

# Making Rehab Work: An Analysis of Design and Construction Issues in a LIHTC Rehabilitation Project

**Vince Scarano**

Biltform Architecture Group  
of Companies



An Analysis of Design and Construction Issues in a LIHTC Rehabilitation Project

# MAKING REHAB WORK

# Vince Scarano, AIA LEED® AP

- Principal / Architect / Figurative Firefighter / Pop Culture Junkie at Biltform Architecture
- Working on LIHTC projects since the late 1990's
  - All applications were new construction ten years ago
  - The past 3 LIHTC rounds have averaged a 70 -30 percent new-rehab split
- Biltform does CNA's (Capital Needs Assessments)
- 12 years of HOPE VI Experience

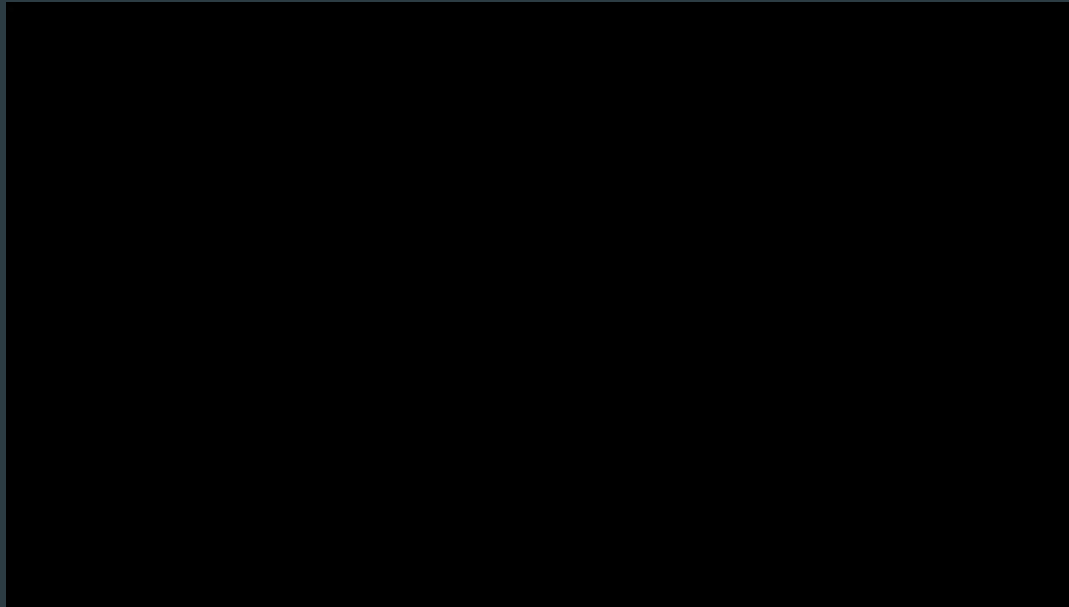


# Session Outline

- ❑ **Why is multi-family housing stock acquisition/rehab the way of the future?**
- ❑ *What?* Can't you tell me *exactly* what will need to be replaced and repaired?
- ❑ What are the zoning and code requirements for rehabbed buildings?
- ❑ What are some of the more common (and expensive) fixes you're seeing?
- ❑ How do the ADOH LIHTC requirements mesh with redevelopment?
- ❑ My budget is soooooo tight...will my rehab look cheap and ugly?



# The Existing Rental Housing Stock is Aging...



Source: youtube.com  
from [AJuHeRe4u](#)

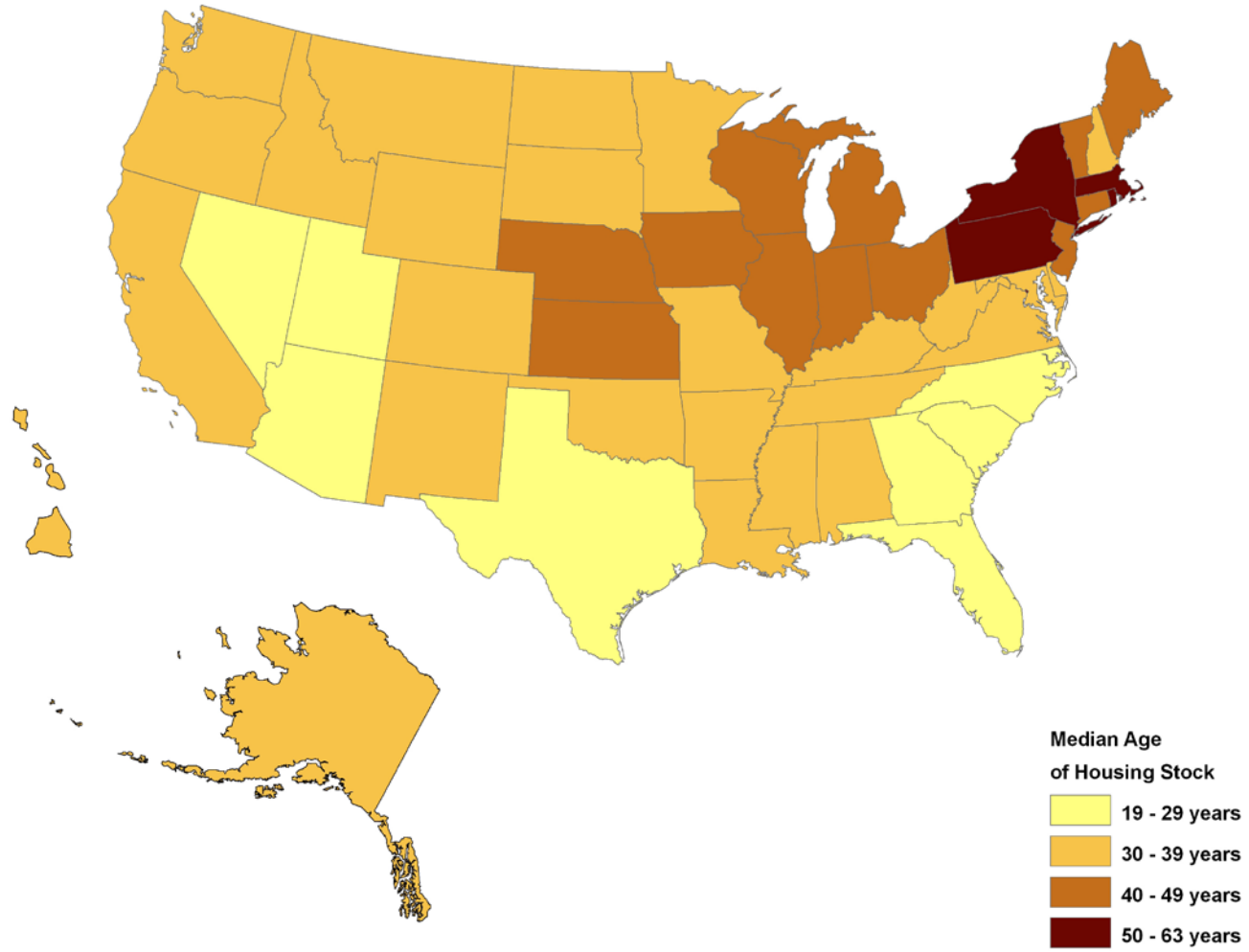
- ▶ The U.S. Census Bureau's 2012 American Community Survey found that nearly 60 percent of U.S. rental properties with 20 or more units were built before 1980 – with many showing their age.
- ▶ More than half of the units affordable to extremely low-income renters are at least 50 years old.



Up to 50 people were homeless following the apartment blaze Monday, February 28<sup>th</sup>, 2011 just before 9 p.m. at Las Cascadas Apartments near 44th Street and Indian School Road.  
Source: youtube.com from [bricesam123](#)

- ▶ According to Joint Center for Housing Studies of Harvard University, nearly 6 percent of all units are retired each year; almost double that number for lower-income units.

## Median Age of Housing Stock



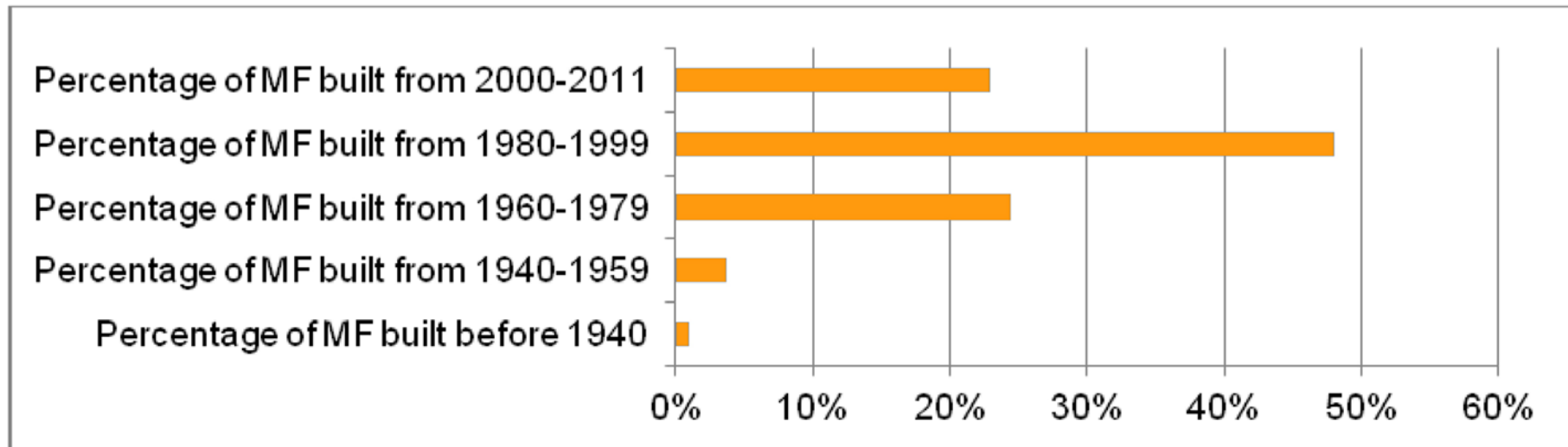
Source: American Community Survey, 2010

# The 1970's



According to the National Multi-Housing Council, the *"biggest wave of apartment construction occurred in the early 1970's in response to a strong economy, increased demand from the first wave of baby boomers reaching adulthood, government 'urban renewal' incentive programs and easy credit.*





**Phoenix**

*Source: 2011 American Community Survey*

Can't you tell me *exactly* what will need to be replaced and repaired?



# *“I wish I knew then what I know now.”*

- Hire a commercial building inspector.
- *Experienced with older multi-family residential buildings.*
- Have a general contractor you’ve worked with in the past take a look.
- *Experienced with older multi-family residential buildings.*
- Engage your architect earlier in the process.
- Review the Capital Needs Assessment.





*"Yeah, but that costs money!"*

- Cost of a com

- C



*Contingency*



# Typical Life Expectancy of Building Components

(That is, components typically found in older multi-family residential housing stock in Arizona)



*Source: International Association of Certified Home Inspectors and Personal Experience*

# Building Components that last a long time...

- ▶ Post and Tensioned Slab on Grade
- ▶ Poured-Concrete Footings and Foundation
- ▶ Slab on Grade (concrete)
- ▶ Steel Frame
- ▶ Wood Frame
- ▶ Brick
- ▶ Insulated Concrete Forms (hybrid block)
- ▶ Stone
- ▶ Concrete Block
- ▶ Wood Trusses
- ▶ Plywood Decking



**100+ YEARS**

# More Components that last a long time...

Source:  
[electrictreehouse.com](http://electrictreehouse.com)

- Concrete Waste Pipe
- Clay/Concrete Roof Tile
- Asbestos Shingle
- Engineered Wood Members
- Solid Core Wood Doors
- Fiberglass Doors
- Steel Doors
- Clay and Brick Paving
- Marble
- Granite
- Wood Flooring
- Batt Insulation
- Loose-Fill
- Rock Wool
- Closet Shelves
- Copper-Clad Aluminum Wiring
- Copper-Plated Wiring
- Cast-Iron Bathtub



**100+ YEARS**



# AESTHETIC OBSOLESCENCE



Source: retailremix.com





Source: [altaverdeescena.com](http://altaverdeescena.com)

Component Name	Typical Life Expectancy in Years
<b>ENGINEERED LUMBER</b>	
Engineered Joists	80+
Laminated Veneer Lumber	80+
<b>PANELS</b>	
Flooring Underlayment	25
Hardboard	40
Particleboard	60
Oriented Strand Board (OSB)	60
<b>DECKS</b>	
Deck Planks	15
Composite	8 to 25
Structural Wood	10 to 30
<b>FASTENERS, CONNECTORS &amp; STEEL</b>	
Fasteners (galvanized)	10+
Fasteners (electro-galvanized)	15 to 45





Component Name	Typical Life Expectancy in Years
<b>ROOFING</b>	
Aluminum Coating	3 to 7
Asphalt Shingles	20 to 30
BUR (built-up roofing)	30
EPDM (ethylene propylene diene monomer) Rubber	15 to 25
Fiber Cement	25
Green (vegetation-covered)	5 to 40
Metal	40 to 80
TPO	7 to 20
Wood	25
Copper	70+



Source Image:  
Westpac Roofing

**Thermoplastic PolyOlefin (TPO) is a trade name that refers to polymer /filler blends usually consisting of some fraction of PP (polypropylene), PE (polyethylene), BCPP (blockcopolymer polypropylene), rubber, and a reinforcing filler.**

**Outdoor applications such as roofing frequently contain TPO because it does not degrade under solar UV radiation, a common problem with nylons. TPO is used extensively in the automotive industry.**

**TPO is easily processed by injection molding, profile extrusion, and thermoforming. However, TPO cannot be blown, or sustain a film thickness less than 1/4 mi (about 6 micrometres).**

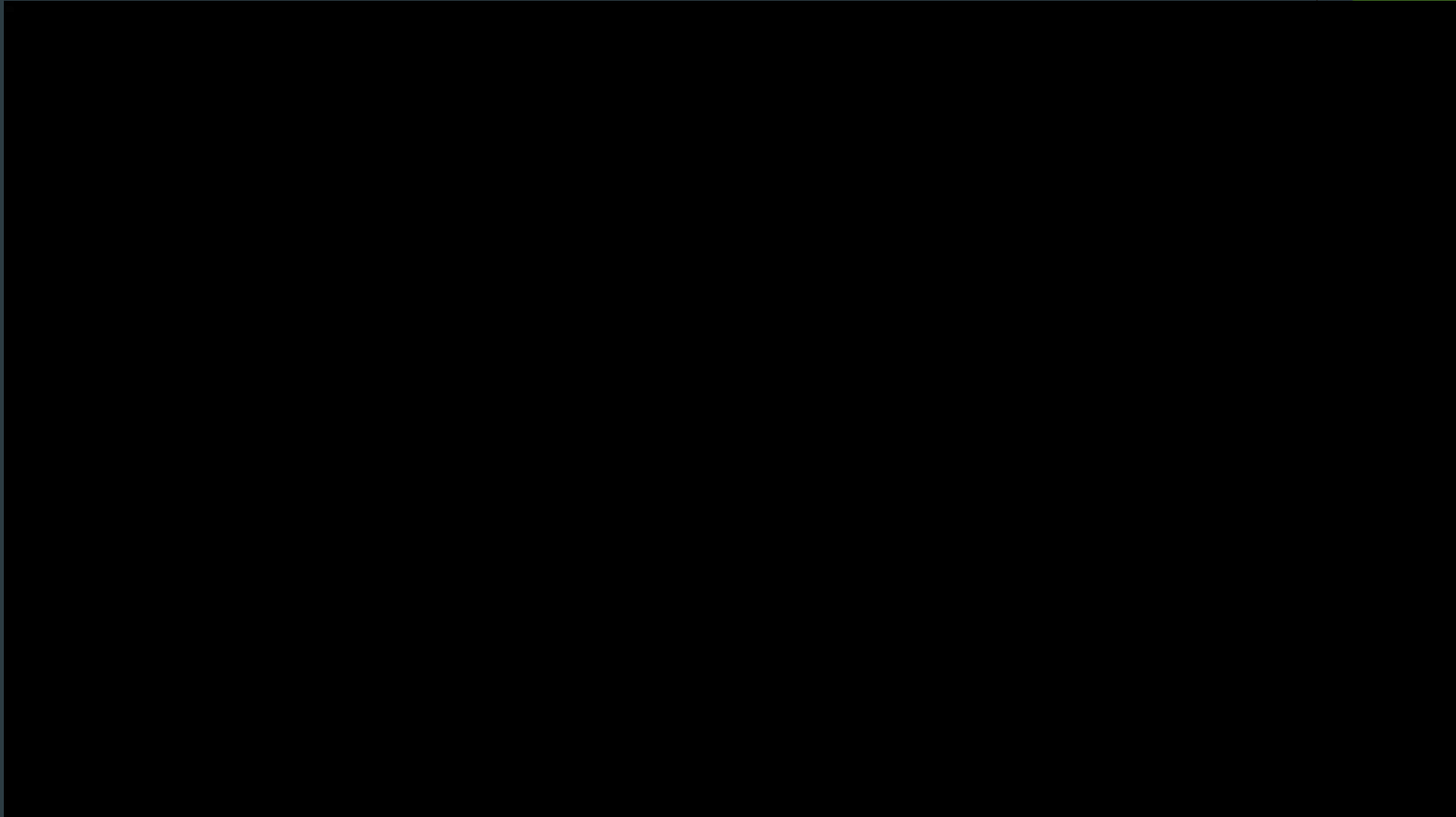
Component Name	Typical Life Expectancy in Years
<b>SIDINGS, FLASHING &amp; ACCESSORIES</b>	
Aluminum Siding	25 to 40+
Aluminum Gutters, Downspouts, Soffit and Fascia	20 to 40+
Wood Trim	25
Fiber Cement	100+
Stucco/EIFS	50+
Vinyl Siding	60
Vinyl Gutters and Downspouts	25+
Wood/Exterior Shutters	20
<b>WINDOWS</b>	
Aluminum/Aluminum-Clad	15 to 20
Double-Pane	8 to 20
Skylights	10 to 20
Vinyl/Fiberglass Windows	20 to 40
Wood	30+



Source: Seattle Pi



*Looks can be deceiving...*



Component Name	Typical Life Expectancy in Years
<b>SITE &amp; LANDSCAPING</b>	
Asphalt Driveway	15 to 20
Brick and Concrete Patio	15 to 25
Concrete Walks	40 to 50
Controllers	15
Sprinkler Heads	10 to 14
Underground PVC Piping	60+
Valves	20
<b>CEILINGS &amp; WALLS</b>	
Acoustical Tile Ceiling	40+
Ceramic Tile	70+
Gypsum	75
Wood Paneling	20 to 50



Source: [decorativepavingsolutions.com](http://decorativepavingsolutions.com)



Component Name	Typical Life Expectancy in Years
<b>DOORS</b>	
French (interior)	30 to 50
Screen (exterior)	30
Sliding Glass/Patio (exterior)	20 (for roller wheel/track repair/replacement)
Vinyl (exterior)	20
Wood (hollow-core interior)	20 to 30
<b>GARAGES</b>	
Garage Doors	20 to 25
Garage Door Openers	10 to 15
<b>INSULATION &amp; INFILTRATION BARRIERS</b>	
Black Paper (felt paper)	15 to 30
Housewrap	80+
Liquid-Applied Membrane	50
Wrap Tape	80+






Component Name	Typical Life Expectancy in Years
<b>CABINETRY &amp; STORAGE</b>	
Bathroom Cabinets	50+
Entertainment Center/Home Office	10
Medicine Cabinet	25+
<b>SWIMMING POOLS</b>	
Concrete Shell	25+
Cover	7
Diving Board	10
Filter and Pump	10
Interior Finish	10 to 35
Vinyl Liner	10
Pool Water Heater	8
Waterline Tile	15+



Source: Luke Pools




Component Name	Typical Life Expectancy in Years
<b>ADHESIVES, SEALANTS, CAULK &amp; PAINTS</b>	
Caulking (interior & exterior)	5 to 10
Construction Glue	20+
Paint (exterior)	7 to 10
Paint (interior)	10 to 15
Roofing Adhesives/Cements	15+
Sealants	8
Stains	3 to 8
Masonry Sealant	2 to 20
Bituminous-Coating Waterproofing	10
<b>COMMON STAIRS AND COMPONENTS</b>	
Concrete Stairs	75+
Steel stairs	60
Hardwood stairs	75
Aluminium stair nosings	20
Plastic stair nosings	15




### ANTI-SLIP STAIR NOSINGS

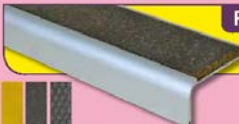
**REDUCE THE RISK OF INJURY!**



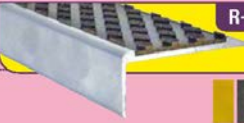
**R-NS**  
SERRATED ALUMINIUM STAIR NOSING  
25mm x 48mm




**R-CB**  
ALUMINIUM ANODISED BULL NOSING  
With bevelled edge.  
25mm x 60mm  
Select from inserts shown




**R-NR**  
ALUMINIUM STAIR NOSING  
30mm x 50mm  
Select from inserts shown




**R-CC**  
ALUMINIUM NOSING  
With bevelled edge.  
25mm x 63mm  
Select from inserts shown




**R-RN**  
RUBBER STAIR NOSING  
45mm x 60mm




**R-MN**  
GALVANISED METAL STAIR NOSING  
Galvanised metal angle coated with heavy duty chemical resistant anti-slip coating. Available in various colours.  
35mm x 50mm - 35mm x 75mm - 35mm x 90mm and custom made to required size.



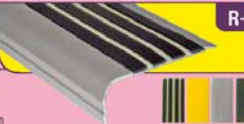
**R-SA**  
ALUMINIUM SERRATED ANGLE  
15mm x 80mm  
Yellow-Black-Clear




**R-NAL**  
LUMINOUS SERRATED ALUMINIUM NOSING  
Aluminium profile with luminous 'Glow in the Dark' strip. 35mm x 75mm




**R-BN**  
ALUMINIUM BULL NOSING  
Clear anodised with PVC coloured insert.  
30mm x 75mm  
Select from inserts shown




**R-NA**  
ALUMINIUM BULL NOSING  
Clear anodised with PVC coloured insert.  
30mm x 75mm  
Select from inserts shown




**R-NAC**  
ALUMINIUM ANODISED NOSING  
For carpet only. Gold or silver with PVC or luminated insert. 35mm x 75mm  
Select from inserts shown



**R-CA**  
ALUMINIUM ANODISED NOSING  
Anodised with PVC coloured insert.  
30mm x 90mm  
Select from inserts shown

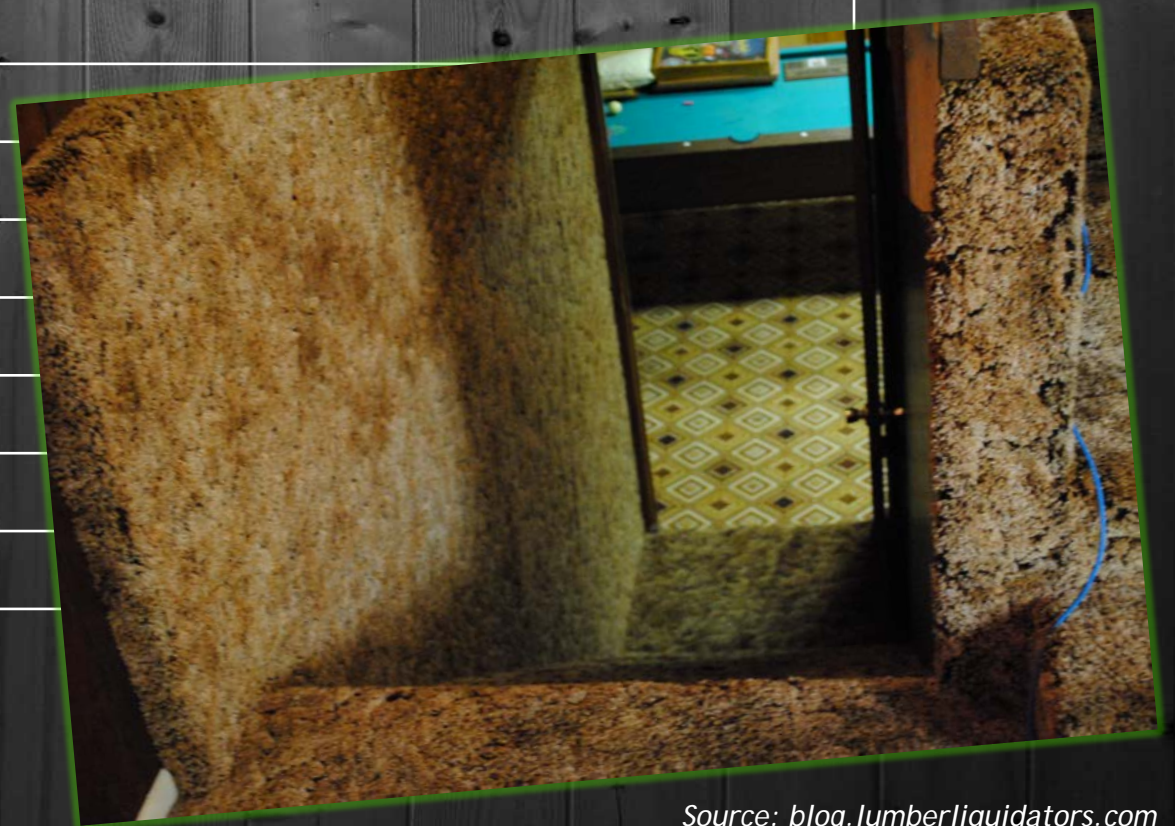


**R-NCP**  
RECYCLED RUBBER STAIR TREAD  
With metal edge nosing. Custom made to size.  
Red, brown, green and black.



**R-AG**  
LUMINOUS ANODISED NOSING  
With anti-slip and glow-in-the-dark strip.  
34mm x 68mm. Also suitable for carpet.  
Also available for carpet R-AGC.

Component Name	Typical Life Expectancy in Years
<b>COUNTERTOPS</b>	
Cultured Marble	20
Plastic Laminate	20 to 30
<b>FLOORING</b>	
Carpet	8 to 10
Concrete	50+
Engineered Wood	50+
Laminate	15 to 25
Linoleum	25
Terrazzo	75+
Tile	75 to 100
Vinyl	25



Source: [blog.lumberliquidators.com](http://blog.lumberliquidators.com)



Component Name	Typical Life Expectancy in Years
<b>ELECTRICAL</b>	
Arc-Fault Circuit Interrupters (AFCIs)	30
Bulbs (compact fluorescent)	8,000 to 10,000+ hours
Bulbs (halogen)	4,000 to 8,000+ hours
Bulbs (incandescent)	1,000 to 2,000+ hours
Bulbs (LED)	30,000 to 50,000+ hours
Fixtures	40
Ground-Fault Circuit Interrupters (GFCIs)	up to 30
Lighting Controls	30+
Service Panel	60
Solar Panels	20 to 30
Solar System Batteries	3 to 12



Source: wikipedia.org



Component Name	Typical Life Expectancy in Years
<b>APPLIANCES</b>	
Dishwasher	9
Disposal (food waste)	12
Dryer Vent (plastic)	5
Dryer Vent (steel)	20
Dryer (clothes)	13
Freezer	10 to 20
Gas Oven	10 to 18
Microwave Oven	9
Range/Oven Hood	14
Electric Range	13 to 15
Gas Range	15 to 17
Refrigerator	9 to 13
Swamp Cooler	5 to 15
Washing Machine	5 to 15



Source:  
atomictoaster.com



Component Name	Typical Life Expectancy in Years
HVAC	
Air Conditioner (central)	7 to 15
Air Exchanger	15
Boiler	40
Ceiling Fan	5 to 10
Condenser	8 to 20
Dampers	20+
Ducting	60 to 100
Furnace	15 to 25
Gas Fireplace	15 to 25
Heat Exchanger	10 to 15
Heat Pump	10 to 15
Induction and Fan-Coil Units	10 to 15
Thermostats	35



Component Name	Typical Life Expectancy in Years
<b>PLUMBING, FIXTURES &amp; FAUCETS</b>	
ABS and PVC Waste Pipe	50 to 80
Cast-Iron Bathtub	100
Cast-Iron Waste Pipe	50 to 60
Copper Water Lines	70
Fiberglass Bathtub and Shower	20
Gas Lines (black steel)	75
Gas Lines (flex)	30
PEX	40
Shower Enclosure/Module	50
Showerheads	<b>100+</b> <i>(if not clogged by mineral/other deposits)</i>
Toilet Tank Components	5
Toilets, Bidets and Urinals	100+
Water Heater (conventional)	6 to 12





Component Name	Typical Life Expectancy in Years
<b>HOME TECHNOLOGY</b>	
Built-In Audio	20
Carbon Monoxide Detectors	5
Door Bells	45
Home Automation System	5 to 50
Smoke/Heat Detectors	less than 10
Wireless Home Networks	5+

***UP NEXT:***

What are the zoning and code requirements for rehabbed buildings?





# Rehab and The Building Code

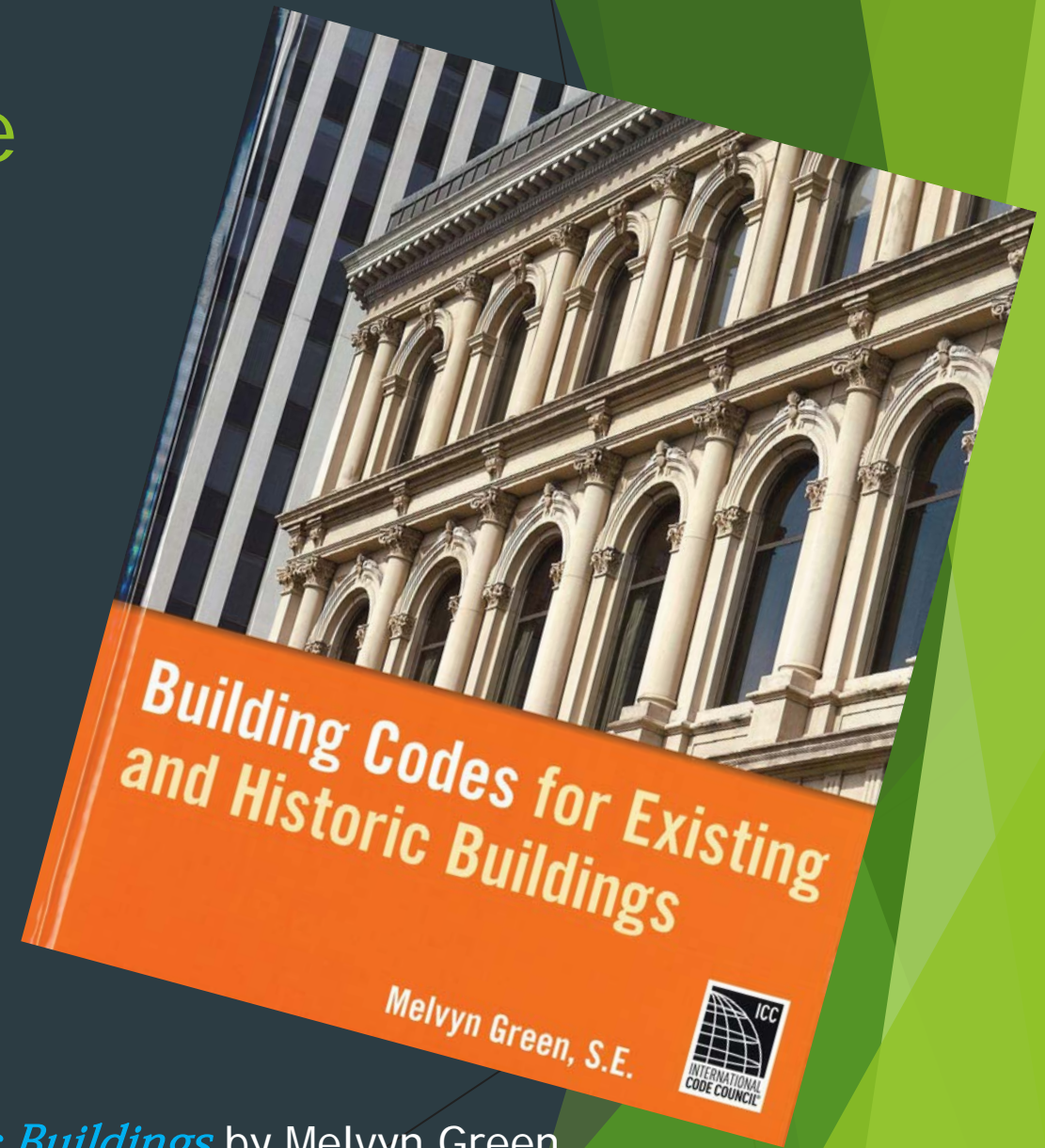
- ▶ International Existing Building Code IEBC
- ▶ Three options to conformance:

**OPTION 1: PRESCRIPTIVE**

**OPTION 2: WORK AREA**

**OPTION 3: PERFORMANCE**

- ▶ Consult your favorite design professional
- ▶ Understand “technically infeasible”
- ▶ Really, it is all up to the Building Official
- ▶ Good read: *Building Codes for Existing and Historic Buildings* by Melvyn Green





# OPTION 1: *PRESCRIPTIVE*

- ▶ Understood by most building code enforcement officials
- ▶ *Meet early* with the building department in the design process
- ▶ *Know the issues* with the building(s)
- ▶ Look at *alternate methods*
- ▶ *More difficult* to establish construction costs *early* in the design process

Source: defense.gov



## OPTION 2: *WORK AREA*

- ▶ *New concept* in code compliance
- ▶ Includes all *reconfigured spaces*
- ▶ Excludes *incidental areas*
- ▶ Clearly defines the *extent and limits*
- ▶ Should improve the *predictability* of development, hence construction \$\$
- ▶ *Little input* from the building department



*Source: Fire & Safety Australia*

## OPTION 2: *PERFORMANCE*

- ▶ Uses a **point score** approach
- ▶ Works best when **alternatives** are needed
- ▶ Seems to work better for a **change of occupancy**
- ▶ More common in use when the building department **doesn't see many of these**
- ▶ Future alterations may incur **minimal code complications**



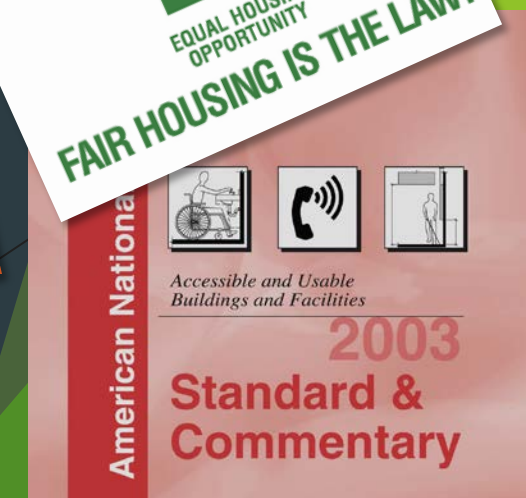
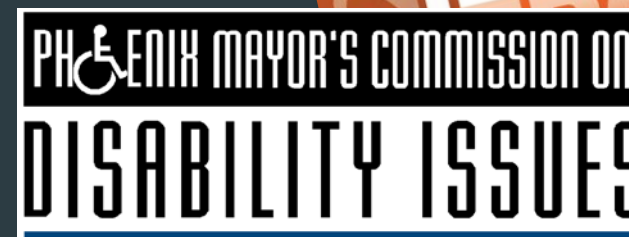
Source: MageGiant



# Rehab and Disabled Accessibility

Source: people.theiapolis.com/

- ▶ It's Complicated
- ▶ Any multi-family project using public funds has additional requirements
- ▶ The IEBC details potentially less stringent requirements
- ▶ Existing and historic buildings...similar but NOT the same
- ▶ Safe harbor
- ▶ Also depends on your target demographic



# Historic Buildings

- More leeway complying with codes and ordinances
- Of course, assuming the building has qualifiable historic certification
- Code and ordinance compliance is commonly done through evaluation
- There are perks to this project type:
  - Tax Incentives and Grant Programs
- Other forces with a stake in decisions:
  - Local Jurisdictions
  - SHPO
  - National Park Service



Old Photo Garfield Sacred Heart Housing



# *"Nobody Knows the Trouble I've Seen"*

Source: [dailyglean.salebooks.com](http://dailyglean.salebooks.com)

What are some of the more common  
(and expensive) fixes you're seeing?





# WATER

Giver of Life  
*Destroyer of Buildings*



# Where does the water go?







*Here's where it goes.*



And with water comes...



# Stucco *and* Wood





# Problems on the Catwalk





# Creative Site Lighting





# *Up to the Roof*



Source:  
shopMissMalaprop  
on Etsy.



# Code Compliance Issues





# Disabled Accessibility





**DANGER**

**ASBESTOS**

CANCER AND LUNG DISEASE  
HAZARD

KEEP OUT

AUTHORIZED  
PERSONNEL ONLY

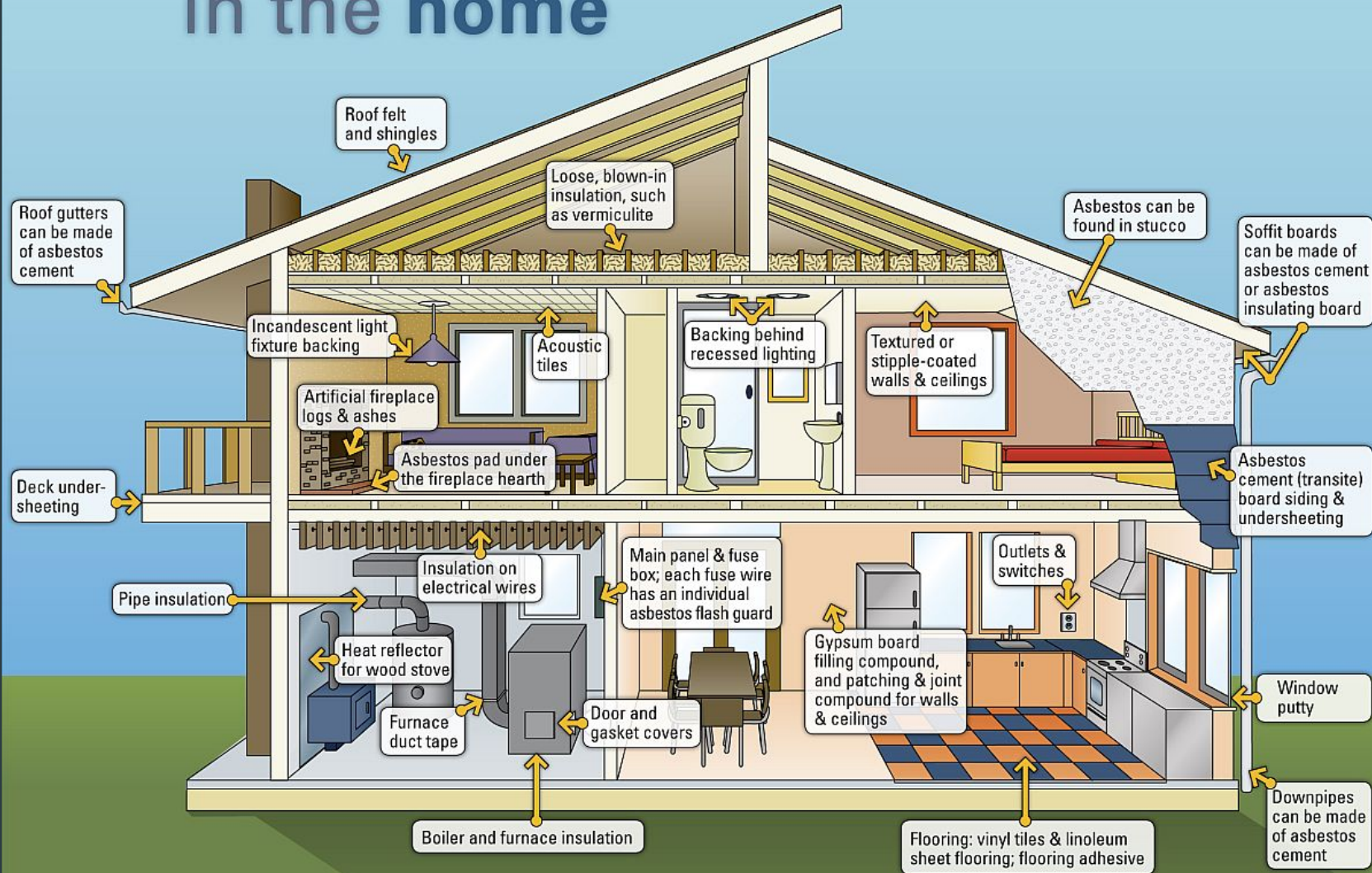
RESPIRATORS AND  
PROTECTIVE CLOTHING  
ARE REQUIRED IN  
THIS AREA

Source:  
[renewableworldfoundation.org](http://renewableworldfoundation.org)



# Potential sources of asbestos in the home

**WORKSAFE BC**  
WORKING TO MAKE A DIFFERENCE



**Please note:** This floor plan depicts a typical older home. Asbestos use has declined significantly; homes built before 1990 are more likely to contain asbestos products.

Switching gears...

How do the ADOH LIHTC requirements mesh with redevelopment?





# Rehab and the ADOH QAP

## Maximizing points from the SUSTAINABILITY CHECKLIST

### *YOUR CHOICES:*

- LEED for Homes Gold
- Home Energy Rating System HERS
- Prescriptive Path

2014 Qualified Allocation Plan

Proposed resident population:	5 points
Grocery store:	5 points
Schools (Households with Children Project only):	5 points
Senior Center (Housing for Older Persons Project only):	2.5 points
Hospital or Urgent Care Clinic:	2.5 points
Sports and Fitness Center:	2.5 points
Recreation Center or Public Park:	2.5 points
Public Library:	2.5 points

D. Sustainable Development 20 points

Section 2.9(Q)/Tab 17

This scoring category is available for Projects that are following one of the below approaches to Sustainable Development.

- Twenty (20) points are available to Projects that are pursuing the LEED for Homes Gold certification path.
- Ten (10) points are available to Projects that follow the performance-based path for energy efficiency based on the Home Energy Rating System ("HERS") index beyond the baseline index of 67. If Applicant chooses the HERS approach, Applicant may gain up to an additional ten (10) points by choosing prescriptive elements from the Materials and Indoor Air Quality options (up to six (6) points), and/or Water Efficiency options (up to four (4) points).
- Up to twenty (20) points are available to Projects that follow the prescriptive-based path. Use the Section below to calculate prescriptive-based path points.

Materials and Indoor Air Quality (up to 6 points)		2014 SUSTAINABLE CRITERIA	Points Avail.
SYSTEM COMPONENT	Construction Use		
Material Selection	New and Rehab	All adhesives applied on site utilize zero VOC products.	1.0
Flooring	New and Rehab	Hard surface flooring materials used throughout the dwelling Units (excludes sheet vinyl).	2.0
Exhaust Fans	Rehab	Install power vented bath fans that exhaust to the exterior.	1.0
Exhaust Fans	Rehab	Install power vented range hoods that exhaust to the exterior.	1.0
Exhaust Fans	New and Rehab	Install an energy-recovery ventilator ("ERV") in the dwelling Units.	2.0



Arizona  
Department  
of Housing

# LEED for Homes

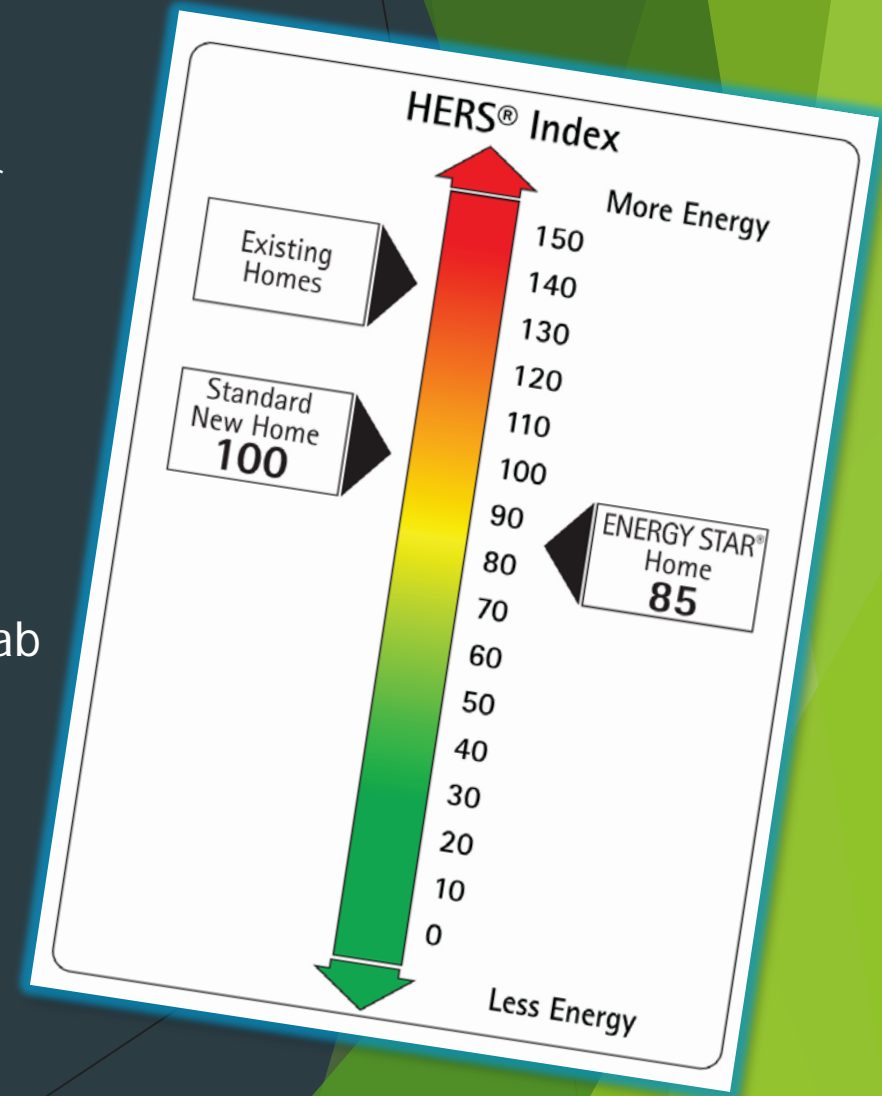
- ▶ USGBC released **LEED for Homes Guidance for Gut-Rehab Projects**
- ▶ Does not certify partial or substantial remodels, nor new additions unless the building earns certification
- ▶ Typically must replace **ALL** of the systems and components
- ▶ Must open up the exterior walls to enable the **Thermal Bypass Inspection** to be completed
- ▶ Submarket-Specific Technical Guidance allows some partial conformance to receive credit points in certain categories.
- ▶ Consult your favorite design consultant





# Home Energy Rating System HERS

- ▶ The 2014 QAP allowed a performance-based path for energy efficiency based on the **HERS** index beyond the baseline index of **67**
- ▶ Consult your Mechanical Engineer
  - ▶ 2011 **Enterprise Green Communities** stated some building construction types undergoing a moderate or substantial rehab were unable to achieve a **HERS** Index of **85**
  - ▶ These building types either do not have insulation, and/or their construction type does not allow installation insulation.



# Prescriptive Path

- ▶ 2014 QAP provided a wide array of point options under **SUSTAINABLE DEVELOPMENT**
- ▶ This route to maximizing points is popular with LIHTC developers.
- ▶ Two categories specifically gave points solely for **rehab construction**:

SYSTEM COMPONENT	Construction Use	2014 SUSTAINABLE CRITERIA	Points Available
Exhaust Fans	Rehab	Install power vented bath fans that exhaust to the exterior.	1.0
Exhaust Fans	Rehab	Install power vented kitchen fans that exhaust to the exterior.	1.0



My budget is soooooo tight...  
will my rehab look  
cheap and ugly?

Source: teoalida.com





# MIDCENTURY MARVELS

COMMERCIAL ARCHITECTURE OF PHOENIX 1945-1975



CITY OF PHOENIX HISTORIC PRESERVATION OFFICE  
AND RYDEN ARCHITECTS, INC.



*Source: Adolfson & Peterson  
Construction*











Source: [oasisongrand.com](http://oasisongrand.com)



Source: [cabanaonthomas.com](http://cabanaonthomas.com)





Source: [cabanaonthomas.com](http://cabanaonthomas.com)



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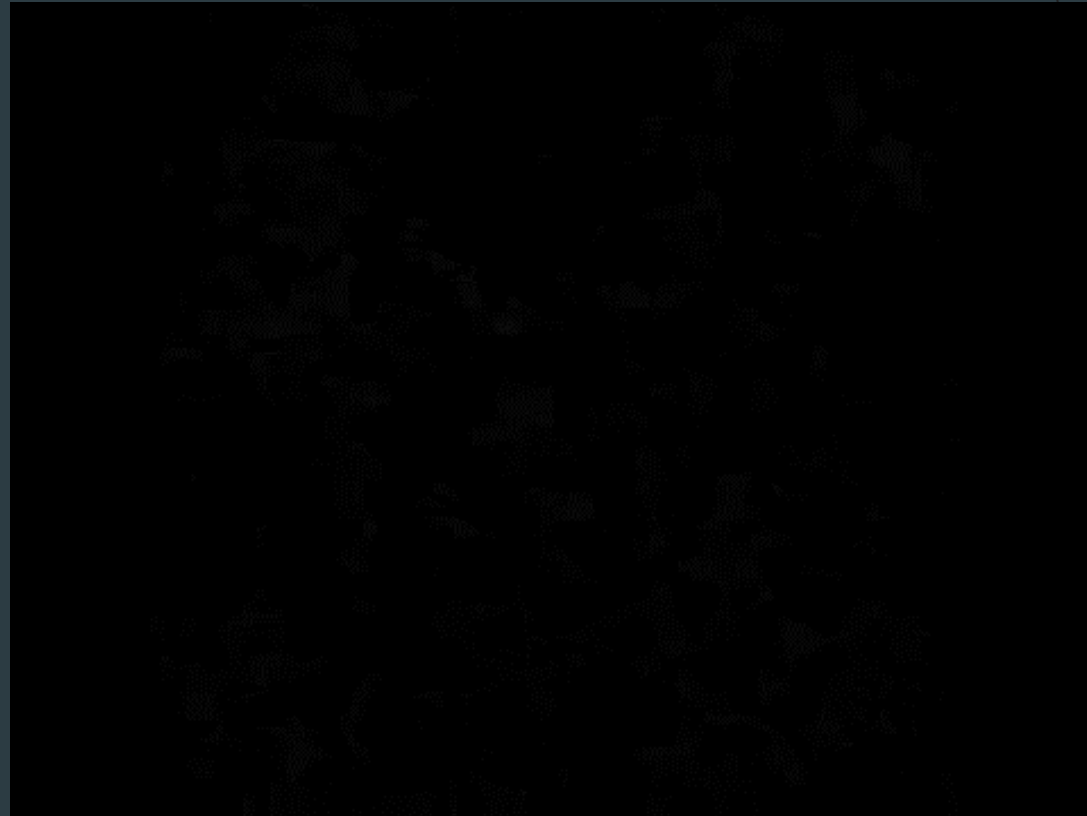




Source: [cabanaonthomas.com](http://cabanaonthomas.com)

# We're almost to the finish line...

CONTAGIOUS YAWNING. No one's really sure why yawning is contagious. One theory is based on the assumption that yawning is a form of nonverbal communication. In baboons, extensive yawning among members of a group signals the time to sleep, typically with the leader (the "alpha male") ending the ritual with a giant yawn. If our ancestors used yawning to communicate like baboons do, then the contagiousness of yawning may be an involuntary, genetically programmed phenomenon; once one person in the "tribe" yawns, others do so because this behavior pattern helped our evolutionary ancestors to communicate with one another.



Robert Shmerling, M.D.,  
Harvard [Health](#) Publications

Questions?

Comments?