



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

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MEETING FIRE CODES WITH OSB

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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

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

CODE COMPLIANCE

- Code-compliant applications of FRCC OSB are described in ESR-1365
- Requirements for fire-resistant construction are specified in IBC, IRC, and state and local building and safety codes
- ICC-ES considers the performance requirements of products in construction applications and establishes test criteria
- ICC-ES publishes acceptance criteria and ESRs
- Test procedures are regulated by ASTM, NFPA, UL etc.
- ESR reports specify the code-compliant applications. Code officials have the authority to permit FRCC OSB in various applications
- www.icc-es.org/evaluation_reports/

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

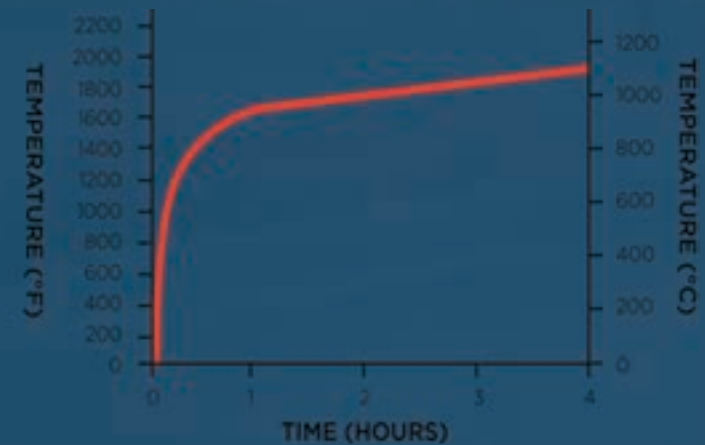


Wall Assembly Test

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

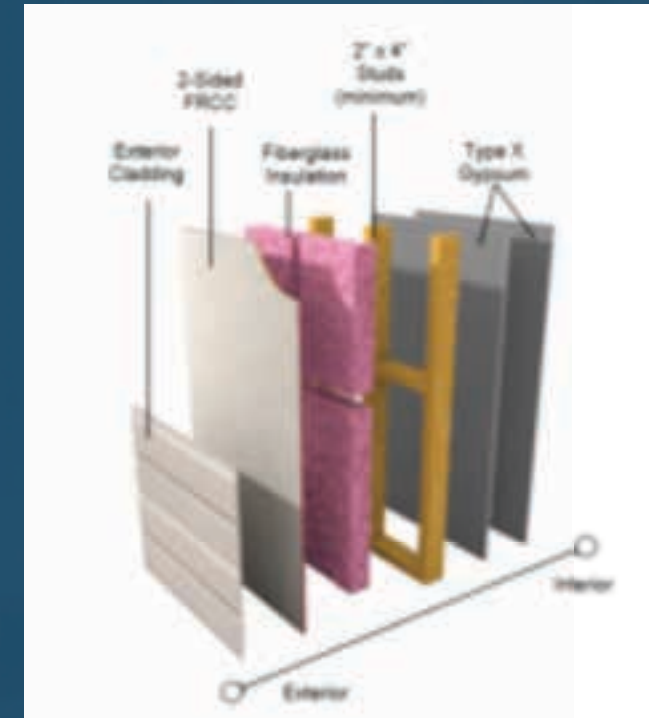
- 2-sided FRCC OSB required

Type V – No restrictions

FRCC OSB Applications – Type III Construction

2-Hour Exterior Bearing Walls – FSD > 10'

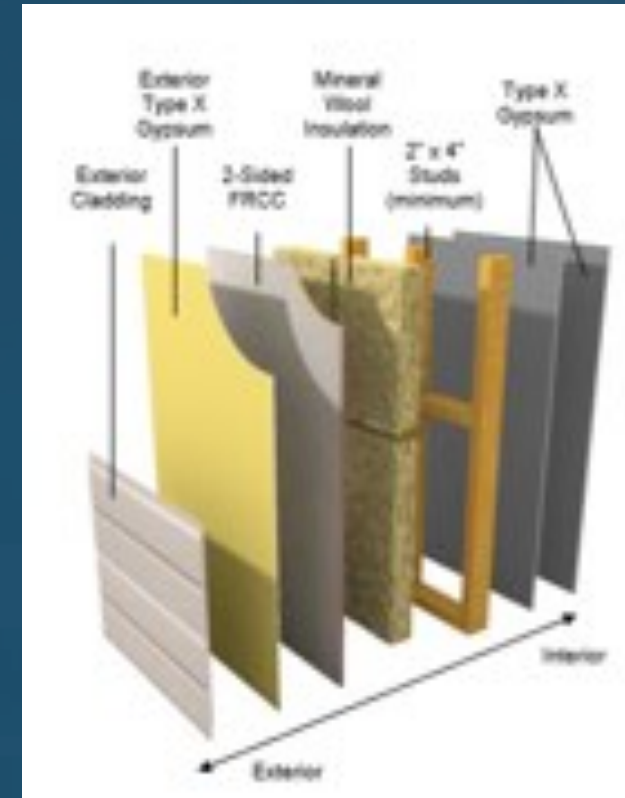
- U349 2-Hour Interior Only
- No reductions – Not chemically treated
- Alternative to FRT Plywood Assembly
- Any approved FRT lumber can be used.
- Nominal Fiberglass Insulation
 - 0.25pcf minimum fiberglass insulation
 - High density or mineral wool required with FRT assembly



FRCC OSB Applications – Type III Construction

2-Hour Exterior Bearing Walls – FSD < 10'

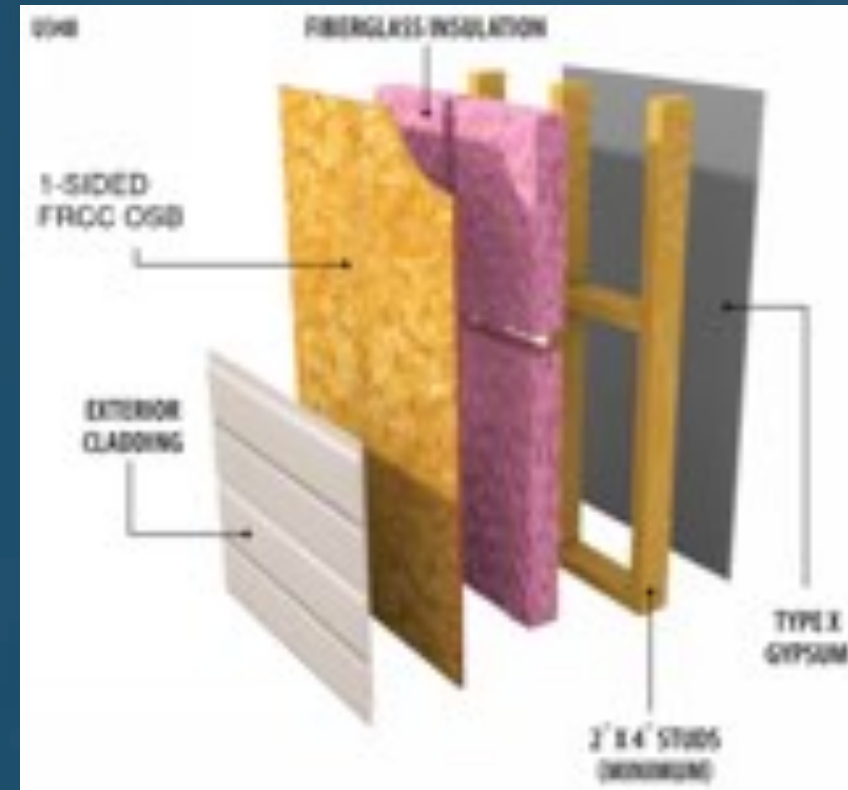
- V337 2-Hour
- No reductions – Not chemically treated
- Alternative to FRT Plywood Assembly
 - FRT plywood and two layers of exterior gypsum
- **ELIMINATES LAYER OF EXTERIOR GYPSUM**
 - Associated time savings
- Thinner wall assembly
- Expedite construction



FRCC OSB Applications – Type III Construction

1-Hour Exterior Non-Bearing Walls – FSD > 10'

- U348 1-Hour Interior Only for Type III
 - 2-sided FRCC required (ESR 1365 Section 4.2)
- No reductions – Not chemically treated
- Alternative to FRT Plywood Assembly
- Type V exterior walls



FRCC OSB Applications – Type III Construction

1-Hour Exterior Non-Bearing Walls – FSD < 10'

- Intertek Assembly LPB/WPPS 60-01
 - 2-sided FRCC required (ESR 1365 Section 4.2)
- No reductions – Not chemically treated
- Alternative to FRT Plywood Assembly
 - FRT plywood and one layer of exterior gypsum
- **ELIMINATES ALL EXTERIOR GYPSUM**
- Thinner wall assembly
 - Thinner window and door casings
- Expedite construction



FRCC OSB Applications – Intertek LPB/WPPS 60-01

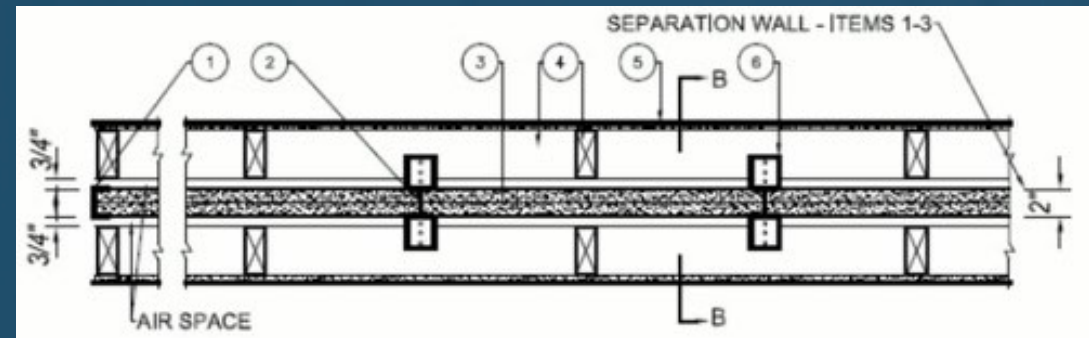
Other Applications

- Residential construction FSD<5'
- 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



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

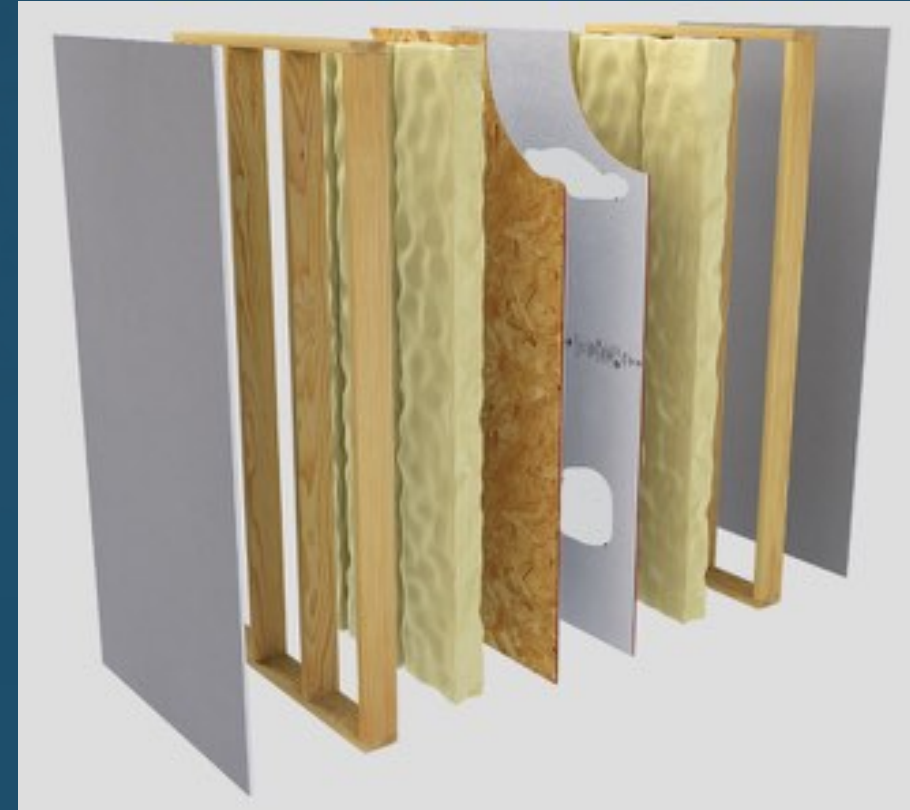
Fire Resistance Rating of Each Wall (hr)	Equivalent to Single Wall (hr)
3	4
2	3
1	2

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

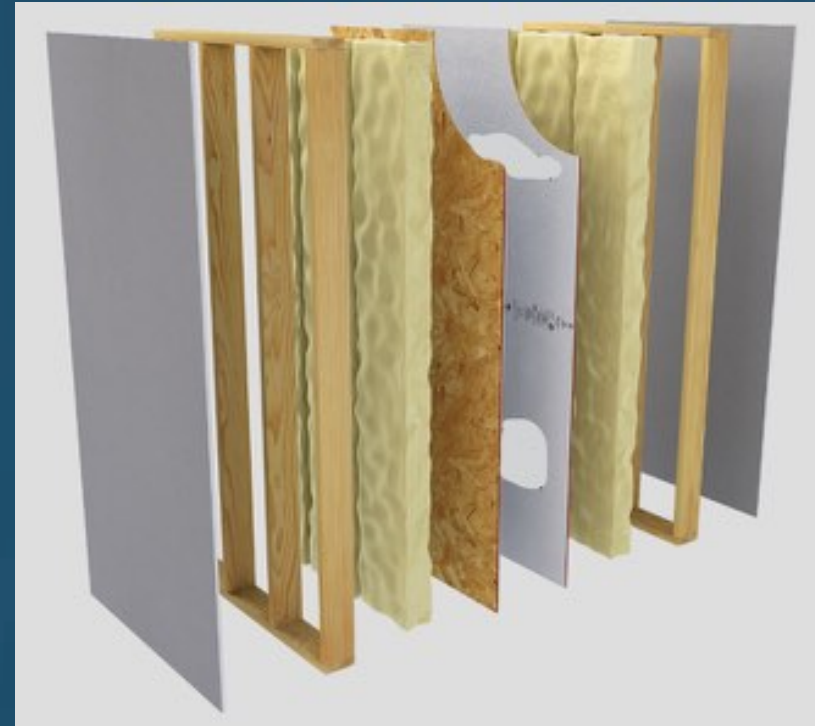


Intertek LPB/WPPS 60-01 Back to Back

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

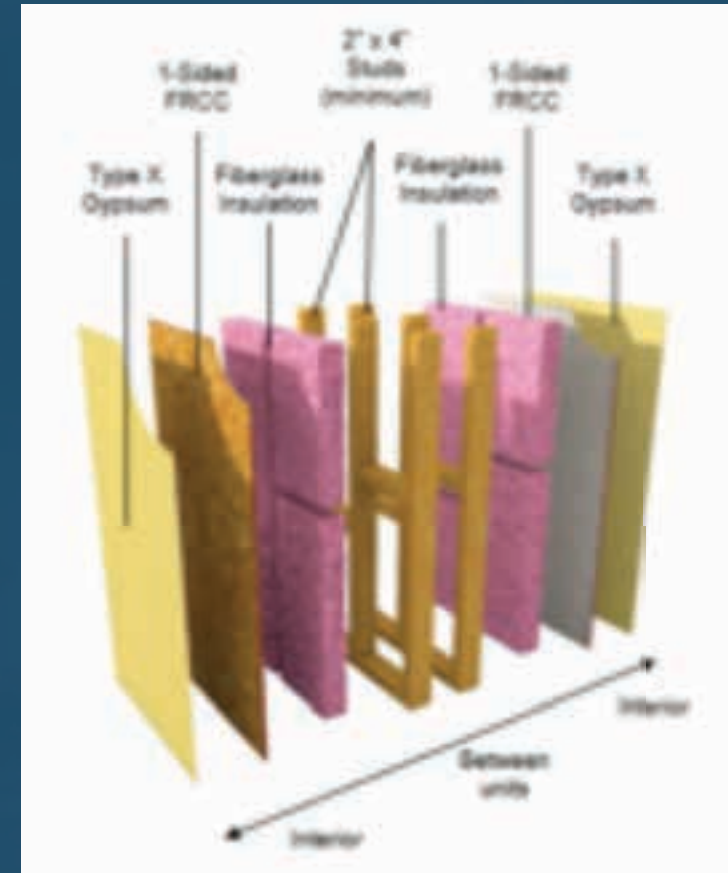


Intertek LPB/WPPS 60-01 Back to Back

Townhome Separations – FRCC OSB

FRCC Assembly U350 Configuration A

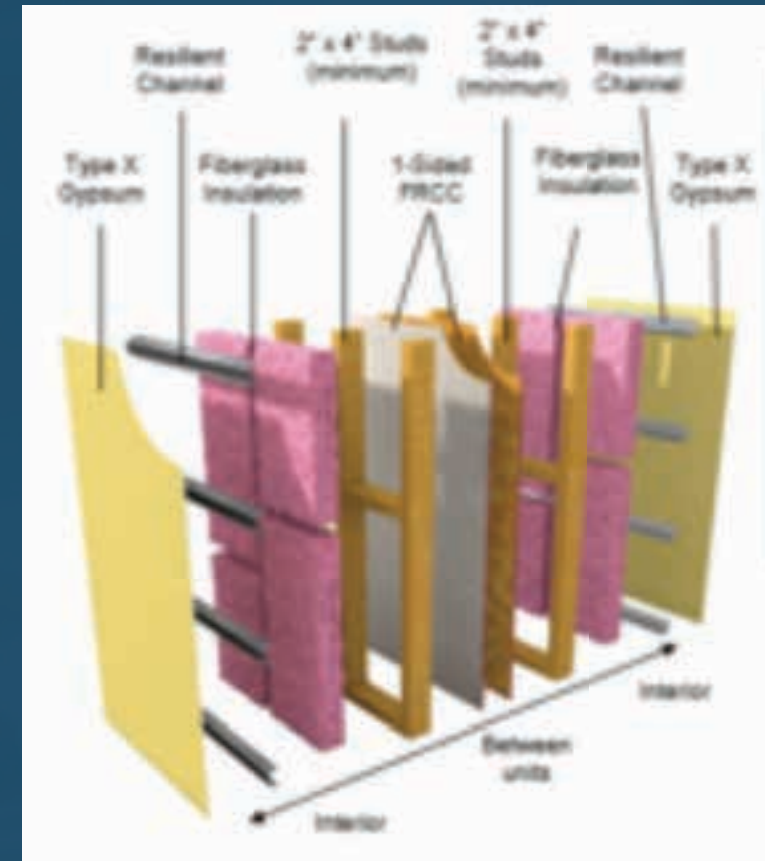
- 2-hour common wall – 2018 IRC 302.2.2
- STC=62
- Each wall offers a minimum of 1-hour interior resistance
- Alternative to Shaft Wall assembly



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





TREATED ENGINEERED WOOD SIDING DURABILITY AND AESTHETICS

Type I & II

- Treated engineered wood siding used in light commercial applications is often allowed given typical structure heights up to 40 feet



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



Type V

- Type V, R-2: entire structure may utilize wood-framing: I-joists, OSB, trusses, 2x4's, wood veneer exterior siding
- Often multi-family buildings



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". To the right, there is a circular logo on the wall. The overall aesthetic is modern and professional.

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



Fiber Cement Siding

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



Fiber Cement Siding Characteristics

OSHA may require:

- Vacuum saws
- Wet saws
- Special training
- Respirators



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 —When used indoors or in an enclosed area	None APF 10	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

- Cracking, shrinkage after installation
- Smoother wood textures highlight issues
- Multifamily projects require a rainscreen, placing furring strips behind siding and reducing the support behind it.



Masonry: Brick and Stone

- Often considered premium option
- Durable
- No need to paint
- 50-plus-year limited warranties
- Low maintenance
- Typically higher cost choice
- Requires more skilled labor
- Longer installation times.



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



AN OVERVIEW OF TREATED ENGINEERED WOOD SIDING

Treated Engineered Wood Siding (TEWS)

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



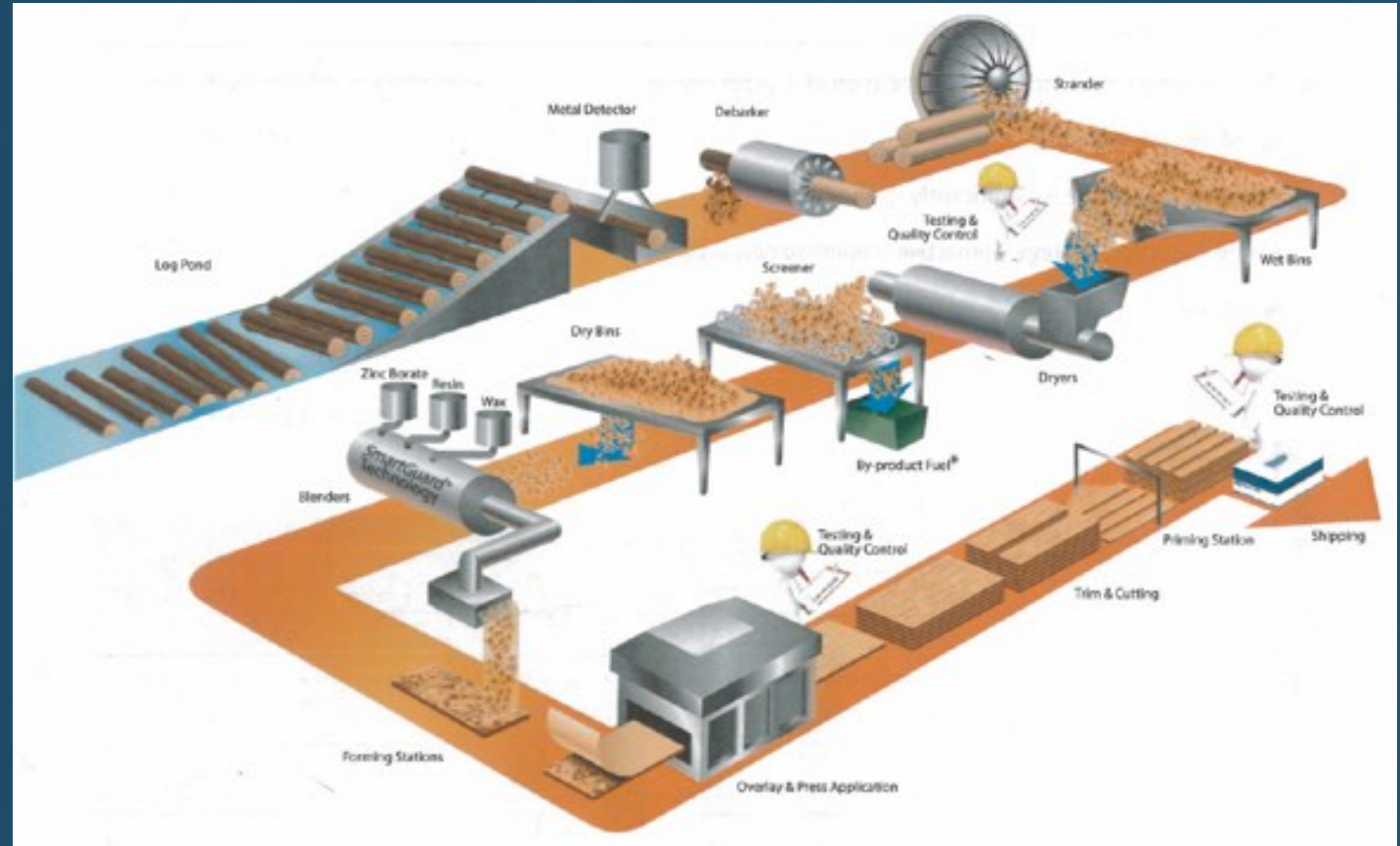
Characteristics of TEWS

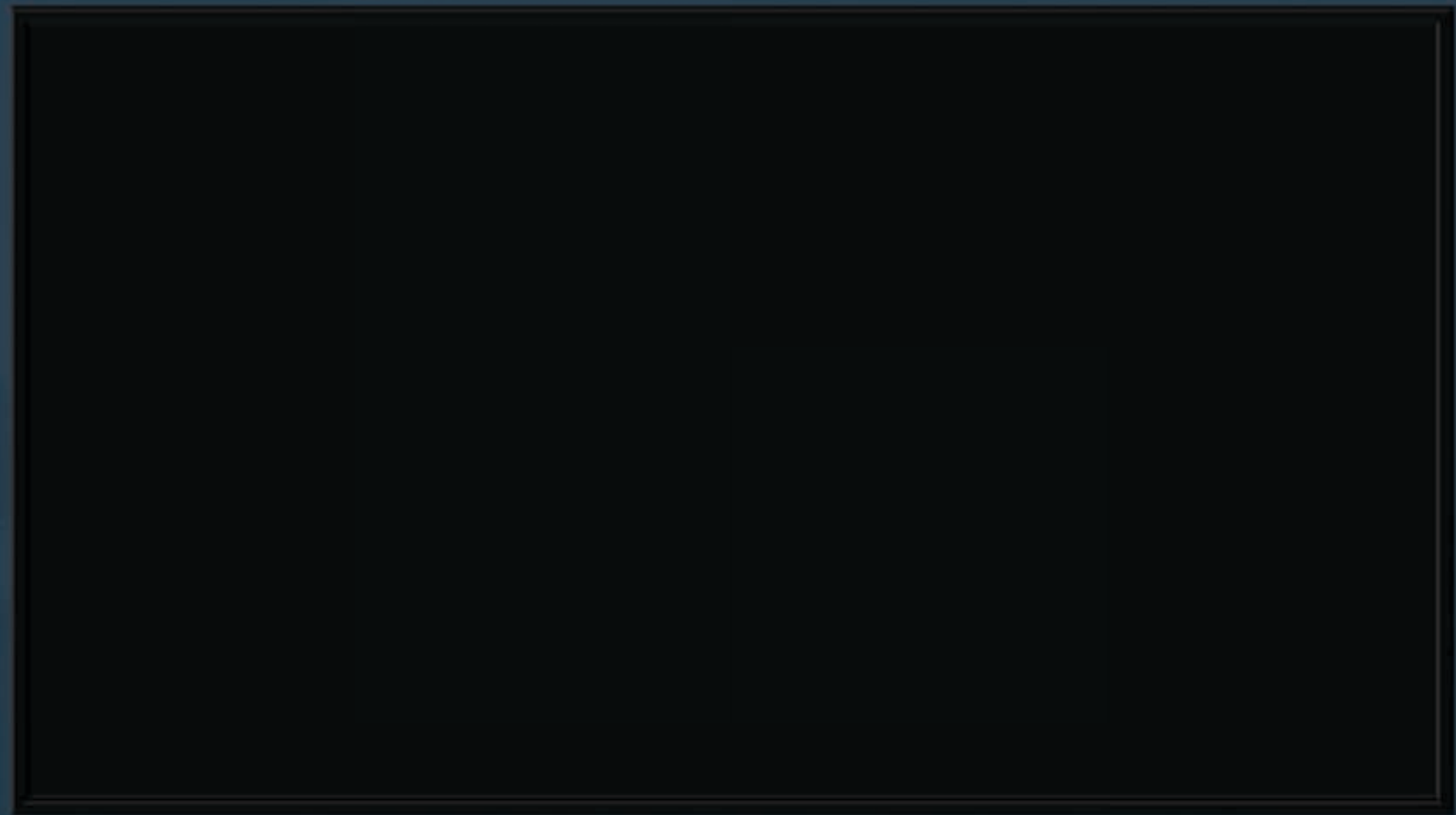
- Assortment of products
- Realistic, deep cedar-grain texture
- Strong, light weight and easy to handle
- Smaller carbon footprint
- Superior impact, wind and hail performance
- Resistant to decay and insect damage
- Withstands extreme temperatures
- Warranty ≤ 50 years



How Strand-Based TEWS is Made

- Logs debarked
- Cut into strands
- Dried
- Screened
- Resins, waxes, and zinc borate
- Strands layered & fused
- Texture added
- Sized and sealed





TEWS Facts

- TEWS is NOT OSB- Different resins, treated to resist pests and mold, water resistant throughout the panel
- Produced since 1965
- Panels have APA Design Values
- Strength and stiffness allowing 16' lengths
- Less breakage reducing jobsite waste



TEWS Installation

- Cuts with standard tools
- Lightweight – strand TEWS 1.5 lbs./sq. ft. compared to fiber cement at 2.3 lbs./sq. ft.
- 16' lengths which can result in fewer seams
- Independent 3rd party analysis determined that TEWS lap siding installed ~12% faster than fiber cement lap siding in the same width. We believe the efficiencies are driven by the longer length and less breakage during handling and fastening.



The background of the slide is a photograph of a building, possibly a school or institutional structure, with a prominent gabled roof. The image is heavily obscured by a semi-transparent blue overlay. Faintly visible on the building's facade are signs that appear to say 'BAR-B-O' and 'C.C.C.'. The text 'Sustainability factors of treated engineered wood siding' is centered over the image. The word 'Sustainability' is in a bold, yellow font, while the rest of the text is in a white, sans-serif font.

Sustainability factors of treated engineered wood siding

Why TEWS is Sustainable

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 IN LIGHT COMMERCIAL AND MULTI-FAMILY PROJECTS

Affordable Suites of America – Portage, IN



Cedar Manor- Forest Grove, OR



Duluth Trading Co. – Noblesville, IN



Trim Boards to
Cover Seams

Famous Dave's – Timonium, MD





TREATED ENGINEERED WOOD SIDING DURABILITY & WEATHERABILITY

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



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



FLEXIBILITY OF TEWS FOR **CUSTOM** SOLUTIONS

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

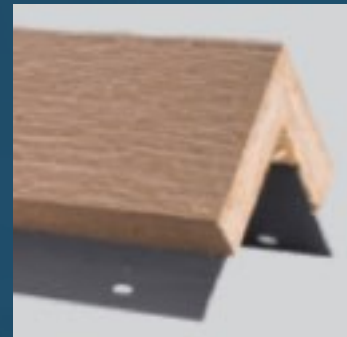
- No visible nail heads

One Piece Corner Trim

- Eliminates visible nail heads and reduces installation time

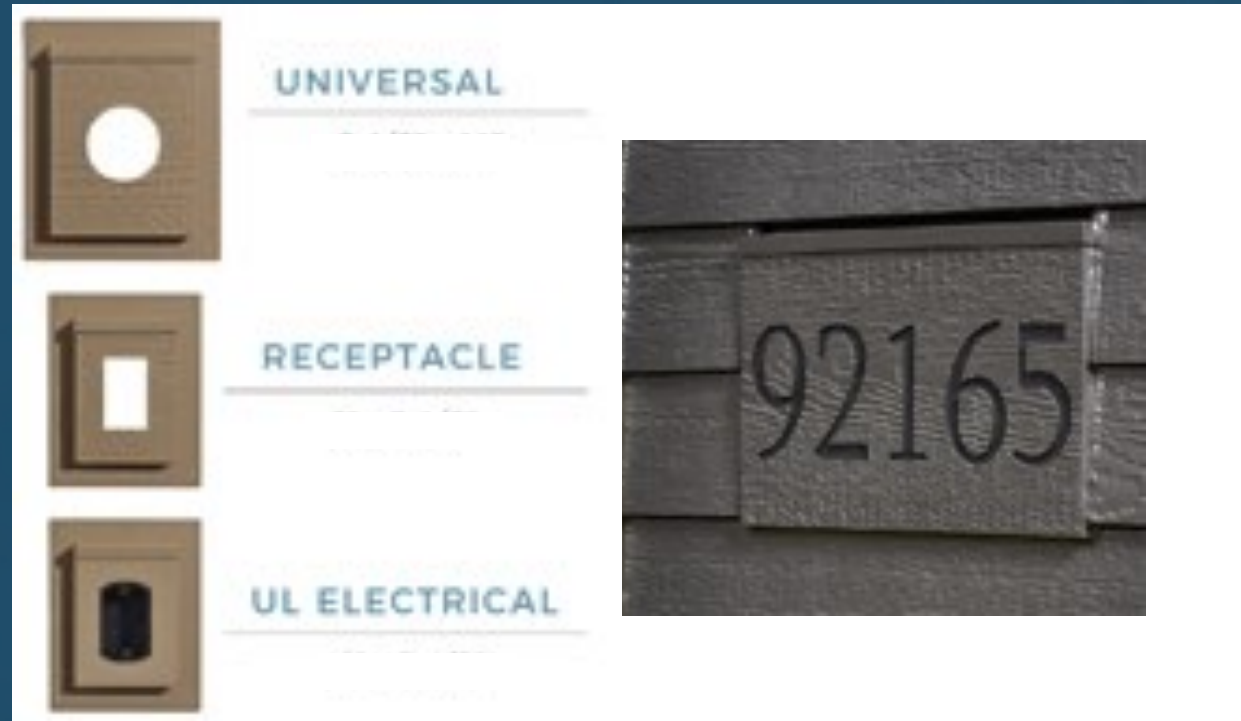
Post Wrap System

- 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



The background of the slide is a dark blue-tinted photograph of a building. The building has a gabled roof and several signs. Two prominent signs on the upper part of the building read 'BAR-B-O'. There are other signs and architectural details visible but less distinct due to the blue tint and focus on the text.

Estimating Materials

(fiber cement siding vs. TEWS)

A Question of Cost

Using public pricing information you can see TEWS siding is a competitive option in the market place the provides advanced durability and performance for your client.

Lap Product	Total Sq Ft for Project	Sq Ft Coverageper Piece	Total Pcs Needed before Waste	Jobsite Waste Factor	Total Pcs Needed	Price per piece (THD)	Total Cost
8"x192" long	2000	9.09	220	5%	231	\$12.72	\$2,938.61
8 1/4"x144" long	2000	6.99	286	10%	315	\$9.12	\$2,870.39

Pricing information based on Home Depot retail cost, Portland, OR

SUMMARY

- Treated Engineered Wood Siding is a cladding option for many designs including multifamily, hospitality, light commercial.
- Made from a renewable resource.
- Provides enhanced resistance to impacts, hail, rot and insects.
- Durability. The tougher your cladding, the longer your design remains as you and your client intended.

Thank You

This concludes The American Institute of
Architects Continuing Education Systems
Course

Questions?

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