COMBAT THE INDUSTRY STORM

Build Superior Structures Faster & Economically With One Building Envelope Assembly.

PREMIER SIPS

STRUCTURAL INSULATED PANELS

Construction Innovation Over 145 Years

147
Years

1877

2024

We are designing and building with 150 year old technology.

Meanwhile in 150 years...

1877

1903

1969

2024

Critical Elements That ARE Changing

There is a “perfect storm” brewing that’s forcing change:

1. Inconsistent building material **QUALITY**
2. Skilled **LABOR** shortages
3. Unpredictable material **COSTS**
4. Increasing energy **CODE** requirements
5. Need for more **RESILIENT** structures
6. Consumer demand for **HEALTHY** environments

We all feel it … old practices are not overcoming these challenges

Storm of Challenges Aren't Going Anywhere

Skilled-labor shortages & lack of material quality

- 72% of general contractors say labor shortage is biggest hurdle
- 81% of construction firms have trouble filling all positions
- Retirements will drain talent: 41 % of US construction set to retire by 2031
- Labor costs projected to continue to grow at 3-5% annually

Demand is outstripping supply: Supply chain issues, low inventory and growing demands = material shortages & increased costs.

- 72% of U.S. freight moves by trucks, ATA says country is short 80,000 drivers
- Low housing inventory & construction costs are expected to continue to rise at a steady rate indefinitely g demand will continue well beyond '24 (NAHB)
- & costs remain high (20%) compared to pre-pandemic levels

Challenge: The Storm Isn't Going Anywhere

Building & energy **codes** work to reduce carbon emissions & address building durability & resiliency

- Buildings account for ¾ of U.S. energy consumption & 40% of carbon emissions
- U.S. is working towards carbon neutrality by 2050, and 2021 code changes and incoming 2024 updates are making fast changes
- Natural disasters have increased over 220% over the last 3 decades, and building codes have changed to require stronger, more durable structures

The global pandemic has made **health** & wellness a priority.

- COVID infection is airborne, making indoor clean air/environments critical
- 20% of households have someone with asthma, allergies or respiratory ailments
- Indoor air is typically 2-5x more polluted than outside air, the building envelope plays a huge role in indoor air health

One Solution To The “Storm” of Challenges Exists!

PRESENTATION FOCUS:

A code approved building envelope assembly exists to combat ongoing industry challenges: SIPS (Structural Insulated Panel Systems)

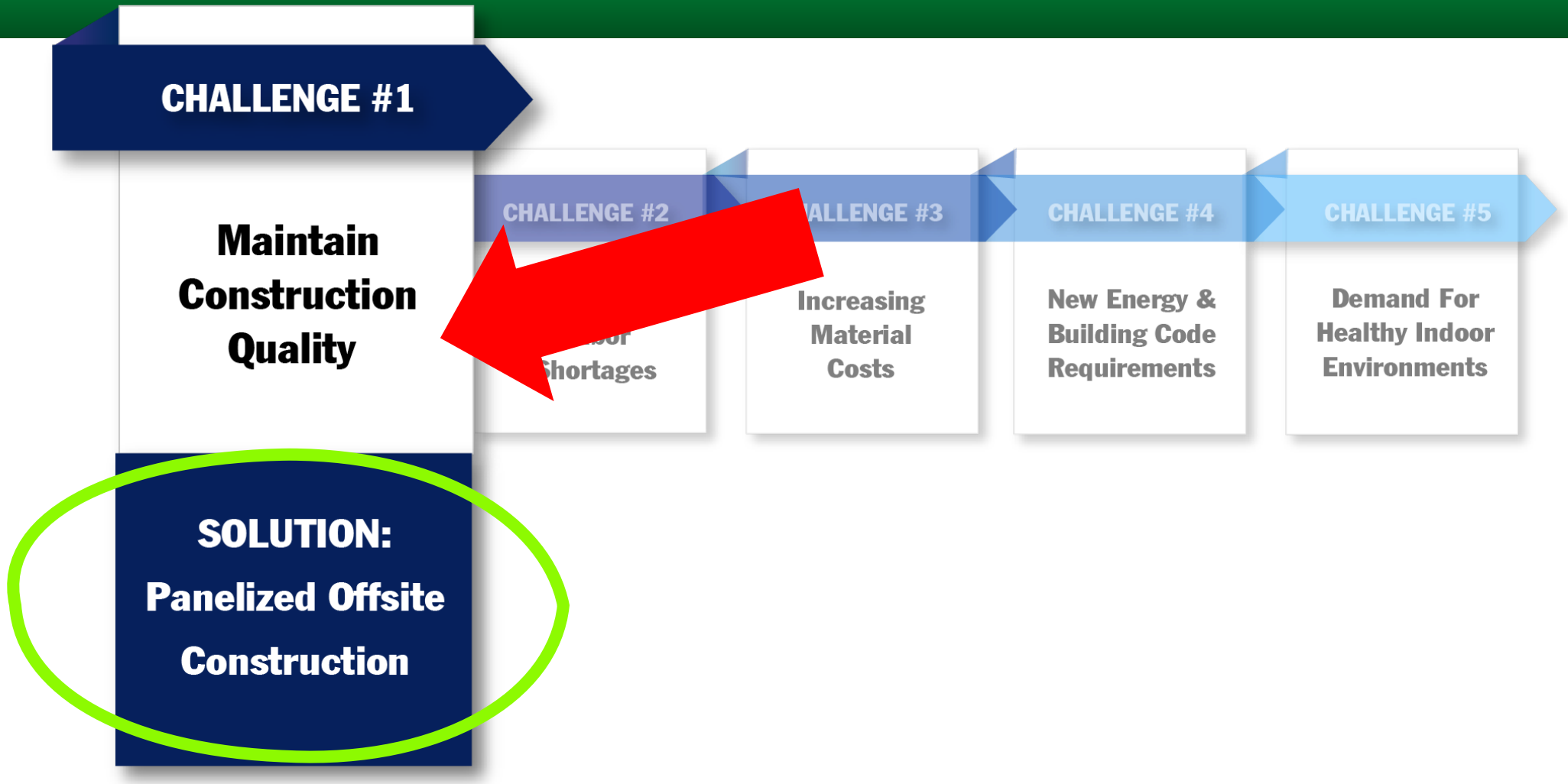
While new to some, SIPS envelope assemblies aren’t new technology.

Early adopters have built thousands of structures with SIPS over the past 80+ years.

Combat Challenges With Building Envelope Choice

We are going to explore how Structural Insulated Panel Systems (SIPS) are a High-Performance Building Envelope (HBPE) that provides solutions for these challenges:

SIPS Solve Challenge #1: Maintaining Quality



Quality: Prefabricated Off-site Construction

Not all offsite construction is the same

- Modular (Pods/Units)
  - Started in 1908 with mail-order home kits from Sears
  - Has evolved to include pods that create various projects
- Manufactured (Mobile)
  - RTA sections of buildings including cladding & interior finishes
- Panelized (SIPs) – Covers All Type V Wood Framing
  - Prefabricated structural insulated panels customized to residential or commercial floor plans to for jobsite installation

Offsite Design & Construction Booming

Offsite construction is growing rapidly.

- In the past 5 years the use of off-site building envelope systems has doubled
- Projected to grow to $110B by 2025, driven by lack of skilled labor and increase in cost-cutting technologies
- North American builders say they plan to pare down on-site construction to just 25% by 2025 in favor of off-site construction

Quality: Material Differences

Site-Framed Assemblies

(Long dry-in time & unpredictable quality)

Offsite Panelized Assemblies

(Precision off-site fabrication & built-in quality control)

APPLIES TO RESIDENTIAL & COMMERCIAL PROJECTS

Quality: Lumber vs Engineered Materials

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | CHALLENGE #4 | CHALLENGE #5

There's only so much a skilled builder can do!

Leave a legacy of quality with each building you design and build by choosing engineered products

Quality: Lumber vs Engineered Materials

Which Would You Rather Design With?

Site-Framed Assembly Lumber

Old-growth and new growth studs
Cupped, Bowed, Unstable.

Offsite Panelized Assembly

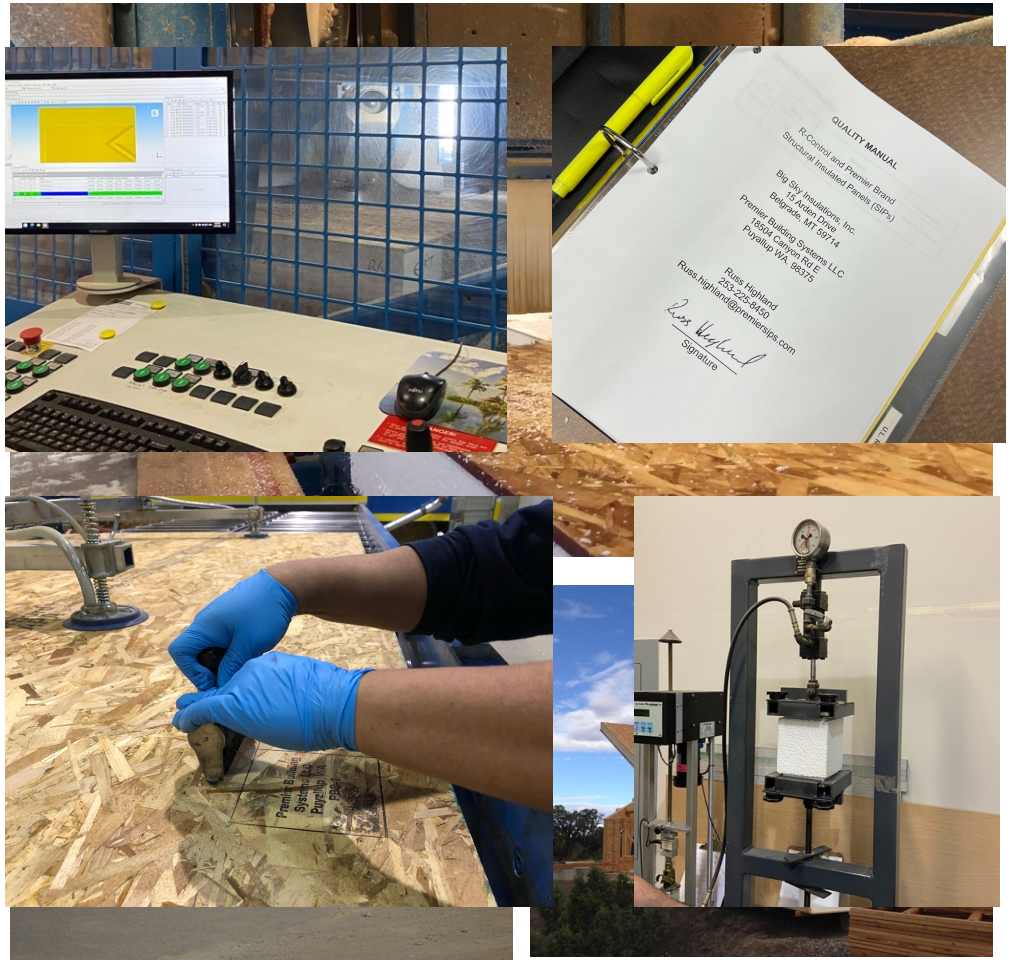
OSB, I-Joist, LVL

Engineered, Predictable,
Straight & Stable

Offsite Construction Benefits

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | CHALLENGE #4 | CHALLENGE #5

- Regulated Precision Fabrication
- Mandatory Quality Control Standards (Don’t occur in the field)
- Rigorous Testing For Building Code
- Fewer Skilled Laborers For Installation
- Optimized Material Use for Significant Jobsite Waste Reduction
- Predictable, Engineered Outcome



Off-site Construction With SIPs:

Real Life Example

1 Day Install!

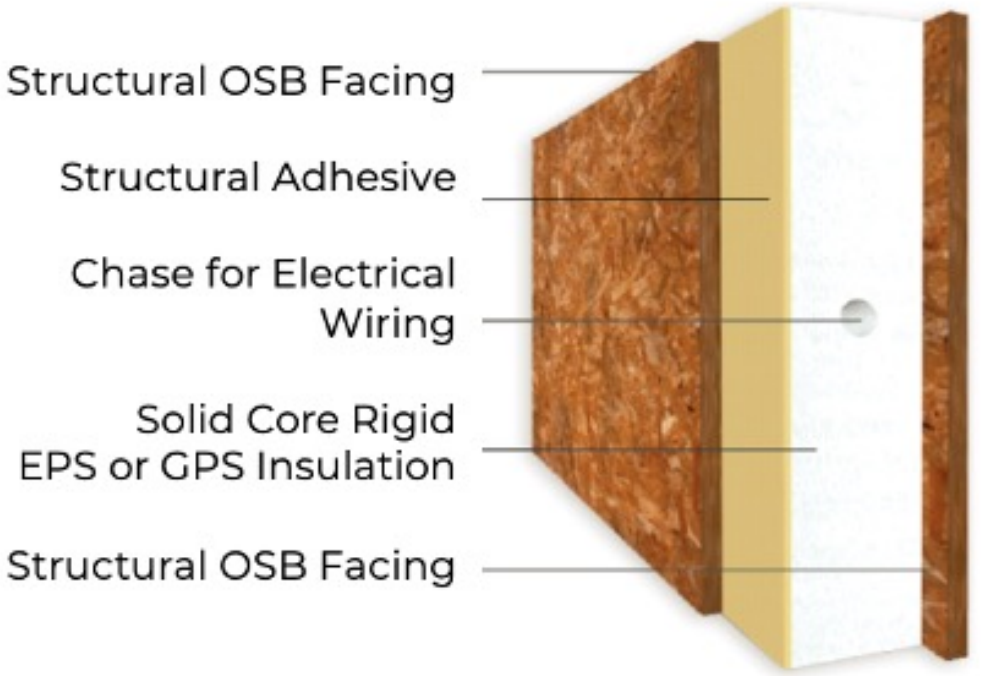
- 1,900 sf
- Crew of 3
- SIPs Envelope
- Scottsdale, AZ

Before We Go Further - What is a SIP System?

Panelized Roof, Wall, & Floor Building Envelope Assemblies

[Panel System = Sheathing + Insulation + Air Barrier]

- Structural Grade Jumbo OSB: Facers are structurally laminated (same process as a glulam beam) to a solid insulation core.
- Rigid Insulation: EPS (Expanded polystyrene – not Styrofoam!) or GPS (Graphite enhanced) is manufactured without harmful blowing agents, so there is no off-gassing enabling long term thermal stability.
- *NOTE: Insulation is so strong it is used as Geofoam below freeways, bridges, etc. & is made from a steam expansion process without harmful chemicals*

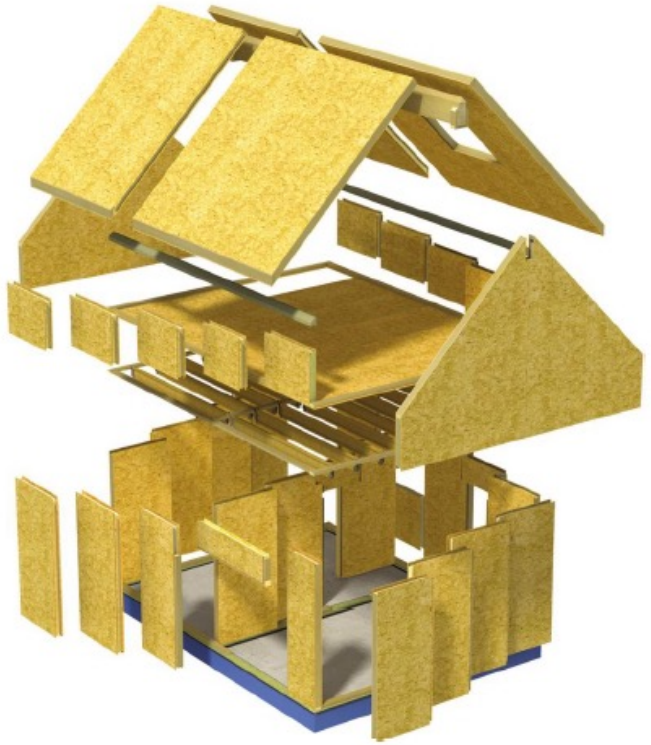


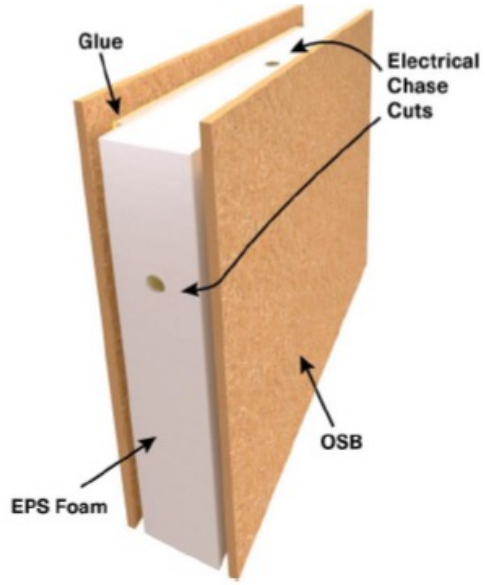
PROVIDE PERFORMANCE:

Maximize Control – SIPS Are Inherently Better

The basic components of a solid core SIP assembly creates a high performance, energy efficient structure with:

- Ultra-Low Thermal Flow
- Ultra-Low Air Flow
- Ultra-Low Vapor Flow





We will dive into why this matters for building codes more later!

PROVIDE PERFORMANCE:

SIPS Offer Structural & Thermal Warranty

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | CHALLENGE #4 | CHALLENGE #5

- EPS & GPS insulation thermal values are 100% warranted for 50 years
- Premier SIPS come with a 20-year structural warranty

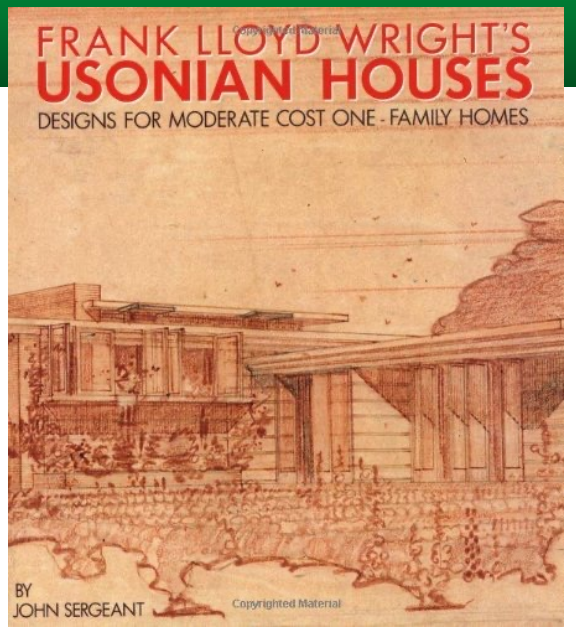
Won't see a warranty with site framed lumber + fiberglass assemblies!

This Form of SIP Building Envelope Isn't New

Used for 80+ Years in Thousands of Structures

- Panelized (offsite construction) building envelope solutions like SIPs have been around since 1935.

- Famed architect Frank Lloyd Wright used SIPs in some of his affordable Usonian Houses built in the 1930-40's in Michigan, and still stand today.

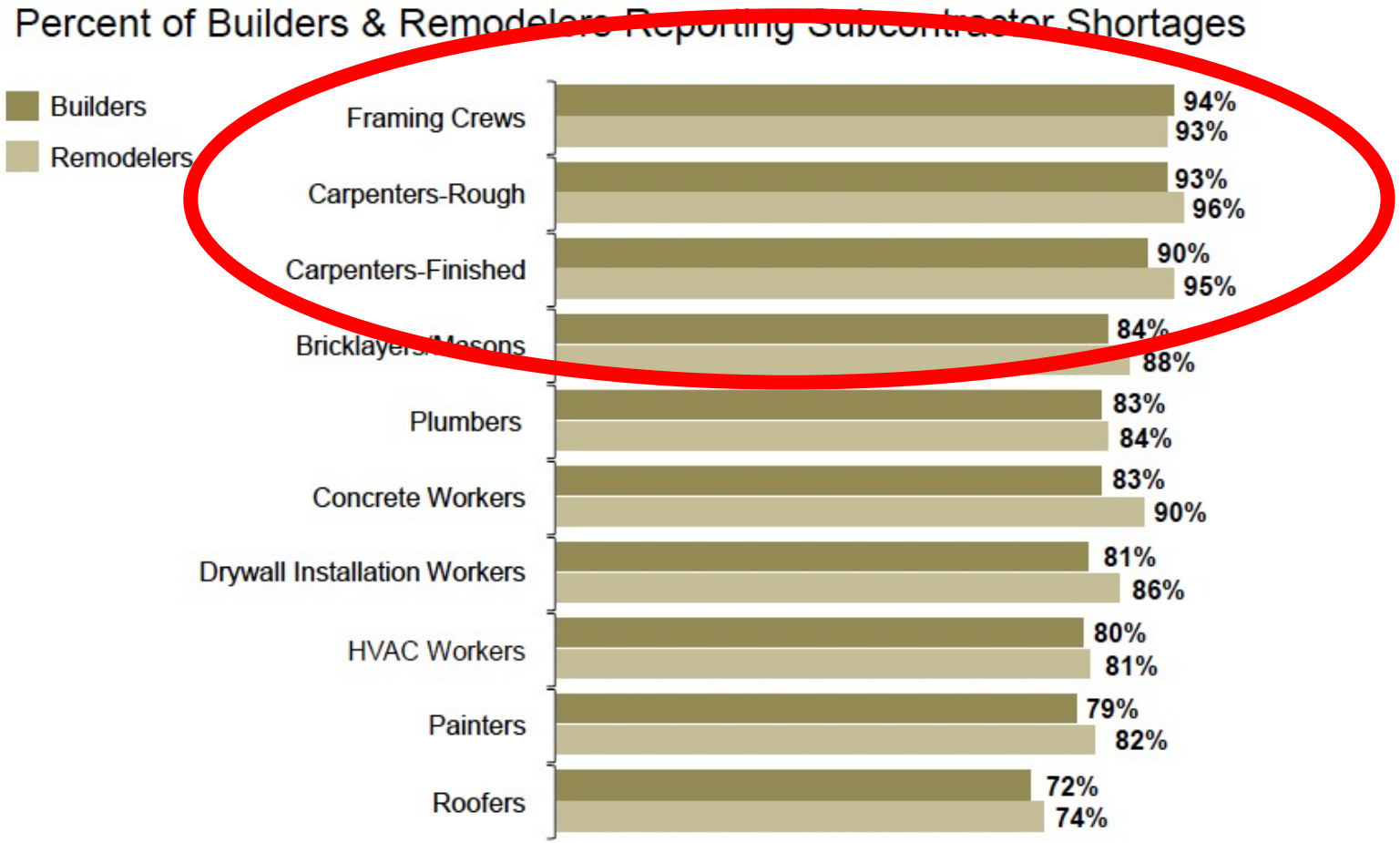


NEXT: CHALLENGE #2

SIPS Solves Challenge #2: LABOR Shortages

Why Minimizing Trades is Critical: Availability

CHALLENGE #1 | **CHALLENGE #2** | CHALLENGE #3 | CHALLENGE #4 | CHALLENGE #5



90% of Builders reported framing and carpenter shortages in 2022 & first half of 2023.

- Home Builder institute (HBI)

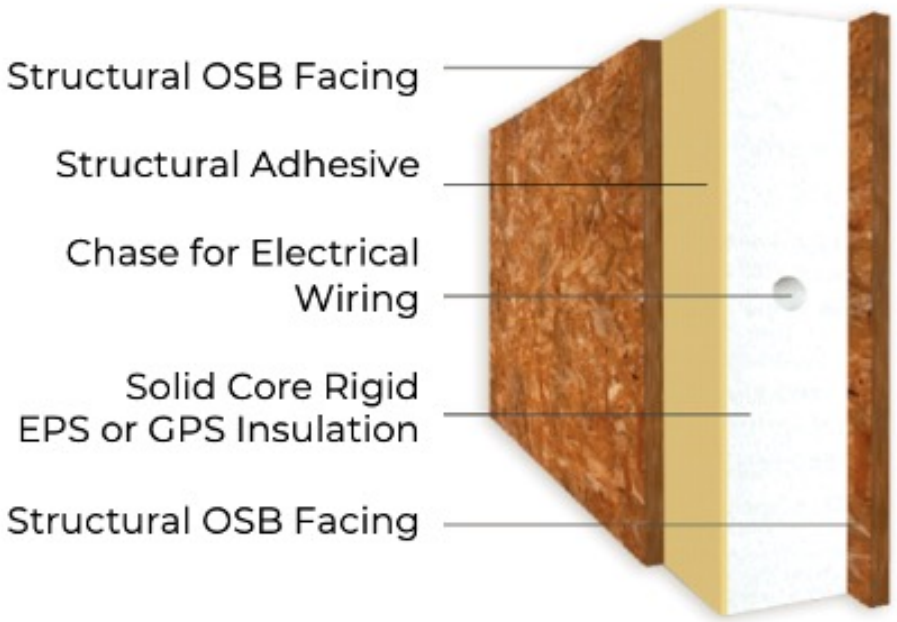
LABOR: Reduced Trades

Trades Eliminated With SIPS

- Framing
- Insulation
- Air Sealing/Air Barrier

Trades Reduced Scope of Work With SIPS

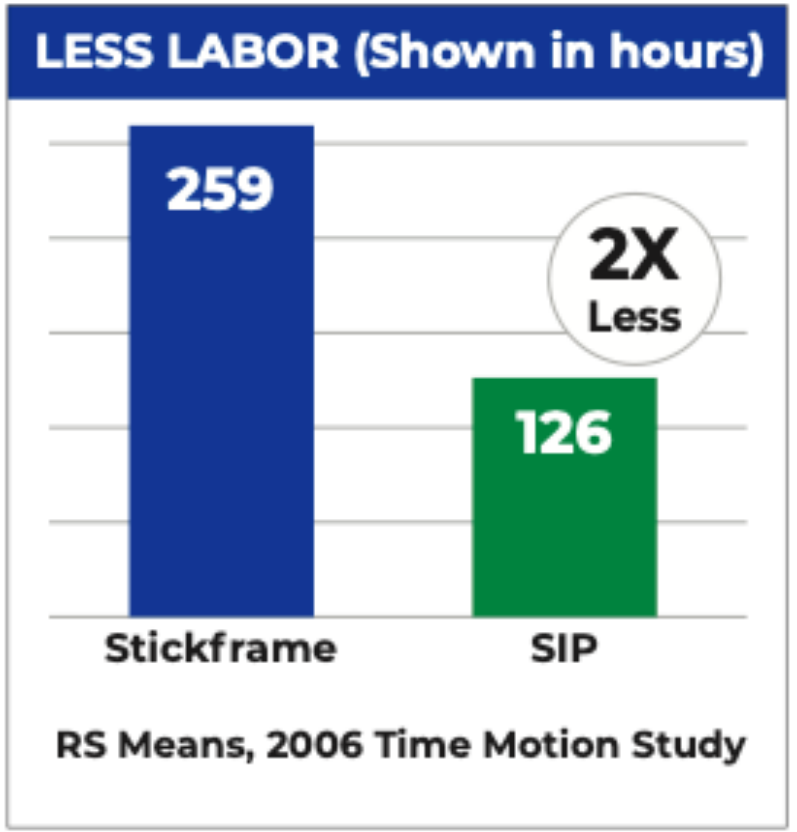
- Drywall
- Finishes/Trim
- Inspections/Testing
- Site Clean-up/Waste Removal



LABOR: Reduce Skilled Labor & Increase Productivity

A SIP install crew can cut framing time and labor costs by up to 55% compared to conventional wood framing.

Jackson Hole, WY builder has refined his SIP install & has cut framing install labor by 80%



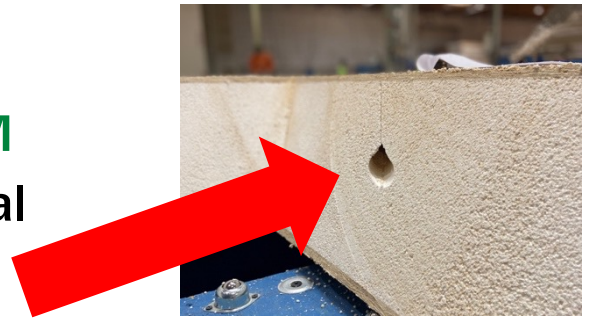
LABOR: Faster Install & Dry-In With Reduced Labor

CHALLENGE #1 | **CHALLENGE #2** | CHALLENGE #3 | CHALLENGE #4 | CHALLENGE #5

- SIPS arrive at jobsites prefabricated per your plans
- Windows and doors are pre-cut, electrical chases pre-drilled
- Large jumbo panels (up to 24'x8') tilt/move into place & connect to the neighboring panel (like a jigsaw puzzle)
- Customized layout drawings show how to assemble panelized sections

- **Premier offers job start training** for new crews to show how minimal measuring, cutting required!

- Manch Elementary School in Las Vegas saved $1M on electrical install because of factory cut electrical chases in SIPS.



LABOR: SIPs Increase Productivity

SIPS typically use a 5-person crew for residential install:

- 2 people installing – no cutting/site framing required
- 2 people preparing the next SIP for installation
- 1 person applying sealant, help lifting, cutting lumber splines (if applicable), etc.

Dry in 55% faster to occupy or sell faster and reduce carrying costs.

LABOR: Fast Commercial Construction = Fast Occupancy

CHALLENGE #1 | **CHALLENGE #2** | CHALLENGE #3 | CHALLENGE #4 | CHALLENGE #5

Real World Example: Multi-Family Project in Tioga, ND

- **July 6th : Foundation ready**
- **July 18th : First shipment of prefabricated SIPs delivered to jobsite**
- **Aug 3rd : Roof installed**
- **Oct 23rd : Building Completed**

60 Units 100% completed and ready to move in after 89 Days – Installed fast with LESS labor!

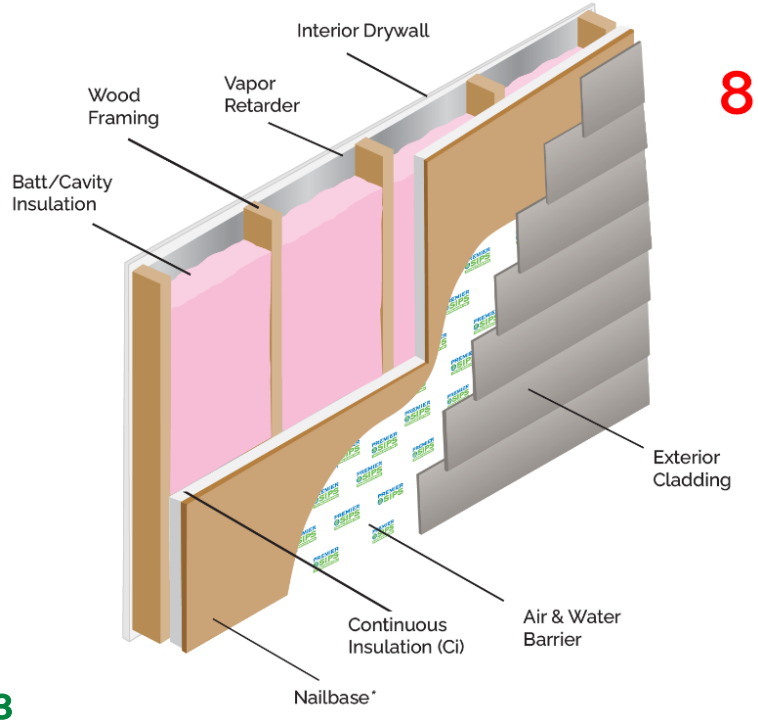
LABOR: NEW!!!! SIPs Reduce Labor With New Codes

CHALLENGE #1 | **CHALLENGE #2** | CHALLENGE #3 | CHALLENGE #4 | CHALLENGE #5

2021 Building Code: Compare wall assemblies

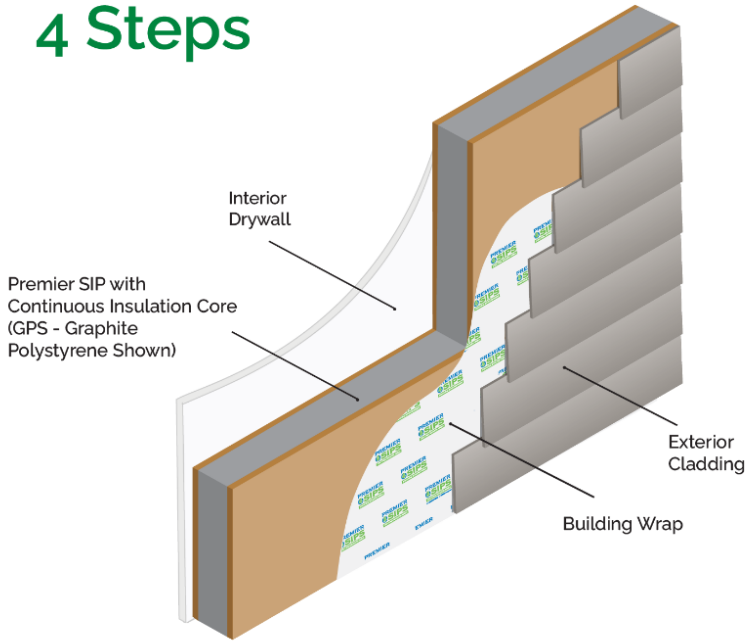
Current IECC code REQUIRES 1” minimum additional continuous insulation around entire perimeter of structure $$$.

SITE-FRAMED CODE APPROVED ASSEMBLY



8 Steps vs. 4 Steps

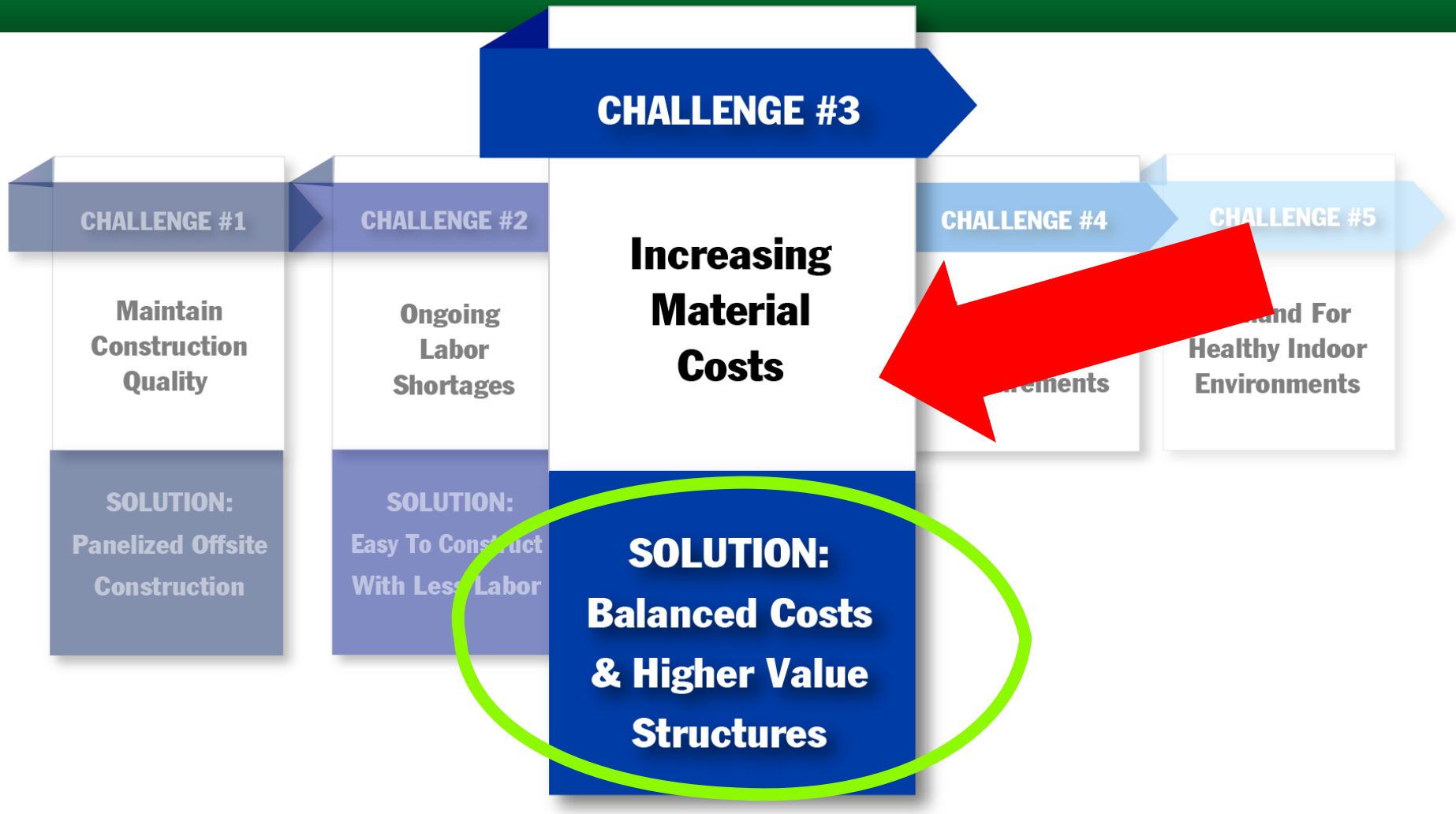
PREMIER SIPS CODE APPROVED ASSEMBLY



Complies with requirement for continuous insulation. NO EXTRA MATERIALS REQUIRED!

NEXT: CHALLENGE #3

SIPS Solves Challenge #3: Increasing Material Costs



SIPS Manage Costs & Create Value

The solution to managing costs, while increasing value is three-fold:

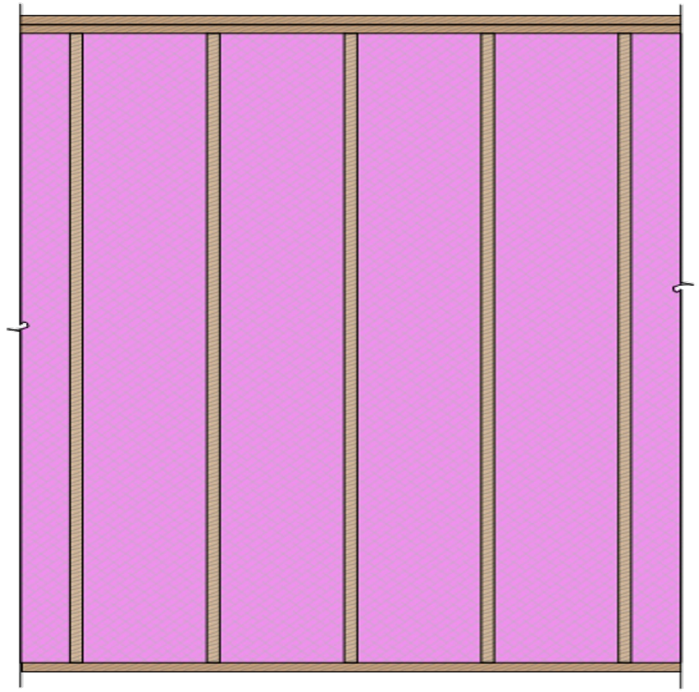
1. Manage supply chain unpredictability
   With Offsite panelized construction strategies … *We just covered this!*

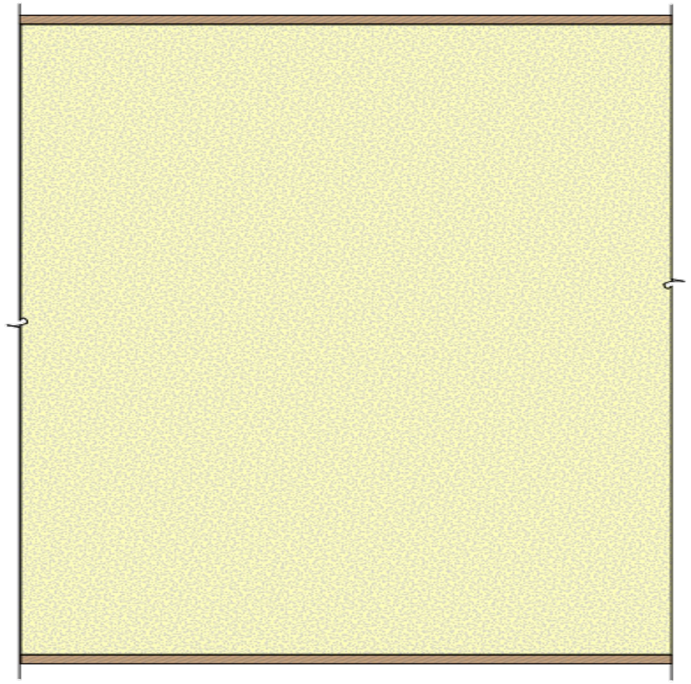
2. Reduce Lumber Costs by lowering the framing factor
   % of wall where wood studs displace insulation. SIP building envelope is 3-5% lumber vs 22-24% for on-site framing assemblies. SIPS have 80% less lumber!

3. Optimize Projects for end user value
   Without adding costs! To maximize profits and increase value.

LOWER COSTS: Reduce Lumber “The Framing Factor”

Comparison of typical lumber needed in framing assemblies





Common studs not needed in SIPs

A Visual Depiction: SIPs have approx. 80% less lumber

LOWER COSTS: Reduce Lumber Waste Expenses

Dimensional lumber is expensive to throw away!

- Typical Residential Home Construction Waste: 8,000 lbs./ 50 Cu. Yds.*
- Commercial projects = greater waste.
- Offsite construction optimizes materials & reduces waste in factory setting
- Result: **30% average savings on jobsite waste disposal costs**

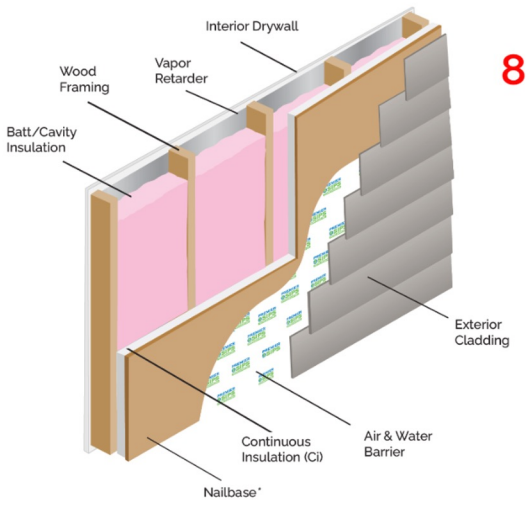
*Source: NAHB Study

ADD VALUE: SIPs Increase Living Space

CHALLENGE #1 | **CHALLENGE #2** | CHALLENGE #3 | CHALLENGE #4 | CHALLENGE #5

Remember the 2021 Code approved wall assembly comparison?

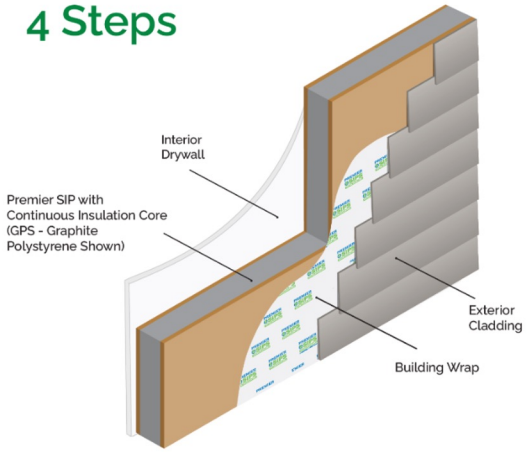
WOOD FRAMED ASSEMBLY
Additional Nailbase Ci Incorporated



NOTE: Additional exterior sheathing may be required for regional code approval in high seismic zones.

8 Steps vs. 4 Steps

STRUCTURAL INSULATED PANEL (SIP) ASSEMBLY
Additional Ci Material NOT Required

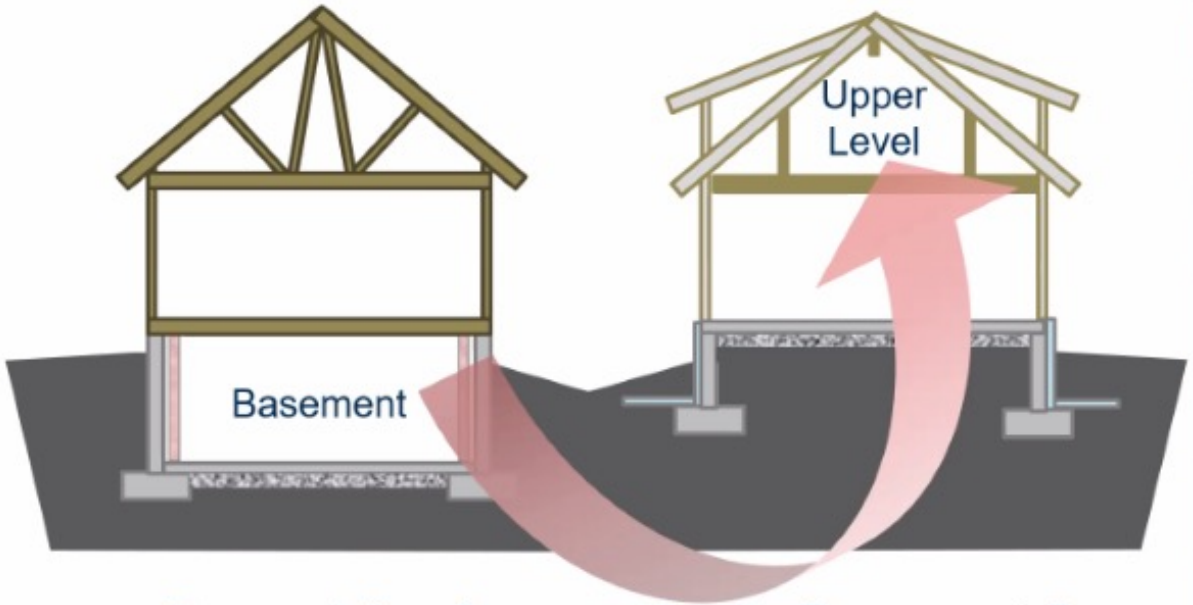


No ADDED continuous insulation requirement with SIPS delivers:

1. Thinner Walls
2. Added living Space

ADD VALUE: Trade Below Grade For Above Grade

CHALLENGE #1 | CHALLENGE #2 | **CHALLENGE #3** | CHALLENGE #4 | CHALLENGE #5



Framed Roof

Trade Basement for Upper Level (e.g., SIPs)

Eliminate Trusses

Cost Savings	
FPS Foundation[1]	up to $6K
Wall Framing	$1K - $2K
Egress Windows	$1K - $2K
Air Seal/Barriers	$1K - $2K
Attic Venting	$1K - $1.5K
Reduced Waste	$1K - $2K
Time (3 days)	$1.5K - $2.5K
Added Value	
2nd Fl. vs. B'ment	$40K - $60K

Project Material Savings: + $15K

+

Added Value: + $40-60K *Additional Living Space!*

=

+ $55-75K Profit

BALANCE COSTS: Reduce Builder Risk

Reduced Inspections: SIPS = A full assembly

Structural Insulated Panel System not individual components.

- Not substituting product components
  Fiberglass for blown in, sticks for steel
- SIPs arrive as one component

Included Warranty:

- Stick frame offers NO warranty
- Premier SIPS 20-year structural & 50-year thermal warranty!

BALANCE COSTS: Post Project Cost Savings

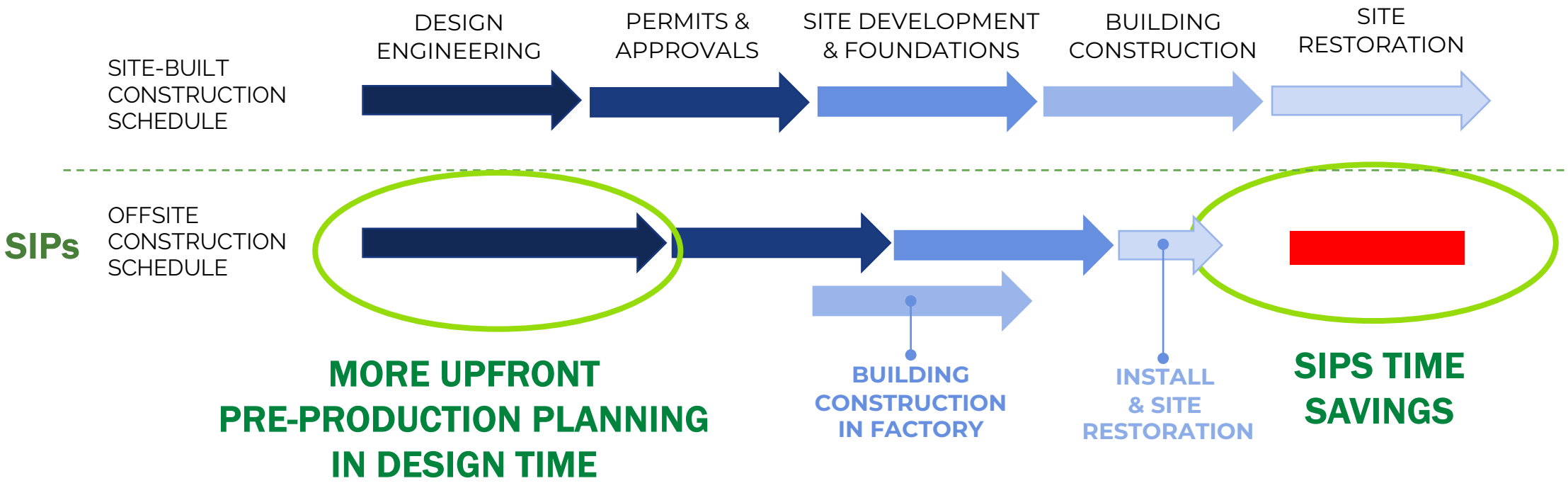
Factory Engineered SIPs are straight and plumb, higher quality structures that **reduce Builder call backs:**

- Nail-pops from lumber drying/shrinking
- Windows & doors sticking due to out of square framing
- Cracked exterior stucco and interior drywall and bowed walls.

How much do project call backs cost you?

BALANCE COSTS: Decrease Cycle Times

SIPs decrease cycle time, improve schedule efficiency, which can result in less interest on construction loans:

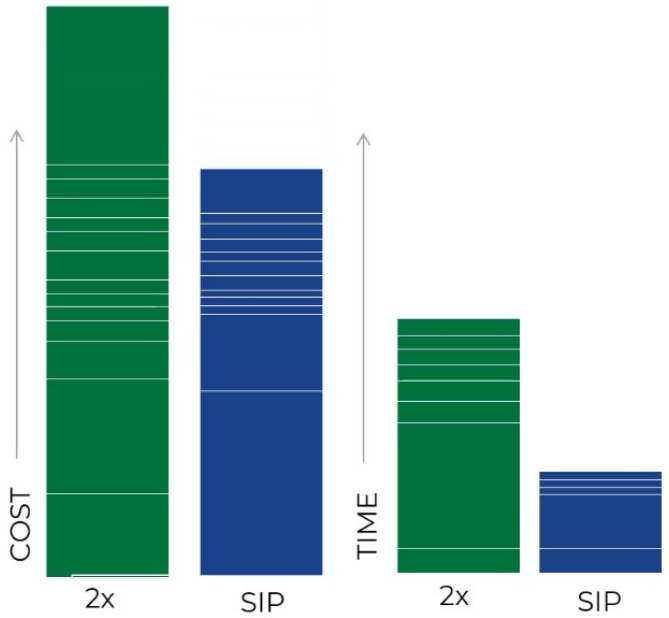


Wright Engineering presented a "*Total* Cost" summary of sticks vs SIPs, demonstrating overall lower costs of SIPs construction.

The impact of building with SIPs is much greater than simply the cost of the product.

WRIGHT engineers

How Costs Stack Up



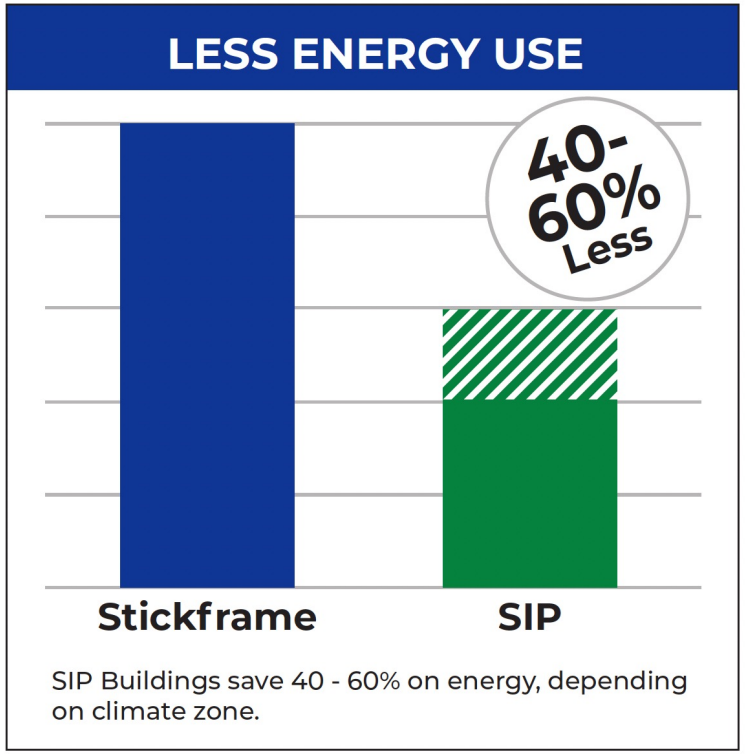
OPERATING COSTS
BETTER PRODUCT = HIGHER SELLING COST
LOST REVENUE
CALL BACKS
COST OF MONEY (FINISH FASTER W/ SIPS)
GENERAL CONDITIONS / WASTE DISPOSAL
HVAC / HEATING EQUIPMENT
INTERIOR FINISH
EXTERIOR FINISH
HARDWARE
SHEATHING
INSULATION
INSTALLATION
STACK OF 2X / STACK OF FABRICATED SIP

2X LUMBER VS SIPS FRAMING

ADD VALUE: End User Value & Financial Flexibility

Energy Efficient SIPS Construction:

- Lower energy bills = Affordability
- ~ 20% Increased appraisal and home values
- Lower insurance rates for energy efficiency & strength
- Premium product!



REDUCE COSTS: HVAC System Downsizing

- Lower energy demands = HVAC System downsizing
- Significant HVAC system cost reduction

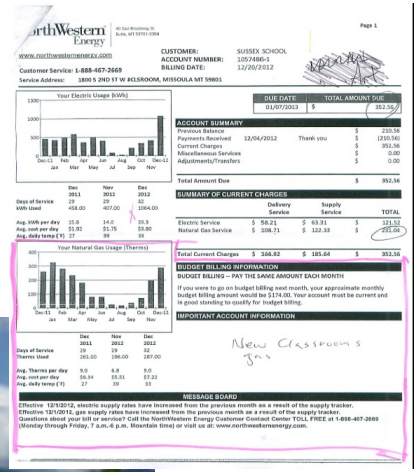
Typical SIP HVAC sizing is half of a stick/site-framed assemblies

- *Stick frame assemblies = 1 ton per 500 sf*
- *SIP residential = 1 ton per 1000 sf*

ADD VALUE: End User Operational Savings With SIPs

CHALLENGE #1 | CHALLENGE #2 | **CHALLENGE #3** | CHALLENGE #4 | CHALLENGE #5

Actual Energy Bill
Private School
Missoula, MT
Nov-Dec Temps 27-39°


NorthWestern Energy

CUSTOMER: SUSSEX SCHOOL
ACCOUNT NUMBER: 1057486-1
BILLING DATE: 12/20/2012

Customer Service: 1-888-467-2669
Service Address: 1800 S 2ND ST W #CLSROOM, MISSOULA MT 59801

Your Electric Usage (kWh)

DUE DATE	TOTAL AMOUNT DUE
01/07/2013	$ 352.56

ACCOUNT SUMMARY

Previous Balance	$ 210.56
Payments Received 12/04/2012 Thank you	$ (210.56)
Current Charges	$ 352.56
Miscellaneous Services	$ 0.00
Adjustments/Transfers	$ 0.00
Total Amount Due	$ 352.56

SUMMARY OF CURRENT CHARGES

	Delivery Service	Supply Service	TOTAL
Electric Service	$ 58.21	$ 63.31	$ 121.52
Natural Gas Service	$ 108.71	$ 122.33	$ 231.04
Total Current Charges	$ 166.92	$ 185.64	$ 352.56

Your Natural Gas Usage (Therms)

BUDGET BILLING INFORMATION
BUDGET BILLING – PAY THE SAME AMOUNT EACH MONTH
If you were to go on budget billing next month, your approximate monthly budget billing amount would be $174.00. Your account must be current and in good standing to qualify for budget billing.

IMPORTANT ACCOUNT INFORMATION
New Classrooms Yes

	Dec 2011	Nov 2012	Dec 2012
Days of Service	29	29	32
Therms Used	261.00	196.00	287.00
Avg. Therms per day	9.0	6.8	9.0
Avg. cost per day	$6.34	$5.51	$7.22
Avg. daily temp (°F)	27	39	33

MESSAGE BOARD
Effective 12/1/2012, electric supply rates have increased from the previous month as a result of the supply tracker.
Effective 12/1/2012, gas supply rates have increased from the previous month as a result of the supply tracker.
Questions about your bill or service? Call the NorthWestern Energy Customer Contact Center TOLL FREE at 1-888-467-2669 (Monday through Friday, 7 a.m.-6 p.m. Mountain time) or visit us at: www.northwesternenergy.com.

Projected Energy Modeling:

- Site-Stick Frame Heating/Cooling $1100 Mo.

Actual SIPS Energy Costs:

- SIPs Actual Heating/Cooling Avg $210/Mo.

81% Savings Over Projected Heating/Cooling Costs 7K sf Building

BALANCE COSTS: New Federal Tax Incentives (IRA '23)

CHALLENGE #1 | CHALLENGE #2 | **CHALLENGE #3** | CHALLENGE #4 | CHALLENGE #5

SIP Structures qualify for FEDERAL Energy Tax Incentives

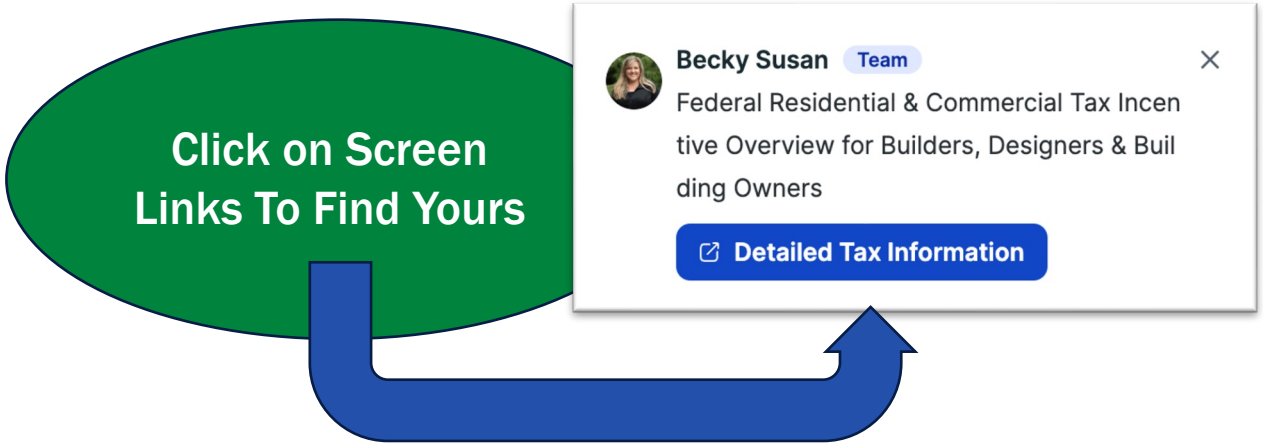
- Residential New Construction - Available to Builders
  - Zero Energy READY (ready for solar!): $5,000 per unit
  - Energy Star: $2,500 per unit

- Commercial New Construction - Designers & Owners Only
  - $2.50/sf Tax Credit (25% + code improvement)
  - $5.00/sf Tax Credit (50% + code improvement)
  - Applicable every 4 yrs. (as improvements made)

BALANCE COSTS: Regional Utility Incentives

SIP Structures qualify for REGIONAL energy efficiency incentives that ADD UP!

- **State, county, city**
- **Private utilities**



Challenges 1, 2 & 3 Tackled!

CHALLENGE #1 | CHALLENGE #2 | **CHALLENGE #3** | CHALLENGE #4 | CHALLENGE #5

SIPS aren't your average building envelope assembly. How else can you maintain quality, build faster, balance costs and deliver a superior end-product?

Many enthusiasts refer to SIPS as the "Ferrari" of the building industry, but without the massive price tag.

NEXT UP: Challenge #4

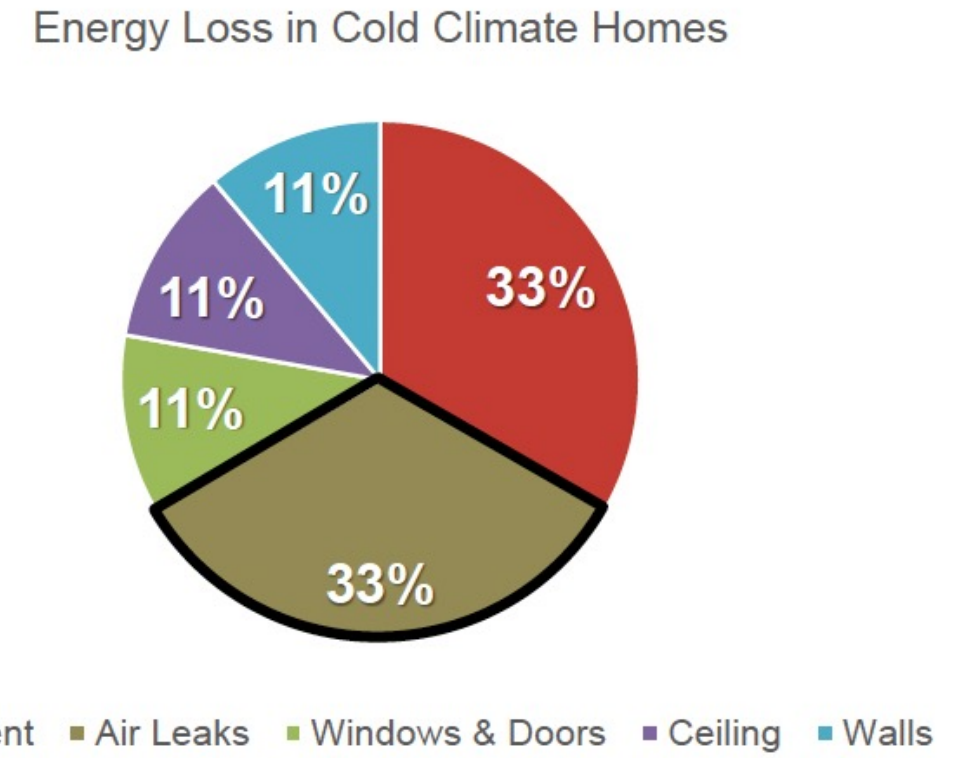
SIPS Solves Challenge #4: Meet New Codes

MEET ENERGY CODES: Why is Air Sealing Critical?

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

- **3X** Greater energy loss than walls, ceilings, windows & doors
- **Up to 60+%** loss of insulation R-value where air moves through wall assemblies

BUILDING CODES HAVE ADDRESSED THIS



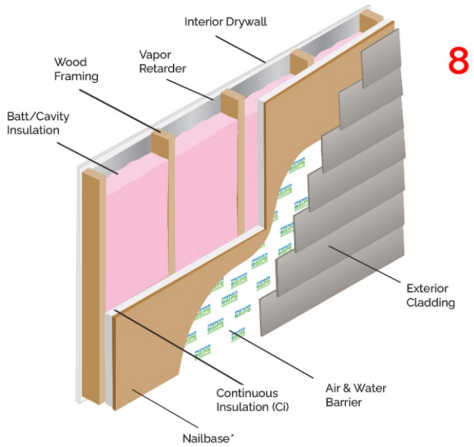
Source: *"The Principal Designer of the House that Inspired the Global Passivhaus Movement Reflects on the Project that Started it All,"* ecohome, October 5, 2020

Meet Codes Without Multiple Components

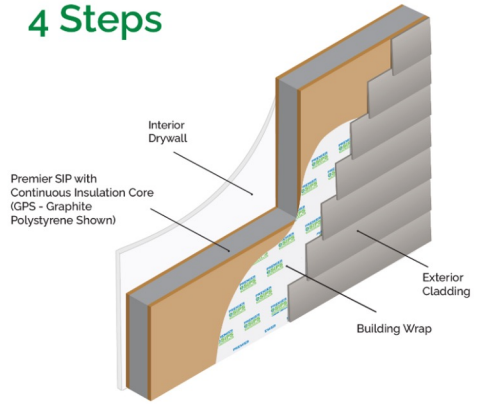
CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

- **Energy codes now** require higher efficiency & energy performance

- **Building codes** require greater strength because of changing weather patterns increased frequency of natural disasters



8 Steps vs. 4 Steps



- Conventional site-framing assemblies require extra steps and costs for continuous insulation to meet energy codes (remember the 8 vs 4 steps?)

- SIPs are a solution to meet code required energy efficiency and strength! .....without extra materials or installation time (as we just covered).

Meet 2021 & 2024 Energy & Building Codes Now

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

Structural Insulated Panels meet and/or exceed:

- ICC Code Reports (NAHB/ICC 700)
- IECC Continuous Insulation Compliant (up to 60% energy reduction)
- Recognized in ICC ESR's for compliance to the IRC & IBC
- ASTM material property standards*
- ICC-ESR and ESL recognized for Seismic Zones D,E & F*
- Florida Product Building Code Approval for High Velocity Hurricane Zones* *Not all manufacturers*
- California TITLE 24 Compliance – (Most stringent in the nation!) Net-Zero Code

ICC INTERNATIONAL CODE COUNCIL

IBC INTERNATIONAL BUILDING CODE

IRC INTERNATIONAL RESIDENTIAL CODE for One- and Two-Family Dwellings

ASTM INTERNATIONAL Standards Worldwide

TITLE 24 COMPLIANT

FLORIDA PRODUCT APPROVAL #FL25658

PROVIDE PERFORMANCE:
Meet Energy & Building Codes

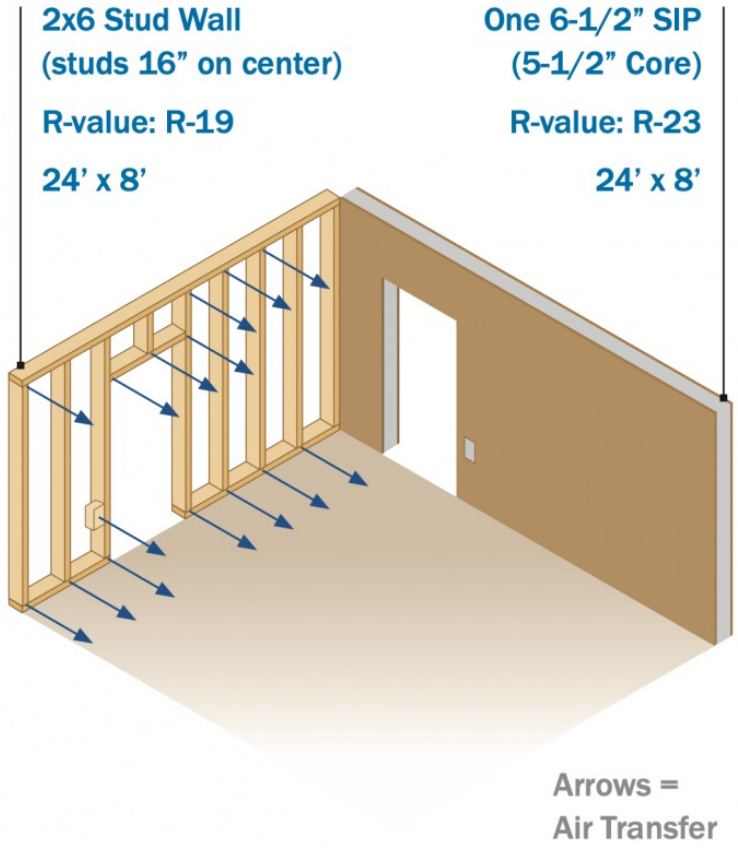
SIP building envelopes easily meet or exceed increasing energy & building codes requirements because of two key attributes:

1. **Airtightness**
2. **Durability**
   (Resilience)

ENERGY PERFORMANCE:
Measure Through Envelope Airtightness

When uncontrolled air moves through the building envelope, this air movement can cause as many as 5-20 air changes per hour.

Uncontrolled air makes heating and cooling a structure inefficient, uses more energy, wastes natural resources and creates more pollution.



ENERGY PERFORMANCE:

Create Energy Tight Envelopes – With Factory Precision

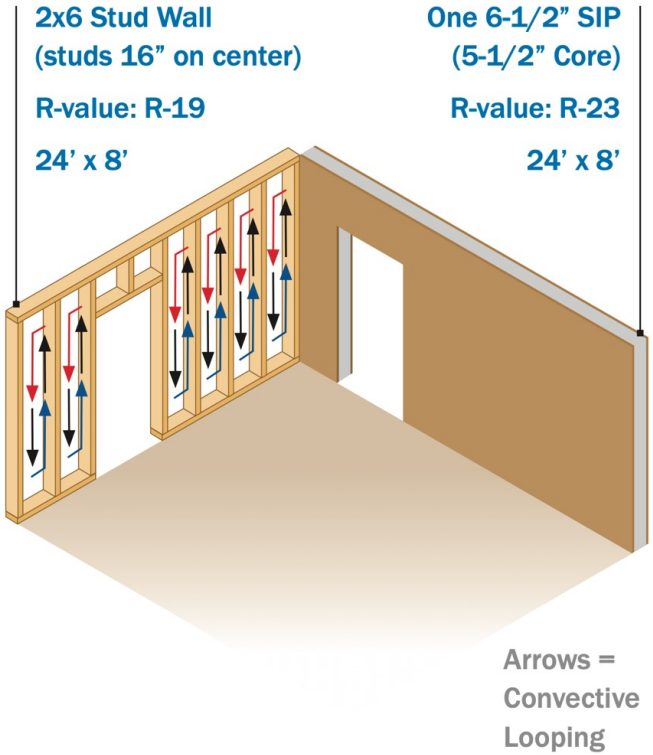
Energy escapes an envelope assembly in THREE ways…

1ST WAY ENERGY ESCAPES is Air Transfer because of:

- Poorly fit framing members in site framed assemblies
- Poor sealing of connections and apertures within the envelope
- Mis-applied water & air barriers
- Loose fitting windows/doors

2nd WAY ENERGY ESCAPES is Convective Looping:

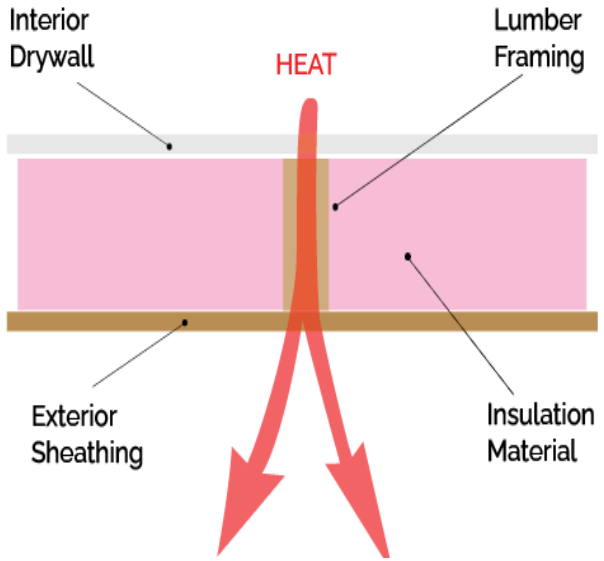
- Warm moist air moving from low to high in the wall cavity, wasting valuable energy
- Steel & wood studs with batt insulation is particularly susceptible to heat loss and moisture condensation due to air moving slowly through the batt insulation

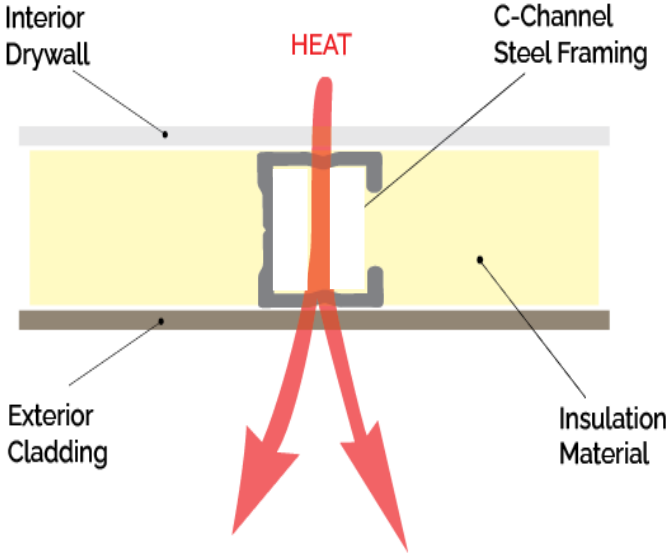


ENERGY PERFORMANCE:

Combat Thermal Bridging

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5





Thermal Bridging is a form of “Conduction” where heat travels through wood or steel.

ENERGY PERFORMANCE:

Continuous Insulation Code Requirement Met

With a reduced framing factor and thermal bridging SIPs meet sections C402 & R402 of the 2021 IECC for thermal envelope requirements and eliminate the need for additional continuous insulation.

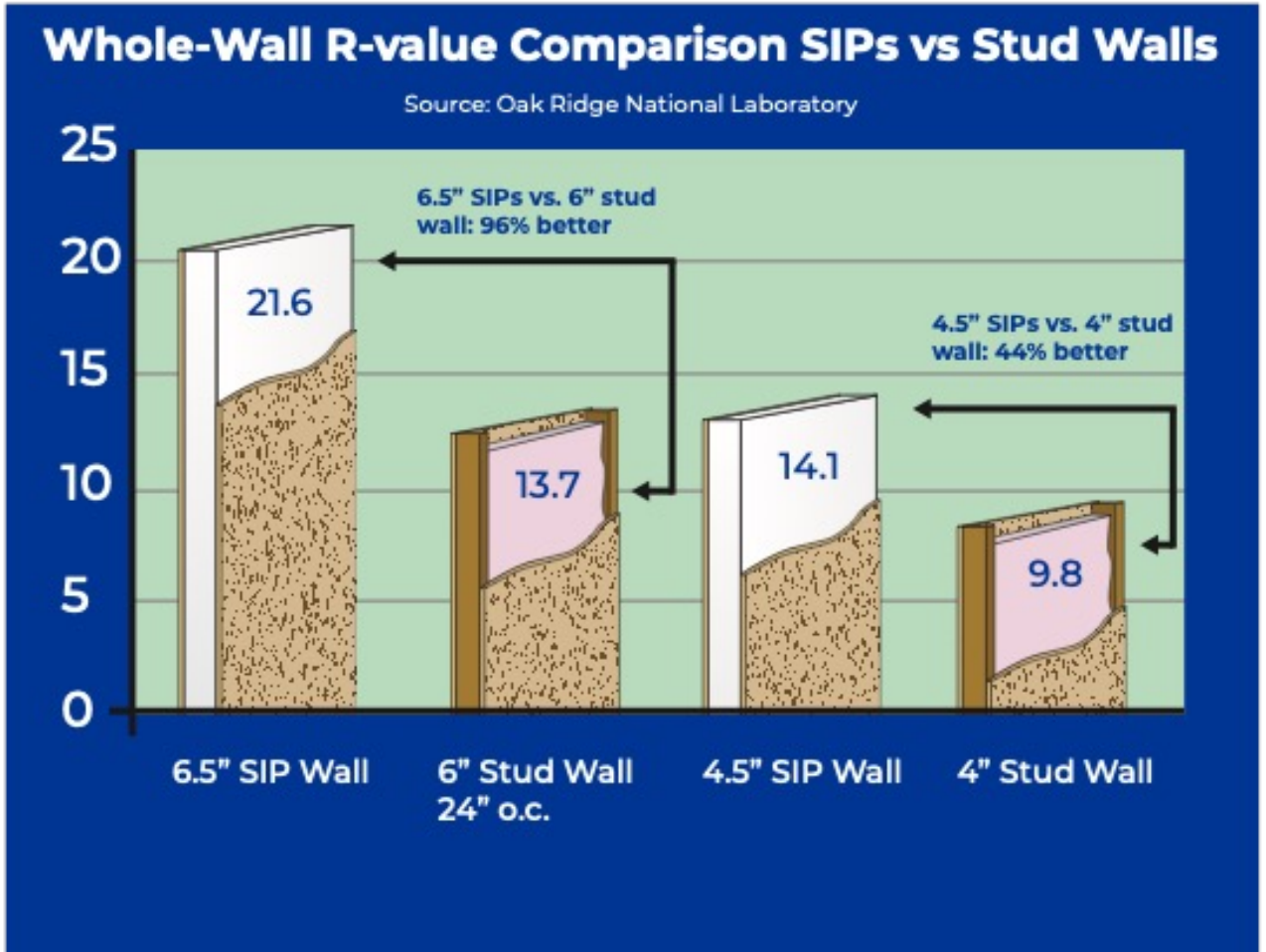
... 2024 code is in the sidelines.

ENERGY PERFORMANCE:

Beyond Product R-value to Whole-Wall R-value

Performance extends beyond product R-value:

- **Whole Wall R-value** accounts for the full assembly and the true values of components together.
- Testing has proven that SIP assemblies, with rigid insulation cores, have the highest and most stable long-term thermal values.



ENERGY PERFORMANCE:

Performance (U-Factors) vs. Prescriptive (R-value) Path

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

- ✓ Because Performance extends beyond each component's R-values, evaluating performance of a full assembly is key with new 2021 + codes
- ✓ Using the Performance Path & "U-Factors" with SIP building envelope assemblies helps exceed energy & buildings codes with less materials

  - SIPS meet code at R-38, where ceiling insulation in other assemblies require R-60. Don't over build!
  - U-Factor performance path evaluates energy efficiency in balanced, full system approach.

Optimize projects with SIPS as a system to realize the most savings & value.

2021 IECC TABLE R402.1.2 EQUIVALENT U-FACTORS [1]
Residential Walls

Zone	Wood-Framed Wall Requirement	Premier SIPS					
		4 ½"	Comply?	6 ½"	Comply?	8 ¼"	Comply?
0 - 1	0.084	0.060	Yes	0.041	Yes	0.033	Yes
2	0.084	0.060	Yes	0.041	Yes	0.033	Yes
3	0.060	0.060	Yes	0.041	Yes	0.033	Yes
4	0.045	0.060	No	0.041	Yes	0.033	Yes
4 Marine	0.045	0.060	No	0.041	Yes	0.033	Yes
5	0.045	0.060	No	0.041	Yes	0.033	Yes
6	0.045	0.060	No	0.041	Yes	0.033	Yes
7	0.045	0.060	No	0.041	Yes	0.033	Yes
8	0.045	0.060	No	0.041	Yes	0.033	Yes

[1] Premier SIPS U-Factors include inside air film, ½" gypsum wallboard, Premier SIP & outside air film. Values are calculated at 75 degrees.

1/R=U

ENERGY PERFORMANCE:

Eliminate Attic Ceiling Interface & Venting

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

Vented Attic Problem:
Settling, condensing & R-value loss over time (~50%). Must add air barrier between conditioned space

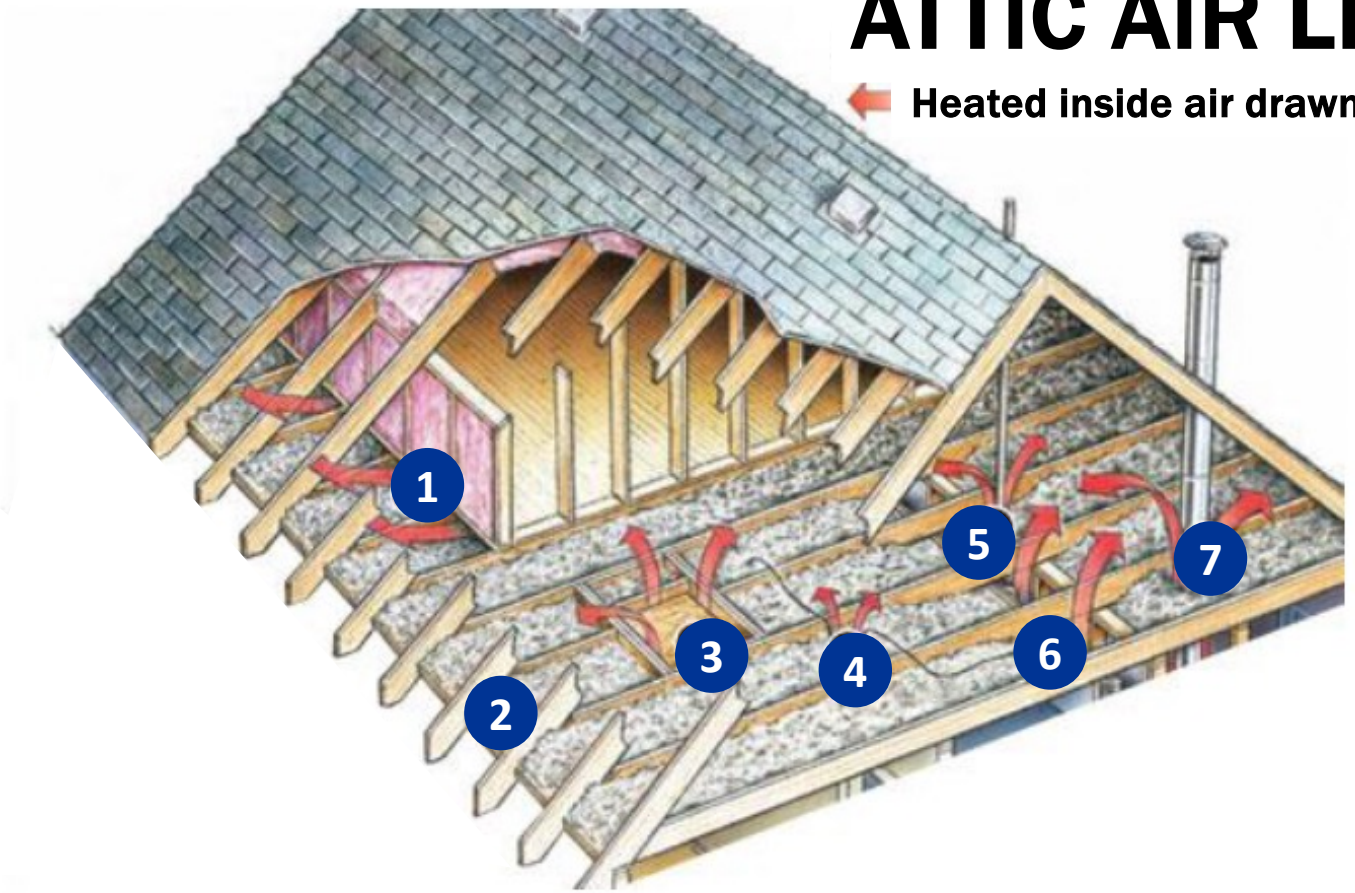
Premier SIPS:
No venting required.
No settling, or loss of thermal values.
Air barrier is integrated.

ENERGY PERFORMANCE:

Eliminate Attic Leaks

ATTIC AIR LEAKS

Heated inside air drawn into the attic



1. Behind Knee Walls
2. Exterior Wall Plate
3. Attic Hatch
4. Wiring Holes & Lights
5. Plumbing Pipes
6. Dropped Ceilings
7. Furnace Flutes

ENERGY PERFORMANCE:

SIPS Superior – Air Leakage Commercial & Residential

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

- Current NEW code calls for max 3-5 air changes/hour at 50 pascals (ACH 50)
- SIPS Projects REGULARLY below 1 - 1.5 ACH50
- Premier SIPS achieve above & beyond national program requirements and code standards for ACH

Climate Zones	ACH50 Requirements/Targets			
	Zero Energy Ready	ENERGY STAR V3	2012 - 2018 IECC	Passive House
1-2	3.0	6.0	5. 0	0.6
	2.5	5.0	3.0	0.6
	2.0	4.0	3.0	0.6
8	1.5	3.0	3.0	0.6

SIPs Inherently Optimize Air Tightness:

1.5 ACH50

ENERGY PERFORMANCE:

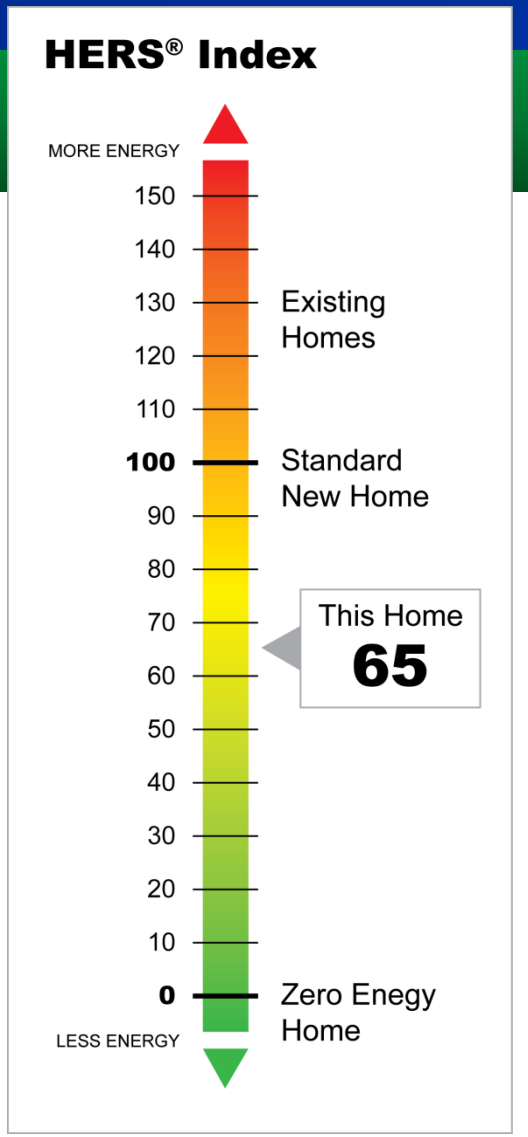
Quantifiable Results – Residential Scale

The Home Energy Rating System (HERS) Index is a scoring system established by the Residential Energy Services Network (RESNET)

- Net zero energy home scores a HERS Index of 0
- Each 1-point decrease in the HERS Index corresponds to a 1% reduction in energy consumption
- Reference Home, HERS 65 = 35% more energy efficient than a Standard New Home

- SIPS average HERS energy ratings of 50 or less.
- 50% more energy-efficient than 2006 standards.

RESNET HERS Rater



ENERGY PERFORMANCE:

Applying Energy Efficiency - LEED Certification

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

SIPS have a significant impact on environmental credentialing

SIPS are so efficient that they can qualify for:

- **40 LEED BD&C 4.0 points**
- **47 LEED 4.0 residential points**

Certify a residential project with SIPS alone!

FOUR LEVELS OF CERTIFICATION:

Certified: 40 to 49 points
Silver: 50 to 59 points
Gold: 60 to 79 points
Platinum: 80 to 110 points

PROVIDE PERFORMANCE:

Real Life Energy Performance & Renewable Energy

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

Cooper's Hawk – Multi-Family Community

- 18 units residential units each 1,152 sf
- SIPs building envelope pairs with solar on garage roofs for net-positive energy
- Solar energy generated operates each unit, 2 PHEV cars per unit **AND** the 54 existing surrounding homes
- US DOE Zero-Energy-Ready standard, including EPA Indoor Air Plus

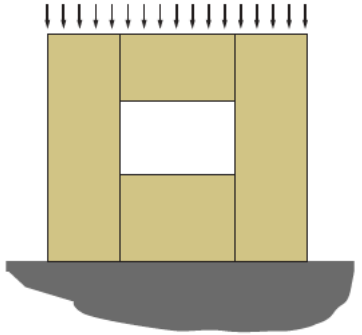
DURABLE PERFORMANCE:

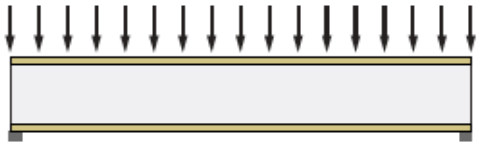
Strength & Durability of SIPs

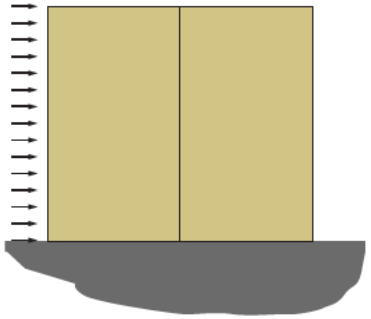
CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

With increasing code requirements every year, the construction industry needs to create structures with extreme durability.

- Third party testing validates SIPs strength
- Approved as shear walls in all seismic zones including D, E and F *
- SIPs have an advantage when handling in-plane compressive loads.







**Not all SIPs Manufacturers approved*

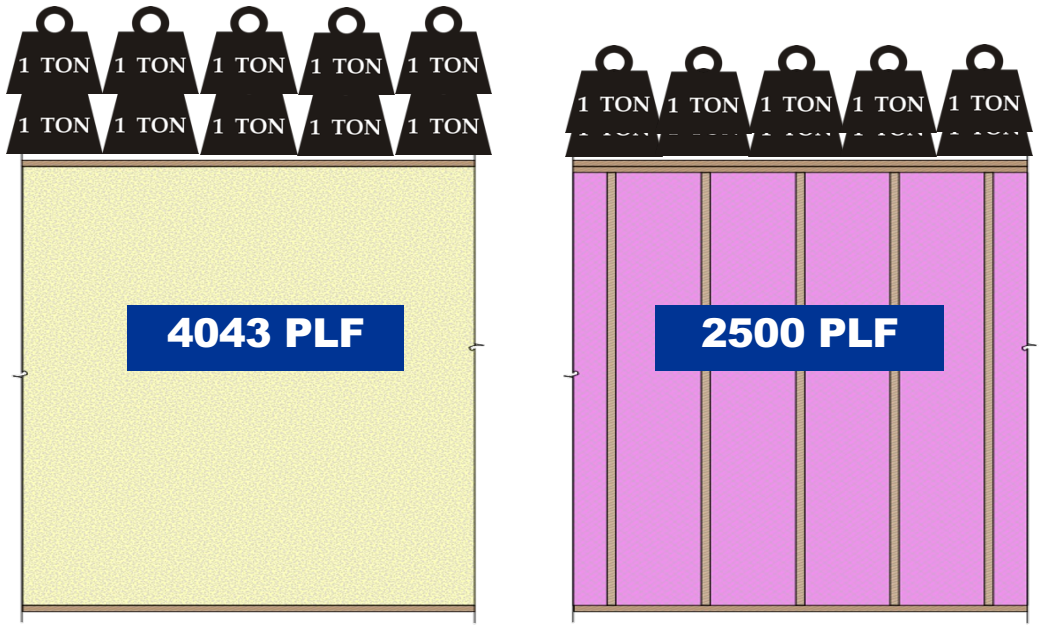
DURABLE PERFORMANCE:

Reduced Studs Does Not Mean Less Strength

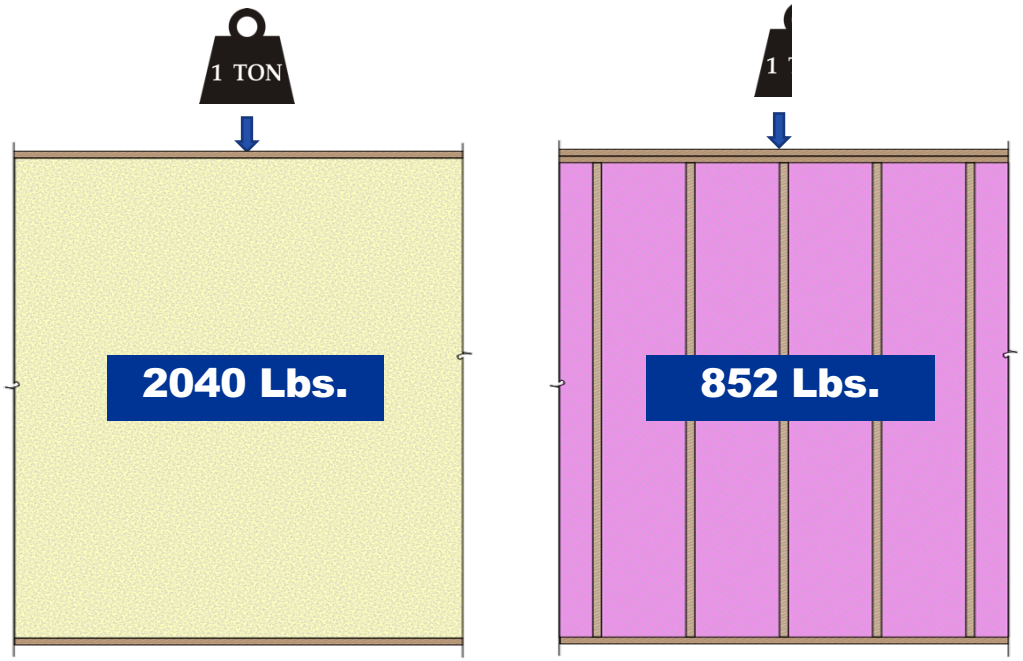
CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

Gravity & SIPs Wall Loads:

2 tons of vertical uniform load



A ton of vertical point load

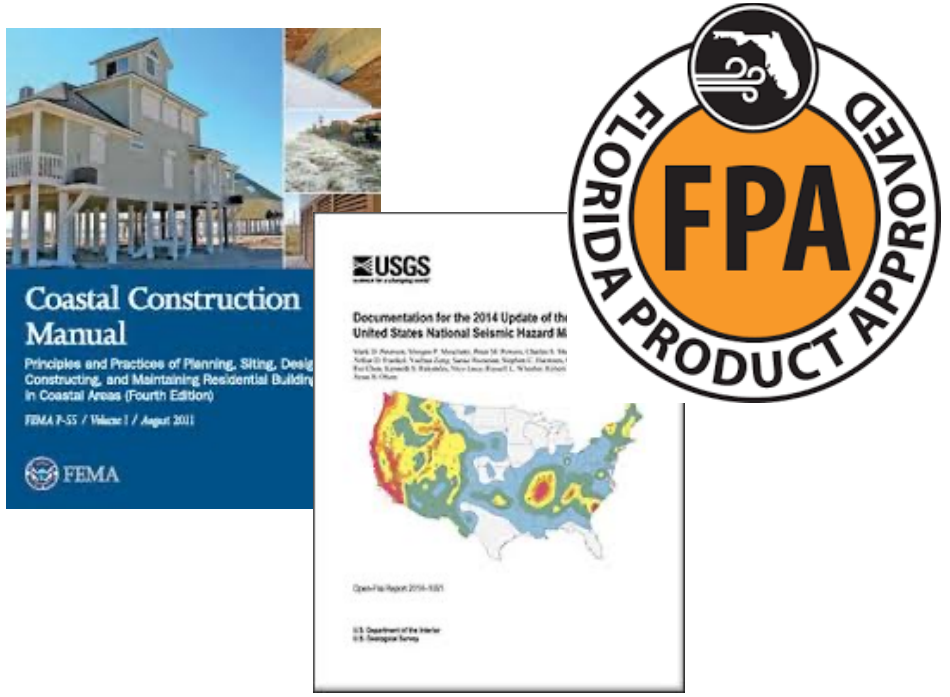


DURABLE PERFORMANCE:

Resilient & Ready for Natural Disasters

SIPs form a monolithic envelope with superior strength recognized by agencies in natural disaster-prone settings:

- FEMA Home Builder's Guide includes SIPs as a sound option for coastal construction
- Approved for Florida's strict High Velocity Hurricane Zones (HVHZ) - 180 mph winds
- Approval for seismic zones D, E & F – for some manufacturers, not all



DURABLE PERFORMANCE:

SIPs Standing Through Natural Disasters

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

Real life examples:

Hurricane IKE Home

ouisiana coast after hurri ane IKE, USA

Kobe Earthquake (6.9 Magnitude)

Tennessee Tornado

DURABLE PERFORMANCE:

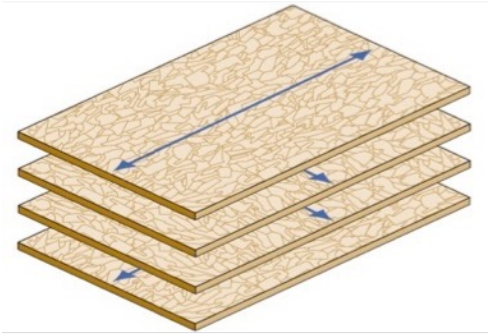
Termite & Fungal Decay Resistant

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | **CHALLENGE #4** | CHALLENGE #5

Fungal Decay & Termite Resistant *(Not your average OSB/Insulation)*

OSB Additives in production, such as Frame Guard™ and Zinc Borate, offer warranties and can provide protection from:

- Weathering & fungal decay
  - During job site storage & the construction process
- Termites & fungal decay
  - After completion of the structure

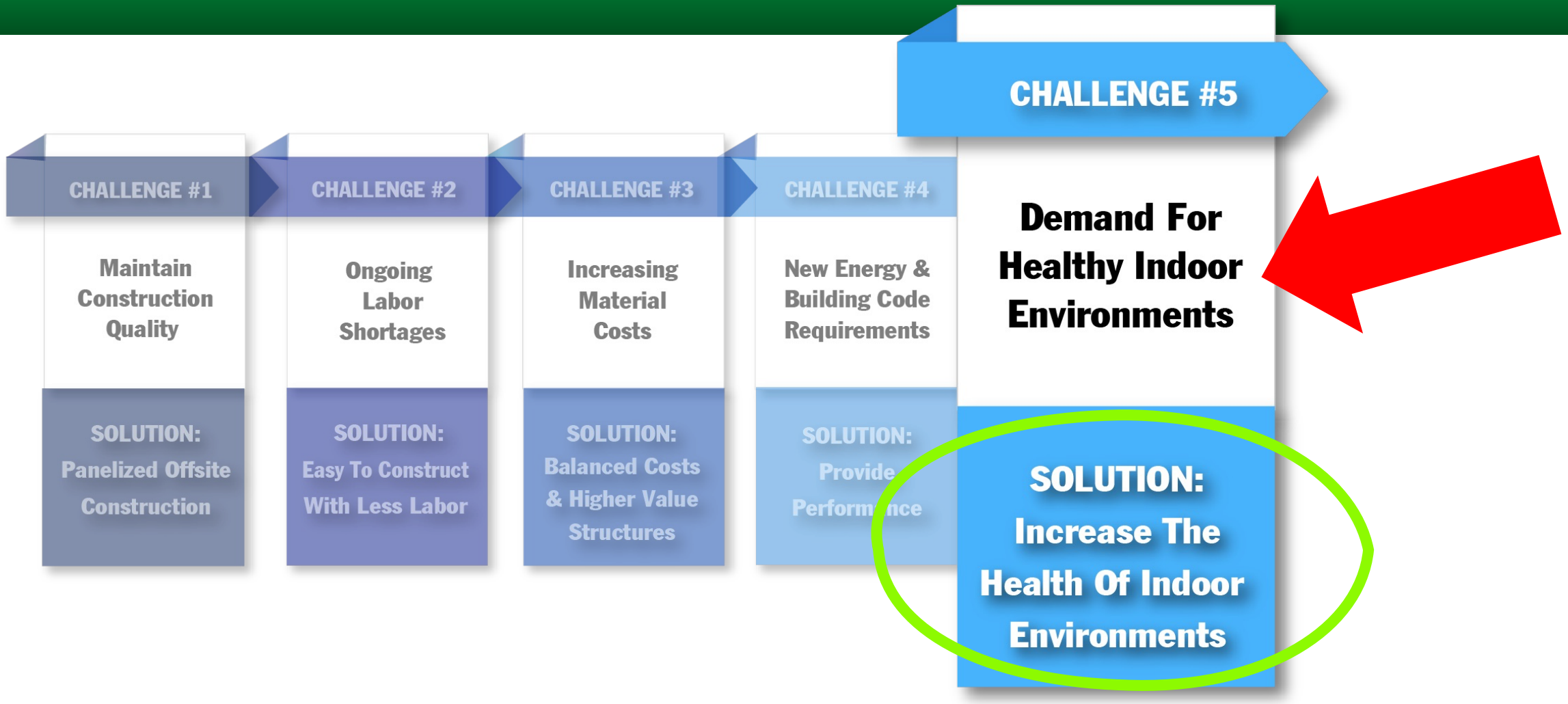


EPS and GPS solid core insulations include termite resistant borate products in manufacturing to prevent termite infestation (safe for people & animals).

NEXT UP: Final Challenge #5

HEALTH DEMANDS:

Challenge & Solution



HEALTH DEMANDS:

The Importance of Indoor Air Quality (IAQ)

IAQ Facts:

- Americans, on average, spend 90% of time indoors
- Indoor pollutants 2-5 x higher concentration than outdoor
- Indoors often refuge from poor air quality (fires)

- Vulnerable groups (the very young and old), spend more time indoors, with more exposure to pollution's adverse effects.

HEALTH DEMANDS:

SIP Solid Cores Eliminate Moisture Carrying Air Movement

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | CHALLENGE #4 | **CHALLENGE #5**

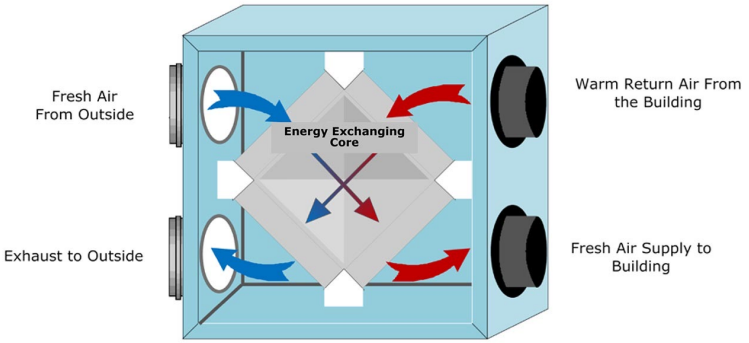
The job of the building envelope is to prevent unwanted air infiltration.

Solid core insulation in SIPs create airtight environments:

- Eliminating air infiltration reduces moisture inside building cavities
- Without moisture, you can eliminate mold growth, fungal decay
- Minimize health risks for building occupants

Ensure air entering building is fresh & healthy, use mechanical ventilation systems to manage IAQ:

- Using Energy Recovery Ventilators (ERV) or Heat Recovery Ventilators (HRV) efficiently manages heat, moisture & humidity
- HEPA Filters manage contaminates such as dust, smoke & pollen



HEALTH DEMANDS:

Clean Air Certified

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | CHALLENGE #4 | **CHALLENGE #5**

Building envelope assemblies like SIPs can be tested for low VOC levels and certified by third party ”Clean Air Certifiers.”

INTERTEK SUSTAINABILITY

CERTIFIED
CLEAN AIR GOLD

CERTIFIED
CLEAN AIR GOLD

Intertek does hereby certify that an independent assessment has been conducted on behalf of

PREMIER BUILDING SYSTEMS, LLC

Certificate Number: CA-28301-2021a
Certification valid until: 23 November 2021

Applicant Address: 18504 Canyon Road E.
Puyallup, WA 98375 USA

Product Category: Building Products, Adhesives and Sealants

Product Details: See Appendix

Conformance Criteria: California Department of Public Health (CDPH) Standard Method v1.2: Private Office and School Classroom.

Issuing Office Name & Address: Intertek Testing Services NA, Inc.
4700 Broadmoor Ave SE, Suite 200
Kentwood, MI 49512 USA
Ph: +1-616-656-7401

Jesse Onderuma
Certification Officer

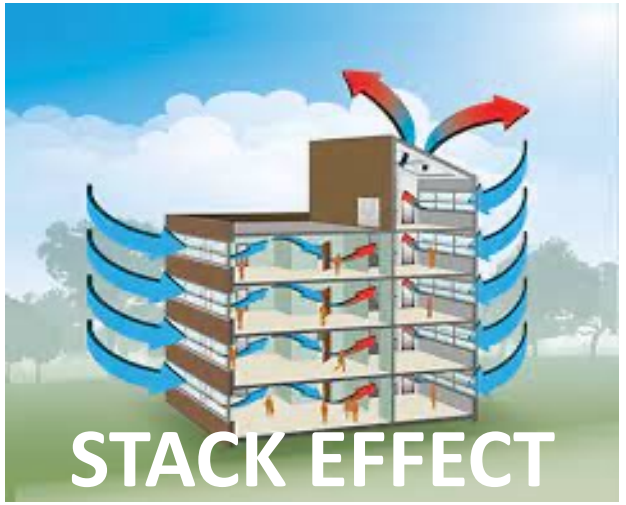
HEALTH DEMANDS:
Occupant Comfort = Temperature & Sound Control

CHALLENGE #1 | CHALLENGE #2 | CHALLENGE #3 | CHALLENGE #4 | CHALLENGE #5

Beyond IAQ – Indoor Environmental Quality (IEQ)

SIPS also benefit Indoor IEQ by delivering:

- Temperature uniformity throughout the building
- Consistent comfort in every room/on every level
- Solid core walls dramatically improve sound control, reducing high-frequency irritating noises



We've Shown Key Challenges Are Tackled With SIPS

CHALLENGE #1	CHALLENGE #2	CHALLENGE #3	CHALLENGE #4	CHALLENGE #5
Maintain Construction Quality	Ongoing Labor Shortages	Increasing Material Costs	New Energy & Building Code Requirements	Demand For Healthy Indoor Environments
SOLUTION: Panelized Offsite Construction	**SOLUTION:** Easy To Construct With Less Labor	**SOLUTION:** Balanced Costs & Higher Value Structures	**SOLUTION:** Provide Performance	**SOLUTION:** Increase The Health Of Indoor Environments

RECAP: Beyond Tackling The Storm Of Industry Challenges....

COST SAVINGS

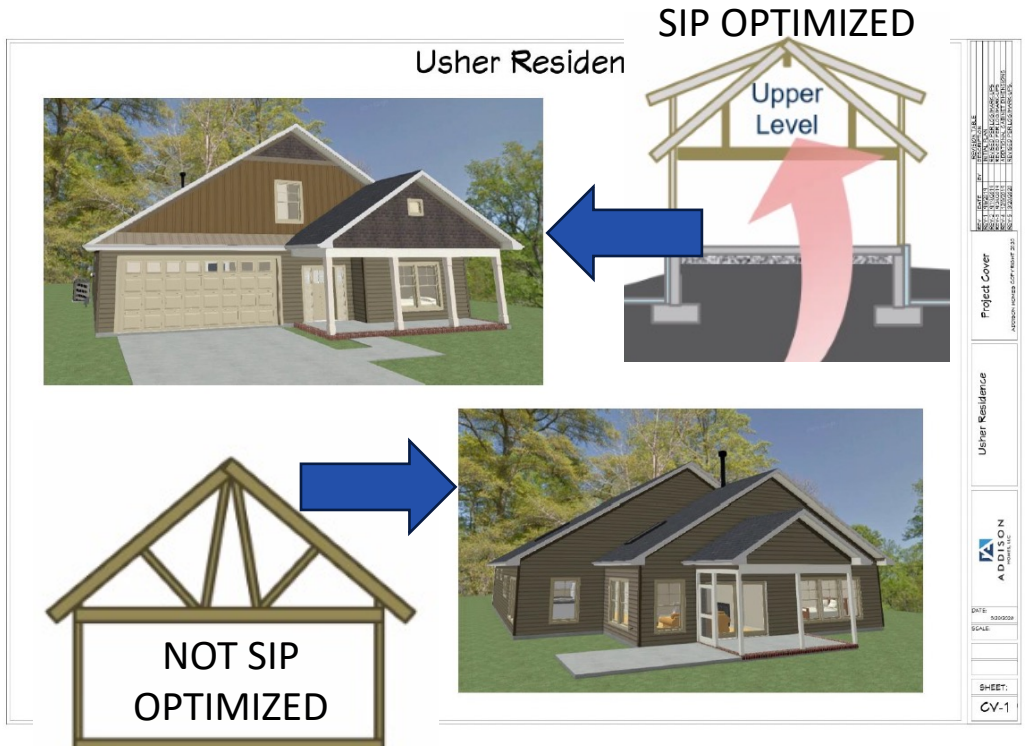
Time	• Framing • Drywall • Finishes & Trim • Interest/Loan Costs
Material & Waste	• Structure: Lumber & Sheathing • Insulation • HVAC • Air Sealing & Aire Barriers • Attic Venting
Quality	• Save rework (Framing, Finishing) • Call back reduction • Inspections (Inherent QA) • Training (MEP, Insulation, air sealing)
Tax Incentives	• Federal & Regional • Private Utility

ADDED VALUE:

Enhanced Quality	• Accuracy & Precision • Resilience & Strength (Fire, Wind, Seismic) • 20 Year Structural Warranty • Healthier, Comfortable Indoor Environments
Enhanced Space	• Thinner Walls = Added Space • Conditioned Attic = Added Space/Storage • Raised Ceilings = Added Volume
Reduced Operating Costs	• 60% + Reduction in End User Operating Costs (Can afford a larger mortgage, upgraded commercial elements, etc.) • Reduction in Owners Insurance
Sustainable	• Higher Appraisals • Turn-Key Environmental Certifications

Summary: Three Real World Cost Saving Scenarios

#1 Addison Homes – South Carolina



Addison Homes
Greenville, SC
- 3BR / 3 Bath
- ~2,740 SF
- $450,000
- Framed Walls/Roof

Non-SIP-Optimized:
- No Ridge Beam Column Location with Open Space
- SIP Roof Requires Truss Framing
- No 2 Ft. Dimensions

SIPS vs Site Framing Costs

BID PACKAGE COMPARISON
SIPS + 59% $$$

"TRUE COST" COMPARISON
(Add labor, time, HVAC, trades, carrying cost savings, tax credits, increased profits)
SIPS + 10% $

SIPS OPTIMIZED & "TRUE COST" COMPARISON
- 4% $

Summary: Three Real World Cost Saving Scenarios

#2 Duke Street Cottages – North Carolina

Duke St. Cottages
Granite Falls, NC
- 2BR / 1 Bath
- ~1,600 SF
- $199,900
- SIPs Walls/Roof

SIP-Optimized:
- Simple Roof
- ½ Attic Storage
- ½ Sloped Ceilings
- 2 Ft. Dimensions
- Ductless Minisplit High-Efficiency HP

SIPS vs Site Framing Costs

BID PACKAGE COMPARISON

SIPS + 56% $$$

SIPS OPTIMIZED
"TRUE COST" COMPARISON

(Add labor, time, HVAC, trades, carrying cost savings, tax credits, increased profits)

SIPS - 65% $$$

Summary: Three Real World Cost Saving Scenarios

#3 Prairie Lofts – Minnesota

Prairie Lofts
Leverne, MN
- Built 2022
- 2 Bldgs./54 Units
- 1BR/2BR Plans
- HERS 45 w/o Solar
- 1.35 ACH50
- SIPs Walls:
  - Exterior
  - Hall
  - Demising

SIP-Optimized:
- 1 Hour from Plant
- Simple Design

SIPS vs Site Framing Costs

BID PACKAGE COMPARISON

SIPS + 11% $$

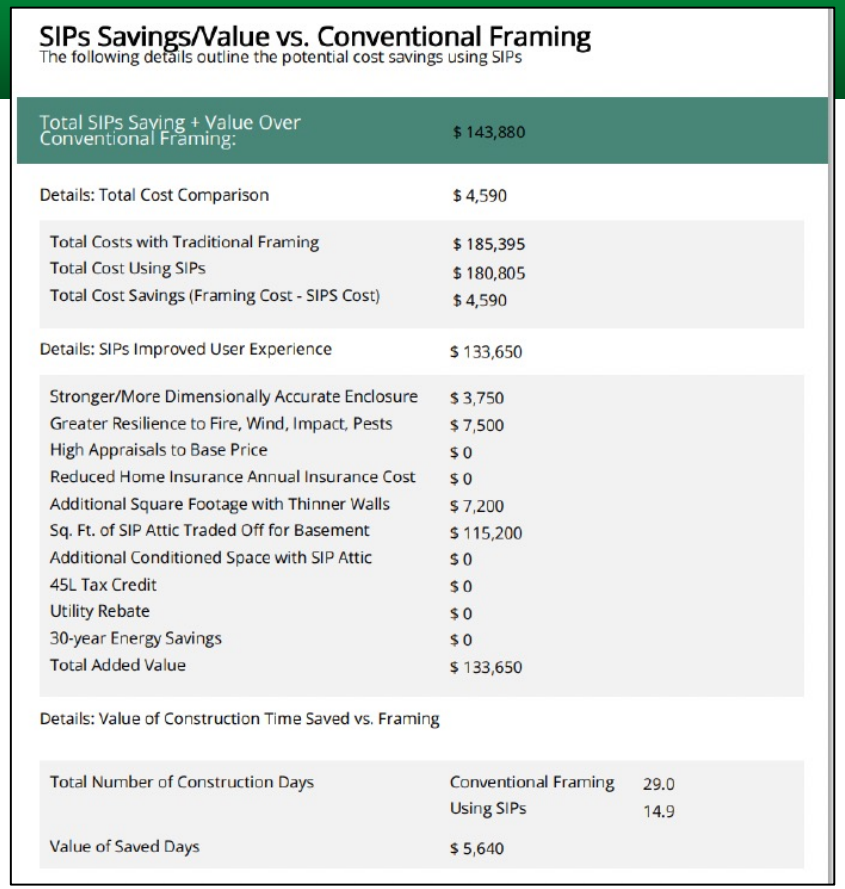
"TRUE COST" COMPARISON

(Add labor, time, HVAC, trades, carrying cost savings, tax credits, increased profits)

SIPS - 31% $$$

Summary: True Cost Comparison Critical

- SIPS true cost advantage is missing when comparing straight bid packages.
- Must compare all ANCILARY costs, benefits and value-adds to maximize profits.
- We have a calculator to help!
- Contact the Rep near you for a comparison and estimate www.premiersips.com

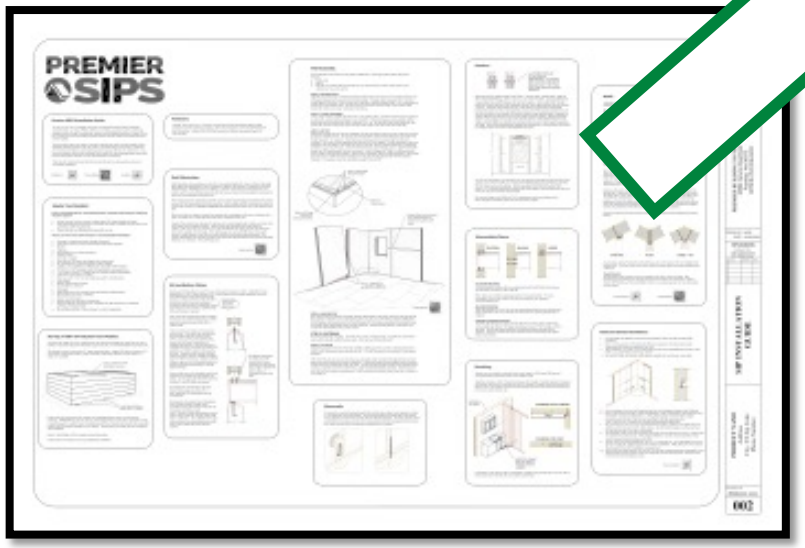


SIPs Savings/Value vs. Conventional Framing
The following details outline the potential cost savings using SIPs

Total SIPs Saving + Value Over Conventional Framing:	$ 143,880
Details: Total Cost Comparison	$ 4,590
Total Costs with Traditional Framing	$ 185,395
Total Cost Using SIPs	$ 180,805
Total Cost Savings (Framing Cost - SIPS Cost)	$ 4,590
Details: SIPs Improved User Experience	$ 133,650
Stronger/More Dimensionally Accurate Enclosure	$ 3,750
Greater Resilience to Fire, Wind, Impact, Pests	$ 7,500
High Appraisals to Base Price	$ 0
Reduced Home Insurance Annual Insurance Cost	$ 0
Additional Square Footage with Thinner Walls	$ 7,200
Sq. Ft. of SIP Attic Traded Off for Basement	$ 115,200
Additional Conditioned Space with SIP Attic	$ 0
45L Tax Credit	$ 0
Utility Rebate	$ 0
30-year Energy Savings	$ 0
Total Added Value	$ 133,650
Details: Value of Construction Time Saved vs. Framing	
Total Number of Construction Days	Conventional Framing 29.0
	Using SIPs 14.9
Value of Saved Days	$ 5,640

The SIPs Process: Plans to Production to Install

Your local SIPs Rep can help with tips on optimizing designs for SIPs construction or help convert existing plans to SIPs



No Need To Wait - Innovation Is Here With SIPS

146
Years

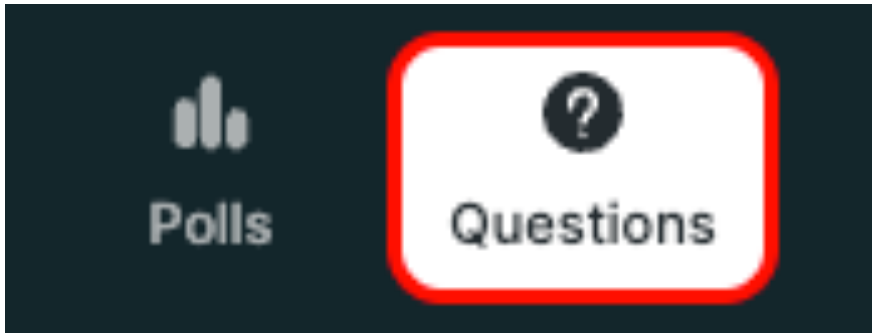
Available Today!

1877

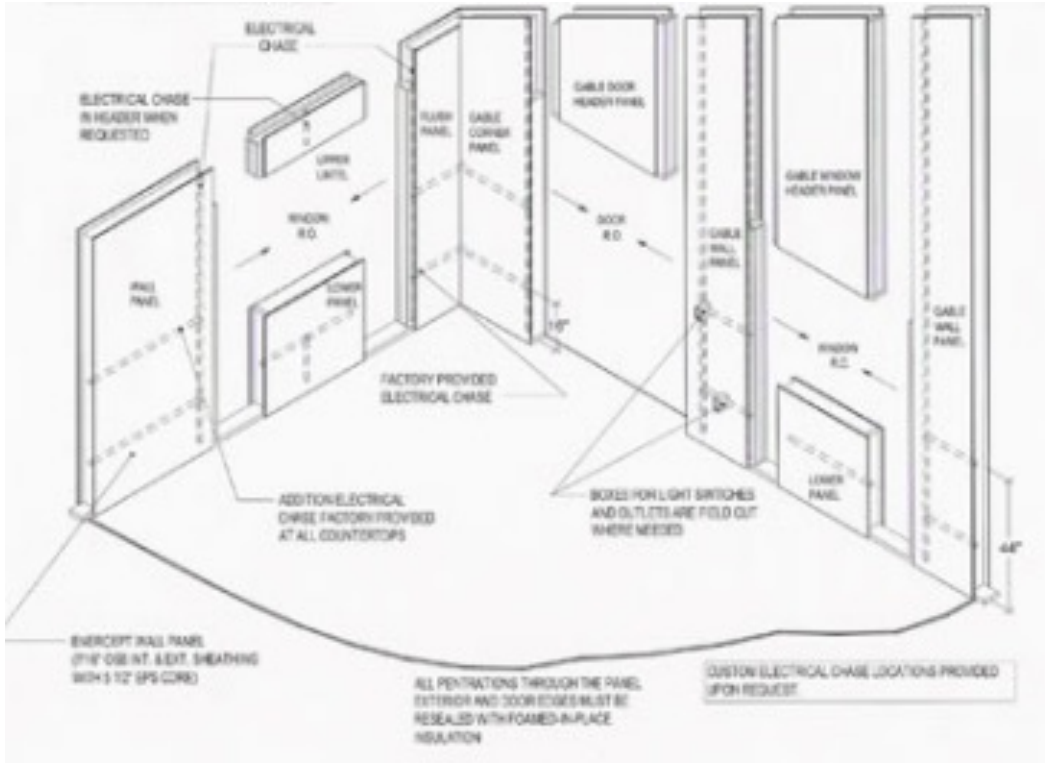
2023

2024!

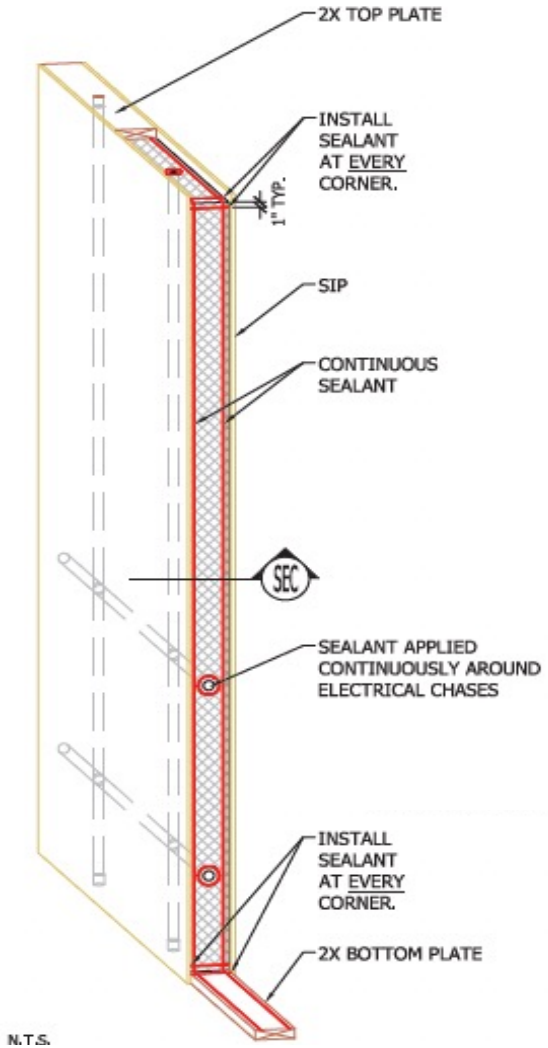
Questions?

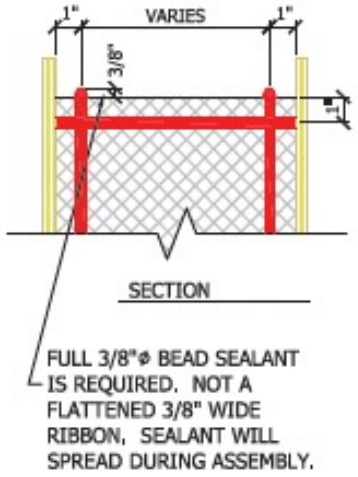


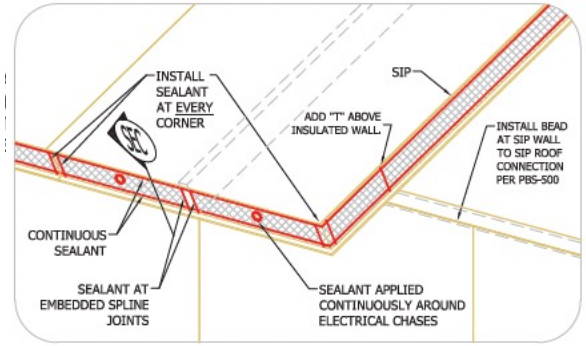
How Do Projects Get Started in the Design Phase?

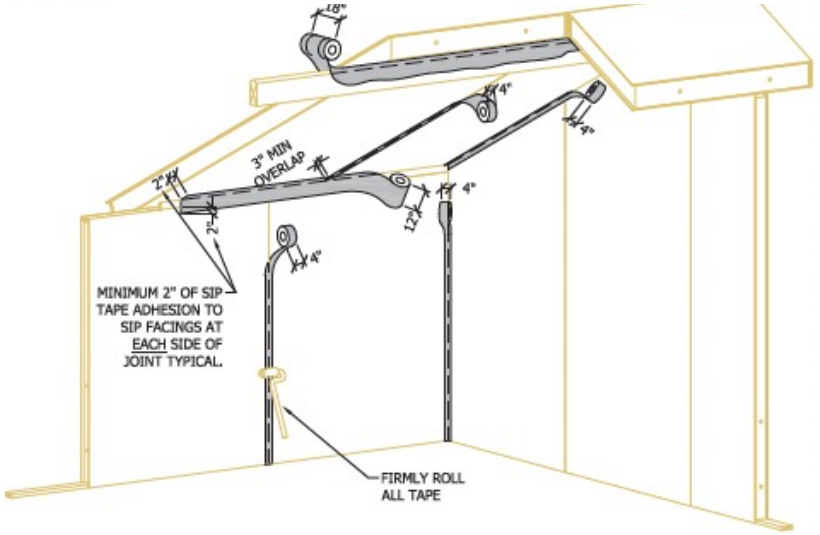


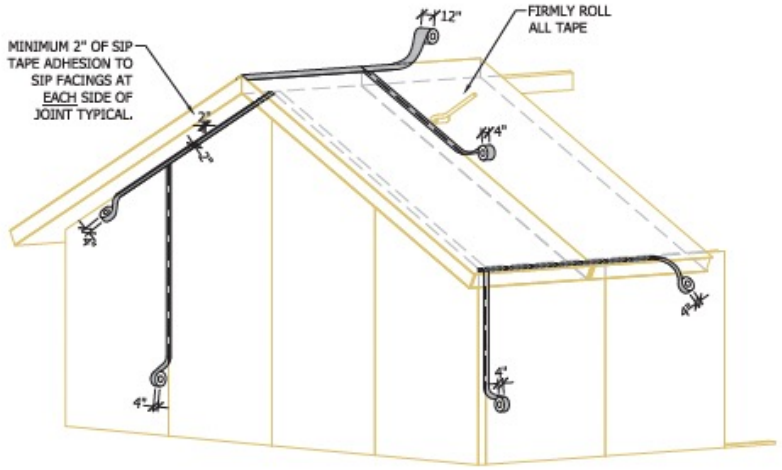
Basic Design Details: Panel Sealing Between Connections & Taping Joints





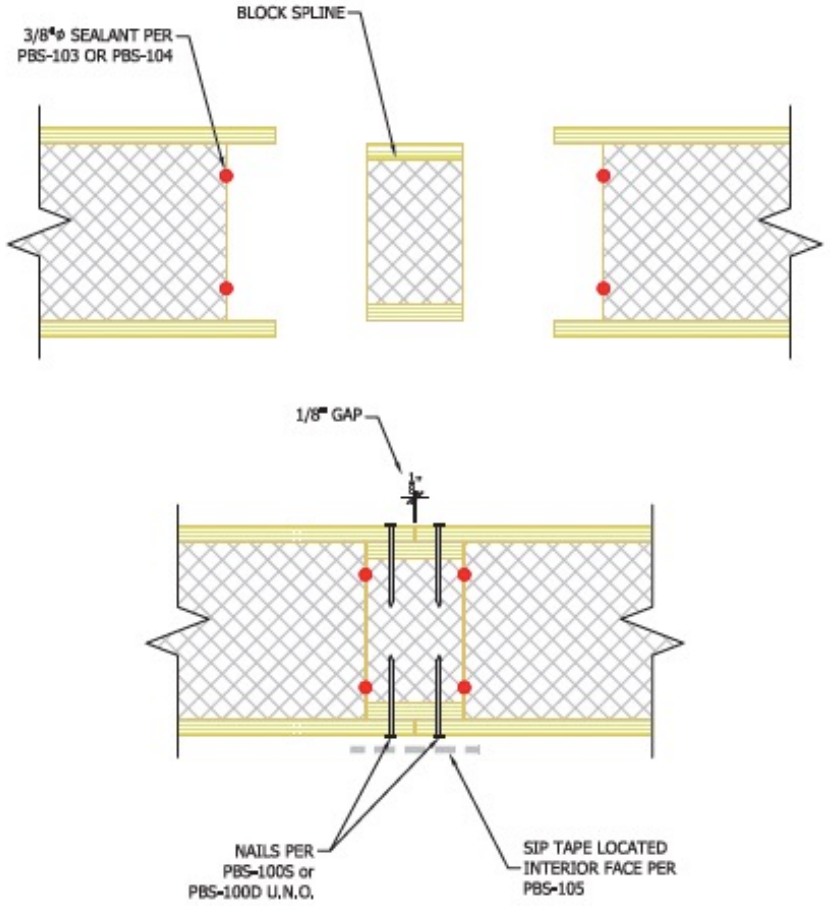




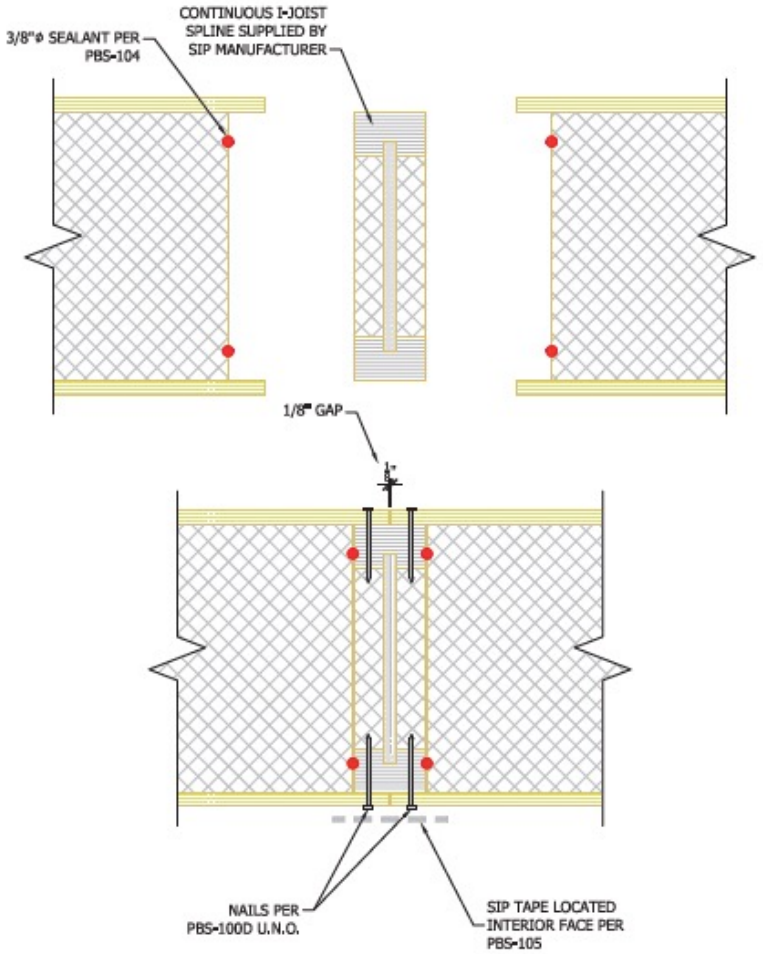


Panel Connection Options: Splines

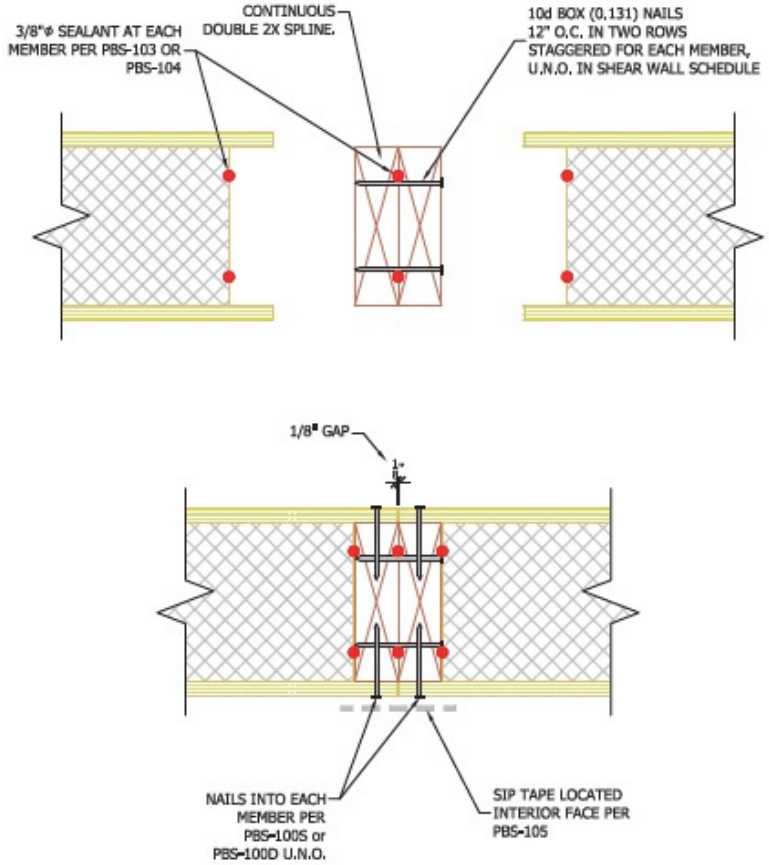
Type S (Box) Spline



Type I (I-Joist) Spline

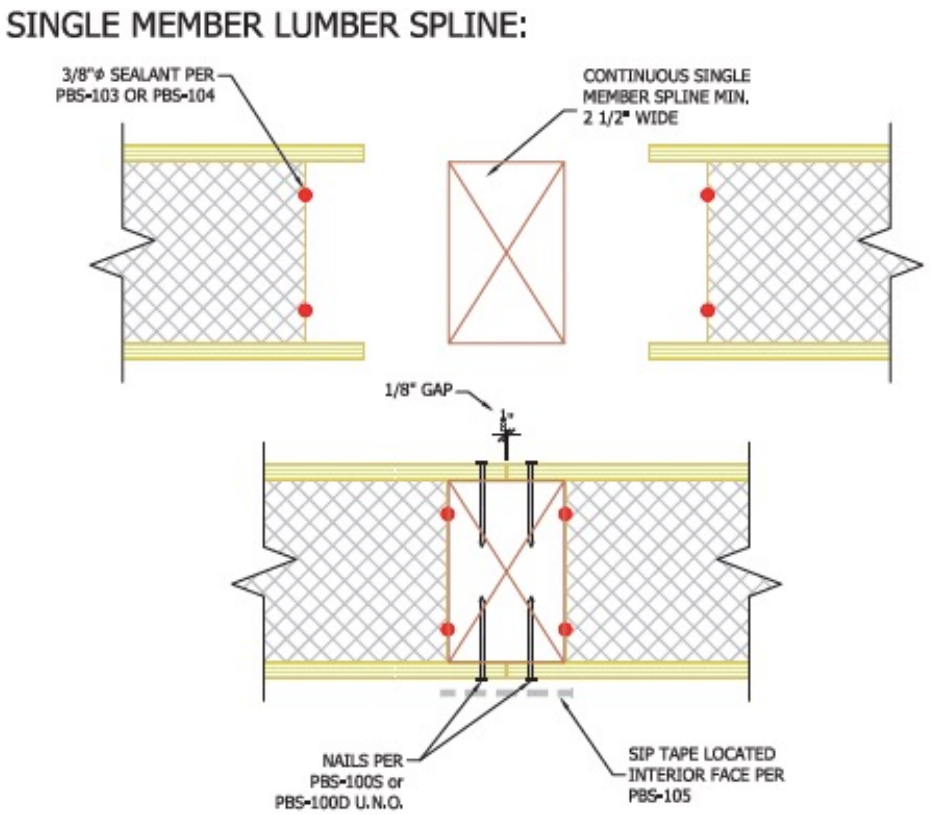


Type L (2x) Spline

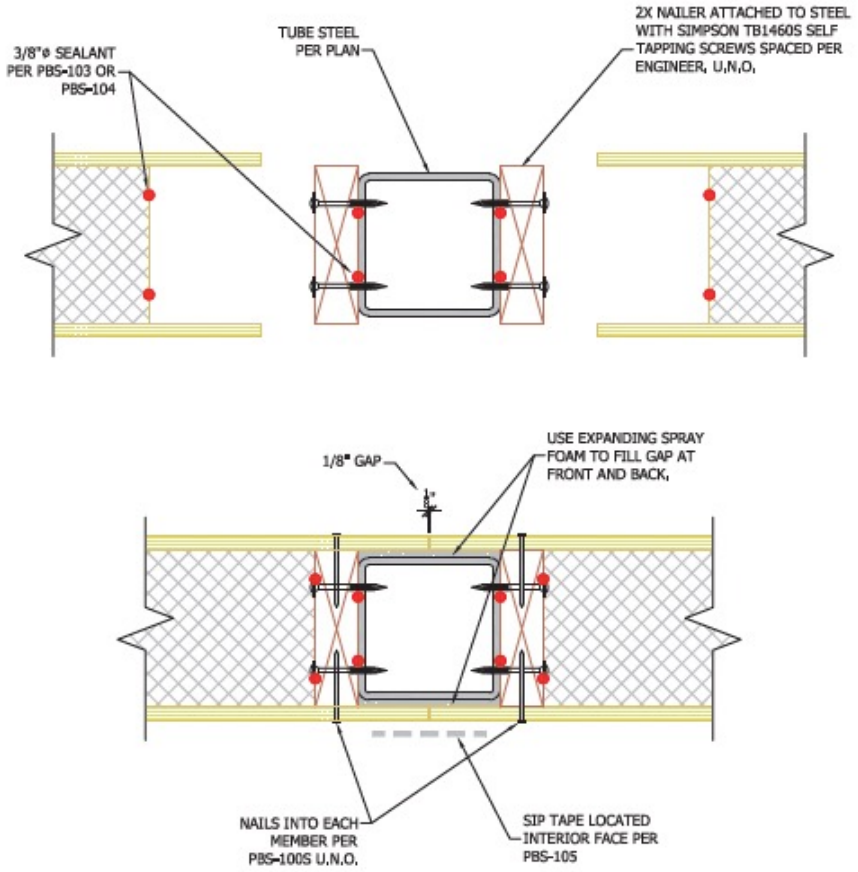


Panel Connection Options: Posting & Columns

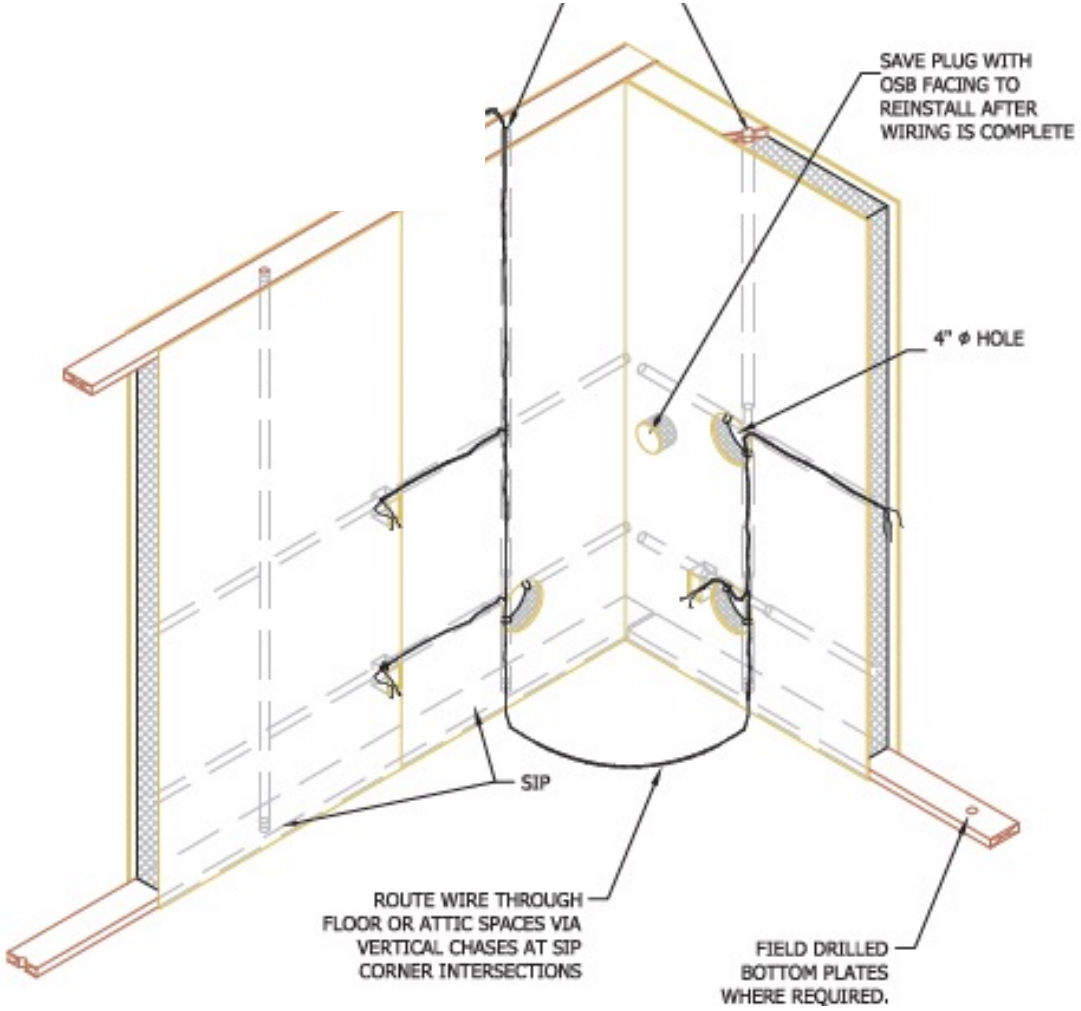
Alternative Lumber Spline

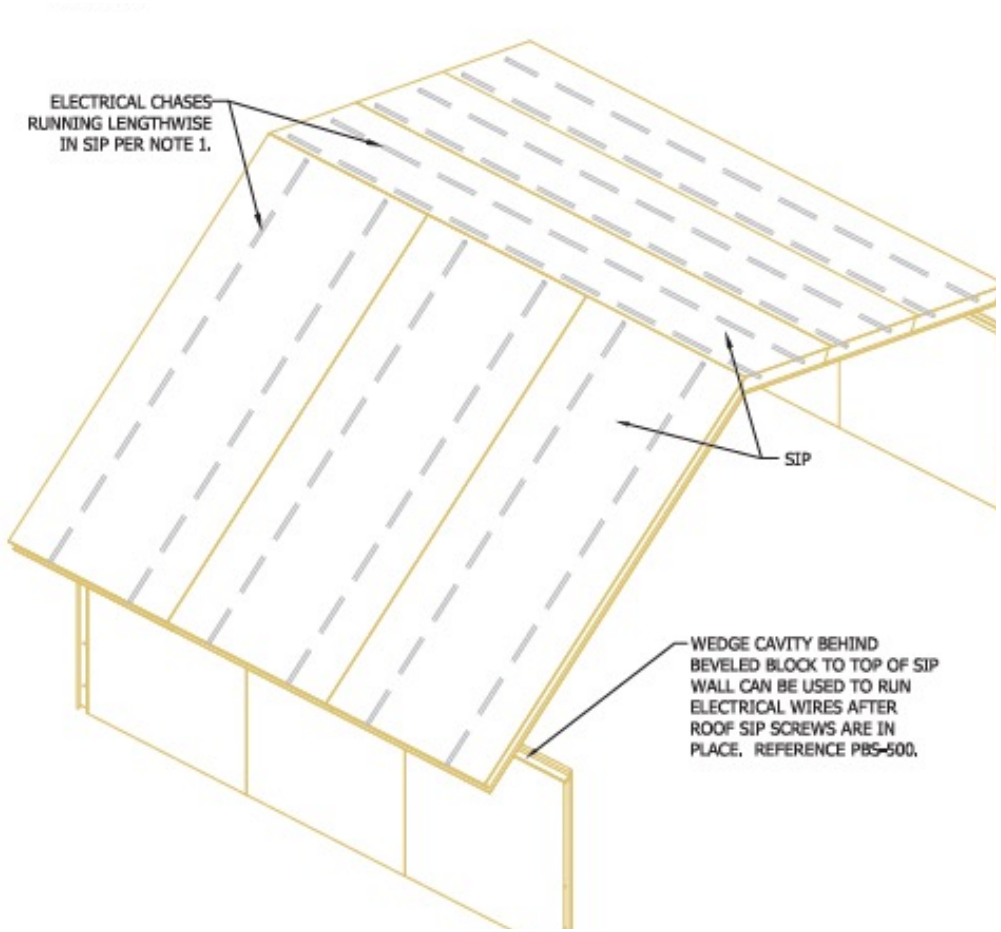


HSS 2x Spline

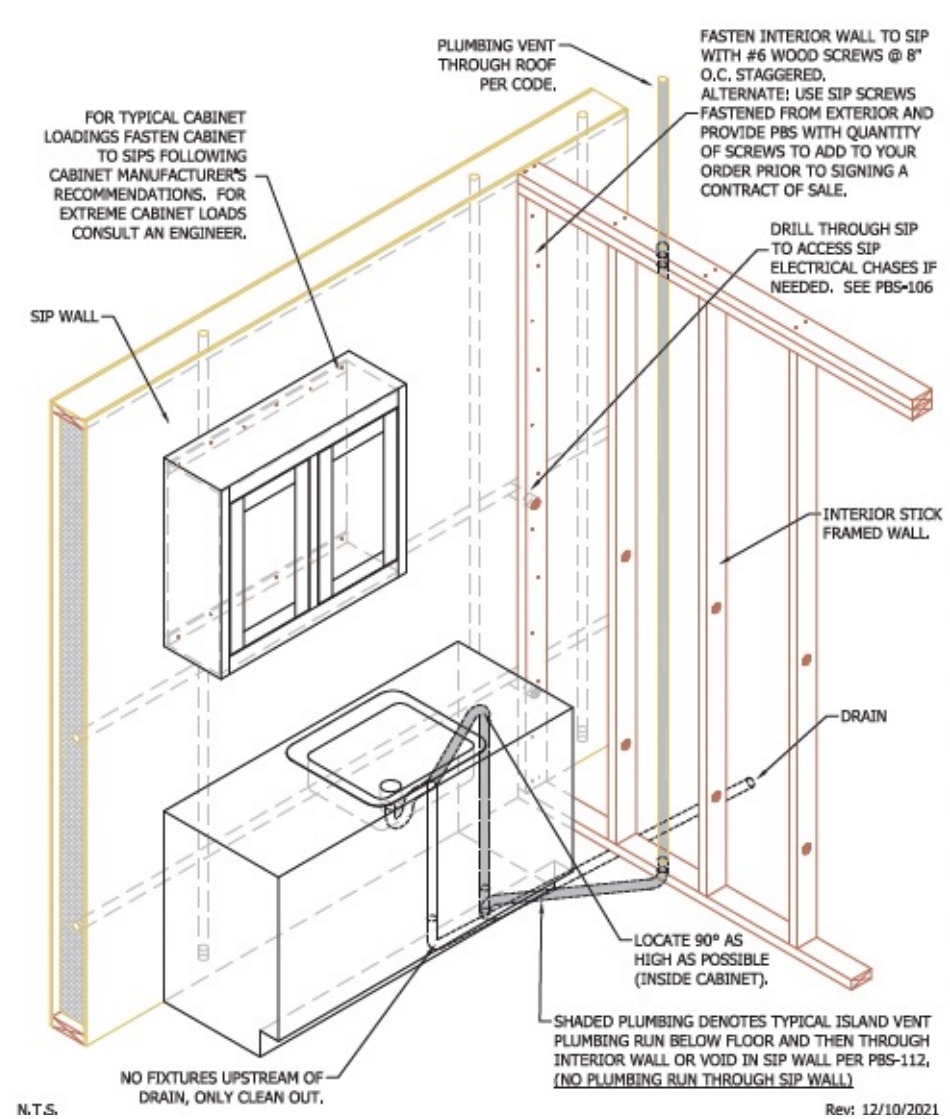


Factory Installed Electrical Chases



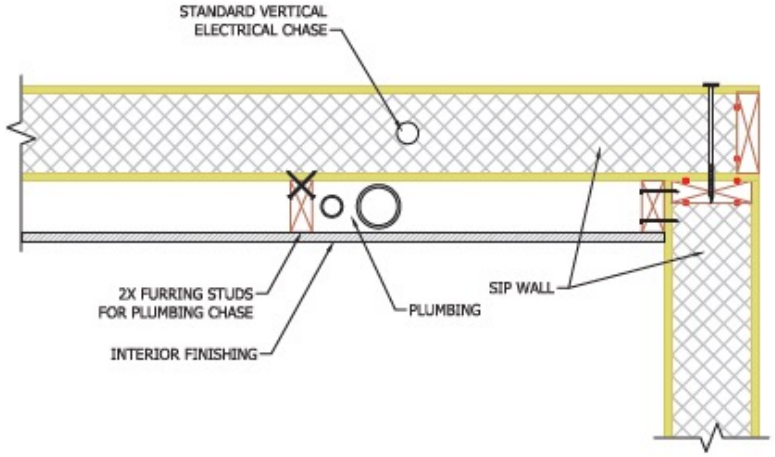


Connecting Non-SIP Interior Walls

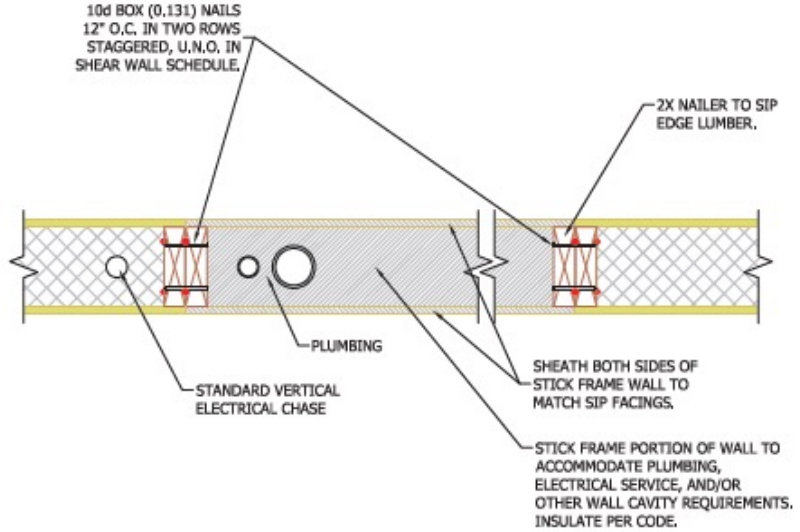


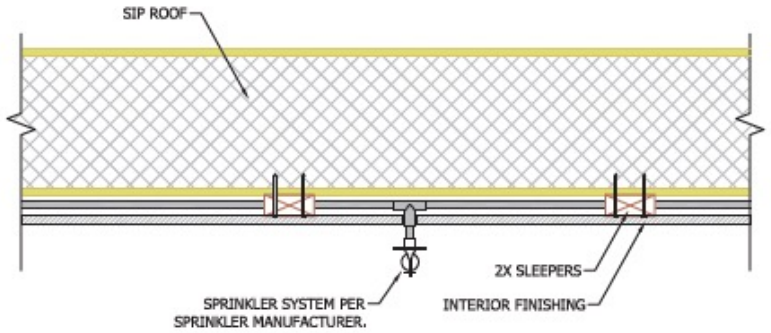
Plumbing & Furring

Plumbing Furring



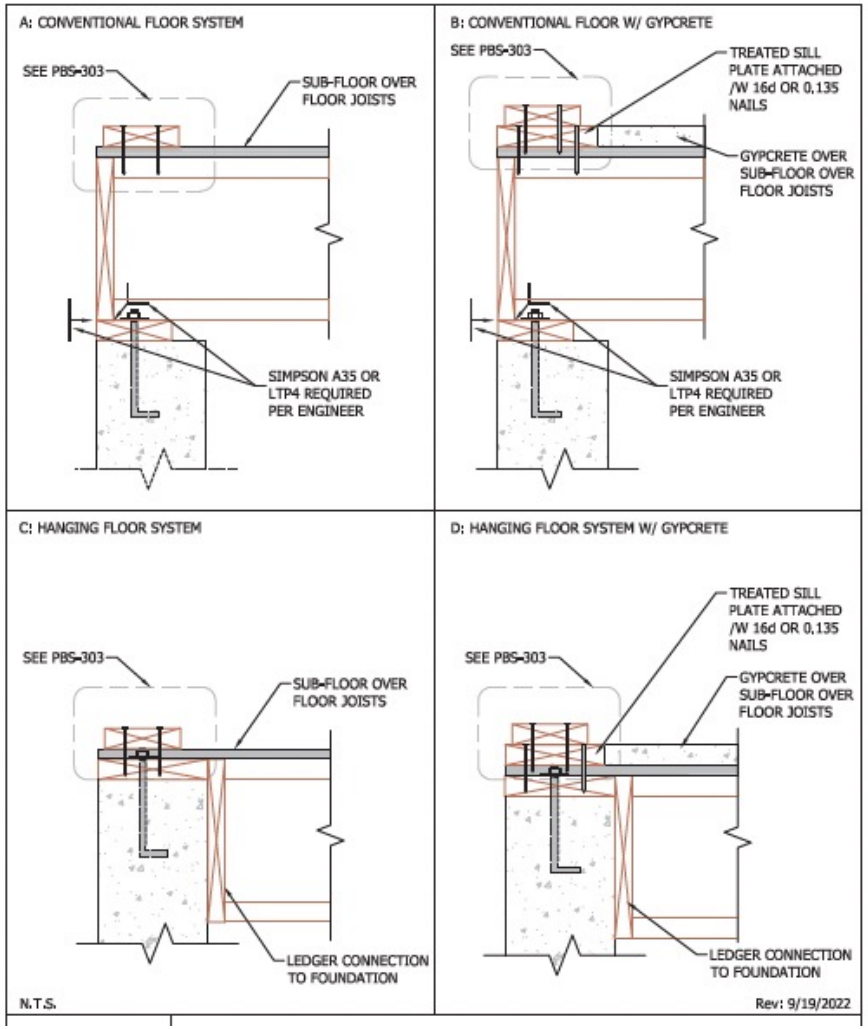
Void in Wall



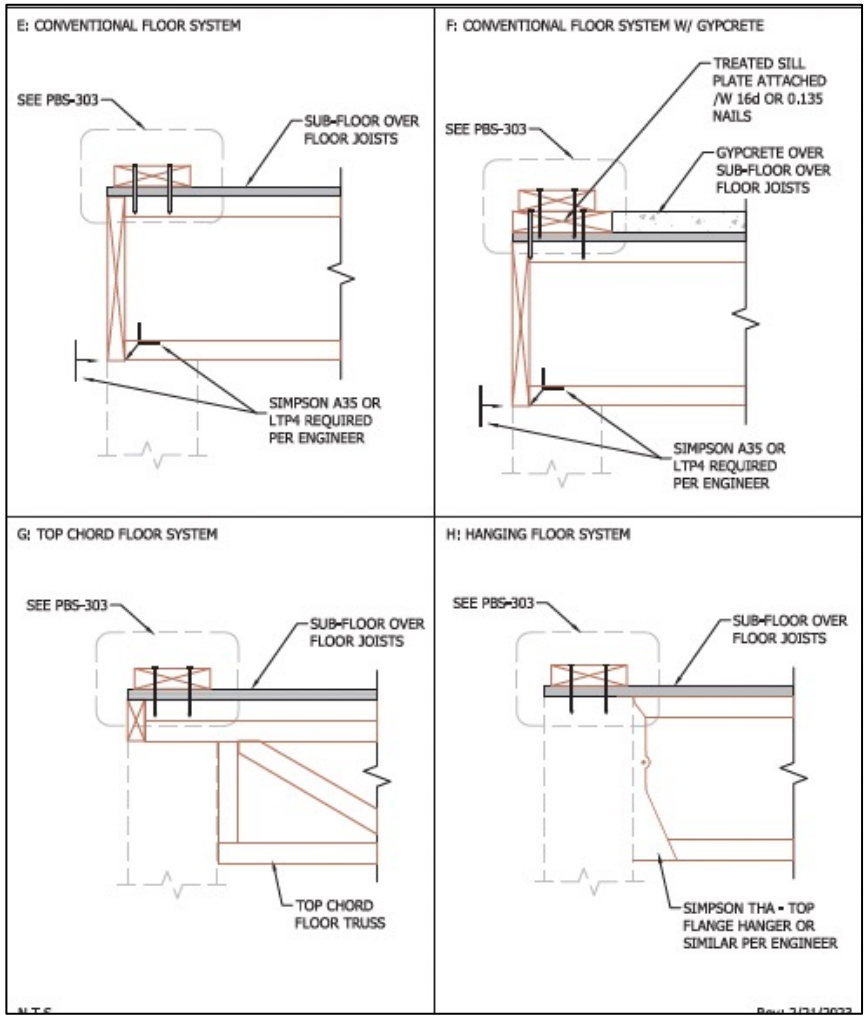


Sprinkler Furring

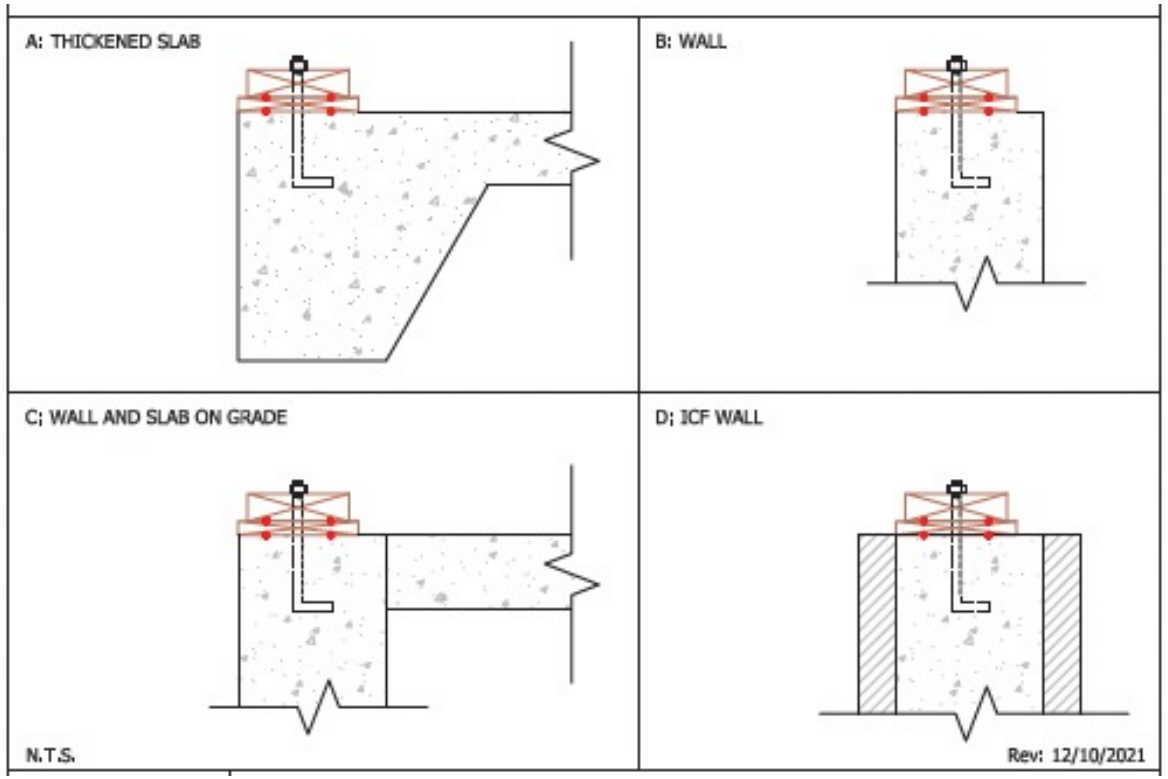
Bottom Plate
Floor Joist to Concrete



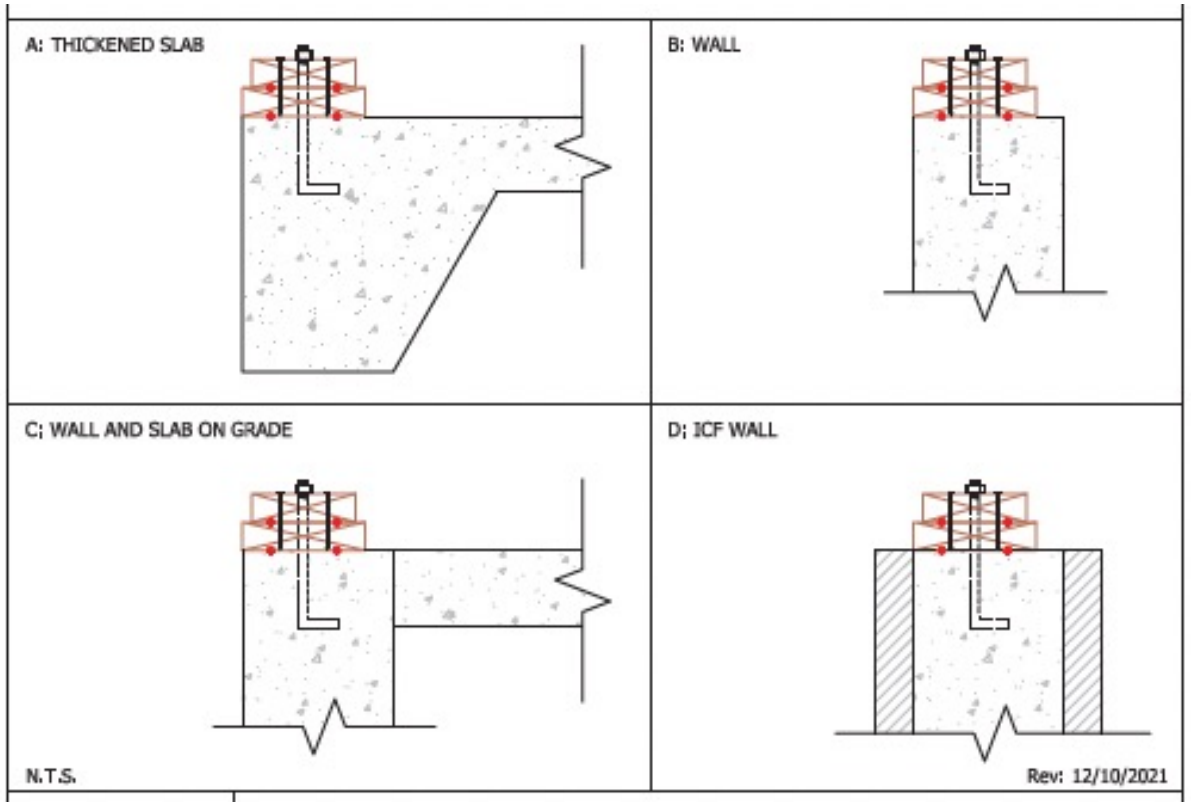
Bottom Plate
Floor Joist to Wall



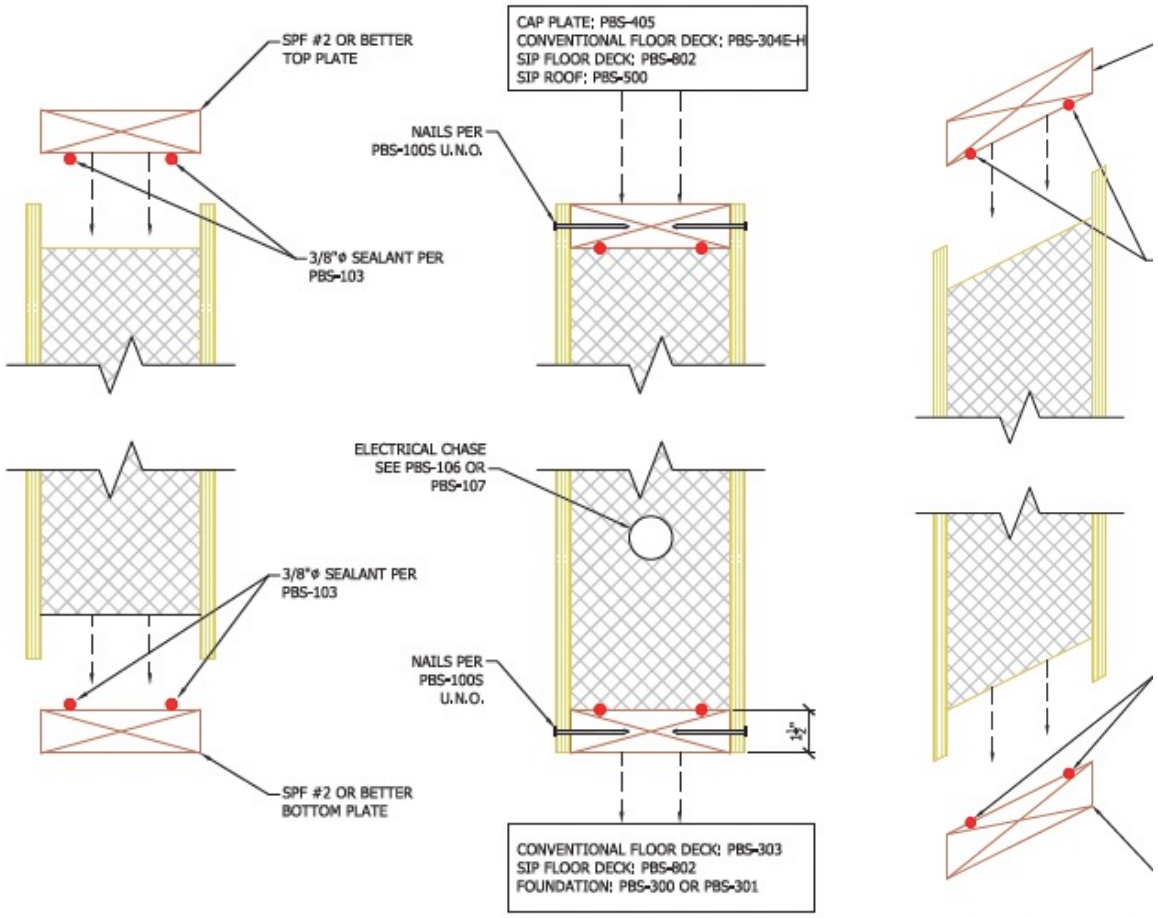
Plywood Sill Bottom Plate Foundation Connection



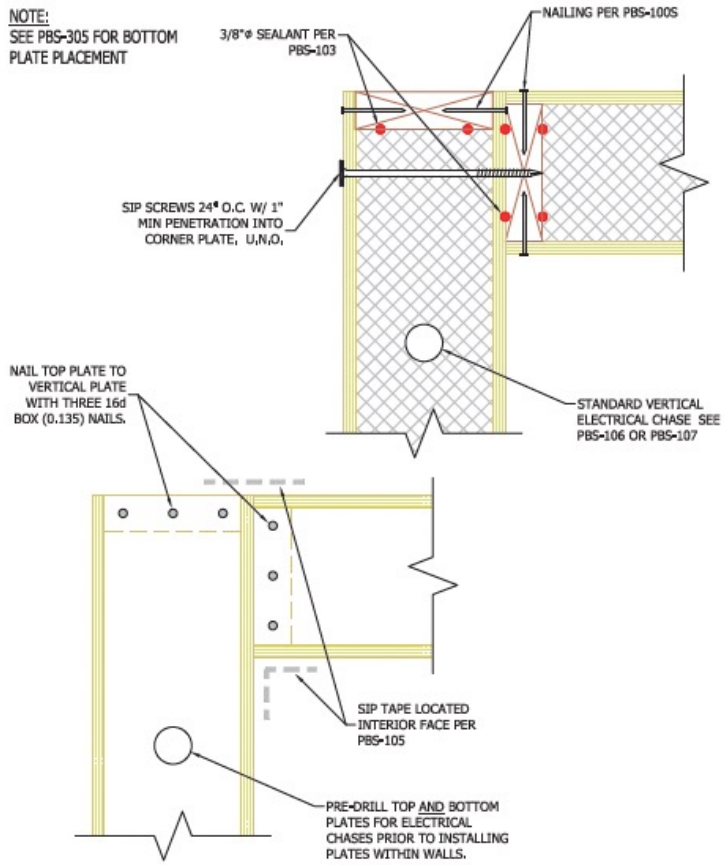
2X Sill Bottom Plate Foundation Connection



SIP Wall Plate: Factory Installed Option

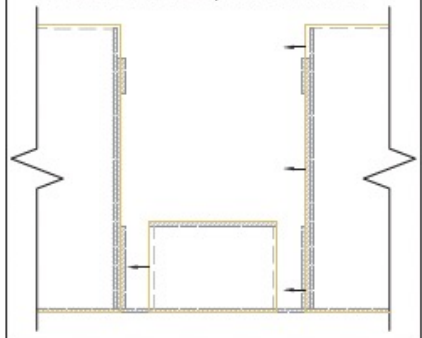


SIP Wall Corner

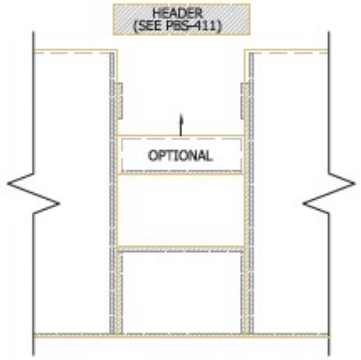


SIP Headers

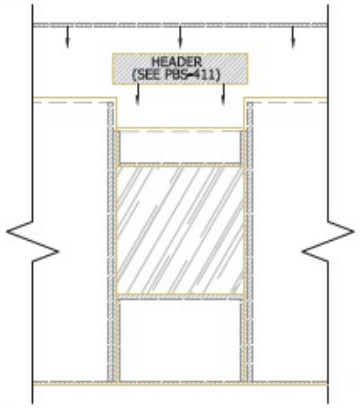
STEP #1:
1. PRE-DRILL ELECTRICAL CHASES PER PBS-106.
2. INSTALL KINGS, TRIMMERS, & NAILERS INTO SIP USING (2) 3/8" BEADS OF SEALANT PER PBS-103 AT ALL INTERFACES (LUMBER TO LUMBER AND LUMBER TO SIP).
3. ASSEMBLE SIPS ON THE GROUND AND LIFT INTO PLACE OR ASSEMBLE VERTICALLY, ONE PIECE AT A TIME.



STEP #2:
1. DROP FILLER SIP FROM ABOVE OR BELOW 2x NAILER MEMBERS, WHICHEVER METHOD IS EASIEST,
2. CUT HEADER TO LENGTH FROM FACE OF KING TO FACE OF KING, (SEE PBS-411 FOR ASSEMBLIES).

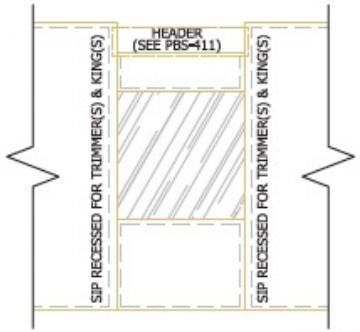


STEP #3:
1. DROP IN HEADER FROM ABOVE.
2. INSTALL CONTINUOUS TOP PLATE ACROSS HEADER AND SIPS.



NOTES:

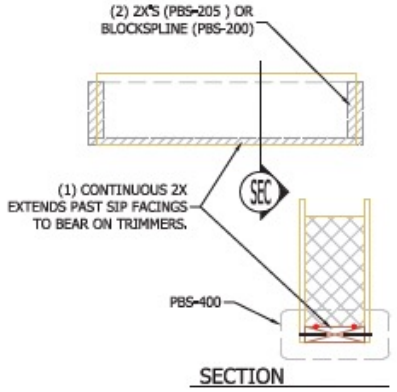
1. ALL NAILING PER PBS-100S
2. FOAM EDGE OF SIPS WILL BE RECESSED AT FACTORY TO RECEIVE LUMBER PER SIP SHOP DRAWINGS.
3. FUR OUT EACH SIDE OF HEADER AFTER INSTALLATION.



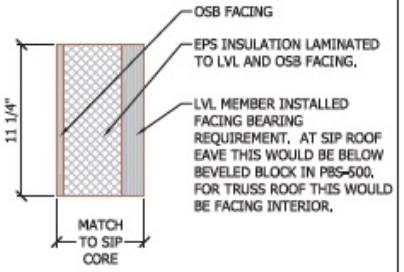
N.T.S.

Rev: 9/19/2022

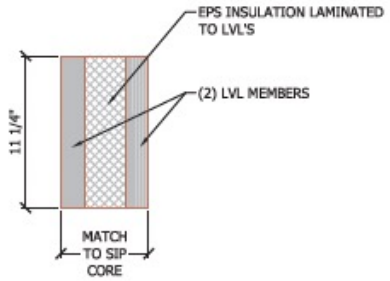
SIP HEADER: SIP AS A STRUCTURAL HEADER.
SEE PBS-407 OR PBS-408 FOR ASSEMBLY SEQUENCE.



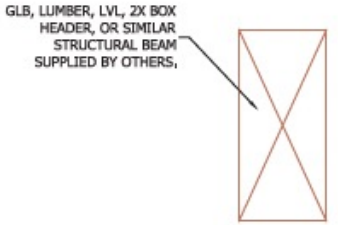
IHDR-1 PLY: INSULATED HEADER (1) PLY LVL.
SEE PBS-407 OR PBS-408 FOR ASSEMBLY SEQUENCE.



IHDR-2 PLY: INSULATED HEADER (2) PLY LVL.
SEE PBS-407 OR PBS-408 FOR ASSEMBLY SEQUENCE.



HBO: HEADER BY OTHERS,
SEE PBS-407 OR PBS-408 FOR ASSEMBLY SEQUENCE.

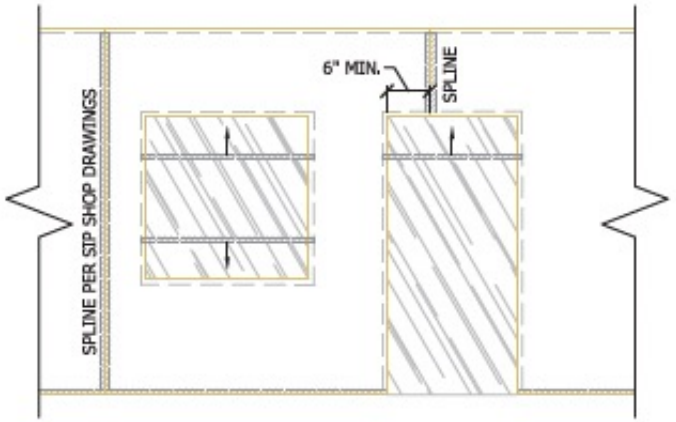


N.T.S.

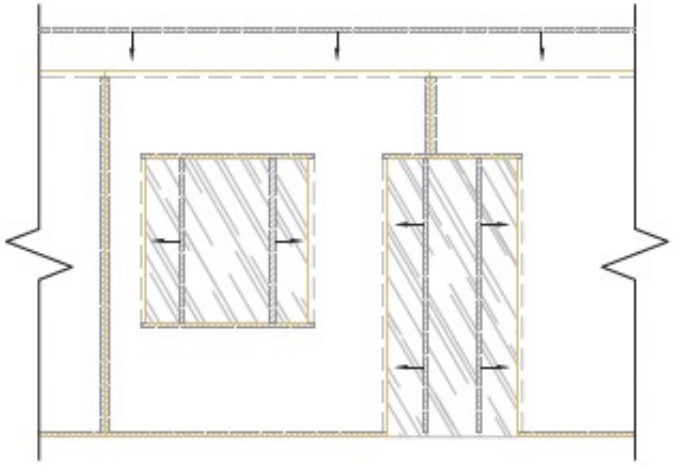
Rev: 12/10/2021

Factory Cut Openings: SIP Can Serve As Header

STEP #1:
INSTALL OPENING TOP AND BOTTOM 2X MEMBERS FLUSH TO FOAM.



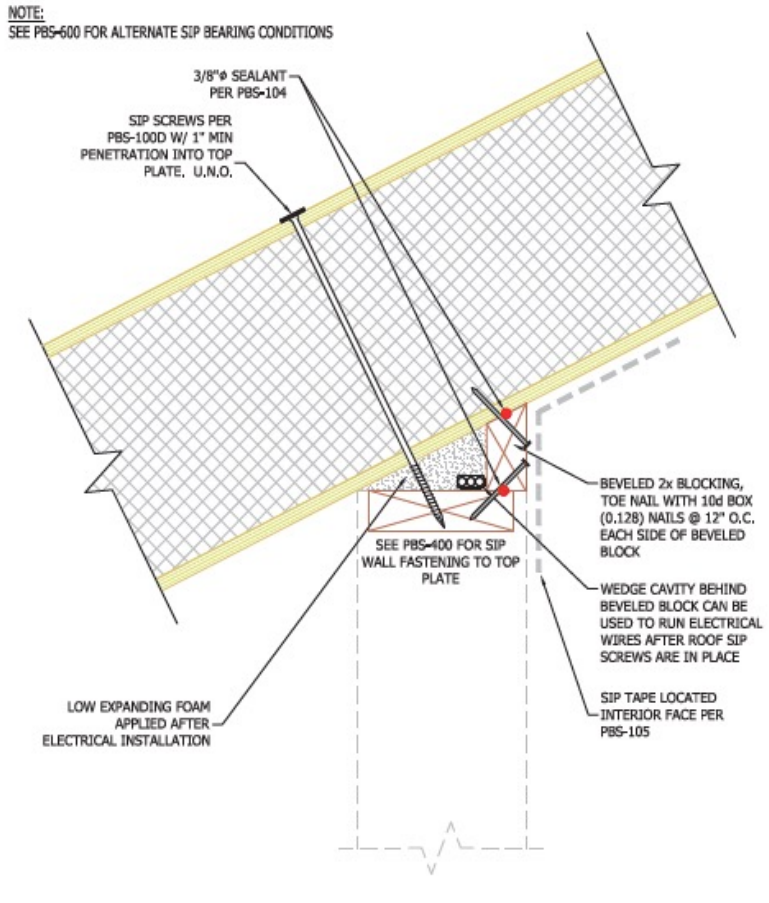
STEP #2:
1. PRE-DRILL ELECTRICAL CHASES PER PBS-106
2. INSTALL OPENING VERTICAL 2X MEMBERS FLUSH TO LUMBER PLATES AT TOP AND BOTTOM OF OPENING.
3. INSTALL CONTINUOUS TOP PLATE ACROSS SIP JOINTS.

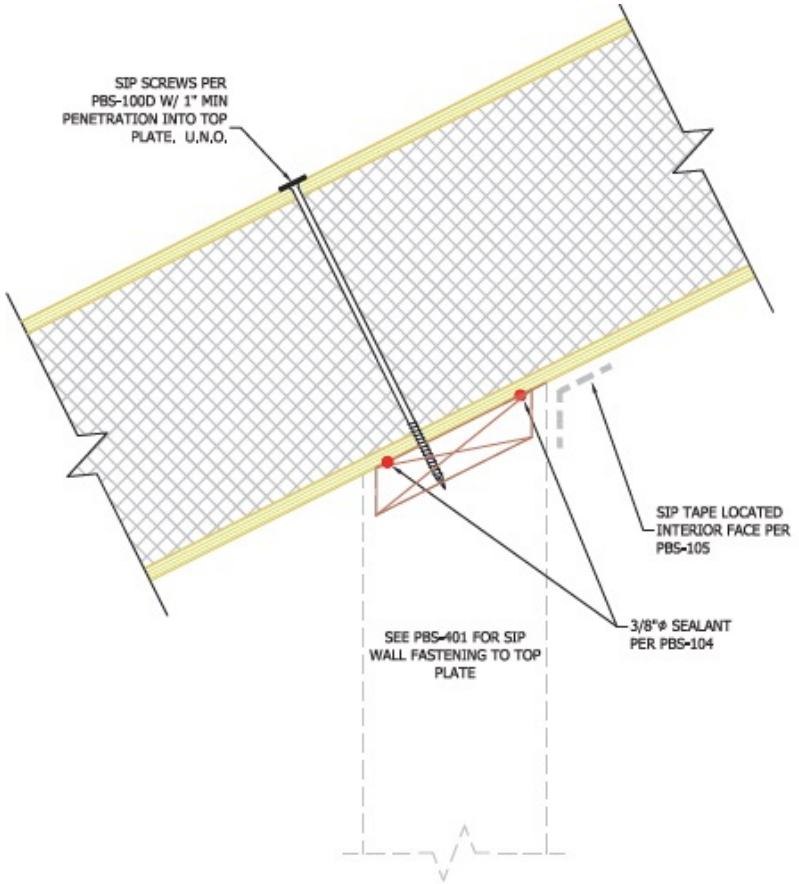


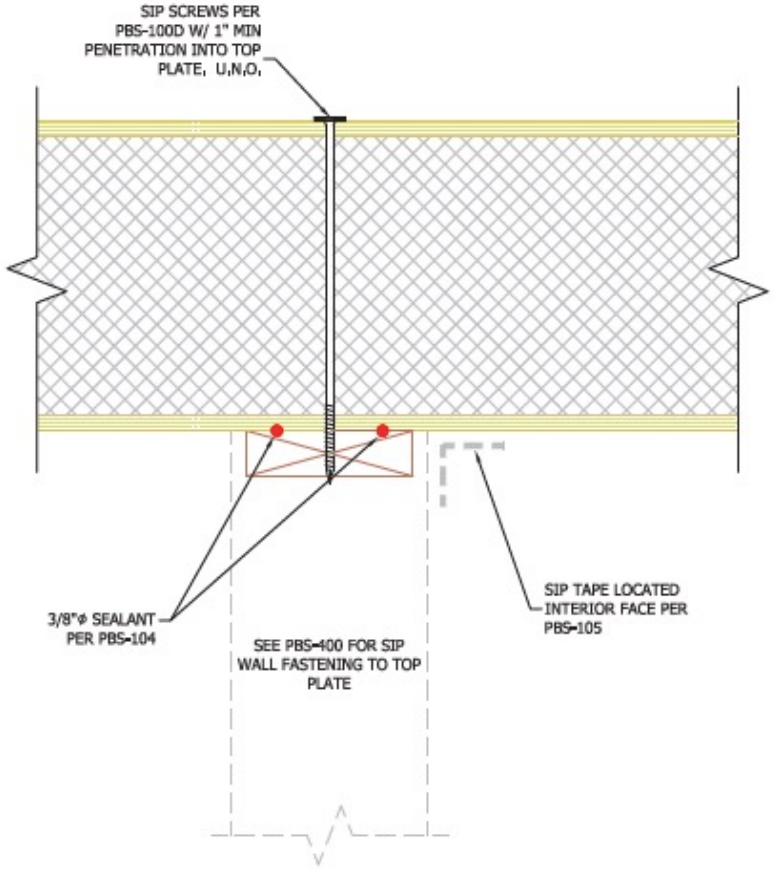
N.T.S.

Rev: 8/11/2022

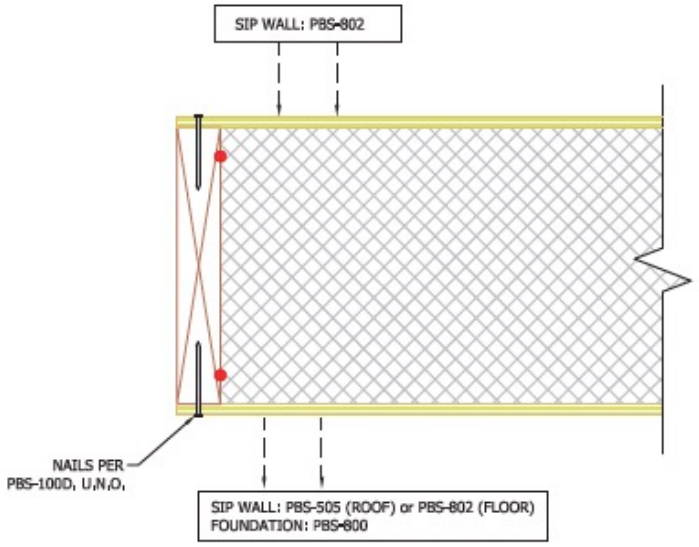
Wall to Roof

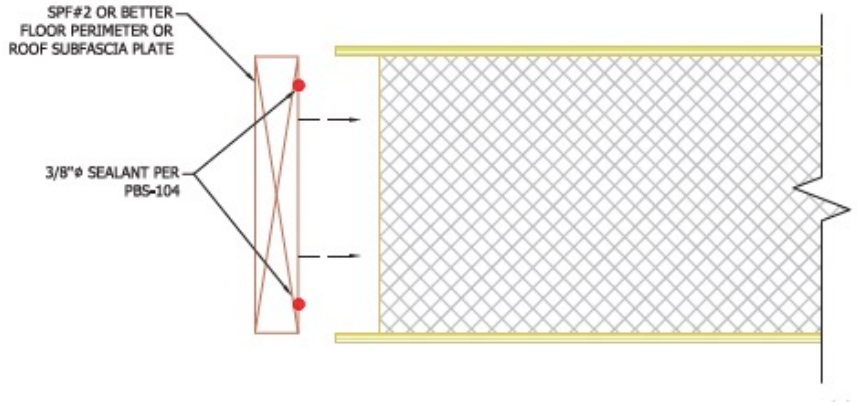

NOTE:
SEE PBS-600 FOR ALTERNATE SIP BEARING CONDITIONS
3/8"ø SEALANT PER PBS-104
SIP SCREWS PER PBS-100D W/ 1" MIN PENETRATION INTO TOP PLATE, U.N.O.
BEVELED 2x BLOCKING, TOE NAIL WITH 10d BOX (0.128) NAILS @ 12" O.C. EACH SIDE OF BEVELED BLOCK
SEE PBS-400 FOR SIP WALL FASTENING TO TOP PLATE
WEDGE CAVITY BEHIND BEVELED BLOCK CAN BE USED TO RUN ELECTRICAL WIRES AFTER ROOF SIP SCREWS ARE IN PLACE
LOW EXPANDING FOAM APPLIED AFTER ELECTRICAL INSTALLATION
SIP TAPE LOCATED INTERIOR FACE PER PBS-105

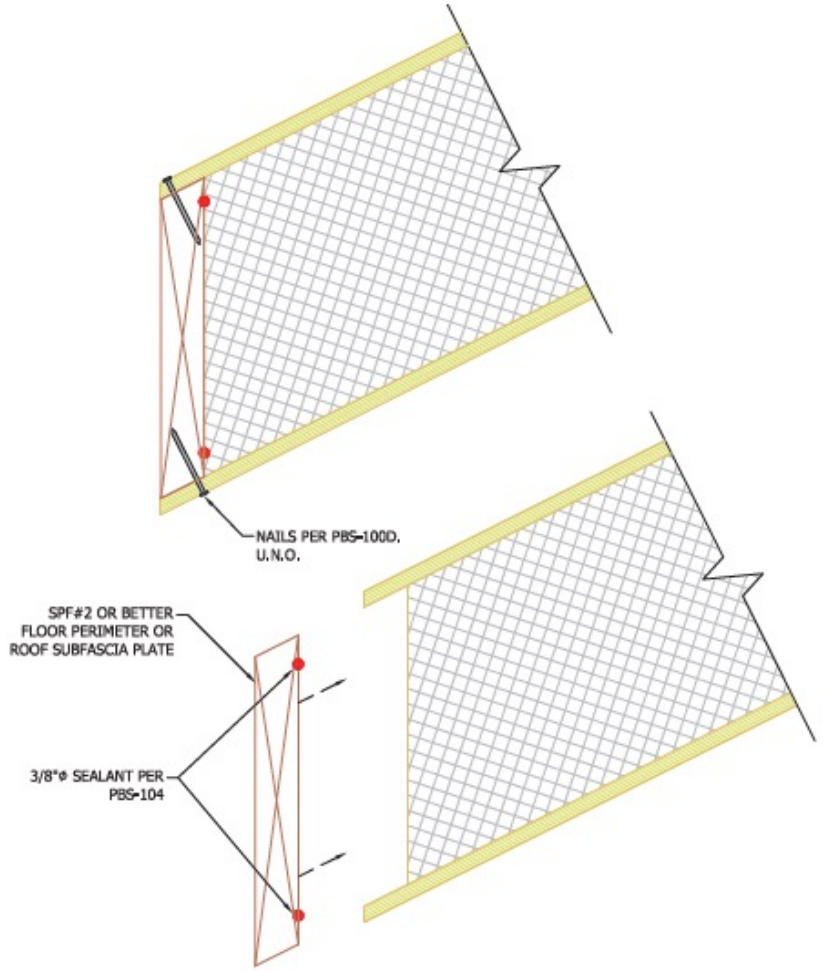

SIP SCREWS PER PBS-100D W/ 1" MIN PENETRATION INTO TOP PLATE, U.N.O.
SIP TAPE LOCATED INTERIOR FACE PER PBS-105
3/8"ø SEALANT PER PBS-104
SEE PBS-401 FOR SIP WALL FASTENING TO TOP PLATE


SIP SCREWS PER PBS-100D W/ 1" MIN PENETRATION INTO TOP PLATE, U.N.O.
3/8"ø SEALANT PER PBS-104
SEE PBS-400 FOR SIP WALL FASTENING TO TOP PLATE
SIP TAPE LOCATED INTERIOR FACE PER PBS-105

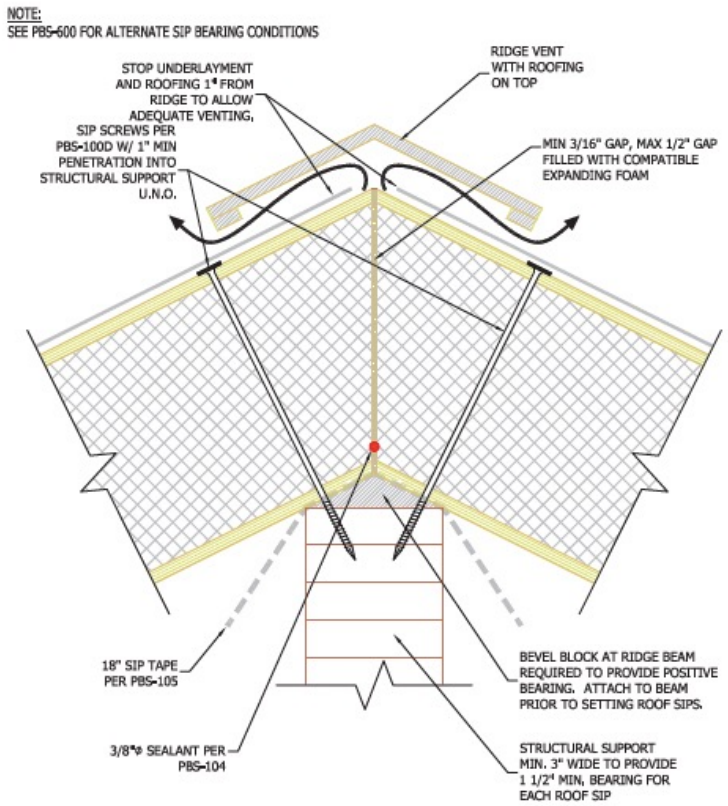
Roof/Floor Plates: Factory Installed Option



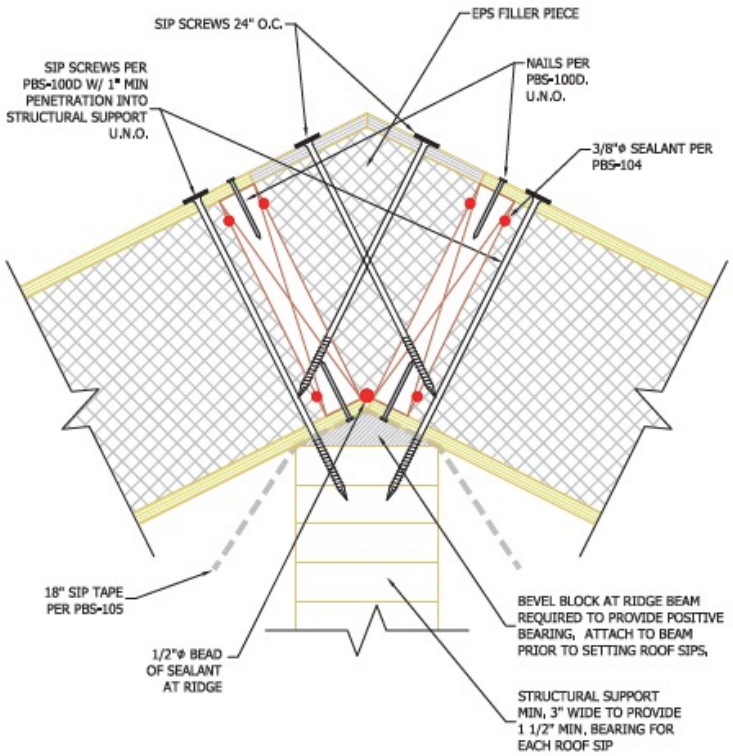




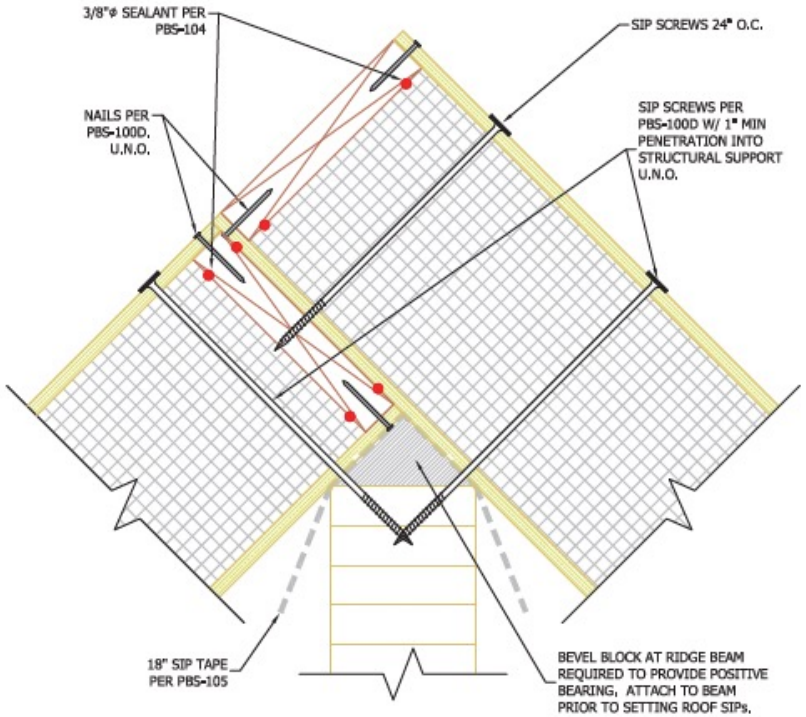
Roof: Ridge/Hip Bevel Cut



Roof: Ridge Cap



Roof: Ridge Overlap



Portervile, CA Commercial Office Installation

Affordable Housing 88 Units - Las Vegas, Nevada

PREMIER SIPS
STRUCTURAL INSULATED PANELS

Private Residence – Golden, Colorado

Valhalla Elementary – Washington State

PREMIER SIPS
STRUCTURAL INSULATED PANELS

Northern California – Mid-Sized Production Bldr

PREMIER SIPS
STRUCTURAL INSULATED PANELS

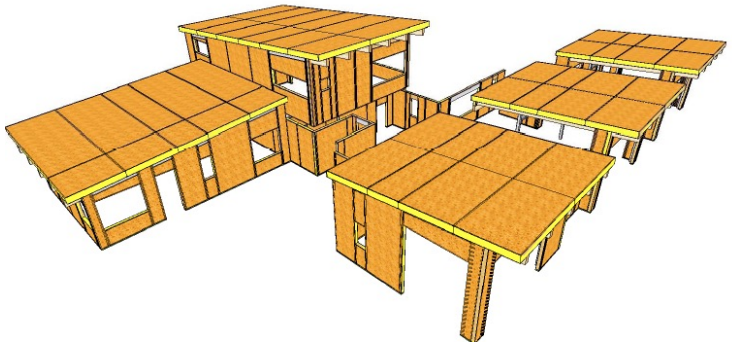
Private Residence – Scottsdale, Arizona

PREMIER SIPS
STRUCTURAL INSULATED PANELS

Private Residence Featured in Dwell – Malibu, California

PREMIER SIPS
STRUCTURAL INSULATED PANELS

Private Residence - Colorado



PREMIER SIPS
STRUCTURAL INSULATED PANELS

Carroll College Chapel – Helena, Montana

Grand Families Senior Living – Phoenix, Arizona

PREMIER SIPS
STRUCTURAL INSULATED PANELS

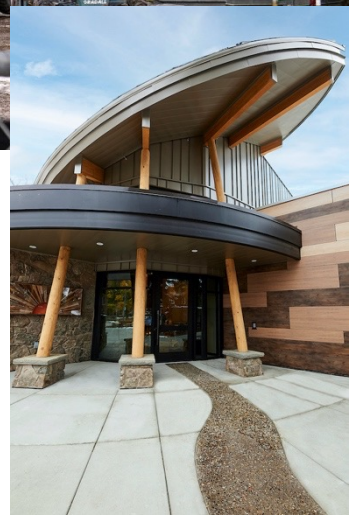
Private Timber Frame Residence - Colorado

Corporate HQ – San Luis Obispo, California

Anthem information Center – Broomfield, Colorado

La Posada Neighborhood, Parkview Homes – Arizona

Montana State American Indian Hall – Bozeman, Montana



Private Residence – Washington State

Bridger View Ranch - Montana

Benihana - Downey, California
7k sf installed in 1 week!

PREMIER SIPS
STRUCTURAL INSULATED PANELS

The Barn – Bend, Oregon

Private Residence - Colorado

Malabon Middle School - Oregon

PREMIER SIPS
STRUCTURAL INSULATED PANELS

Private Residence – San Diego, California

Fire Station - Snoqualmie Pass, Washington

Private Residence – Northern California

PREMIER SIPS
STRUCTURAL INSULATED PANELS

Merrill Environmental Center – Maryland

Private Residence - Utah

PREMIER SIPS
STRUCTURAL INSULATED PANELS

7-11 Denver - Colorado

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Private Residence - Washington

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Whiskey Distillery – Woodinville, Washington

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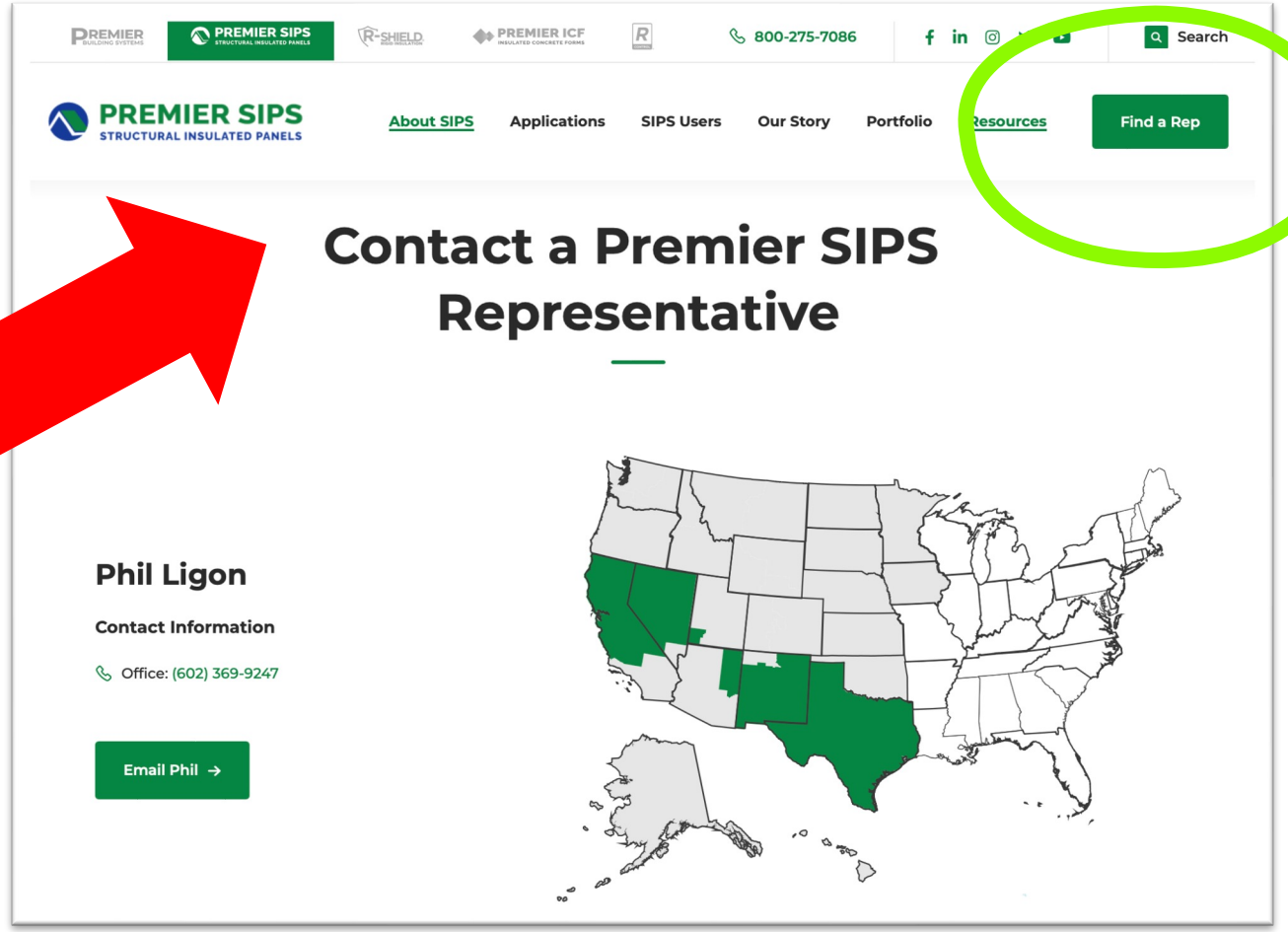

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