4.87/12 VS. 5/12 SLOPE?

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# *Structural System Not Integrated*



28/02/2010

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# *HVAC System Integrated*



Fit to  
Site

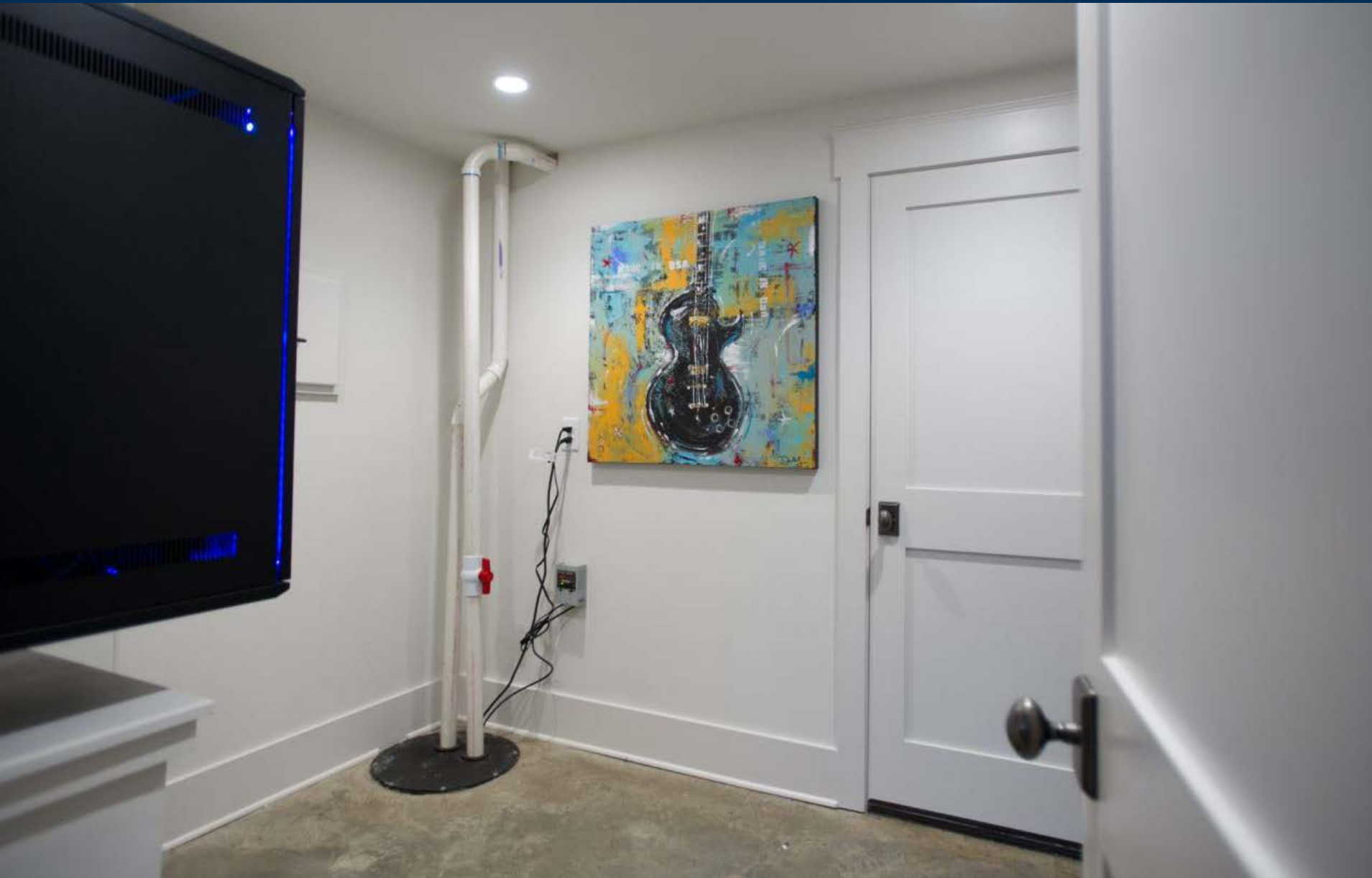
Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# *Plumbing System Not Integrated*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# *Plumbing System Not Integrated*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# Plumbing System Integrated



**Air Admittance  
Valves**

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

**Mandalay Homes**

# *Plumbing System Integrated*

Fit to  
Site

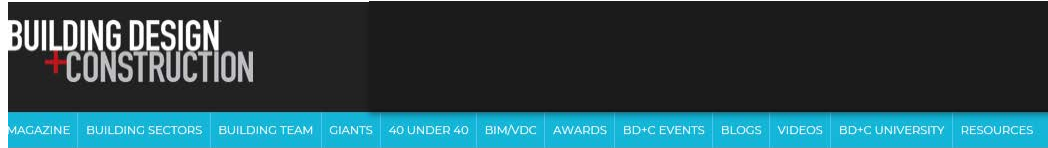
Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# Plumbing System Integrated



## Pampering the pups: Why dog-washing stations are a must-have in multifamily developments

Self-serve dog-washing stations are reinforcing strong bonds between multifamily residents and their beloved canines.

MULTIFAMILY HOUSING | MAY 16, 2018 | MIKE PLOTNICK, CONTRIBUTING EDITOR



*The 240-sf dog spa at Seattle's AMLI Arc apartment tower has two stainless-steel washbasins, a hydraulic grooming table, a pet dryer, and a hair vacuum system. "We chose a no-frills aesthetic to blend with the building's deconstructed interior design concept," says Interior Designer Camilla Watson, ZGF Architects. Photo: © Benjamin Benschneider*

There's a construction boomlet under way in dog-washing facilities at U.S. and Canadian apartment and condominium communities.

Fit to Site

Natural Comfort

Right Size, Right Way

Architectural Integrity

Integrated Systems



# Plumbing System Integrated



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# *Electric System Integrated*



Fit to  
Site

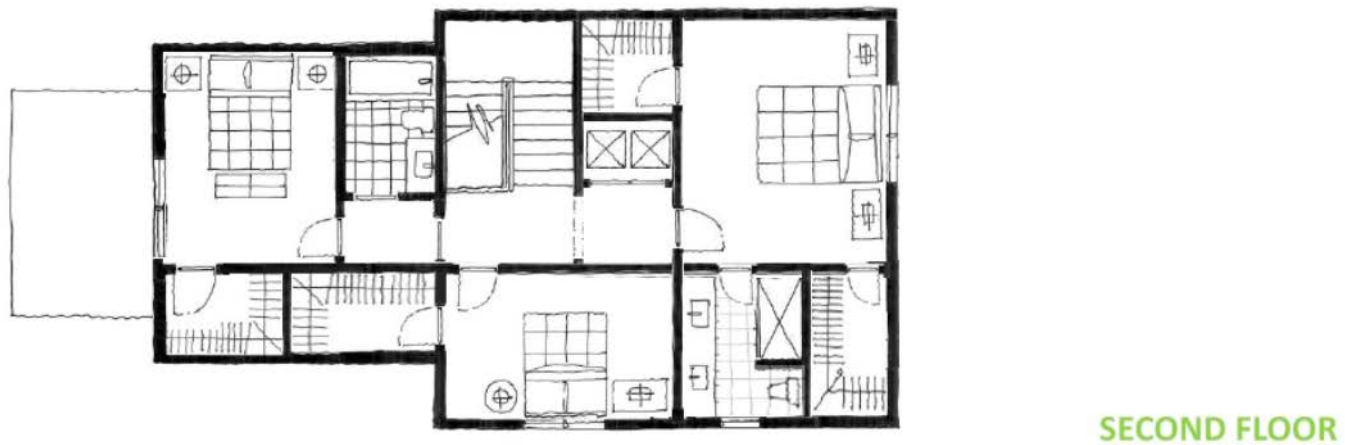
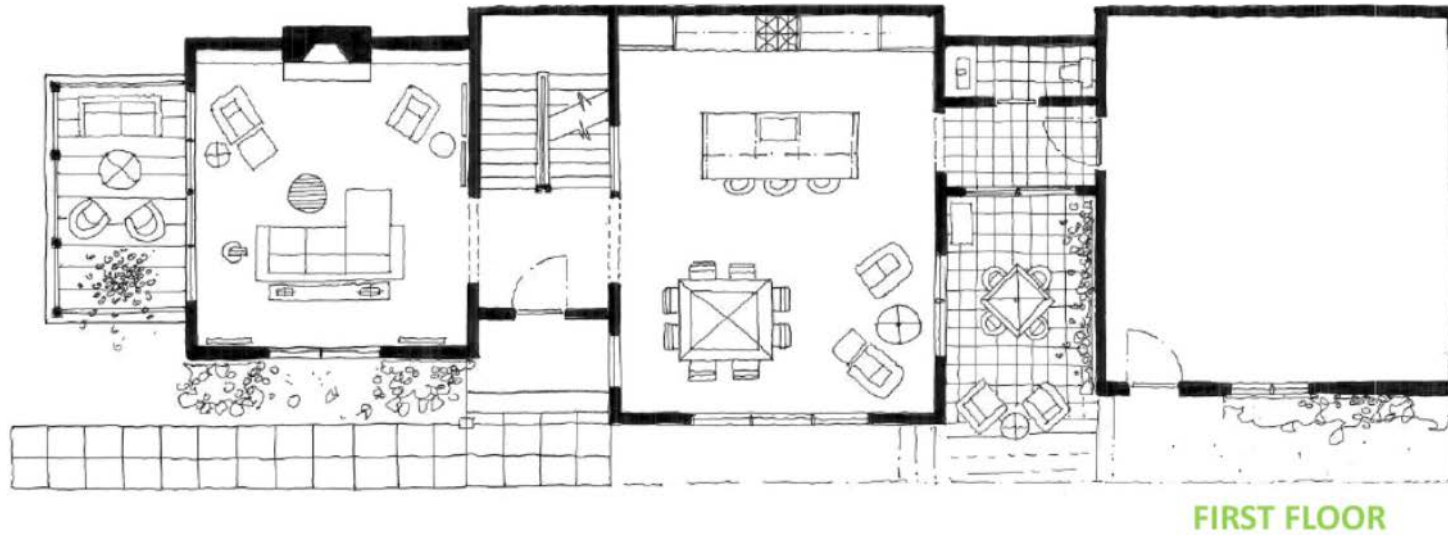
Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# *Furniture System Integrated*



Fit to  
Site

Natural  
Comfort

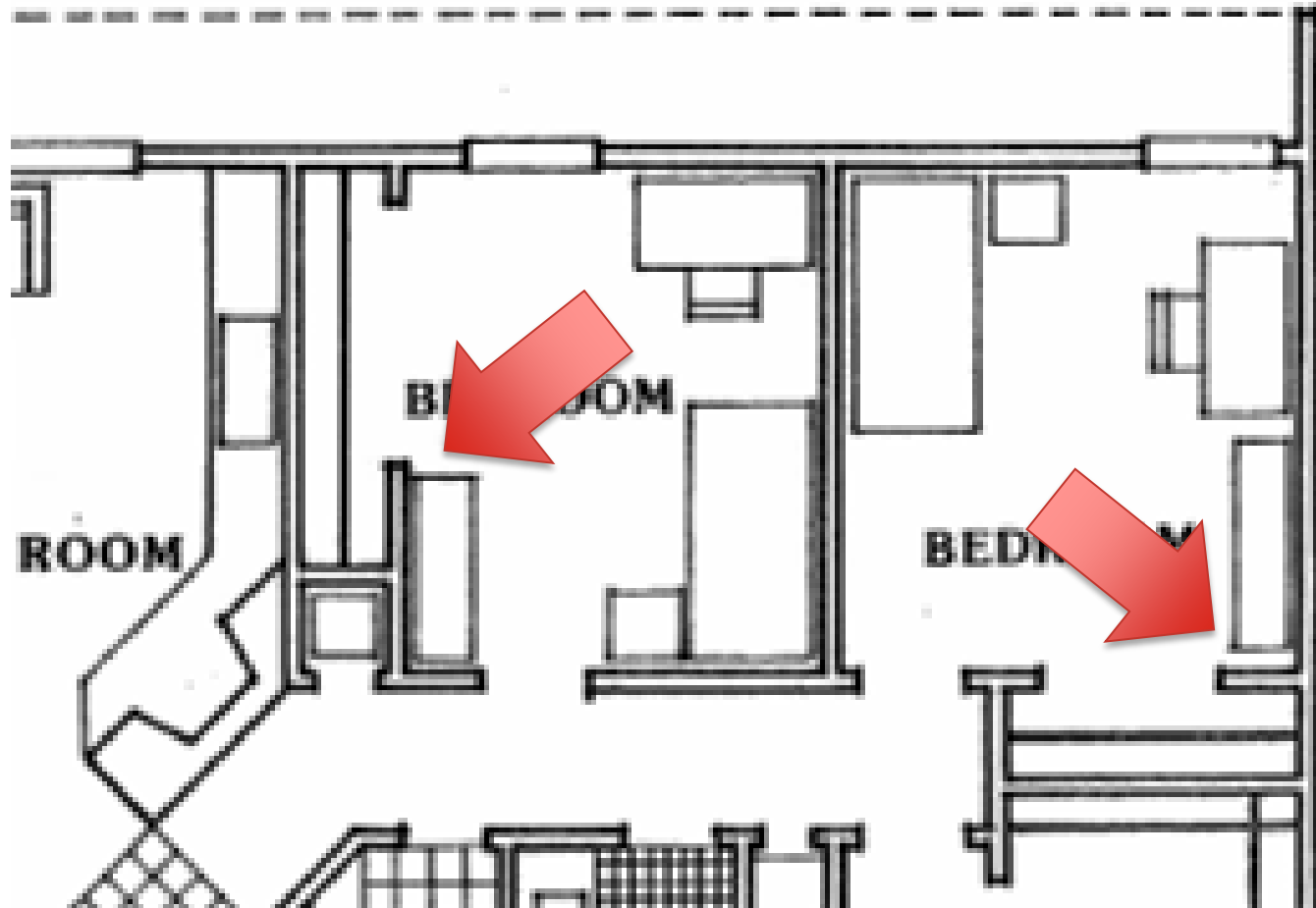
Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# *Furniture System Integrated*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# *Storage System Integrated in My Car*

CDs/MP3 Player

Change

Maps/Papers

Owners Manual

Pens

Sun Glasses

Drink Cups

Tools

Garage Door Opener

- Tissues
- Dry Cleaning (hooks)
- Arm Rests
- Long Items (e.g., skis)
- Wallet
- Safety Kit
- Spare Fuses
- Spare Key
- Spare Tire

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# Storage System Integration Missing in Homes

## Bedrooms:

Reasonable Amt. Shoes  
Reasonable Amt. Clothes  
Belts  
Ties  
Handbags  
Winter Blankets  
Flat Screen TV/Set box  
Books  
Pictures

## Cleaning:

Ironing Board  
Vacuum Cleaner  
Brooms/Dust Pans  
Recycling Center

## Entertainment

Flat Screen TV/Set box  
Electronics  
Electronic Media  
Manuals  
Speakers  
Books

## Work:

Important Papers  
Mail/Bills  
Computer/Printer  
Books  
Owners Manuals  
Gift Wrap  
Pictures

## Arriving/Leaving:

Umbrellas  
Keys  
Wallets  
Shoes  
Coats  
Bags

## Garage:

Garbage Cans  
Sports Gear  
Bikes  
Yard Tools  
Work Tools  
Luggage

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# *Storage System Integrated*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# Storage System Integrated



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# *Lighting System Integrated*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# *Lighting System Integrated*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# Smart Home/Controls Integration



Fit to  
Site

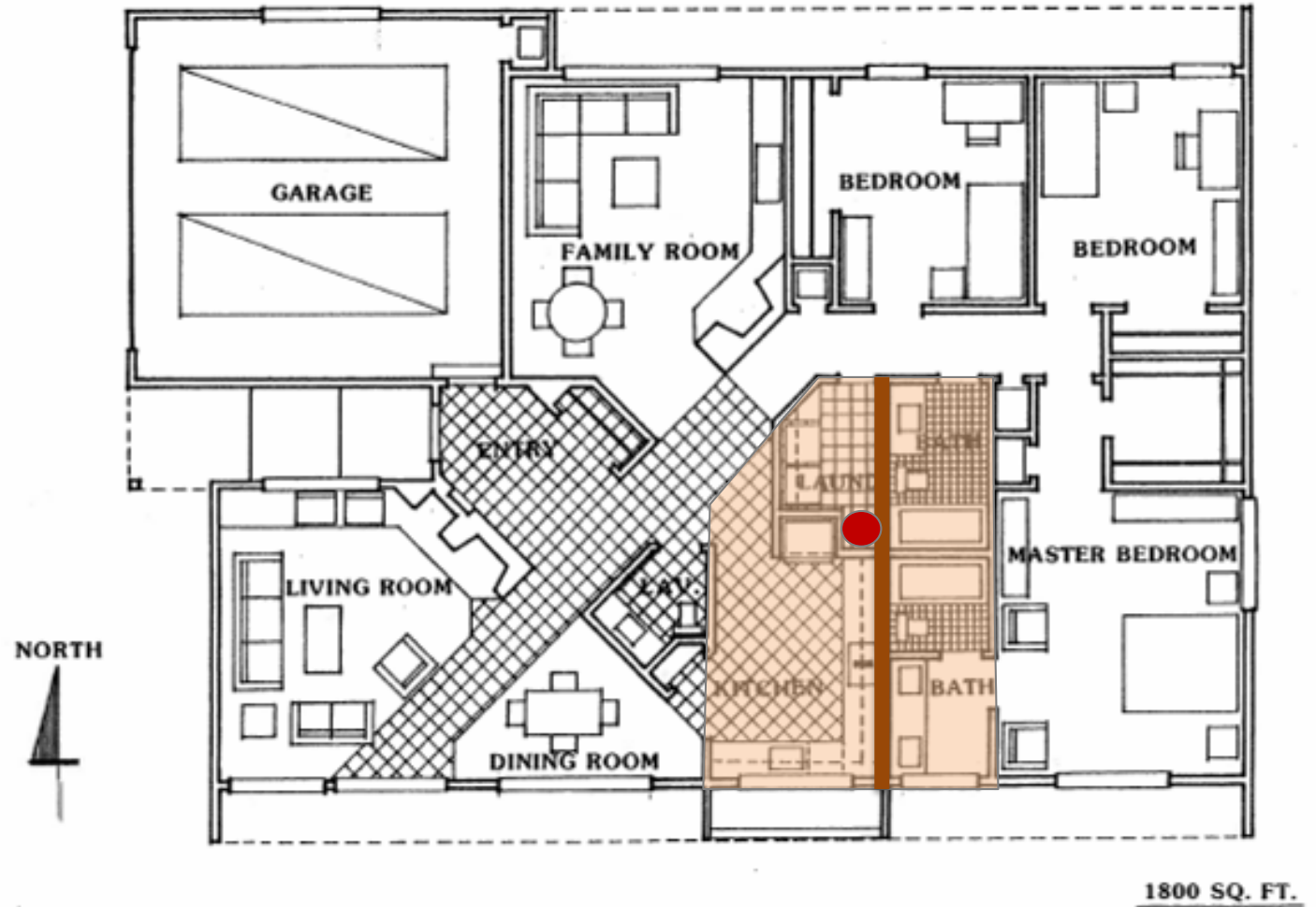
Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# Water Conservation Integrated



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# *Water Management System Not Integrated*



Fit to  
Site

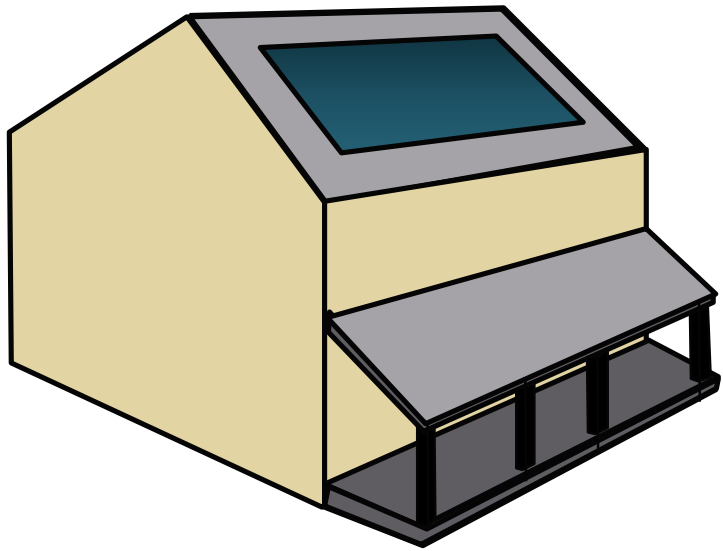
Natural  
Comfort

Right Size,  
Right Way

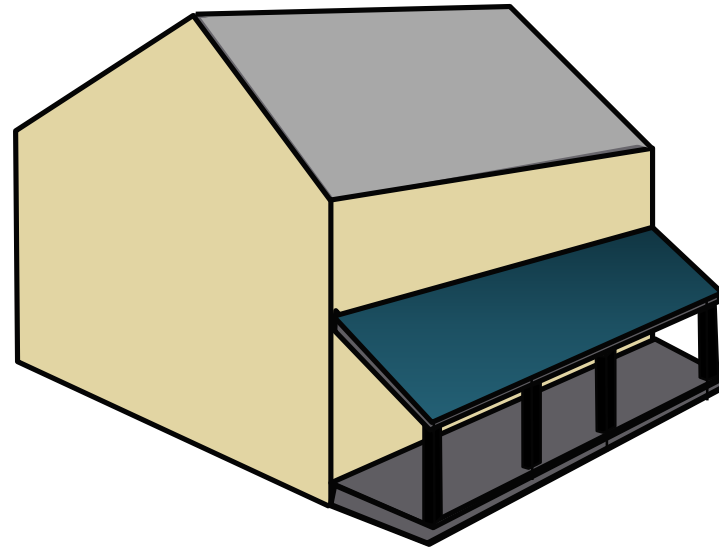
Architectural  
Integrity

**Integrated  
Systems**

# *Solar System Integrated*



PV Not Integrated



PV Integrated

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# *Solar System Integrated*

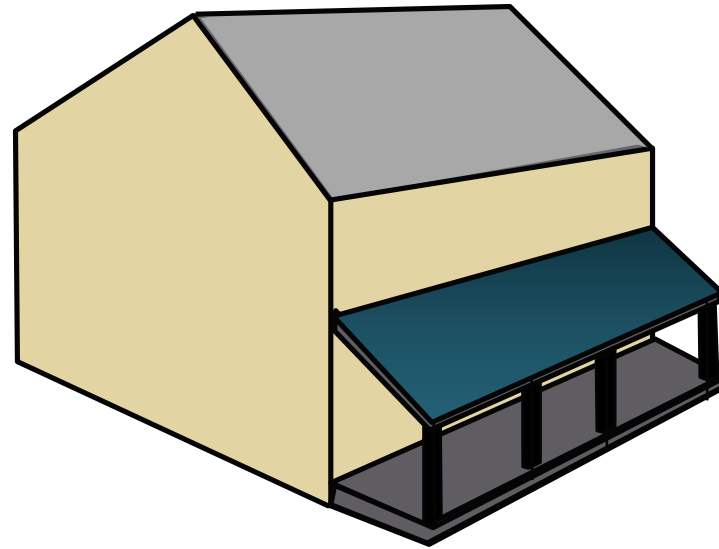
## **Benefits:**

Cost

Appearance

Daylighting

Maintenance



PV Integrated

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# *Solar System Not Integrated*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# *Solar System Integration*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# Solar System Integration



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# *Solar System Integration*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

# *Disaster Resistance System Integrated*



Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**

**Source:** "BSD-111: Flood and Hurricane Resistant Buildings," Joseph Lstiburek, Building Science Corporation, October 26, 2006

# *Disaster Resistance System Integrated*



**Source:** "BSD-111: Flood and Hurricane Resistant Buildings," Joseph Lstiburek, Building Science Corporation, October 26, 2006

Fit to  
Site

Natural  
Comfort

Right Size,  
Right Way

Architectural  
Integrity

**Integrated  
Systems**



# Transformation Design Summary

- Color
- Lighting: Indoor, Outdoor, Natural
- Landscaping/Hardscaping
- Finish: Materials, Trim, Hardware
- Storage/Built-ins
- Technology Integration
- Views: Natural, Designed
- Exterior Spaces

## **How to Pay for Transformational Design:**

- Hard Cost Savings  
Right-Sizing the Right Way
- Simple Designs  
Easier to Build

# *Innovation Recommendations*

## **Invest in Experts**

[interior design, color, lighting, technology, landscaping]

## **Design for Site and Region**

## **Optimize Natural Comfort**

## **Right-size, Than Invest Savings in Quality Design**

[built-in's, trim, hardware, materials, colors, lighting, exterior spaces]

## **Simple Design Choices**

## **Integrate Designs with all Major Systems**

# Benchmarking Score Card

## Design Experience

		Fit to Site		Natural Comfort		Right-Size, Right Way		Architectural Integrity		Integrated Systems									
<b>3</b>	<b>3</b>	<b>2</b>	Optimize Views	<b>2</b>	<b>3</b>	Natural Heating	<b>3</b>	<b>4</b>	Leverage Space	<b>3</b>	<b>4</b>	Simple and Functional Ext.	<b>2</b>	<b>2</b>	Infrastructure				
		<b>4</b>	Effective Drainage		<b>1</b>	Natural Cooling		<b>4</b>	Optimize Space		<b>3</b>	Eff./Functional Layout		<b>2</b>	Liveability				
		<b>4</b>	Appropriate Materials		<b>2</b>	Natural Fresh Air		<b>2</b>	Quality Features		<b>2</b>	Materials/Details/Color		<b>1</b>	Performance				
		<b>2</b>	Regional Resilience		<b>1</b>	Nat. Comfort Control		Notes: Focus on designs that optimize natural comfort. More built-ins. Hold designers accountable for integrated systems.											
		<b>3</b>	Community Connection		<b>2</b>	Natural Lighting													



# Retooling THE U.S. Housing Industry

How We Got Here, Why  
It's Broken, and How to Fix It