Senior Living: Code-Compliant Wood Construction and Designing for Wellness

Presented by Greg Gauthreaux, AIA, LEED Green Associate

PERKINS EASTMAN

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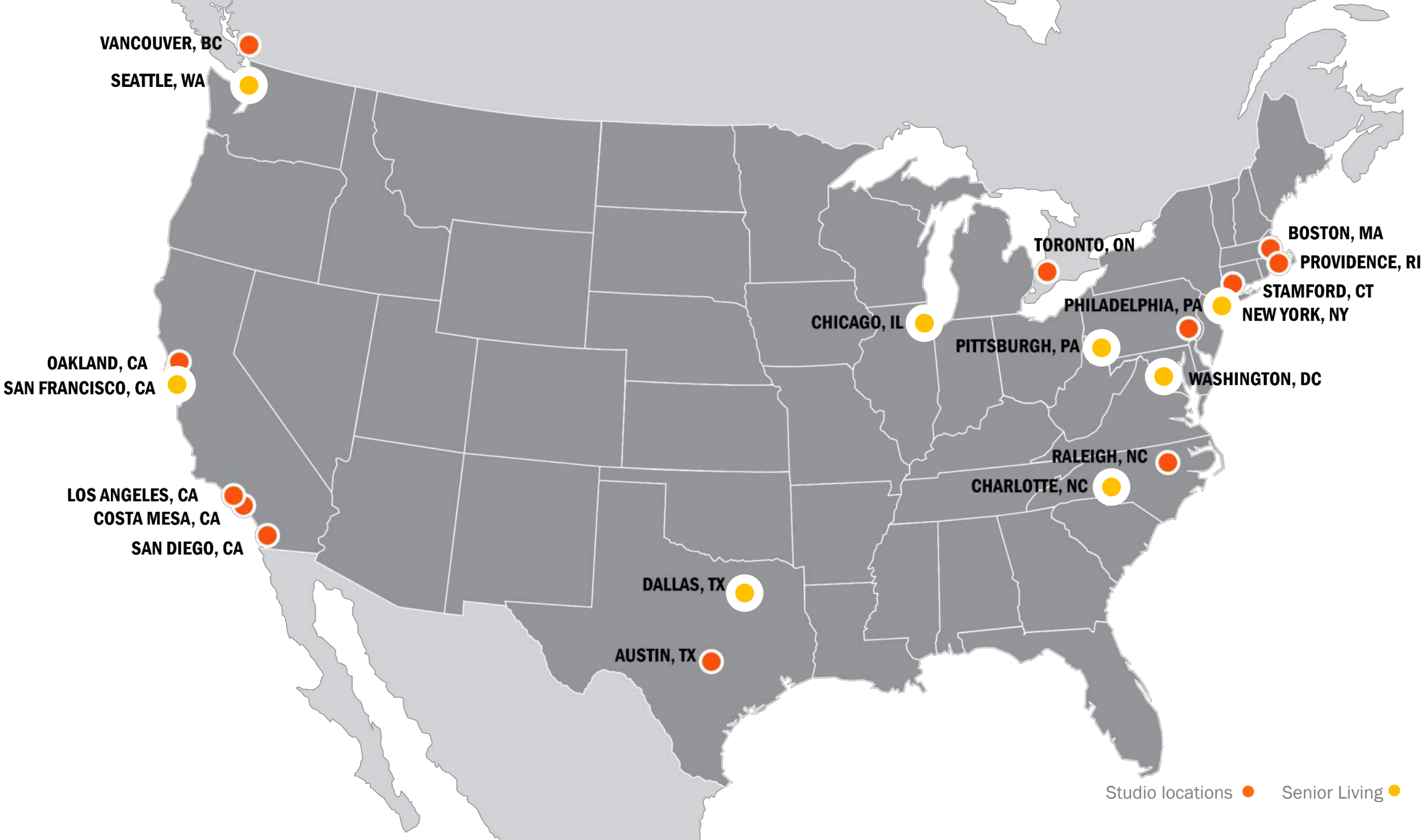
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PITTSBURGH, PA
WASHINGTON, DC
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SAN FRANCISCO, CA
RALEIGH, NC
CHARLOTTE, NC
LOS ANGELES, CA
COSTA MESA, CA
SAN DIEGO, CA
DALLAS, TX
AUSTIN, TX
Studio locations
Senior Living

WA 100 2024
Building Design.

#7 World's Largest Architecture Firms 2024

Architectural Record

#14 Top US Architecture Firms 2024

INTERIOR DESIGN

#1 Senior Living Giants 2024

#6 Hospitality Giants 2024

#8 Healthcare Giants 2024

#17 Interior Design Giants 2024

BUILDING DESIGN + CONSTRUCTION

#1 Top Senior Living Facility Architecture Firms 2024

#6 Top Architecture Firms 2024

#6 Top Multifamily Architecture Firms 2024

#7 Top Hospitality Facility Architecture Firms 2024

#8 Top K-12 School Architecture Firms 2024

#9 Top University Building Architecture Firms 2024

#9 Top Hotel + Resort Architecture Firms 2024

#13 Top Apartment + Condominium Architecture Firms 2024

#16 Top Cultural Facility Architecture Firms 2024

#16 Top Federal Government Building Architecture Firms 2024

#18 Top Office Building Architecture Firms 2024

#19 Top Outpatient Facility Architecture Firms 2024

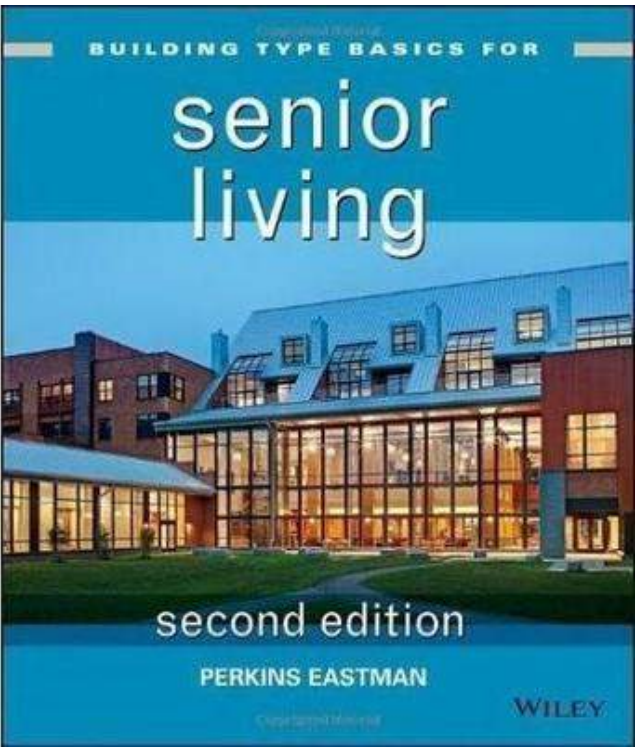
#21 Top Workplace Interior Architecture Firms 2024

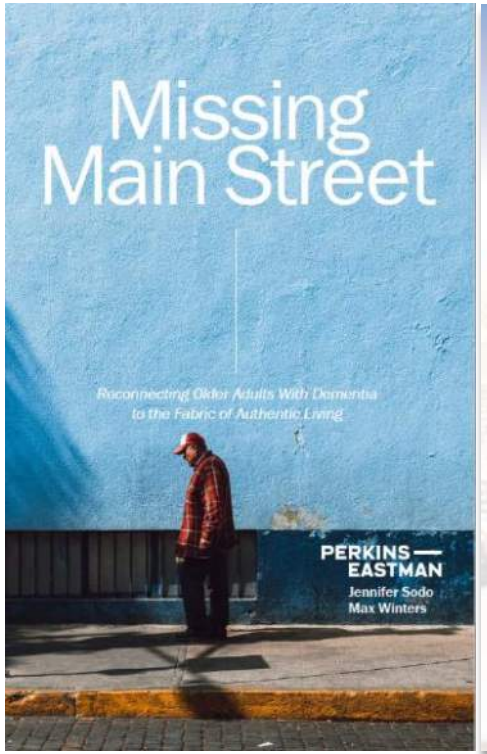
#22 Top Healthcare Architecture Firms 2024

#22 Top Sports Facility Architecture Firms 2024

#25 Top Hospital Facility Architecture Firms 2024

Thought Leadership





TECH-AGE
Artificial intelligence, robotics, virtual reality, home automation

AGING IN THE COMMUNITY
Decentralized care and services

THIRD ACT
An alternative definition of retirement focused on lifestyle and continued engagement

PARADIGM SHIFTS
Climatic, financial, and political changes affecting the world

Perkins Eastman White Papers:
www.perkinseastman.com/white-papers/

The Power of Convergence

Human by Design

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

AIA Approved Continuing Education

Course Description

As the demand for senior housing grows, designers must understand the spectrum of senior living options available and how different levels of care are classified under the International Building Code (IBC). This course provides an in-depth exploration of where wood construction is permitted and special considerations such as how to achieve required fire resistance ratings using wood wall and floor-ceiling assemblies. Additionally, we will delve into some unique design approaches to senior living, focusing on creating environments that promote health and wellness, including biophilic design, which enhances the quality of life for both residents and caregivers.

Learning Objectives

1. **Understand the Growth of Senior Housing Demand:** Gain insights into the projected increase in demand for senior housing in the U.S. and how this trend is influencing architectural design needs.

2. **Classify Senior Housing Options Under the IBC:** Learn to identify and classify different types of senior housing facilities based on occupancy group under the International Building Code (IBC).

3. **Address Fire Safety Challenges in Wood Construction:** Identify and mitigate challenges related to fire resistance ratings and fire separation requirements in wood wall and floor/ceiling assemblies in senior housing projects.

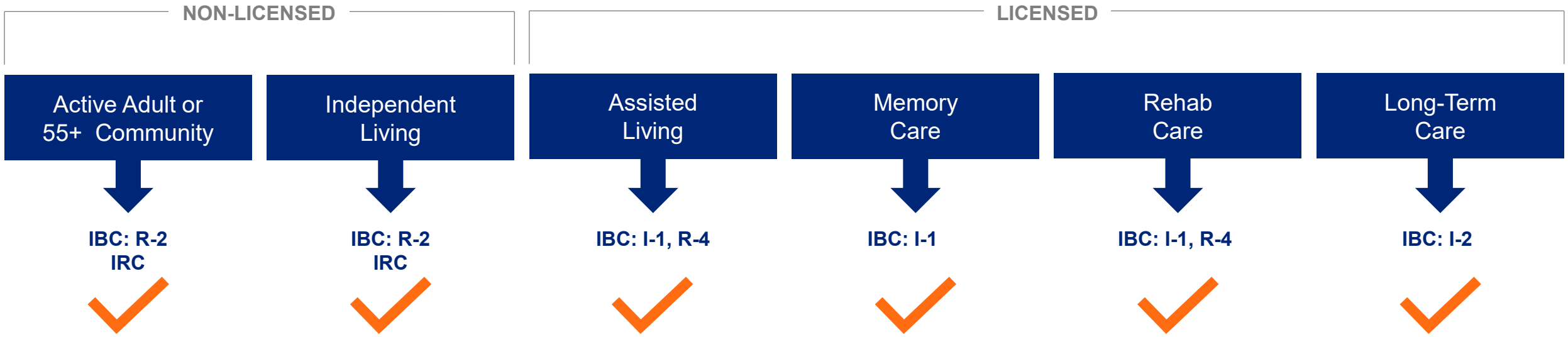
4. **Incorporate Health, Wellness, and Biophilic Design:** Explore different approaches to designing senior living environments that prioritize the physical and emotional health of residents and caregivers through thoughtful design choices, including biophilic elements.

What is Senior Living

Building Community through housing, hospitality, and care.

Common types of Senior Living

Full Continuum of Care



Wood Construction in Senior Living?

Senior Living and the IBC

Maximum Area Limitations (SF per floor)

Assisted Living & Memory Care

Skilled Care

***note NFPA limitation of 22,500 SF per smoke compartment**

55+, Active Adult, Independent Living

***Assuming multi-family**

TABLE 506.2

ALLOWABLE AREA FACTOR (A_t = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET[a, b]

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
I-1	NS[d, e]	UL	55,000	19,000	10,000	16,500	10,000	54,000	36,000	18,000	18,000	10,500	4,500
	S1	UL	220,000	76,000	40,000	66,000	40,000	216,000	144,000	72,000	72,000	42,000	18,000
	SM	UL	165,000	57,000	30,000	49,500	30,000	162,000	108,000	54,000	54,000	31,500	13,500
I-2	NS[d, f]	UL	UL	15,000	11,000	12,000	NP	36,000	24,000	12,000	12,000	9,500	NP
	S1	UL	UL	60,000	44,000	48,000	NP	144,000	96,000	48,000	48,000	38,000	NP
	SM	UL	UL	45,000	33,000	36,000	NP	108,000	72,000	36,000	36,000	28,500	NP
I-3	NS[d, e]	UL	UL	15,000	10,000	10,500	7,500	36,000	24,000	12,000	12,000	7,500	5,000
	S1	UL	UL	60,000	40,000	42,000	30,000	144,000	96,000	48,000	48,000	30,000	20,000
	SM	UL	UL	45,000	30,000	31,500	22,500	108,000	72,000	36,000	36,000	22,500	15,000
I-4	NS[d, g]	UL	60,500	26,500	13,000	23,500	13,000	76,500	51,000	25,500	25,500	18,500	9,000
	S1	UL	121,000	106,000	52,000	94,000	52,000	306,000	204,000	102,000	102,000	74,000	36,000
	SM	UL	181,500	79,500	39,000	70,500	39,000	229,500	153,000	76,500	76,500	55,500	27,000
M	NS	UL	UL	21,500	12,500	18,500	12,500	61,500	41,000	26,625	20,500	14,000	9,000
	S1	UL	UL	86,000	50,000	74,000	50,000	246,000	164,000	102,500	82,000	56,000	36,000
	SM	UL	UL	64,500	37,500	55,500	37,500	184,500	123,000	76,875	61,500	42,000	27,000
R-1[h]	NS[d]	UL	UL	24,000	16,000	24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
	S13R												
	S1	UL	UL	96,000	64,000	96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000
R-2[h]	NS[d]	UL	UL	24,000	16,000	24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
	S13R												
	S1	UL	UL	96,000	64,000	96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000

Senior Living and the IBC

Maximum Height Limitations (# of stories)

Assisted Living & Memory Care

Skilled Care

55+, Active Adult, Independent Living

***Assuming multi-family**

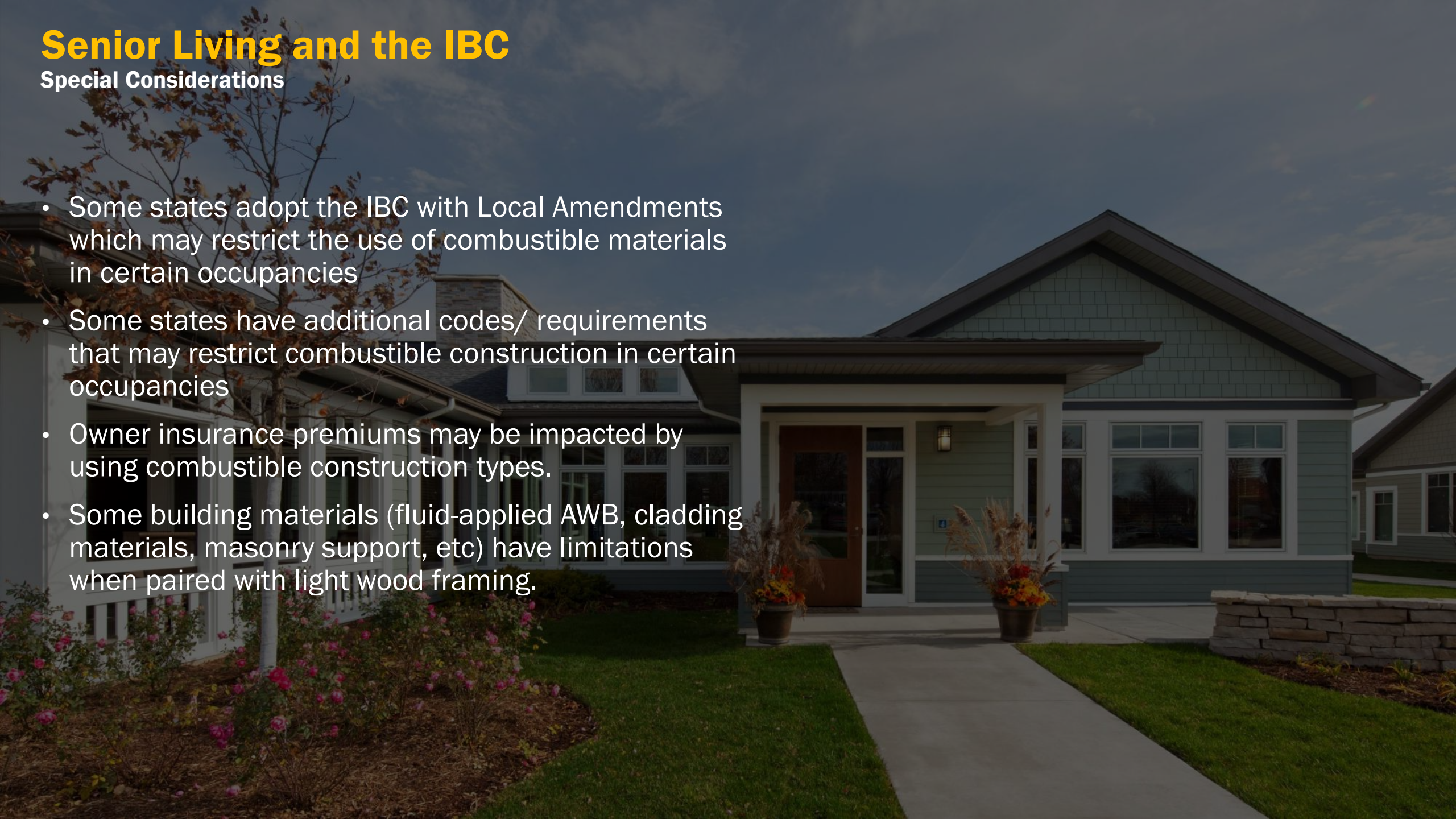
TABLE 504.4

ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE[a, b]

OCCUPANCY CLASSIFICATION	See Footnotes	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
I-1 Condition 1	NS[d, e]	UL	9	4	3	4	3	4	4	4	4	3	2
	S	UL	10	5	4	5	4	10	7	5	5	4	3
I-1 Condition 2	NS[d, e]	UL	9	4	3	4	3	3	3	3	4	3	2
	S	UL	10	5				10	6	4			
I-2	NS[d, f]	UL	4	2	1	1	NP	NP	NP	NP	1	1	NP
	S	UL	5	3				7	5	1			
I-3	NS[d, e]	UL	4	2	1	2	1	2	2	2	2	2	1
	S	UL	5	3	2	3	2	7	5	3	3	3	2
I-4	NS[d, g]	UL	5	3	2	3	2	3	3	3	3	1	1
	S	UL	6	4	3	4	3	9	6	4	4	2	2
M	NS	UL	11	4	2	4	2	4	4	4	4	3	1
	S	UL	12	5	3	5	3	12	8	6	5	4	2
R-1[h]	NS[d]	UL	11	4	4	4	4	4	4	4	4	3	2
	S13R	4	4									4	3
	S	UL	12	5	5	5	5	18	12	8	5	4	3
R-2[h]	NS[d]	UL	11	4	4	4	4	4	4	4	4	3	2
	S13R	4	4	4								4	3
	S	UL	12	5	5	5	5	18	12	8	5	4	3

Senior Living and the IBC

Special Considerations



- Some states adopt the IBC with Local Amendments which may restrict the use of combustible materials in certain occupancies
- Some states have additional codes/ requirements that may restrict combustible construction in certain occupancies
- Owner insurance premiums may be impacted by using combustible construction types.
- Some building materials (fluid-applied AWB, cladding materials, masonry support, etc) have limitations when paired with light wood framing.

Common types of Senior Living

Life Plan Community

Common types of Senior Living

Life Plan Community

Common types of Senior Living

Life Plan Community

Common types of Senior Living

Life Plan Community

Senior Living Trends

Population + housing demands

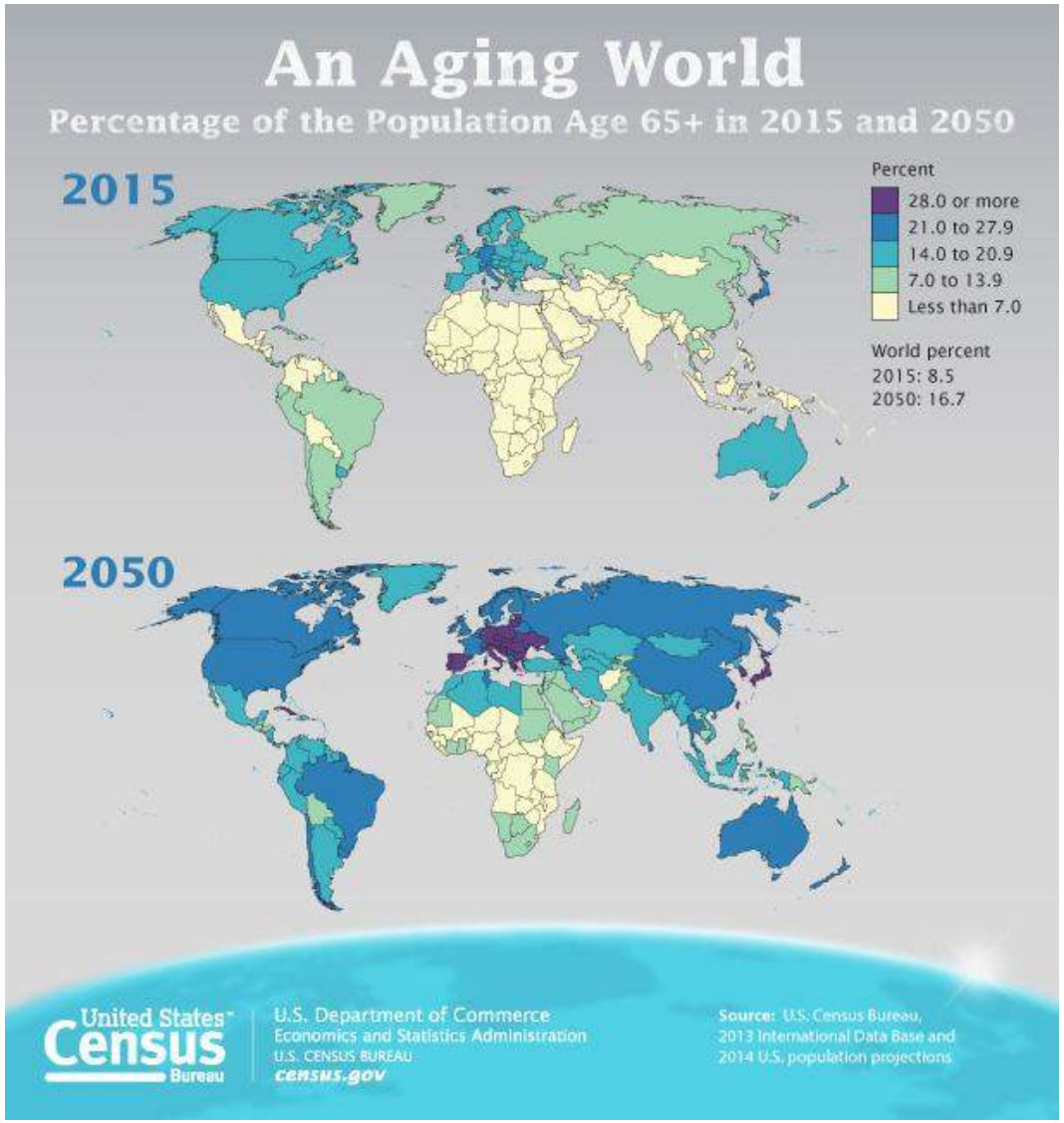
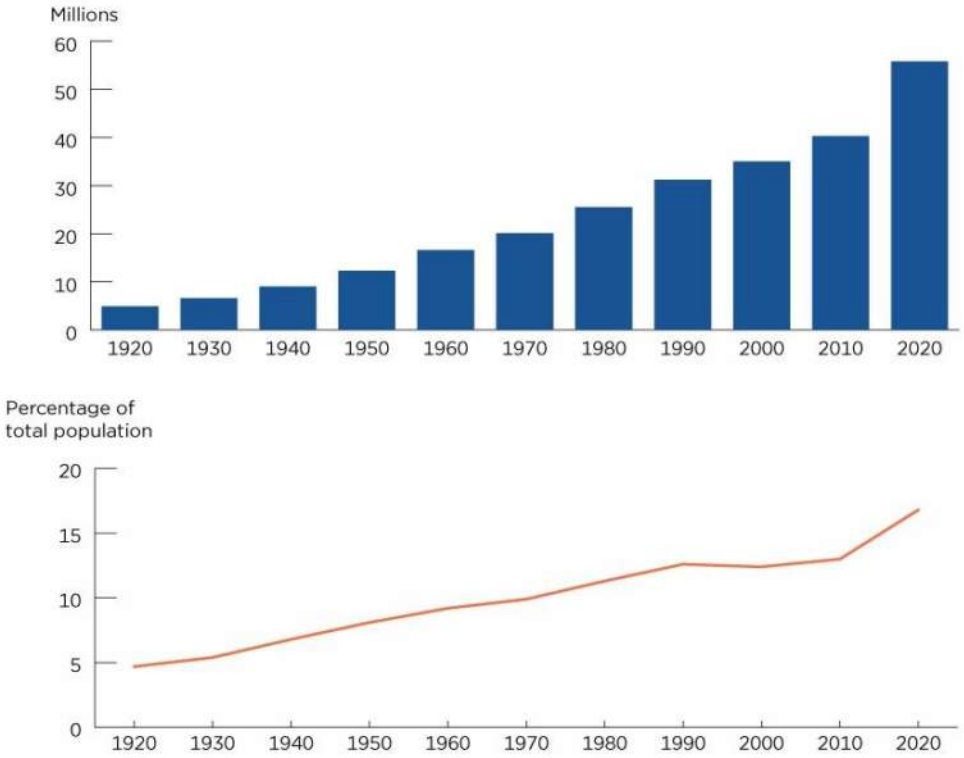


Figure 1.

Population 65 Years and Over by Size and Percentage of Total Population: 1920 to 2020



Note: For information on data collection, confidentiality protection, nonsampling error, and definitions, refer to <https://www2.census.gov/programs-surveys/decennial/2020/technical-documentation/complete-tech-docs/demographic-and-housing-characteristics-file-and-demographic-profile/2020census-demographic-and-housing-characteristics-file-and-demographic-profile-techdoc.pdf>.

Source: U.S. Census Bureau, Decennial Census of Population, 1900 to 2000; 2010 Census Summary File 1, and 2020 Census Demographic and Housing Characteristics File (DHC).

Senior Living Trends

Population + housing demands

Today's Active Adults Over 50:

- Control 70% of all disposable income
- Represent the third-largest economy in the world
- 46% of affluent boomers have net worth exceeding $2 million
- Expected to inherit $8.4 trillion by 2030
- Often wealthier in retirement
- 95% of household purchasing decisions are made by women

Senior Living Trends

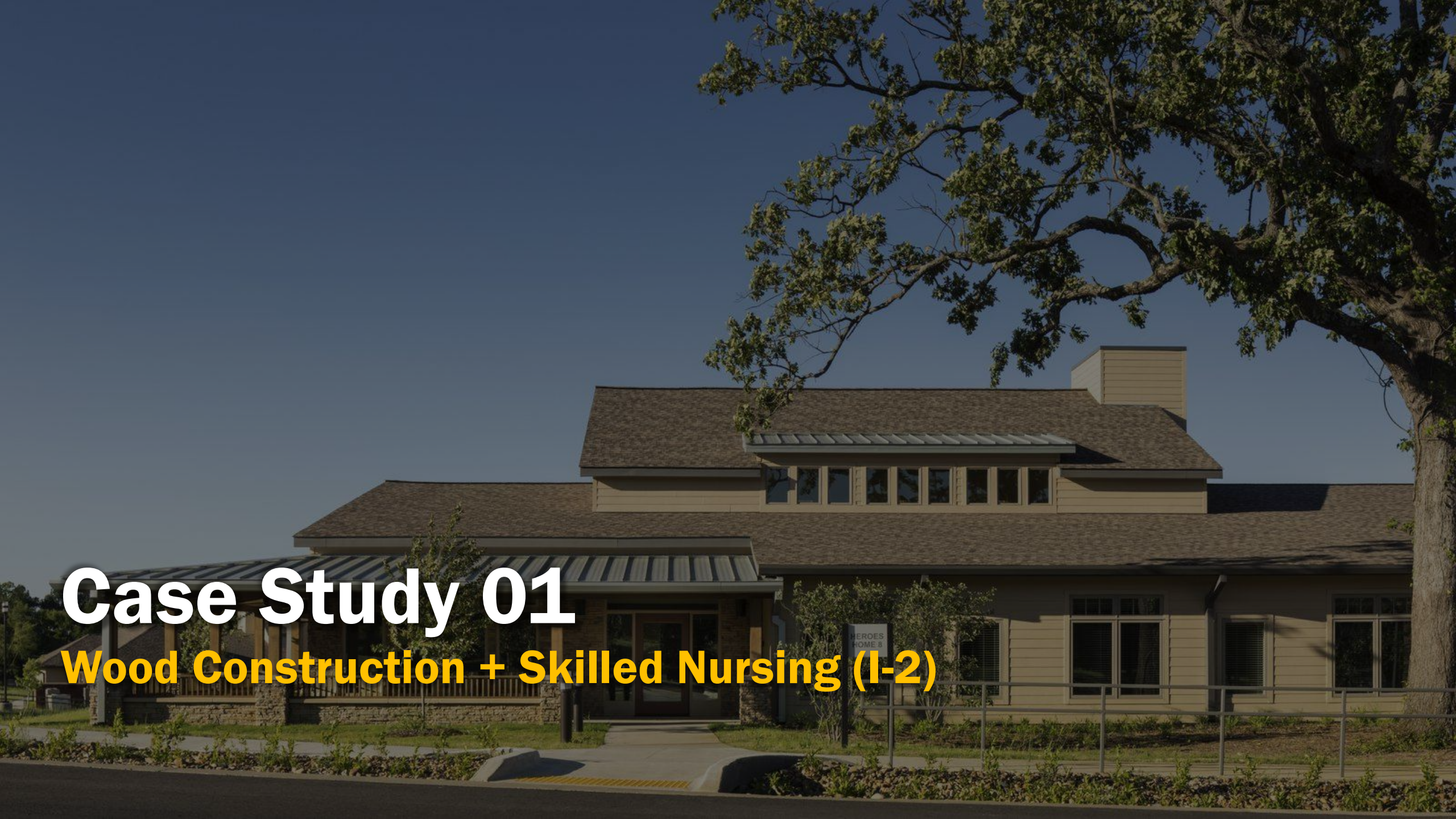
Population + housing demands

- Boomers account for $1 out of every $4 spent on home purchases and renters will spend $500 billion on rent in the next five years
- In 2017, the home equity of homeowners age 62+ was valued at $6.3 trillion
- By 2035 the population over 65 will have **doubled and will be living longer**

Places for living

Inspired by Hospitality


Resident-centered care

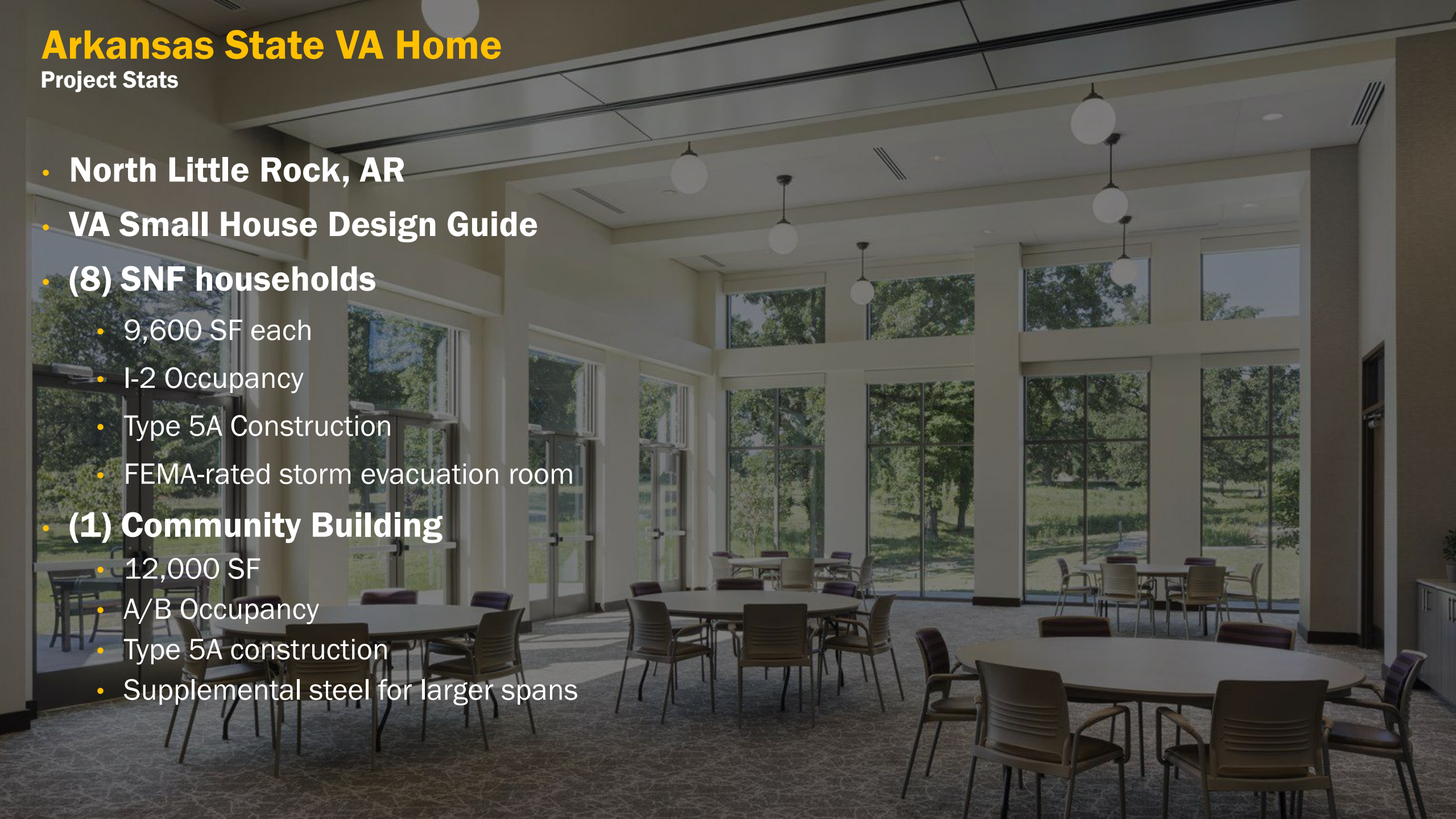


Case Study 01

Wood Construction + Skilled Nursing (I-2)

Arkansas State VA Home

Project Stats



- **North Little Rock, AR**
- **VA Small House Design Guide**
- **(8) SNF households**
  - 9,600 SF each
  - I-2 Occupancy
  - Type 5A Construction
  - FEMA-rated storm evacuation room
- **(1) Community Building**
  - 12,000 SF
  - A/B Occupancy
  - Type 5A construction
  - Supplemental steel for larger spans

Arkansas State VA Home

Overall Site Plan

Arkansas State VA Home

Overall Site Plan

Arkansas State VA Home

Typical Floor Plan - Household

- Resident Unit
- Commons
- Assisted Bathing
- Staff Support
- Building Support
- Circulation

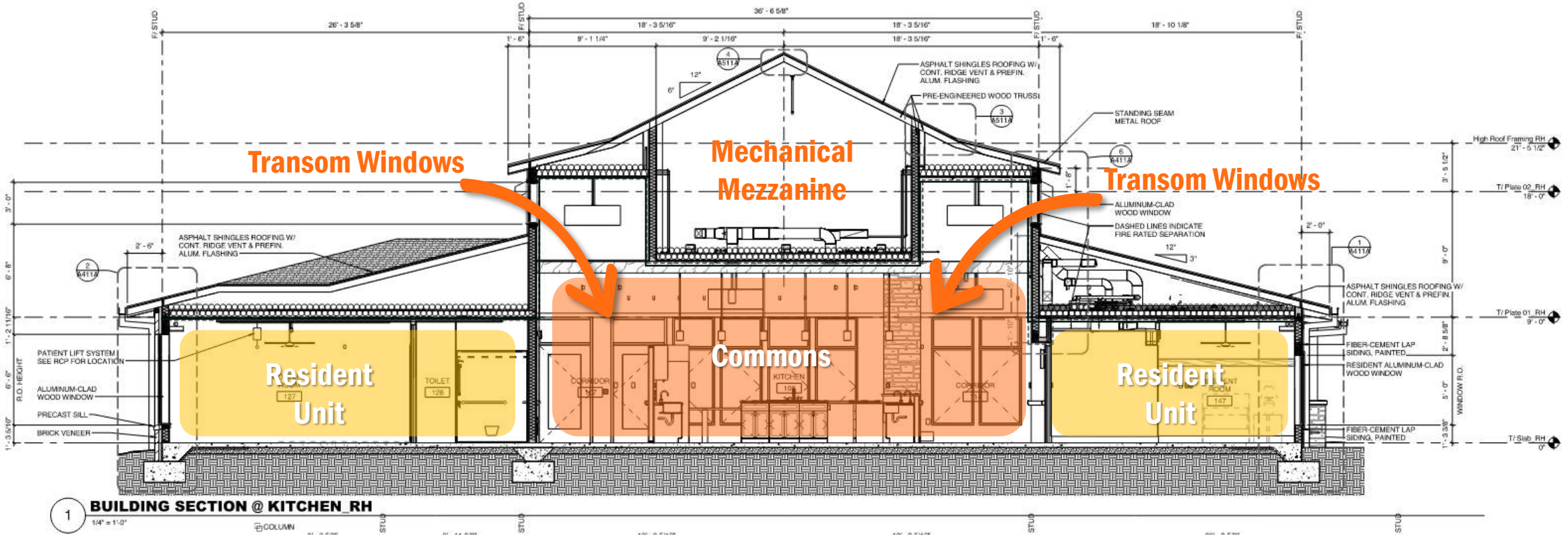
Arkansas State VA Home

Community Building – Floor Plan

- Commons
- Therapy
- Staff Support/ Admin
- Building Support
- Circulation

Arkansas State VA Home

Building Section - Household

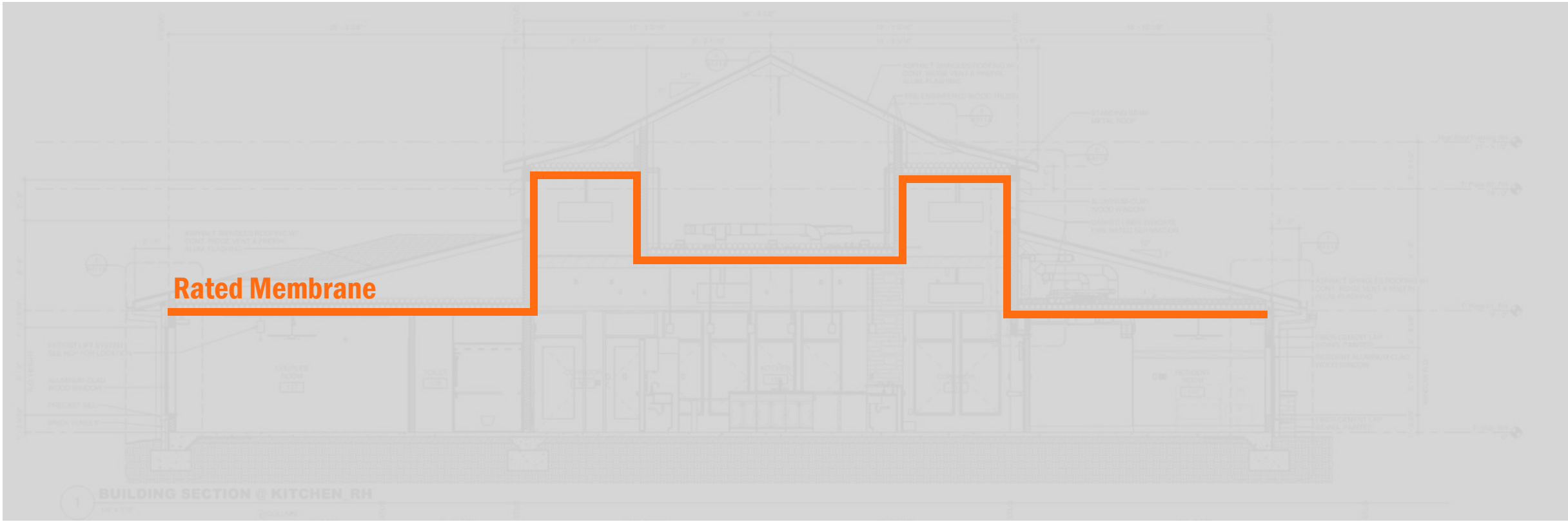


Arkansas State VA Home

PSL Headers + Transom Framing

Arkansas State VA Home

Building Section - Household



Arkansas State VA Home

Household Construction Process

Arkansas State VA Home

A new home for Veterans

Arkansas State VA Home

A new home for Veterans

Arkansas State VA Home

A new home for Veterans

Arkansas State VA Home

A new home for Veterans

Case Study 02

Hybrid IL units for the new consumer

Southminster Terraces

Hybrid Units for the New Consumer

- **Existing Life Plan Community**
- **Charlotte, NC**
- **Land-locked w/ dated stock**
  - Increase Density on site
  - Introduce new housing product
  - Replace Healthcare Building
  - Enhance amenities

Southminster Terraces

Hybrid Units for the New Consumer

- **New Hybrid Building**
  - Increase Density on site
  - Planned for 12+ units, demand yielded 30+ units
  - Generate revenue for new Healthcare building
  - Wood construction offered tremendous value over concrete and steel.
- **Demo under-utilized structures**
  - Small IL apartments
  - 3rd party Hospice service

Southminster Terraces

Hybrid Units for the New Consumer

- **New Hybrid Building**
  - 38 new apartments
  - Demand continues to grow on campus
- **New Healthcare Building**
  - Small-house model of care
  - Physical connection to independent living residences

Southminster

Hybrid Units for the New Consumer

- **Lower Level**
  - Parking
  - Building Support
  - Concrete Structure

Case Study

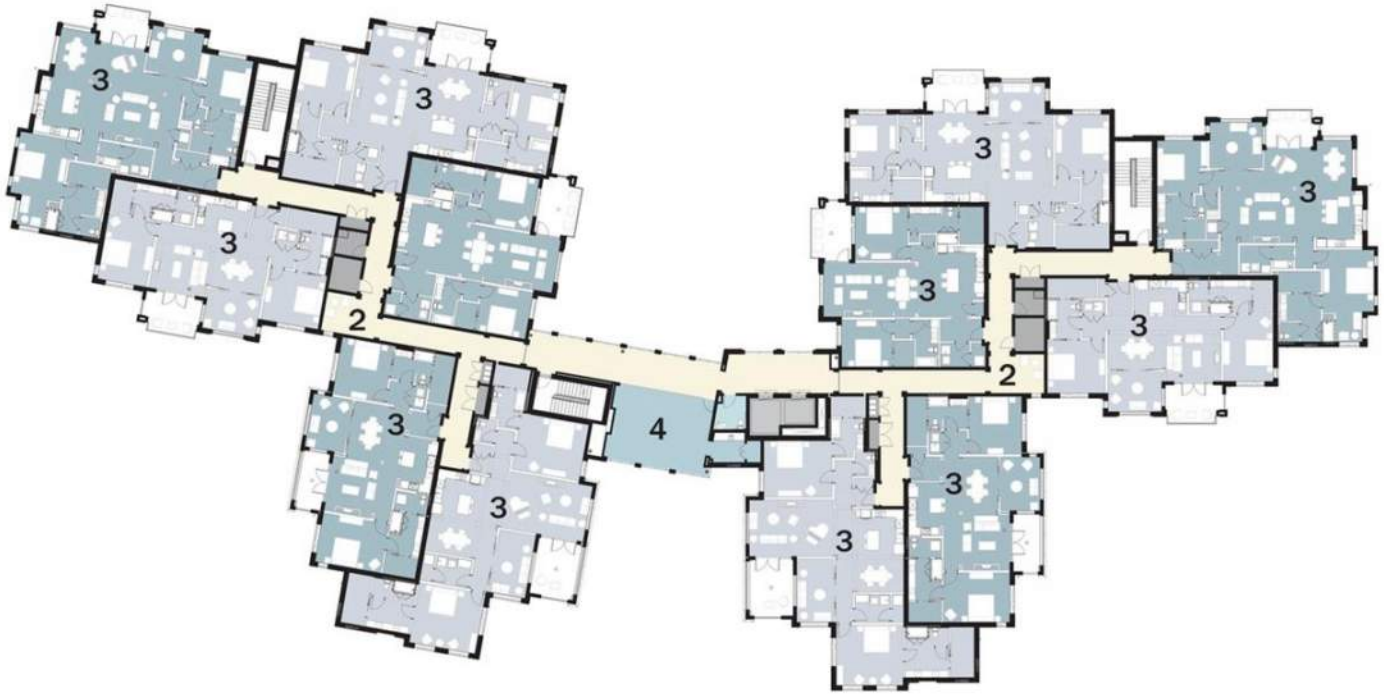
Hybrid Units for the New Consumer

- **Ground Level**
  - Parking
  - At-grade units
  - Concrete + Wood

Southminster

Hybrid Units for the New Consumer

- **Levels 2-4**
  - IL Apartments
  - Amenity Space
  - Wood Structure



Southminster

Hybrid Units for the New Consumer

Southminster

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Southminster

Hybrid Units for the New Consumer

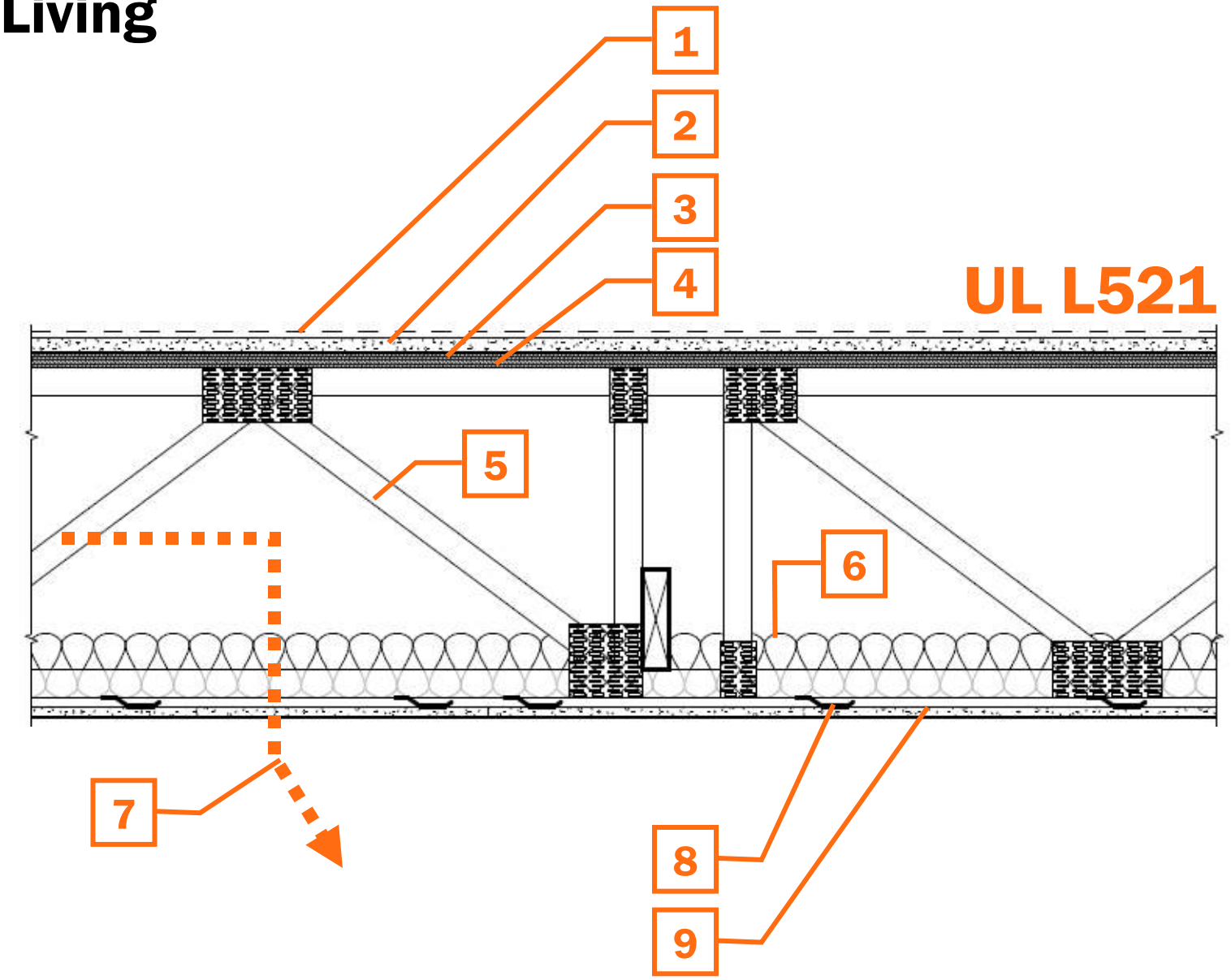
Wood Construction in Senior Living

Lessons + Best Practices

Wood Construction in Senior Living

Floor-Ceiling Assemblies

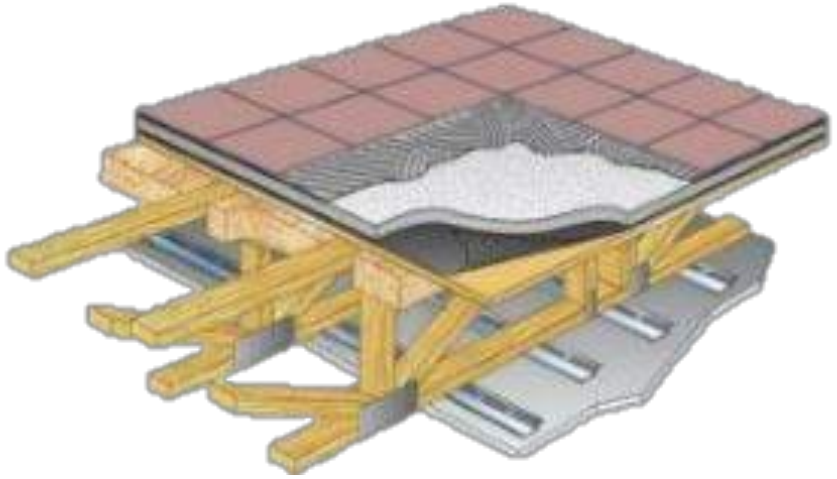
1. Floor Finish
2. Gypsum Underlayment
   - ¾” min, 1 ½” recommended
3. Acoustic underlayment
4. Subfloor (plywood/ OSB)
5. Wood Truss (18”-24” typ)
6. Cavity Insulation (NFPA 13)
7. Penetrations + Dampers
8. Resilient Channels
9. Type X gyp-board



Wood Construction in Senior Living

STC + IIC Considerations

- **STC = airborne sounds …easy!**
- **IIC = impact/vibration sounds…complicated!**
- **Current market demands higher STC & IIC ratings**
  - Floors
  - Demising Walls
  - Corridor Walls
  - Interior Unit Walls
- **Manage Client Expectations**
  - Residents transitioning from SFH
  - Nothing is “soundproof”
- **Without the data, it doesn’t exist**
  - Tested assemblies w/ all layers



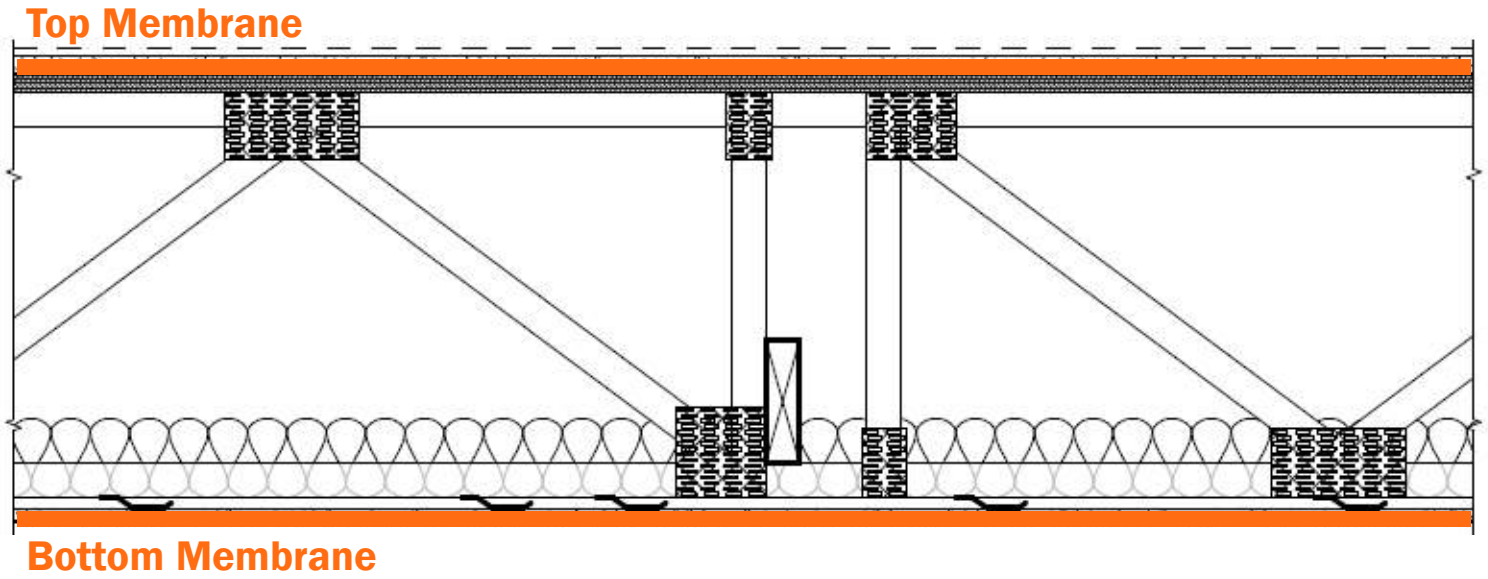
Floor Covering	STC	IIC
Sheet vinyl	62	53
Cushioned vinyl	62	55
Carpet and pad	62	81
Ceramic tile	62	54
Engineered wood laminate	61	55

Note: above assemblies include ¼” sound attenuation mat
Code minimum IIC = 50 (55+ recommended)
Code minimum STC = 50 (55+ recommended)

Wood Construction in Senior Living

Floor-Ceiling Assemblies

- **Must maintain membrane continuity**
  - Radiation dampers at diffusers
  - Fire Dampers at duct penetrations
  - Surface-mounted light fixtures (or rated enclosures)
  - Check area limitations for membrane penetrations (100 sq inches per 100 sq feet)
  - Double top plate required to avoid membrane gaps
  - Depression at roll-in showers



Wood Construction in Senior Living

Floor-Ceiling Assemblies

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Wood Construction in Senior Living

Floor Assemblies + Supporting Structure

Wood Construction in Senior Living

Floor Assemblies + Supporting Structure

2hr Fire Barrier

- Must be continuous
- 1hr floor.
- pport floors.

1hr Floor Ass

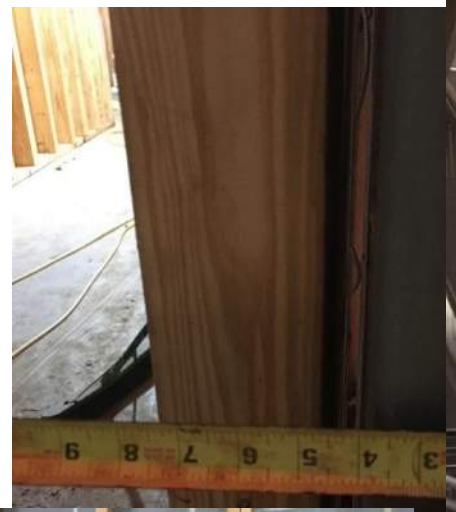
Bearing Wal

- Adds thickn
  assembly
- Requires 1h

Wood Construction in Senior Living

Floor Assemblies + Supporting Structure

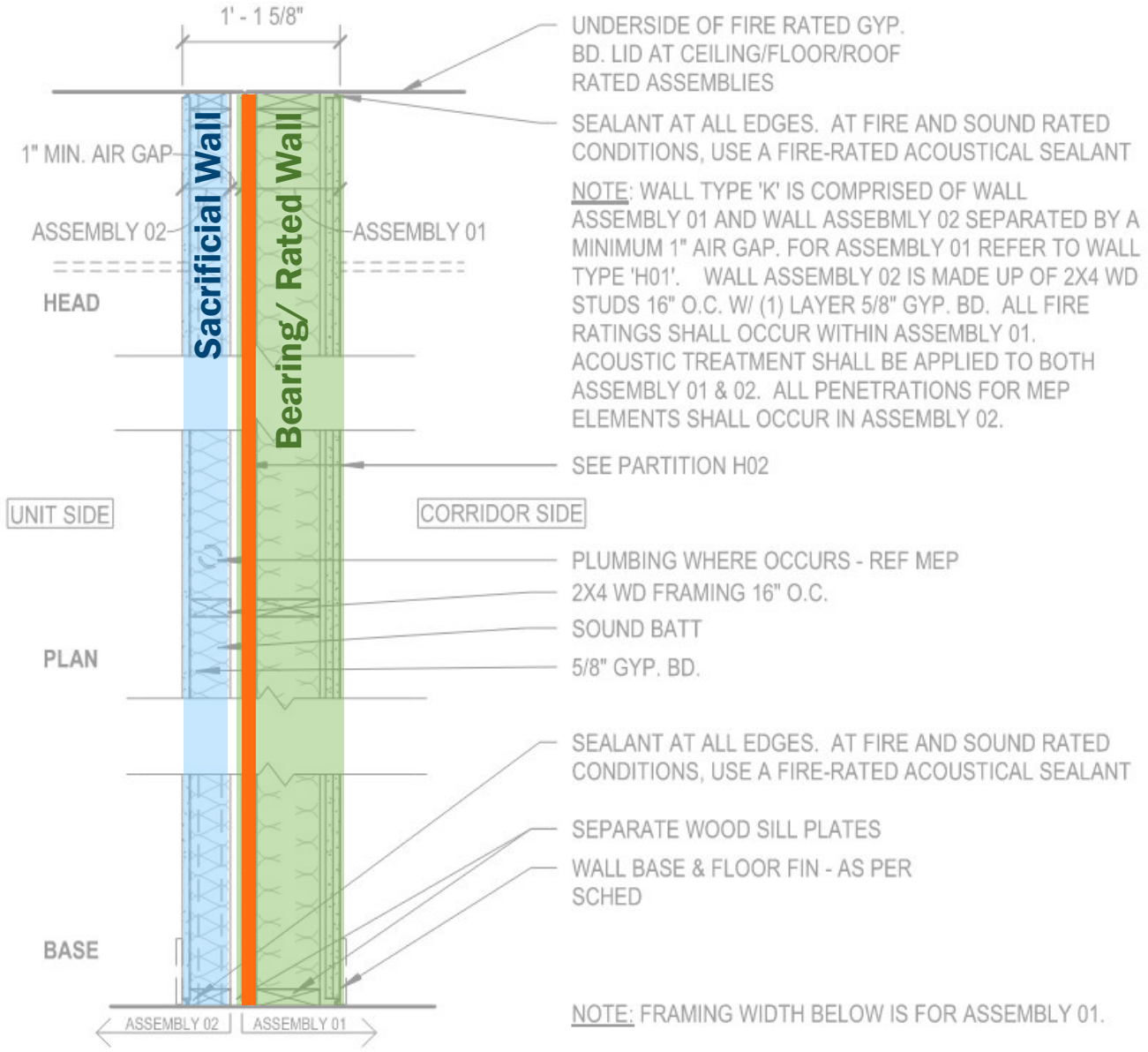
- **Review rating strategy w/ AHJ**
  - 1-hour wall with 1-sided protection
- **8” ADA rule at stair doors within CMU walls**
  - Solution: Add header to cover 18” span to achieve clearance requirements



Wood Construction in Senior Living

Wall Assemblies + Construction Sequencing

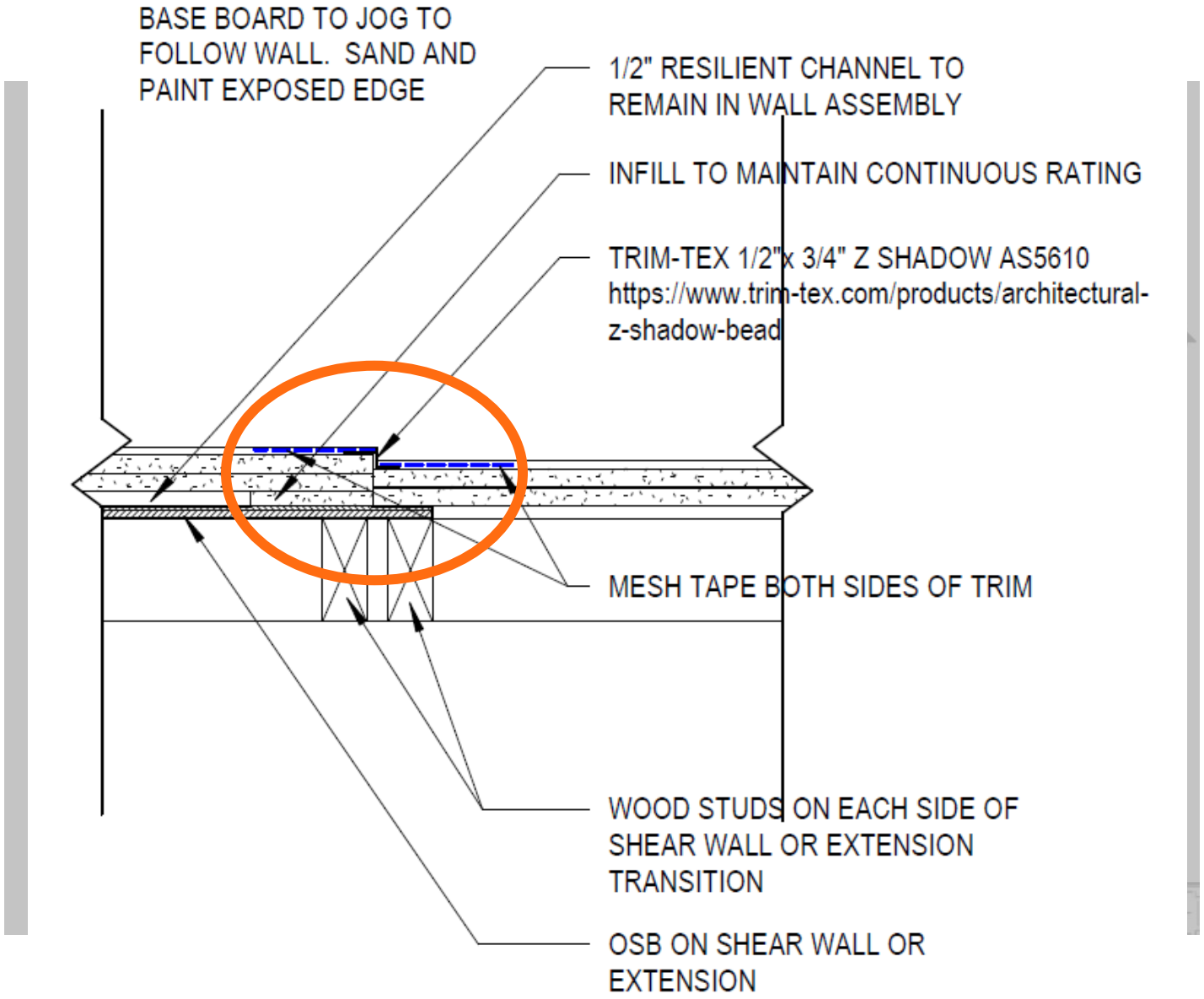
- **Managing Sound and Fire continuity**
- **Sacrificial wall to improve acoustics and rating continuity**
- **Concealed layers present sequencing issue**
  - Remobilizing trades to finish work
  - Consider plywood/OSB/glass-mat in lieu of paper-faced products (guaranteed RFI if you don't!)
  - Review UL assemblies for compliance



Wood Construction in Senior Living

Shear Walls + Construction Sequencing

- **Shear wall locations along corridors**
  - Additional plywood/OSB layer creates thickness differential relative to adjacent walls
  - Potential framing size differential relative to adjacent walls
  - Rating requirements may pose challenge with openings
    - Fire extinguisher cabinets
    - Shower niches
    - Medicine cabinets



Wood Construction in Senior Living

Thermal Bridging + Framing density

- **Cavity insulation effectiveness**
  - Reduced by 63% with steel framing
  - Reduced by 14-18% with wood framing
- **Energy Code requirements**
  - Increased demand for continuous insulation
  - 2015: Zone 5: R13 + 3.8ci or R-20
  - 2021: Zone 5: R13 + 7.5ci or R20 + 3.8ci
- **Framing density considerations**
  - Larger openings = larger framing members
  - Consider u-factor, or performance approach

Wood Construction in Senior Living

Conclusions

- Cost effectiveness
- Speed to market
- Sub-market familiarity
- Material availability
- Maintenance simplicity
- Easily tailored to client demands


Thank you

QUESTIONS?

This concludes The American Institute of Architects Continuing Education Systems Course

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