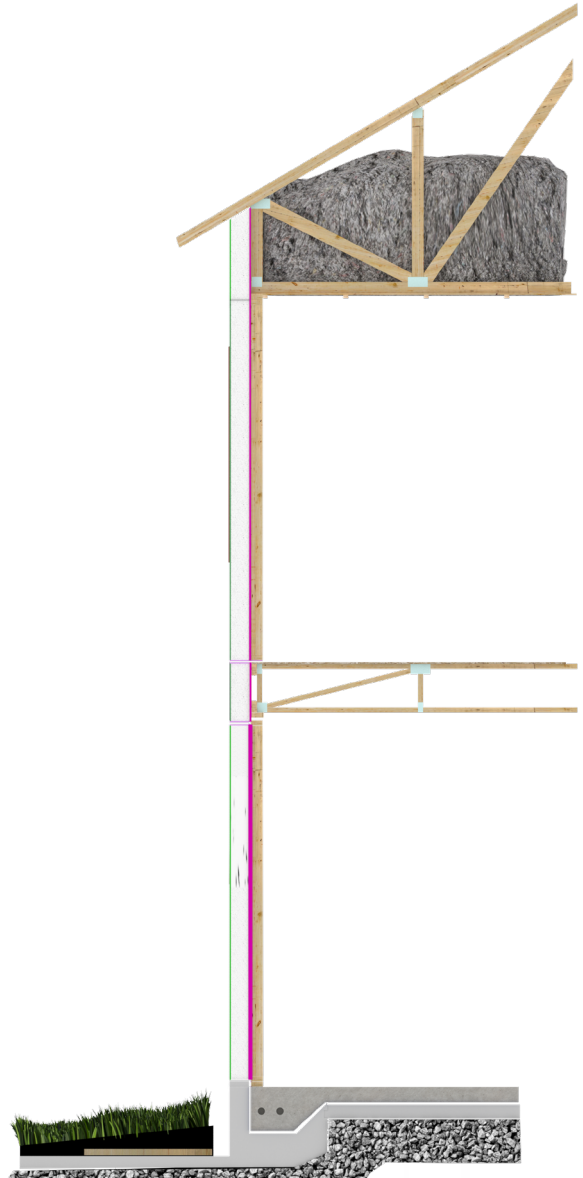


BUILD BETTER. BUILD FASTER.
BUILD SMART™



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Anatomy of the Build SMART System

The Control Layers

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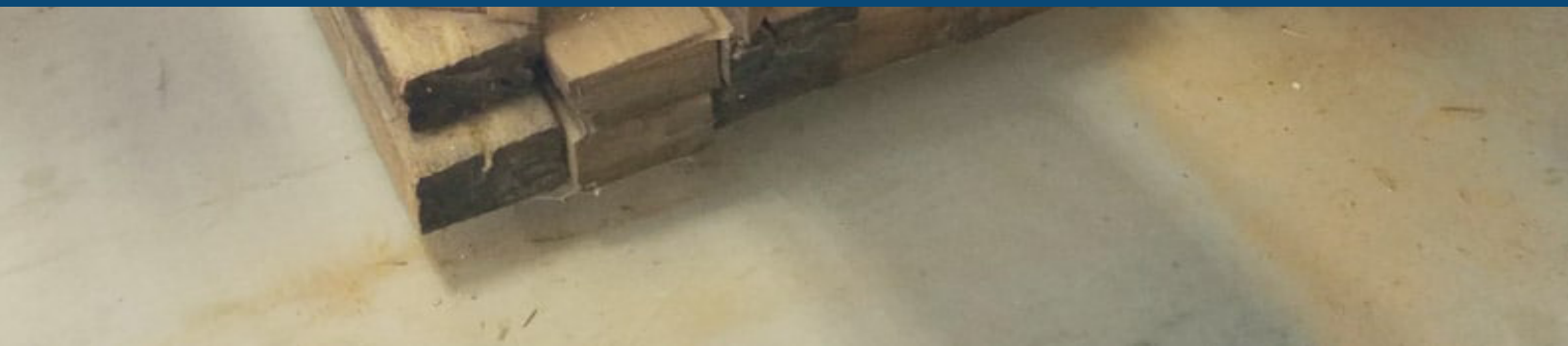
At Build SMART

Good enough
isn't.

Any builder that has culled through a stack of 2x4's – separating those that are “good enough” for plates, studs or kings, from those to be cut up for jacks and cripples - often finds themselves staring at a sizable reject pile (15-20%) **relegated to ground stakes or firewood.**

Multifamily projects produce an additional \$70/mo per unit revenue! When that is considered in the context of the prefab savings, shortened construction time, reduced HVAC capital expense, and window replacement savings, the cash flow increase is 60% (*assuming a \$200 per unit base line*).

In addition, the overall cost of the building is **reduced by 4.8%** compared to stick-building merely to meet code. Build SMART in particular has calculated **it costs 19% less to use our panels than to stick-build the same assembly** – and that is before you consider the above-referenced overall project savings from accelerated construction.



System Components

Build SMART set out to create the simplest way to achieve the Passive House¹ standard.

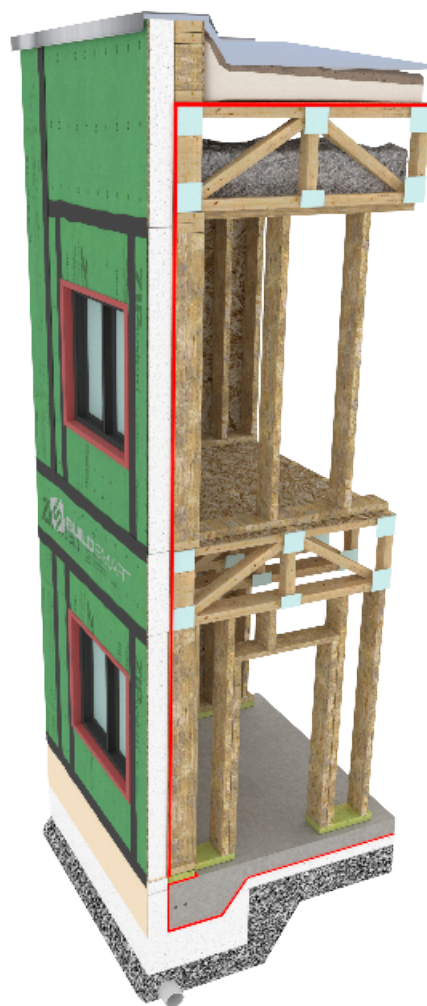
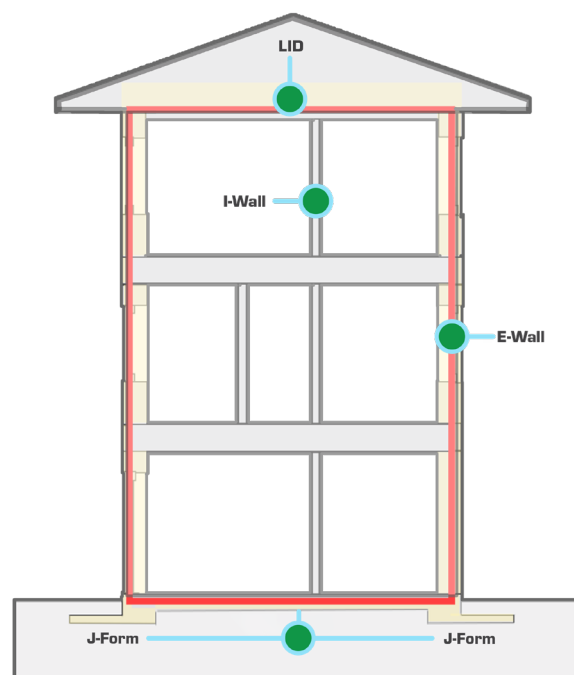
Each Build SMART project is optimized for the local conditions. The Build SMART System provides a comprehensive, six-sided building envelope system. The Contractor's slab on grade, floor and roof complete the building structure.

When considering a 'building as a system' it is the building envelope that holds everything together.

The Build SMART System exemplifies ideas that Joe Lstiburek of the Building Science Corporation presented in his paper on "The Perfect Wall"² including proper design of the rain control layer, air control layer, vapor control layer, and thermal control layer. It is vapor open and designed for engineered drying by vapor diffusion, i.e. the annual wetting potential (accumulation of moisture inside building envelope assemblies) is lower than the annual drying potential (moisture drawn out of the wall). The small amount of moisture that may be present through vapor diffusion remains harmless. Engineered drying ensures that mold and mildew will not form, and wood will not rot. Occupant health is protected. Premature damage and expensive repairs are avoided.

The Build SMART System works in all climates. Project teams decide thicknesses and performance, customized for design intent, budget, project goals and hygrothermal performance (movement of heat and vapor) of the building envelope.

The Build SMART System carries an air tightness warranty. If built per Build SMART's Installation Instructions, we warrant that air tightness of the building will comply with PHIUS Requirements.³



¹ Passive House Institute US | phius.org

² BSI-001: The Perfect Wall | buildingscience.com/documents/insights/bsi-001-the-perfect-wall

³ PHIUS+ Certification Guidebook²⁰²¹ | phius.org/phius-certification-for-buildings-products/project-certification/documents-for-download



J-Form | Foundation Insulation System

The **J-Form Insulating Form and Slab System** can be used with or without E-Walls on any project using slab on grade foundations. J-Form complies with the building code.⁴ It allows the material cost and labor of concrete frost footings to be avoided by using a cost-saving alternate approach with “horizontal wing insulation” that protects the foundation from frost heave.

UV CONTROL

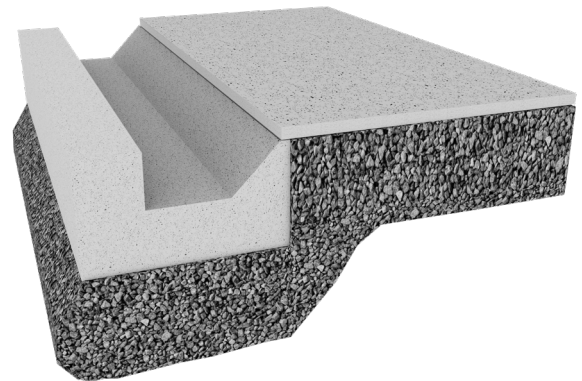
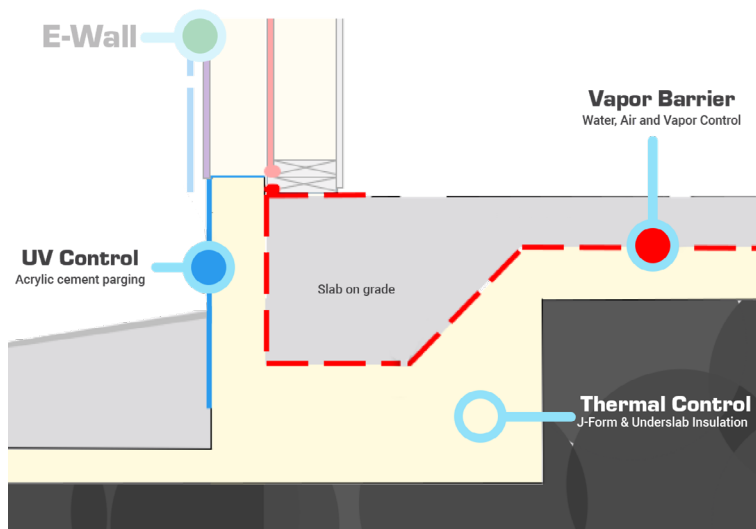
The Geofoam surface of J-Form that is exposed to sunlight must be protected from damaging UV rays and impact. Typically, Contractors use acrylic cement stucco parging or an adhered layer of cement board/siding.⁵

WATER, AIR, AND VAPOR CONTROL

A continuous vapor barrier (VB) membrane is installed on top of the J-Form and underslab insulation before the slab is poured. The VB membrane keeps the slab dry and prevents soil gasses such as radon from entering the building interior.

THERMAL CONTROL

J-Form and underslab Geofoam are termite treated and designed for permanent contact with the earth. Thicknesses vary depending on climate zone and the Air-Freezing Index at the project location.⁶



⁴ International Building Code (IBC) 1809.5 and International Residential Code (IRC) R403.1.4.1 | up.codes/codes/general

⁵ Build SMART Installation resources | buildsmartna.com/resources/#ir-installation-resources-title

⁶ J-Form Foundation System Engineering Guide | buildsmartna.com/resources/#tech-notes-title

⁷ PROSOCO FastFlash | proso.co.com/product/r-guard-fastflash/

⁸ Huber ZIP LiquidFlash liquid applied flashing membrane | huberwood.com/zip-system/liquid-flash

⁹ PROSOCO AirDam | proso.co.com/product/airdam/



E-Wall | Exterior Envelope System

E-Wall Building Envelope System has been developed to be “the easy button” for Contractors that aspire to deliver higher levels of building performance. The system virtually eliminates thermal bridges and allows water vapor to harmlessly escape. It is designed to minimize the number of plumbing and electrical penetrations through the air barrier plane and the cost of sealing those potential leak points.

UV CONTROL

Contractor’s cladding and trim cover and protect E-Wall from the sun’s UV rays.

WATER CONTROL

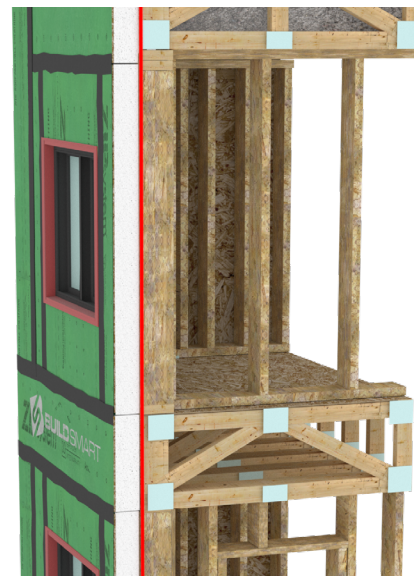
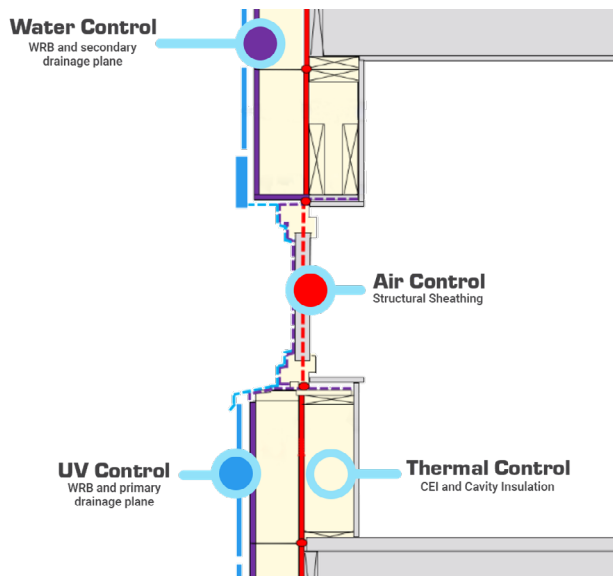
The water resistive barrier (WRB) is ZIP Board factory applied to ZIP sheathing used as the exterior face of E-Wall assemblies. Rough openings are flashed all around with PROSOCO FastFlash⁷ and panel-to-panel joints are sealed using ZIP LiquidFlash⁸ by the Contractor. Factory installed windows are sealed all around with PROSOCO AirDam⁹. Good building practice assumes that rain will find it’s way under site-installed exterior finishes. The E-Wall water resistive barrier (ZIP Board) is the second line of defense. Water is directed down and out the drainage plane. Site-installed vertical furring strips on the exterior face of E-Walls create vented pressure equalized, drainage plane that directs water away from the building enclosure. Continuous exterior insulation (EPS, GPS, XPS, PIC, or rigid phenolic board) provides highly efficient insulation free of thermal bridges, and it also ensures that the dew point and condensation won’t occur within the wood frame and cavity insulation. Build SMART E-Wall prevents ice formation because the assembly is extremely airtight. Cold winter wind does not penetrate. Therefore, the small amount of water vapor that may be present remains harmless. It does not freeze and accumulate.

AIR AND VAPOR CONTROL

E-Wall is designed to “breathe” by vapor diffusion. Water vapor may enter your E-Wall assembly can escape and not accumulate inside the wall. The structural sheathing is the least permeable material in the wall assembly. Thus, as shown in the diagram below, E-Wall is designed for engineered drying from the structural sheathing in each direction - to the interior and to the exterior.

THERMAL CONTROL

E-Wall continuous exterior insulation plus the Contractor’s stud cavity insulation form the thermal control. Thicknesses are variable as appropriate for the project climate, building geometries, and use patterns.



Build SMART panels combine with your roof and foundation system to create a highly efficient, draft free building envelope

The LID | continuous airtight top envelope

Build SMART recommends a simple methodology we call “the LID System.” It ensures a continuous airtight top to the building envelope. LID System materials are typically offered as a Build SMART Proposal Alternate. Many Contractors find it advantageous to give this task to Build SMART so that everything arrives at the jobsite, sequenced conveniently in Build SMART deliveries. For more detail, refer to Build SMART’s Installation Instructions.¹⁰

UV AND WATER CONTROL

The Contractor’s roof forms the UV and water control for the top of the building envelope. Sloped and low-slope roofs can be accommodated.

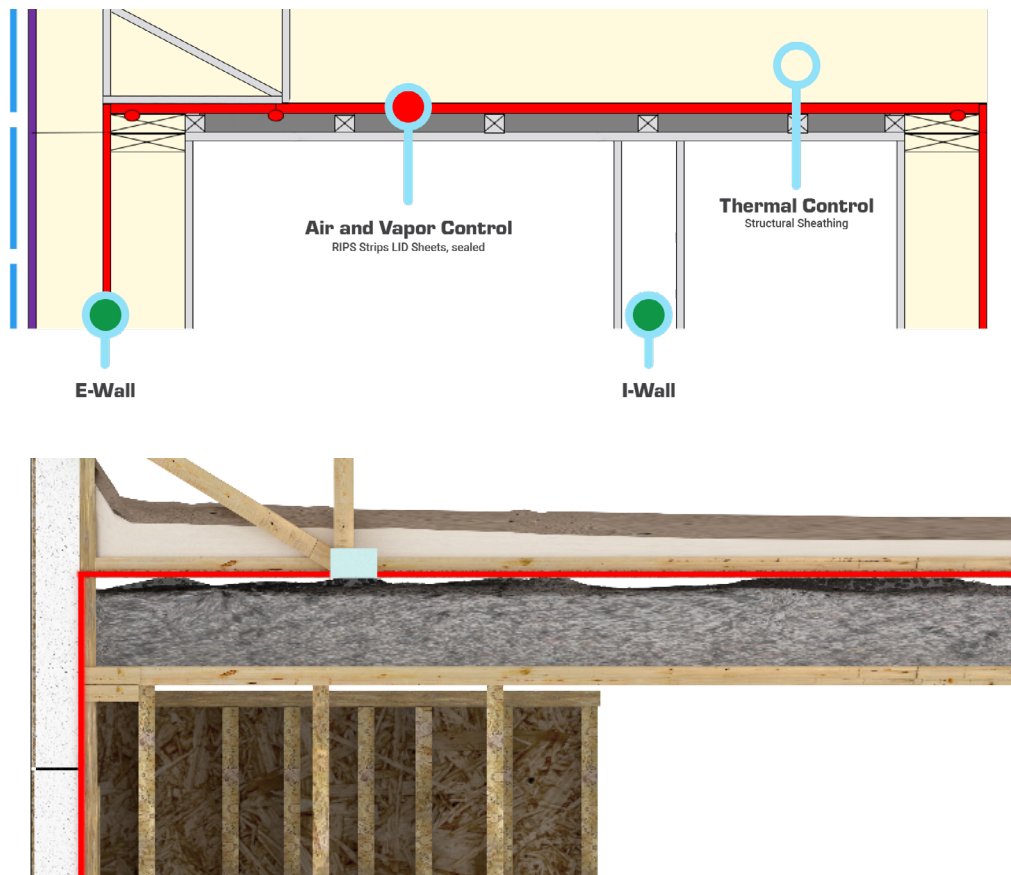
AIR AND VAPOR CONTROL

At the uppermost top plate, below the roof structure, OSB LID sheathing is installed with sealed joints. Below the LID sheathing, 2x2 furring creates an electrical chase for wiring and junction boxes. This allows penetrations through the LID sheathing to be nearly eliminated. Thus, the time and cost of sealing penetrations, leak chasing and rework can be nearly eliminated.

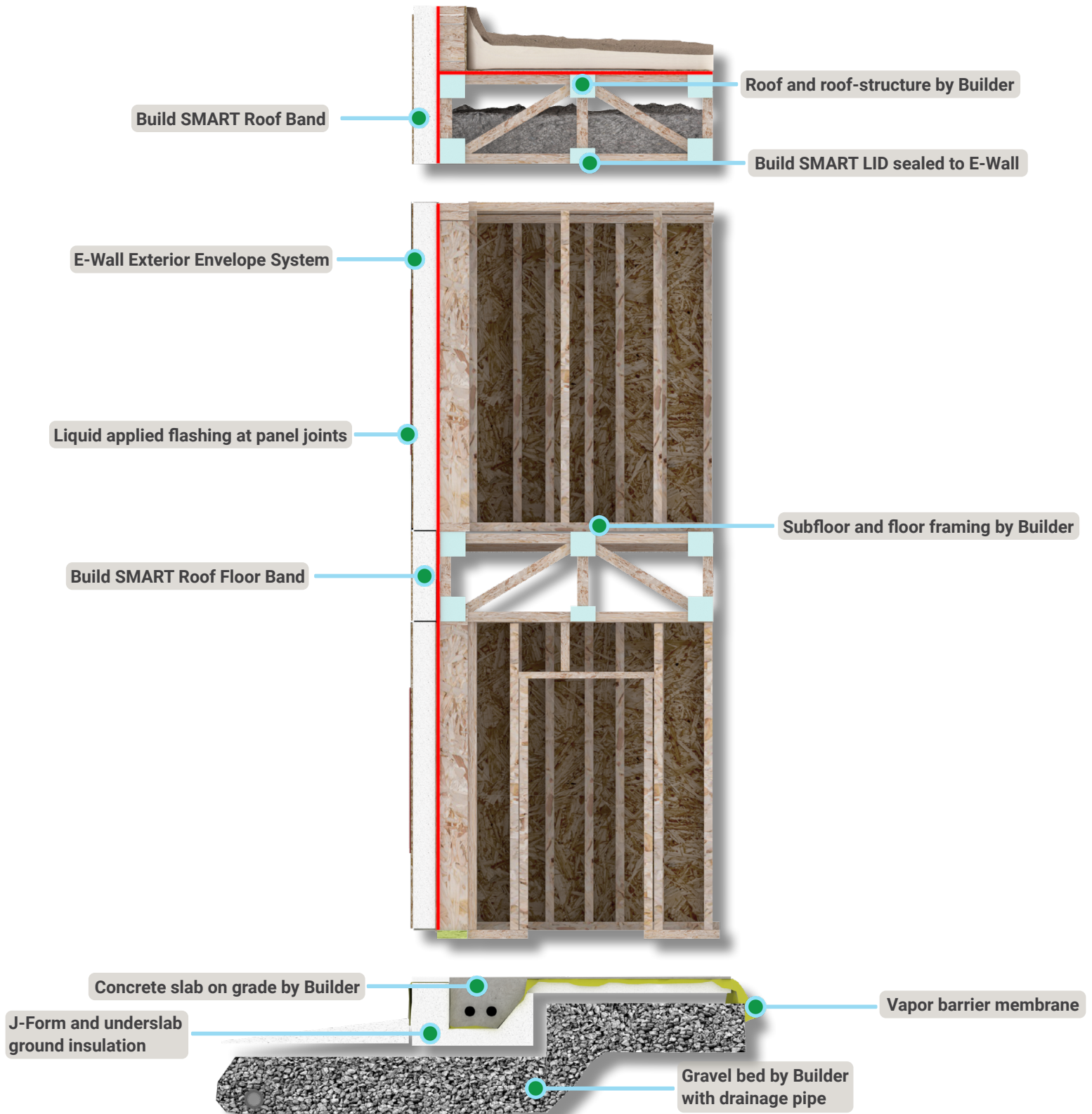
For low sloped roofs with vapor impermeable roofing membranes, the roof decking can be sealed at the seams to form the air and vapor control layer, alternatively LID sheathing and as shown in the diagram below can be used.

THERMAL CONTROL

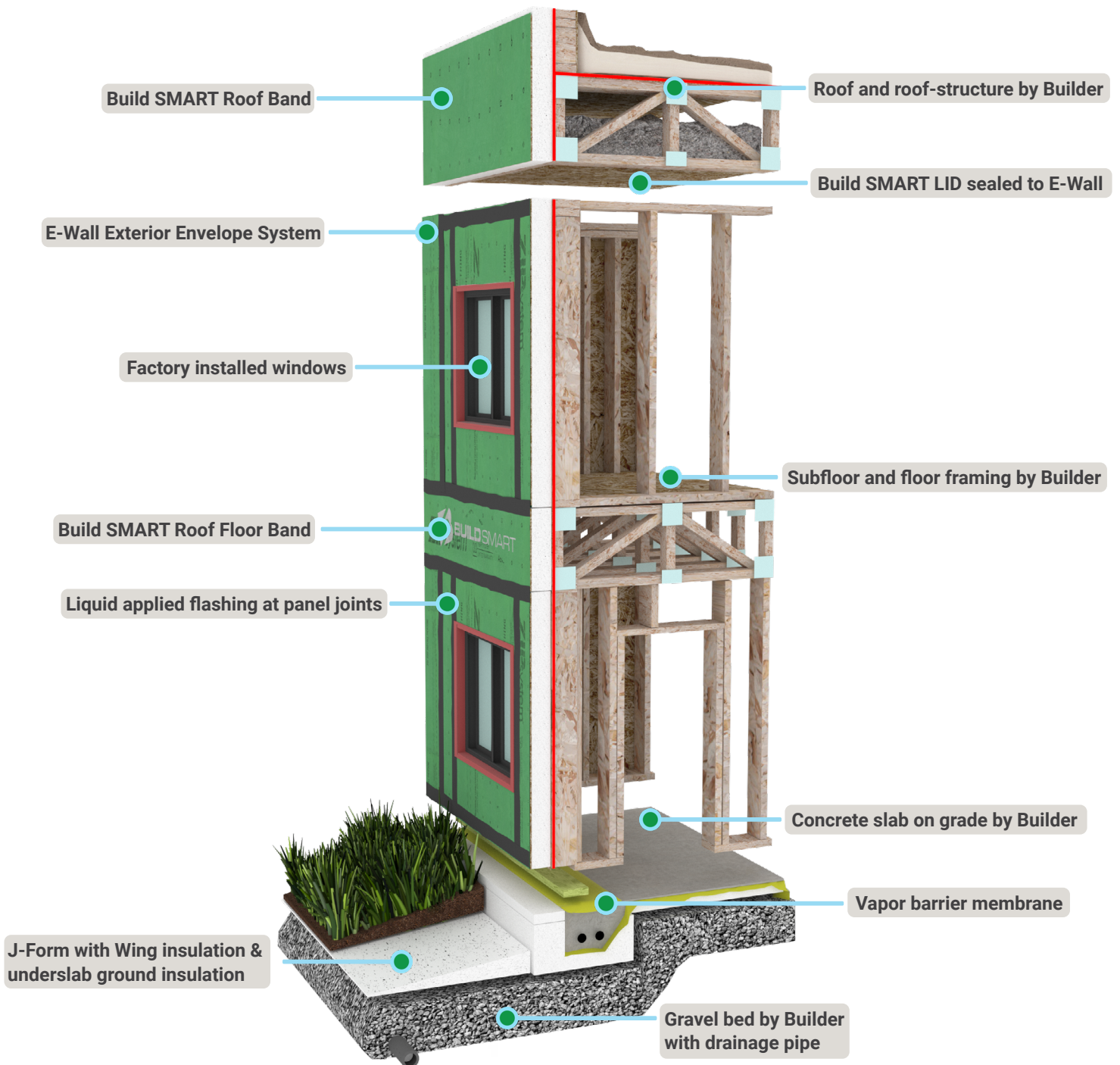
Contractor provided attic insulation forms the thermal control of the LID



The Build SMART System | 1/2 view



The Build SMART System | 3/4 view



Preventing Leaks

AIR SEALING is the most important factor in determining short-term and long-term building performance and occupant health. Because buildings operate as a system, moisture intrusion into walls through leaks is the biggest and most common source of problems.

People occupying effectively air-sealed structures breathe fresh pathogen allergen-free air. They don't hear or smell what's going on outside unless they open a window or door. They have a better, healthier, quality of life.

It is our philosophy that the trade who creates a penetration through the building envelope should be made responsible to make it airtight. Build SMART both uses and recommends the use of PROSOCO R-Guard¹¹ FastFlash and Joint & Seam for this purpose.

Build SMART does NOT rely on pressure sensitive tapes or mechanically fastened house wraps.

Avoiding Multiple Vapor Restrictive Layers

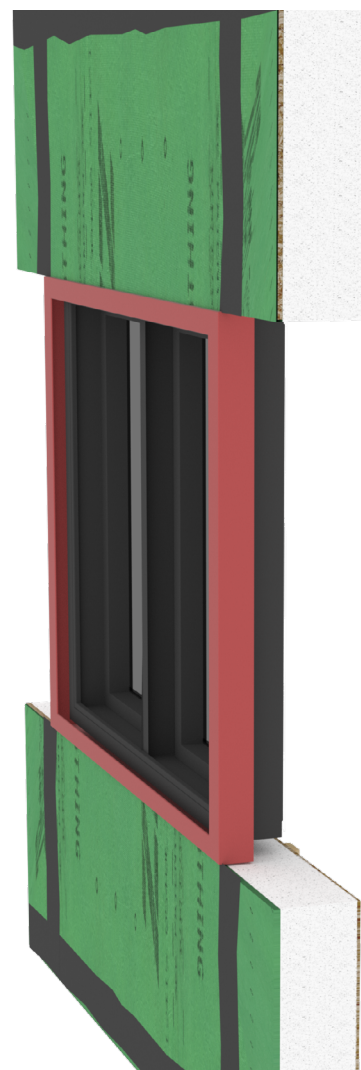
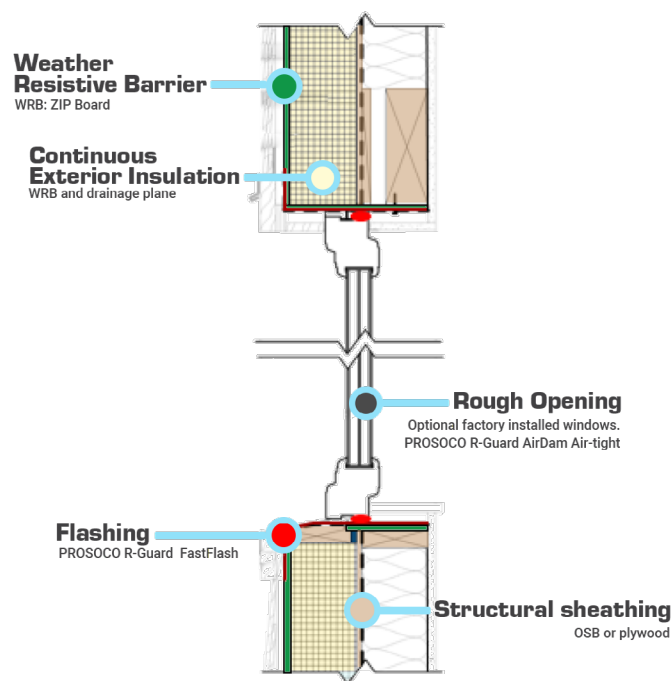
It's important to keep in mind that while vapor barriers prevent assemblies from taking on moisture, they can also prevent wall assemblies from drying. The E-Wall's structural OSB sheathing is designed to be more vapor restrictive and reduce the need for redundancy layers in the wall assembly. It is very important for designers to avoid applying excess vapor restrictive layers on the interior face of the wall. Here are a couple examples of how:

Avoid impermeable interior finishes such as vinyl wall covering or oil based interior paint.

Avoid installation of expanding foam or exterior cladding details that prevent the ½" space around the windows, outboard of the factory installed sealant and backer rod, from draining freely. Window and door rough openings are continuously flashed with PROSOCO FastFlash membrane¹². This space between the flashing and window/door unit is designed to drain freely down the jambs and out at the sill to the drainage plane.

¹¹ PROSOCO R-Guard | prosoco.com/products/air-water-barriers/

¹² PROSOCO FastFlash liquid flashing membrane | prosoco.com/product/r-guard-fastflash/



THE SCIENCE OF BUILDING ENVELOPES

KEEPING RAINWATER OUT

With the ever changing climate, moisture infiltration and water leaks have never been a bigger challenge. In general, industry professionals understand that a double-defense approach is most effective. This generally means that builders can rely on exterior cladding and trim as a first defense, but with E-Wall a secondary protected water resistive barrier (**WRB**) with vented, pressure equalized, drainage plane is used.¹³

MAINTAINING THERMAL COMFORT

E-Wall applies the latest building science and is capable of easily achieving higher levels of insulation than the building code minimum requirements. The Passive House standard fits nicely within E-Wall's capabilities and is one of the most practical approaches to design of the thermal envelope. While it's true that industry professionals and even the building codes are catching up to the building science, the omission of exterior insulation is still common and allowed by code,¹⁴ leaving building owners open to the unnecessary risk of premature building failure and very costly repairs. Continuous exterior insulation is one of the keys to water vapor control.

CONTROLLING AIR LEAKS

Varying air pressure between inside and outside causes moisture laden air to seep in through walls. In other words, except for glass curtain walls, air and moisture will always try to enter the wall assembly.

MANAGING WATER VAPOR

Water vapor in the air is at the foundation of a lot of building repair business. There's no escaping the water vapor, water vapor is always present outside not to mention people generate water vapor inside by just being alive, cooking and taking showers. As prevalent as the issue is, managing water vapor in¹⁵ building walls is not widely understood. It is common for buildings to be built today with a high risk of premature moisture damage that leads to very costly repairs.

Moisture laden air becomes a problem when walls are leaky. Leaks not only waste about a third of the building's energy, but trapped moisture inside walls can cause mold formation¹⁶, wood rot¹⁷ and premature (very expensive) building failure.¹⁸

AIR INFILTRATION PROTECTION

Build SMART uses sealant materials that were engineered specifically for the construction industry for field use, Build SMART benefits from the experiences of industry veterans who have worked the first half of their career building the traditional way as well as by utilizing factory fabrication, allowing sealing and flashing that is protected from the elements, every day, every season, every project.

In the Build SMART factory, we detail all joints within E-Wall panels using Huber's recommended Zip Liquid Flash. All Rough opening are fully detailed using PROSOCO R-Guard Bond-N-Seal, Joint & Seam Filler and Fast Flash.

¹³ Building Science Corporation | buildingscience.com/documents/reports/rr-9909-drainage-planes-and-air-spaces/view

¹⁴ International Energy Conservation Code | codes.iccsafe.org/content/iecc2018/chapter-4-ce-commercial-energy-efficiency

¹⁵ Moisture Control for Buildings | buildingscience.com/documents/published-articles/pa-moisture-control-for-buildings/view

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¹⁷ Air Leaks—How They Waste Energy and Rot Houses | buildingscience.com/documents/published-articles/pa-air-leaks-how-they-waste-energy-and-rot-houses/view

¹⁸ SIPA Report on the Juneau, Alaska Roof Issue | sips.org/index.php?mod_name=technical-information/sipa-report-on-the-juneau-alaska-roof-issue

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