



# INNOVATIVE BUILDING SOLUTIONS: EXCEEDING OBJECTIVES IN MULTI-FAMILY CONSTRUCTION WITH ENGINEERED WOOD

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Provided by Louisiana-Pacific Corporation

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# INNOVATIVE BUILDING SOLUTIONS: EXCEEDING OBJECTIVES IN MULTI-FAMILY CONSTRUCTION WITH EWP

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



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# Course Description

Wood framing continues to grow as the material of choice for multi-family construction. This presentation will discuss innovations in the use of value added OSB products in applications such as optimized fire-rated assemblies and siding designed to resist moisture and impact. Discussion will focus on applications in Type III and Type V buildings, and opportunities for optimized solutions that offer greater durability at lower cost.

# Learning Objectives

1. Discuss the advantages of fire-rated cementitious-coated oriented strand board (FRCC OSB) sheathing in optimized fire-rated assemblies for Type III and V construction.
2. Determine how to achieve the desired aesthetics along with durability and weather-related requirements using engineered siding in multi-family and commercial projects.
3. Consider how to specify optimized wall assemblies that incorporate multiple building products.
4. Explore other optimized solutions for sub-floors and wall framing.





# AN **OVERVIEW** OF LIGHT COMMERCIAL AND MULTI-FAMILY CONSTRUCTION

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# Construction Types

**TYPE V:** All materials allowed

**TYPE IV:** Heavy Timber Construction

**TYPE III:** All materials allowed with exceptions  
(FRT material at exterior walls)

**TYPE I and II:** Non-combustible with FRT applications



# Type I & II

- Typical non-combustible applications
- Allowance for FRT materials in non-load bearing applications
  - e.g. wood studs in a podium
- Engineered and Traditional Wood Cladding up to 40'



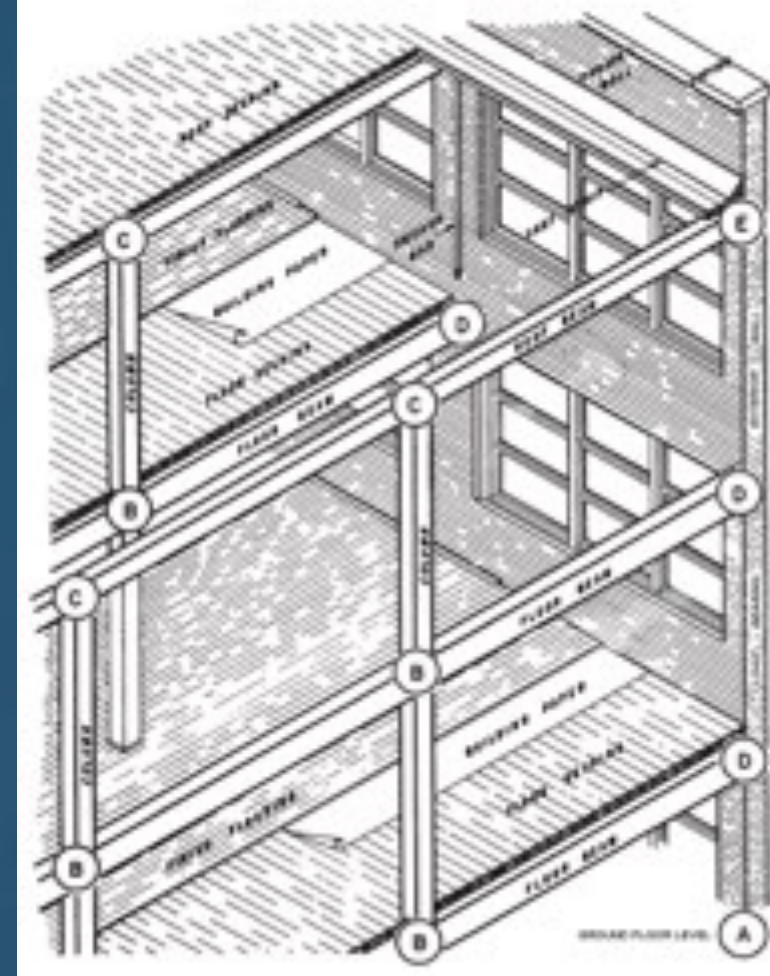
# Type III

- Historically, was ordinary brick and wood-frame construction
- In today's projects this is frequently all wood-framing with Fire Retardant Treated (FRT) or Fire Regime and Condition Class (FRCC) exterior walls and 2 hour exterior bearing walls
- Wood-based siding limited to 40'



# Type IV

- Exterior walls are of non-combustible materials
- Interior building elements are of solid or laminated wood without concealed spaces



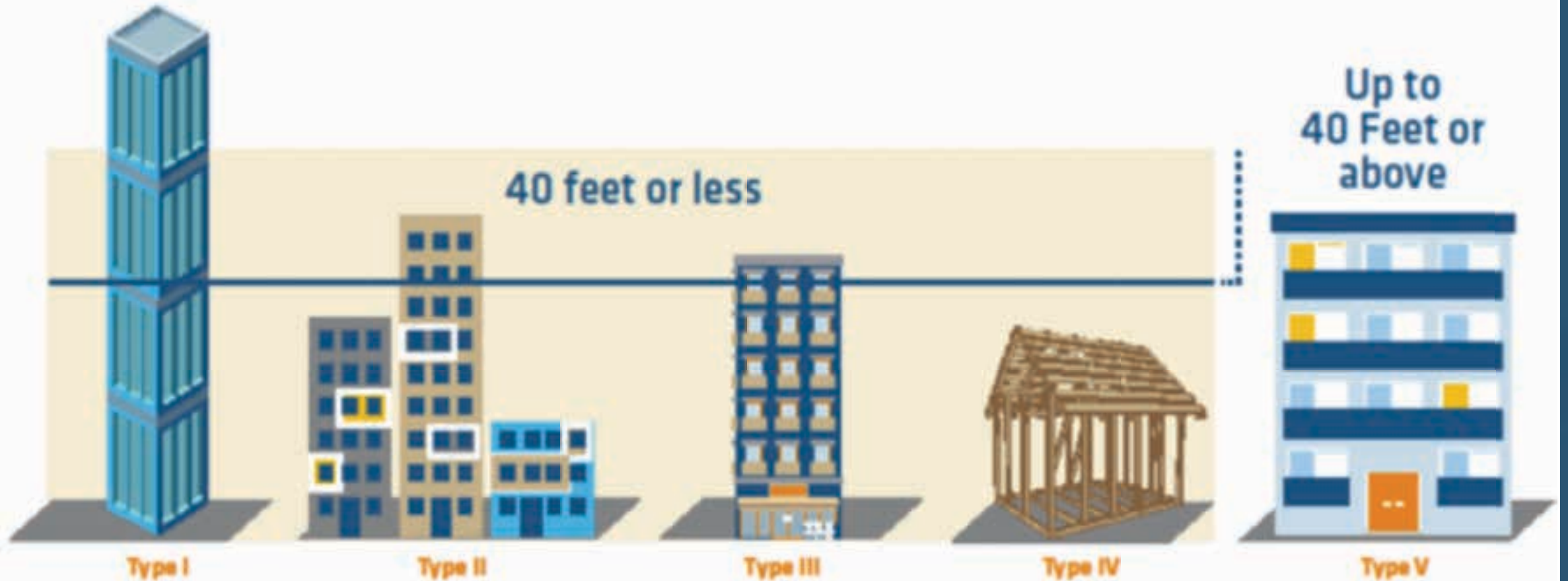


# Type V

1. Entire structure may utilize wood-framing: I-joists, OSB, trusses, 2x4's, wood veneer exterior siding
2. Often multi-family buildings
3. Combustible Siding NOT Limited in Height



# Building Type Recap



# New Applications and Trends

1. Enhanced OSB Substrates
2. Optimized Fire Rated Assemblies
3. Other EWP Applications
4. Treated Engineered Wood Siding



# Enhanced OSB Substrates



# FIBERGLASS REINFORCED CEMENTITIOUS COATED (FRCC) OSB



- 
- Ignition resistant Magnesium Oxide coating applied to one or both sides of APA rated panel
  - OSB substrate is not chemically treated – No reductions
  - Structural and fire performance in one sheet
  - Reference ESR 1365 for approved applications
  - Installs with standard fasteners – galvanized and stainless not required



## FRCC OSB – Testing

- Coated side of FRCC OSB satisfies provisions of IBC 2303.2
  - Flame spread index of 25 or less in 10-minute test
  - Flame progression less than 10'-6" for full 30 minute test.
  - Satisfies smoke development criteria
  - Each sheet of FRCC OSB is stamped it satisfies the performance requirements of Section 2303.2
- FRCC OSB wall assemblies tested in accordance with ASTM E119
  - U348, U349, U350, W408, V337, Intertek LPB/WPPS 60-01, and Intertek LPB/WPPS 60-02



Tunnel Test

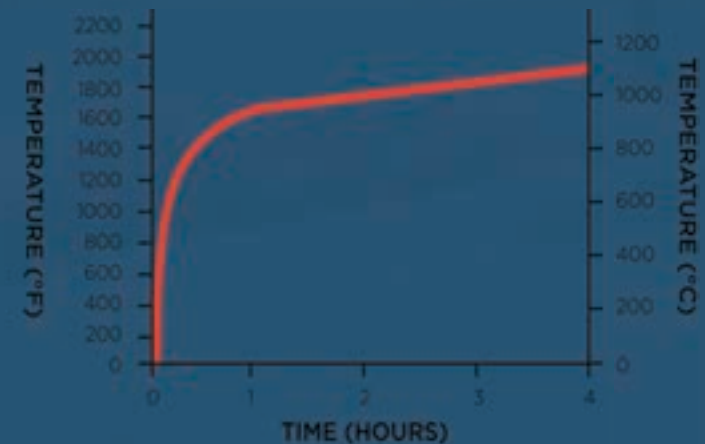


Wall Assembly Test

# Wall Assemblies and Cavity Insulation

Is wall cavity insulation an important component in fire resistant wall assemblies?

- YES, it can be
- Insulation noted in listings is a requirement, not optional. Pay attention to the details.
- High density or mineral wool may be required to protect the studs
- Heed the insulation requirements noted in the assembly listings



# FRCC OSB Applications – ESR 1365 Section 4.2

## Type I & II Exterior Walls and Roof Sheathing

- 2-sided FRCC OSB required

## Type III, IV, V Roof Sheathing Applications at fire walls

- IBC 706.6 Exception
- IRC R302.2.2(2)
- 1-sided FRCC OSB facing the interior

## Type III Exterior Walls

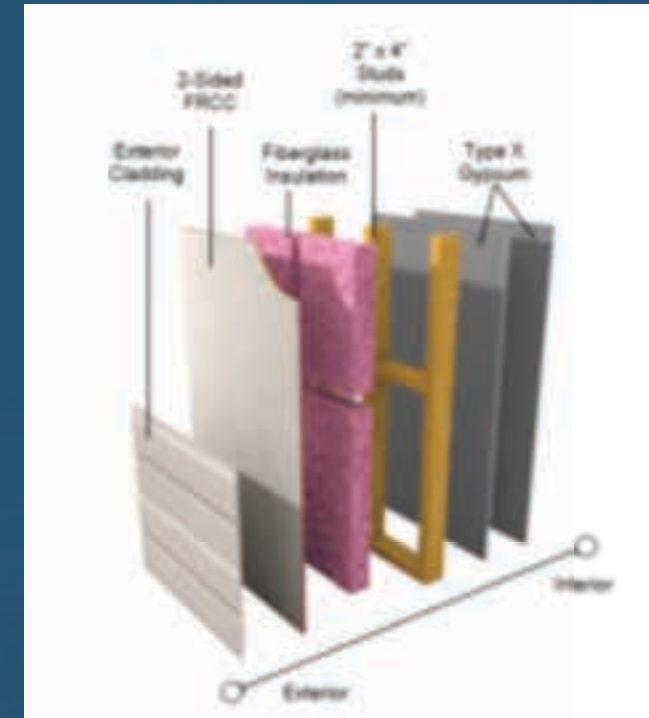
- 2-sided FRCC OSB required

## Type V – No restrictions

# FRCC OSB Applications – Type III Construction

## 2-Hour Exterior Bearing Walls – FSD > 10'

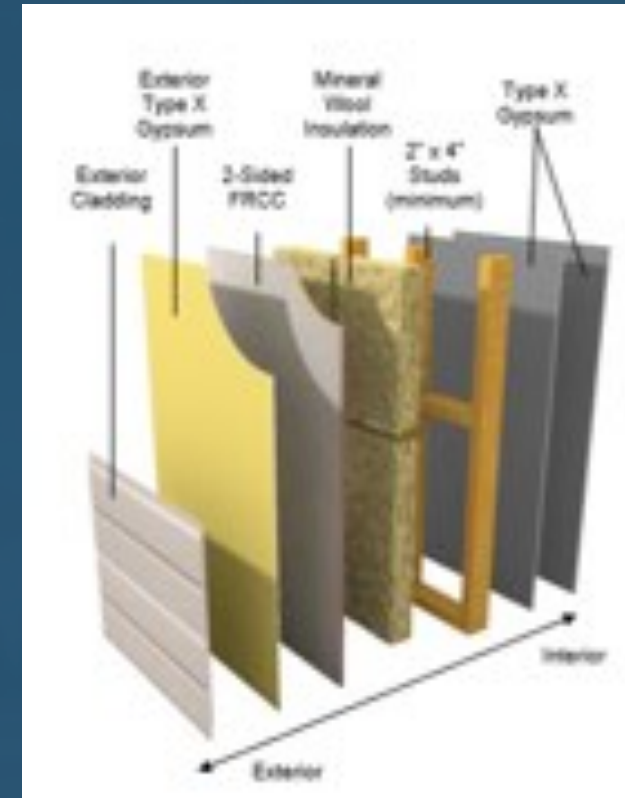
- U349 2-Hour Interior Only
- No reductions – Not chemically treated
- Alternative to FRT Plywood Assembly
- Any approved FRT lumber can be used.
- Nominal Fiberglass Insulation
  - 0.25pcf minimum fiberglass insulation
  - High density or mineral wool required with FRT assembly



# FRCC OSB Applications – Type III Construction

## 2-Hour Exterior Bearing Walls – FSD < 10'

- V337 2-Hour
- No reductions – Not chemically treated
- Alternative to FRT Plywood Assembly
  - FRT plywood and two layers of exterior gypsum
- **ELIMINATES LAYER OF EXTERIOR GYPSUM**
  - Associated time savings
- Thinner wall assembly
- Expedite construction





# FRCC OSB Applications – Intertek LPB/WPPS 60-01

- Single-family 1 hour exterior walls
- Type V exterior walls
- Type I and II exterior non-bearing walls
  - 2-sided FRCC required
  - When structural panel is required
  - Eliminates exterior gypsum
- Assembly LPB/WPPS 60-02
  - Non-bearing with steel studs

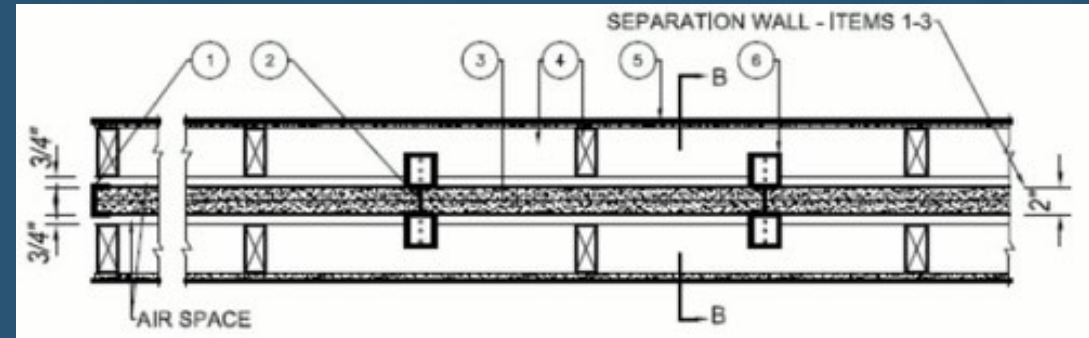


# Want to Install 1 or Two Layers?



# TYPE V FIRE WALLS

- IBC section 706.2
  - Code geared towards a single fire barrier
- IBC section 706.2 requires structural stability
- IBC section 706.3 allows for combustible material in type V
- 2-Hour for type V construction
- Shaft wall assembly with two 1" layers of gypsum commonly used





# Type V Fire Walls – Shaft Wall Pros and Cons

- Pros
  - Provides 2-hour fire resistant barrier
  - Easily satisfies structural stability requirements
  - Commonly done, Familiarity
- Cons
  - Fire resistance is provided by two layers of 1” gypsum
  - Structural stability questions from lack of structural panel in design
  - Potentially introduces another trade during framing

# Type V Fire Walls – NFPA 221

**706.2 Structural Stability.** Fire walls shall be designed and constructed to allow collapse of the structure on either side without collapse of the wall under fire conditions. Fire walls designed and constructed in accordance with NFPA 221 shall be deemed to comply with this section.

## NFPA 221 Approach

- Two 1-hour walls back to back instead of single barrier
- Satisfies structural independence
- Each wall has 1-hour symmetric resistance
  - Consistent with type V exterior walls with FSD<10'
- 2-hour complete resistance with both walls

Table 4.6 Fire Resistance Ratings for Double Wall Assemblies

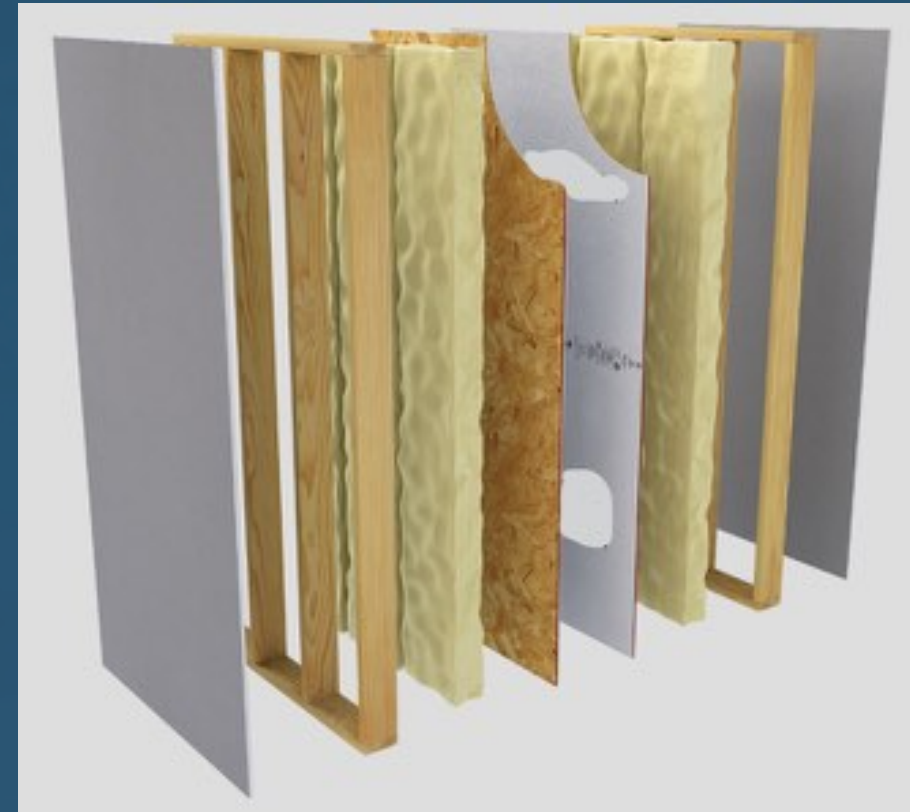
Fire Resistance Rating of Each Wall (hr)	Equivalent to Single Wall (hr)
3	4
2	3
1	2

NFPA 221 Table 4.6

# Type V Fire Walls – FRCC OSB

FRCC Assembly LPB/WPPS 60-01 in a back to back configuration

- Two 1-hour walls back to back
- Ideal for shear walls
- Eliminate gypsum in the seismic joint
- Facilitate construction
- 2x6 and 15/32" FlameBlock
  - ESR Section 4.3.4
- Can add 5/8" type X to the interior for 2-hour interior resistance, if desired

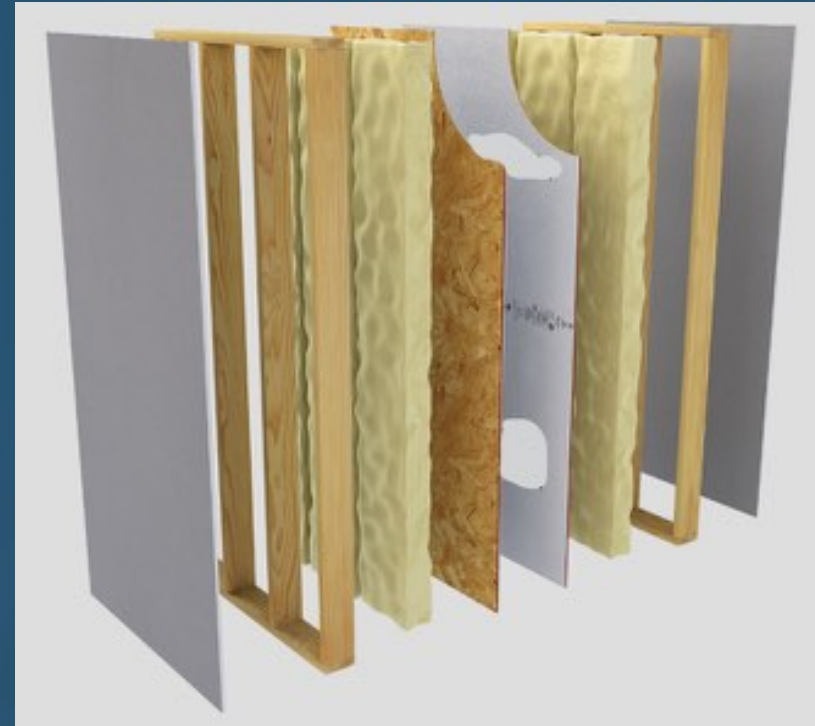


Intertek LPB/WPPS 60-01 Back to Back

# Single Family True Zero Lot Line Residence – FRCC OSB

FRCC Assembly LPB/WPPS 60-01 in a back to back configuration

- Single Family independent tax lots where 1-hour walls required
- Townhome construction
- Provides 1-hour walls back to back
- Eliminate gypsum at the property line
- Facilitate construction
- 2x6 and 15/32" FlameBlock
  - ESR Section 4.3.4

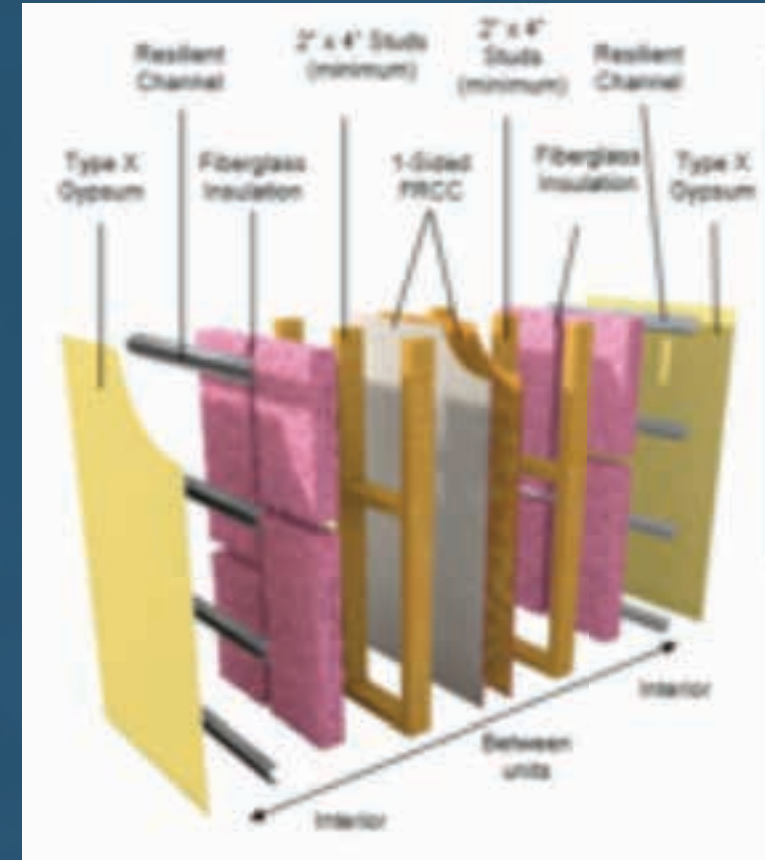


Intertek LPB/WPPS 60-01 Back to Back

# Townhome Separations – FRCC OSB

## FRCC Assembly U350 Configuration B

- 2-hour common wall – 2018 IRC 302.2.2
- STC=61
  - Resilient Channel required for STC
- Each wall offers a minimum of 1-hour interior resistance
- Alternative to Shaft Wall assembly



# OTHER ENGINEERED WOOD APPLICATIONS

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# Other Multi-family EWP Applications



# Integrated WRB





# Enhanced Flooring



# TREATED ENGINEERED WOOD SIDING DURABILITY AND AESTHETICS

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The background of the slide is a photograph of a building facade, likely a commercial or multi-family structure, with a blue semi-transparent overlay. The building features a prominent entrance with a large sign that reads "BAR-B-O" and "COCO". The text "Cladding options for light commercial and multi-family projects" is centered over the image in a white, sans-serif font.

# Cladding options for light commercial and multi-family projects

# The Look of Wood Without All the Worries

Poor detailing and maintenance can lead to performance issues





# Vinyl Siding

- 80% PVC
- Often lower cost
- Most common length – 12'
- Low impact/wind resistance
- Shallow texture
- Less environmentally friendly
- Less rigid for more difficult siding installation



# Fiber Cement Siding

- Silica sand, Portland cement & cellulose fibers
- Rot and decay resistant
- Class A Fire-resistance



employer shall fully and properly implement the engineering controls, work practices, and respiratory

protection specified for the task on Table 1, unless the employer assesses and limits the exposure of the employee

to respirable crystalline silica in accordance with paragraph (d) of this section.

TABLE 1—SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment/task	Engineering and work practice control methods	Required respiratory protection and minimum assigned protection factor (APF)	
		≤4 hours/shift	>4 hours/shift
(i) Stationary masonry saws .....	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None .....	None.
(ii) Handheld power saws (any blade diameter).	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions: —When used outdoors .....	None .....	APF 10.
	—When used indoors or in an enclosed area .....	APF 10 .....	APF 10.
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less).	For tasks performed outdoors only: Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None.	None.



# Fiber Cement Siding Characteristics





# Rain Screens/Furring Strips

- Some fiber cement panel products require rain screens behind siding in multi-family projects
- Potential need for custom door and window solution
- TEWS warranties typically do not require a rain screen allowing for quicker installation
- Rain screens add material cost, labor cost and may extend construction schedules



# AN OVERVIEW OF TREATED ENGINEERED WOOD SIDING

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# Treated Engineered Wood Siding (TEWS)

- Made from renewable wood
- Bound with adhesives
- Select TEWS products are treated to resist fungal decay & termites



# Characteristics of TEWS

- Assortment of products
- Realistic, deep cedar-grain texture
- Strong, light weight and easy to handle
- Smaller carbon footprint
- Superior impact, wind and hail performance
- Resistant to decay and insect damage
- Withstands extreme temperatures
- Warranty  $\leq 50$  years





# Sustainability

## Forestry-

- Made with fast growing wood
- SFI is now recognized by LEED
- Land reforested at 2 to 1 ratio
- Trees are grown within 100 miles of each mill.

## Manufacturing-

- 99% log used
- Bark used as biofuel
- Low-emitting binding agents
- Less energy to produce

**240 million acres** across  
U.S./Canada certified to the  
SFI management standard



# TEWS Freight Advantages

- Lower material weight  
strand TEWS – 1.5 psf  
fiber cement – 2.3 psf
- More efficient freight  
transportation, less  
emissions



# Building Code Acceptance

- IBC & IRC compliant

## 1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2015, 2012, 2009, 2006, and 2003 *International Building Code*® (IBC)
- 2015, 2012, 2009, 2006, and 2003 *International Residential Code*® (IRC)

Properties evaluated:

- Exterior siding
- Structural





# TEWS and the Elements

Resistance to:

- Hail and other impacts
- Termites
- Freeze/thaw degradation
- High winds





# TEWS Performance

Select TEWS products have been tested for:

- Structural performance
- Moisture resistance
- Termite resistance

Testing conducted by:

- Research colleges (Mich Tech, Texas Tech, U of Maine, NASA)
- Industry associations, groups and councils
- Manufacturers



# Cherrywood Pointe Senior Living – Forest Lake, MN





# Fairfield Inn – Galliano, LA



# TEWS – Wind Resistance

TABLE 3b—PANEL SIDING - MAXIMUM ULTIMATE COMPONENT AND CLADDING DESIGN WIND SPEED,  $V_{ult}^1$

PERFORMANCE CATEGORY	MAXIMUM WALL STUD SPACING <sup>2</sup> (inches)	FASTENER SPACING <sup>3</sup> (inches o.c.)		MAXIMUM ULTIMATE WIND PRESSURE (psf)	MAXIMUM ULTIMATE DESIGN WIND SPEED, V <sub>ult</sub> <sup>4</sup> (mph)		
		Edges	Field		Wind Exposure Category		
					B	C	D
3/8	16	6	12	77	160	150	130
			6	133	200	180	180
	24	6	12	51	140	120	110
			6	102	200	160	150
7/16	16	6	12	74	160	140	130
			6	133	200	180	180
	24	6	12	50	140	120	110
			6	99	200	160	150
19/32	16	6	12	69	160	140	130
			6	133	200	180	180
	24	6	12	46	130	115	-
			6	92	180	160	150

For SI: 1 inch = 25.4 mm, 1 psf = 47.88 Pa, 1 mph = 1.6 kph.



# TEWS – Shear Wall Resistance

PERFORMANCE CATEGORY	MINIMUM NAIL PENETRATION IN FRAMING (inches)	PANELS APPLIED DIRECTLY TO FRAMING				
		Nail Size (Common or Galvanized Box)	Nail Spacing at Panel Edges (inches)			
			6	4	3	2 <sup>4</sup>
$\frac{5}{16}$ <sup>5,6</sup>	1 <sup>1</sup> / <sub>4</sub>	6d	180	270	350	450
$\frac{3}{8}$ <sup>5,6</sup>			200	300	390	510
$\frac{3}{8}$ <sup>5,6</sup>	1 <sup>1</sup> / <sub>2</sub>	8d	220	320	410	530
$\frac{7}{16}$ <sup>5</sup>			240	350	450	585
$\frac{19}{32}$ <sup>5</sup>	1 <sup>5</sup> / <sub>8</sub>	10d	340	510	665 <sup>4</sup>	870

For **S1**: 1 inch = 25.4 mm, 1 plf = 14.6 N/m.

# TEWS Products Beyond Siding/Trim



Vented Soffit



# TEWS vs Fiber Cement Siding - Impact

Wildcat Golf Course  
Houston, TX

- Water shed building
- 7-year-old **fiber cement** siding installation
- Replaced with **TEWS** in 2009



2013

# Types of TEWS Finishing Applications

Field Applied



Flood Coated



Spray Applied







# FLEXIBILITY OF TEWS FOR **CUSTOM** SOLUTIONS

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# TEWS Adaptations for Improved Installation Time

Self-aligning lap siding, shakes, & shingles

- Faster installation time
- Easier installation with less measuring

TEWS Substrate



# TEWS Adaptations for Enhanced Aesthetic

## HIDDEN FASTENER SYSTEM

- No visible nail heads

## One Piece Corner Trim

- Eliminates visible nail heads and reduces installation time

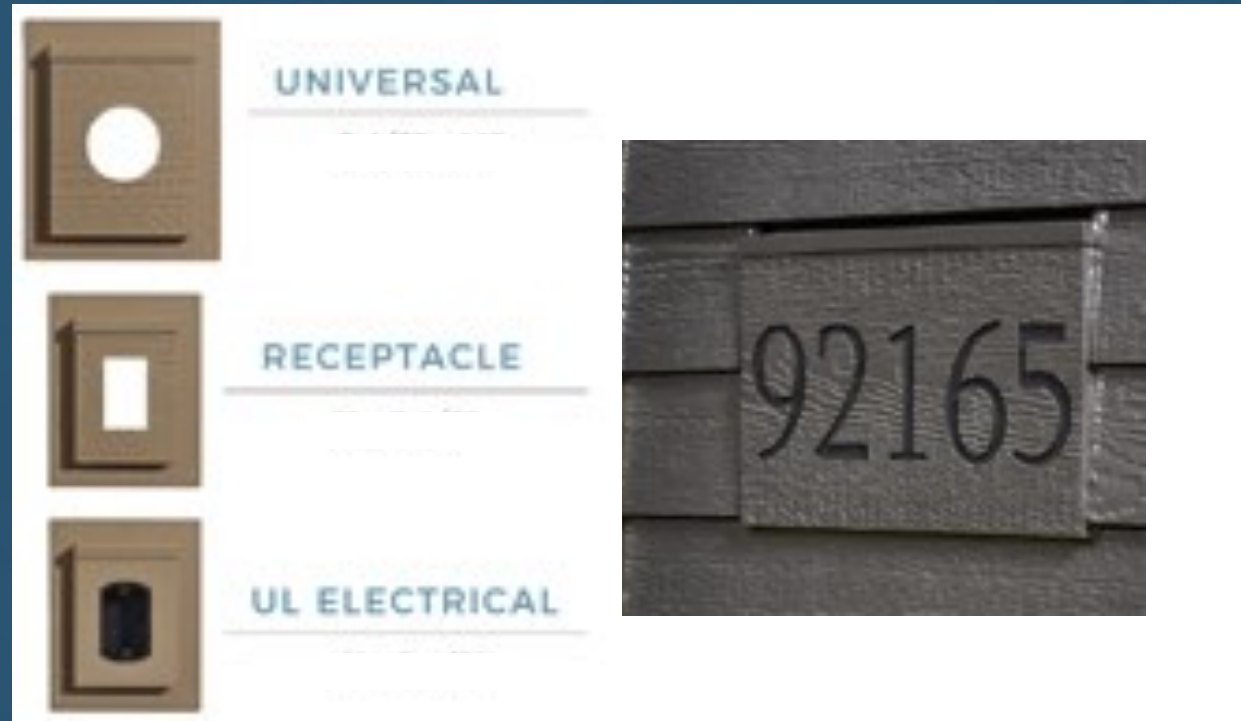
## Post Wrap System

- Eliminates visible nail heads and reduces installation time



# TEWS Accessories - Mounting Blocks

- Pre-manufactured accessories available to save time and labor on jobsite
- Opportunity to match siding color for greater overall aesthetic





# TEWS & ARCHITECTURAL STYLES

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# Duluth Trading Co. – Noblesville, IN



Trim Boards to  
Cover Seams

# Famous Dave's – Timonium, MD



# Cedar Manor- Forest Grove, OR





# Strand Panel Siding Installed with **Extrusion System Profile**



# Architectural Definition of Panels





# Lap on Lap



# Multiple Aesthetics





# Summary

Advancements in Enhanced Engineered

Woods Continues to Grow

Fire Resistant OSB

Integrated WRB, LSL Wall framing,

Enhanced Flooring

Treated Engineered Wood Siding

# Thank You

This concludes The American Institute of  
Architects Continuing Education Systems  
Course

Questions?

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