



## A.4 PEER Wall — I-Joist Framed Panel Wall System

Framed panel for prefabricated exterior energy retrofit using advanced materials and techniques.

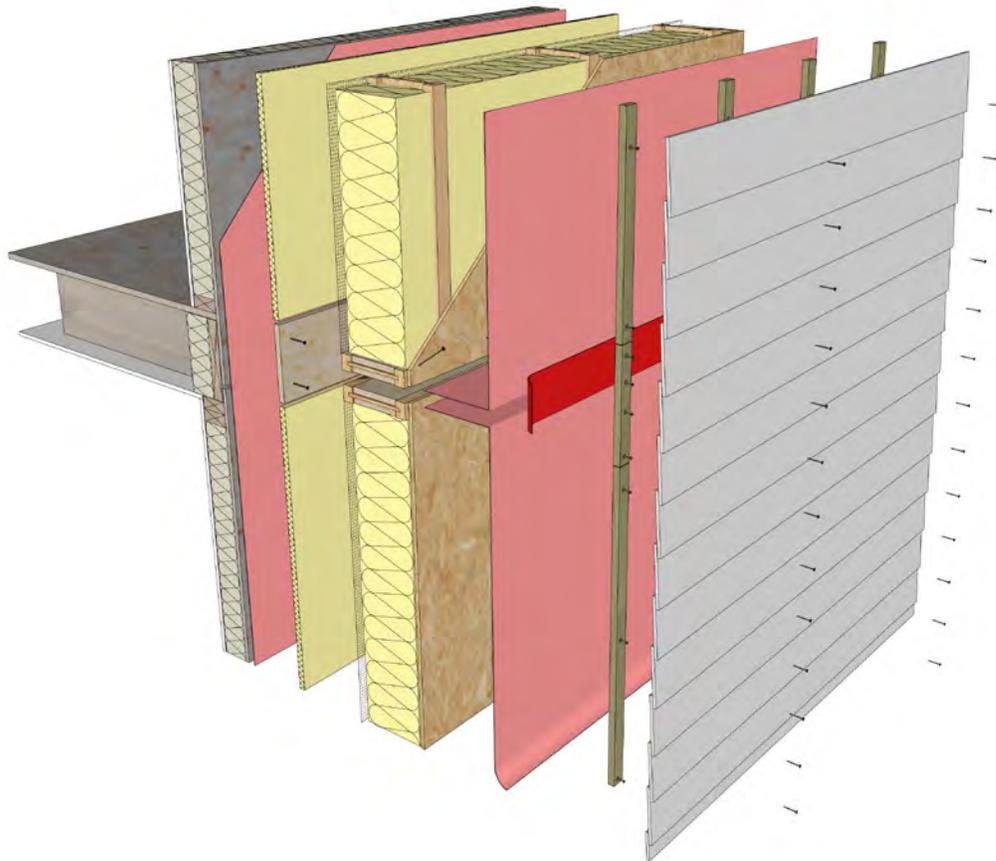


Figure 1 Exploded view of partial retrofit panel components at floor line transition

Developed by Natural Resources Canada's  
Prefabricated Exterior Energy Retrofit (PEER) team

## A.4 PEER Wall — I-Joist Framed Enclosure Assembly Overview

The following is a description of the retrofit panel layers installed on the exterior of the existing house. See also the Typical Construction Details on page 5.

Exterior

- › Cladding
- › Borate-treated strapping + air cavity
- › Self-adhered vapour permeable membrane (water resistive barrier)
- › Wall sheathing
- › I-Joist with fibrous batt insulation and retaining mesh
- › Compressible mineral fibre gap fill insulation
- › Existing assembly with self-adhered vapour permeable membrane (air barrier) (not shown)

Interior

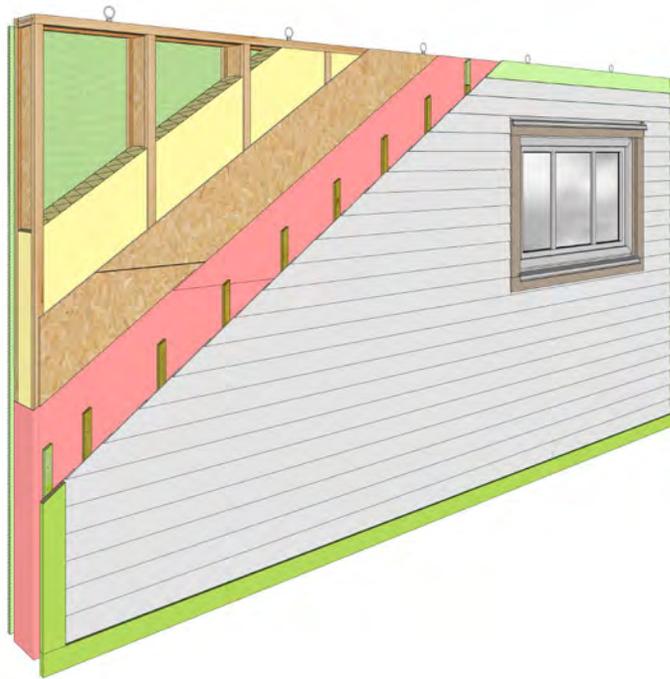


Figure 2 Retrofit I-Joist wall panel overview (green highlights indicate site-applied perimeter joint/tie-in components)

### Retrofit Description

- › Panels can be installed over the existing wall either with the cladding removed or left in place, and the existing windows and interior trim removed. A fibrous batt insulation layer is installed over the existing assembly to provide for in-out tolerance of the panel installation while baffling the small space between the panel and the existing wall.
- › I-Joist panels with batt insulation between studs are fastened to a continuous insulated box beam supported by intermittent foundation brackets at the base of the above grade wall, and plywood plumb shims at the following storey floor line, and the roof line.
- › The air barrier (AB, denoted with red callouts in the details) is a vapour permeable self-adhered membrane applied on site to the existing sheathing.
- › The weather resistive barrier (WRB, denoted with red callouts in the details) is a self-adhered vapour permeable membrane adhered to the panel's exterior sheathing.
- › New windows (and their trim) can be pre-installed into the panels at the factory or site installed after panel placement to accommodate for tolerances. Window and door AB/WRB transition membranes are installed on site between the air barrier membrane and window flashing membranes.
- › The drained and vented rainscreen cladding comes pre-installed except at panel joints and at window interfaces (if site installed).
- › Closure cladding, flashing, and trim is installed as required at panel joints and windows.

### Potential Benefits of an I-Joist Framed + Batt Insulation Retrofit

- › All work (except interior window trim) is done from the exterior leaving the home livable during construction.
- › Site installation work is limited, reducing installation times and disruption to residents.
- › Eliminates on-site framing and using manufactured panels simplifies installation.
- › Insulation thickness can be varied (limited to I-Joist depths) to accommodate energy performance goals and lot-line setbacks.
- › The structural rigidity provided by framed panels allow them to be built larger and provide some load bearing capacity for exterior window installation.
- › Increases air tightness, reduces drafts and noise, and lowers energy costs.
- › Reduces potential for moisture ingress with careful detailing.
- › Improved tolerance to water ingress and drying potential compared to a rigid foam based retrofit.
- › Provides opportunity for seismic upgrades to meet regional requirements.
- › Allows for quality control of the air barrier system at the factory before it is covered with cladding.
- › Allows for quality assurance of the air barrier system transitions on site prior to installing closure cladding.

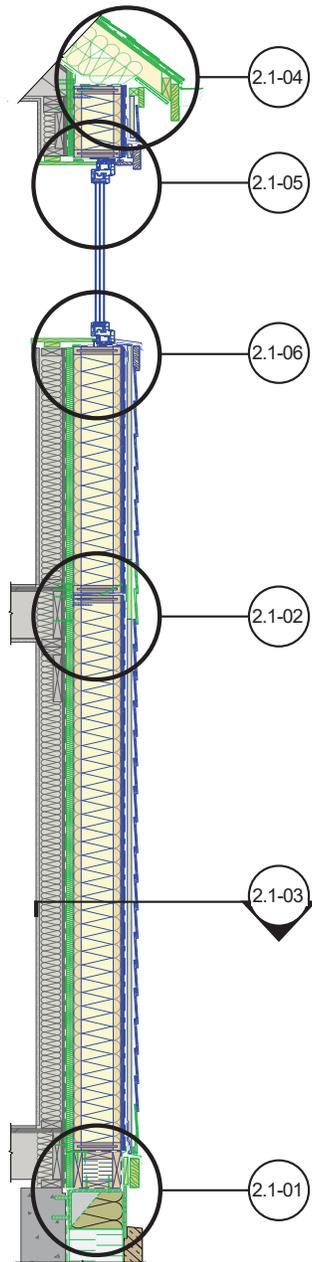
## Key Considerations

**Air sealing:** The air barrier (AB) is provided by the membrane installed on the existing sheathing. This reduces the risk of air leakage into the panel cavities that can result in moisture accumulation. Flexible membrane flashings around windows, doors, and other penetrations and transitions complete the AB. Sealing at the top plate and foundation where the new wall connects to the existing house is also required. The openings around the electrical, mechanical, and other penetrations are sealed throughout the construction process. These are critical details to ensure an airtight barrier.

**Connection to existing structure:** This retrofit uses structural brackets and a continuous box beam at the base of the above grade wall to support the first floor panel at its base. The tops of the panels are fastened to the existing structure at the second storey floor line and roofline using plywood plumb shims and metal straps. The bottom of the second storey panel is toe screwed to the top of the first storey panel.

**Water control:** The membrane on the exterior sheathing of the panel acts as the water resistive barrier (WRB). Strapping is factory installed over the WRB and fastened to wall framing to provide a rainscreen cavity behind the cladding.

**Cladding:** This system must be easily transported and therefore only allows for lighter cladding materials. Materials such as cement board or pre-finished wood are factory installed directly to the strapping. Site install of some cladding around panel joints and windows may be required.



## Typical Construction Details

The sample details shown in the following pages are intended to illustrate typical transition approaches both for air barrier and panel/insulation continuity. Note that these are example details, and project-specific details should always be developed to account for the unique conditions of each project.

The annotations and legend in each sample detail contains red "AB" and "WRB" icons to indicate the various air barrier and where applicable water resistive barrier components are present.

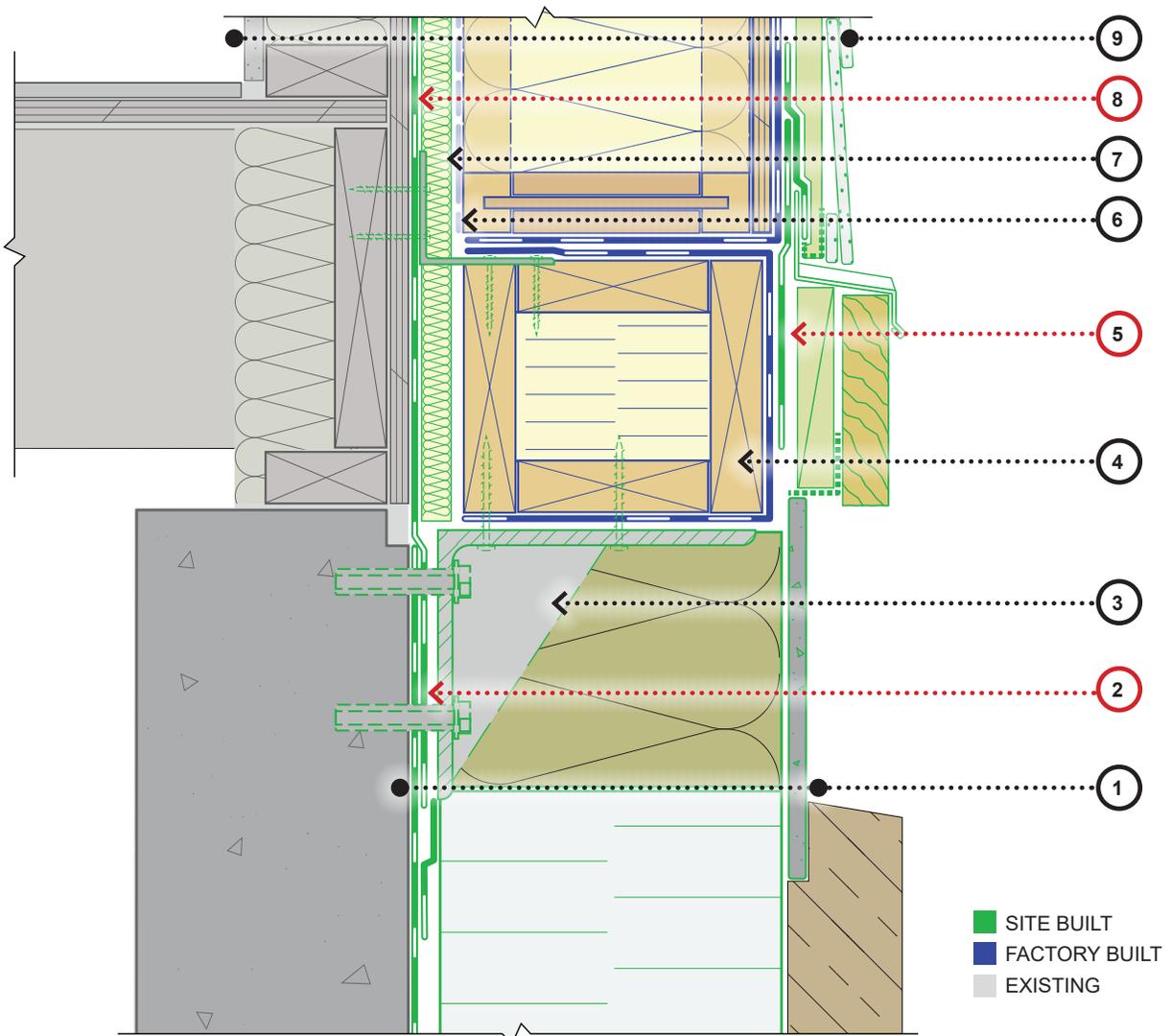
Pink lines indicate factory-installed insulation mesh. Each detail also include a colour legend as follows for the grey, green, and blue components shown:

- SITE BUILT
- FACTORY BUILT
- EXISTING

### List of Details

Detail 2.1-01		Base of Wall at Foundation . . . . .	6
Detail 2.1-02		Horizontal Panel Joint . . . . .	7
Detail 2.1-03		Vertical Panel Joint. . . . .	8
Detail 2.1-04		Top of Wall . . . . .	9
Detail 2.1-05		Window Sill. . . . .	10
Detail 2.1-06		Window Head . . . . .	11

Figure 3 House section detail wayfinder.

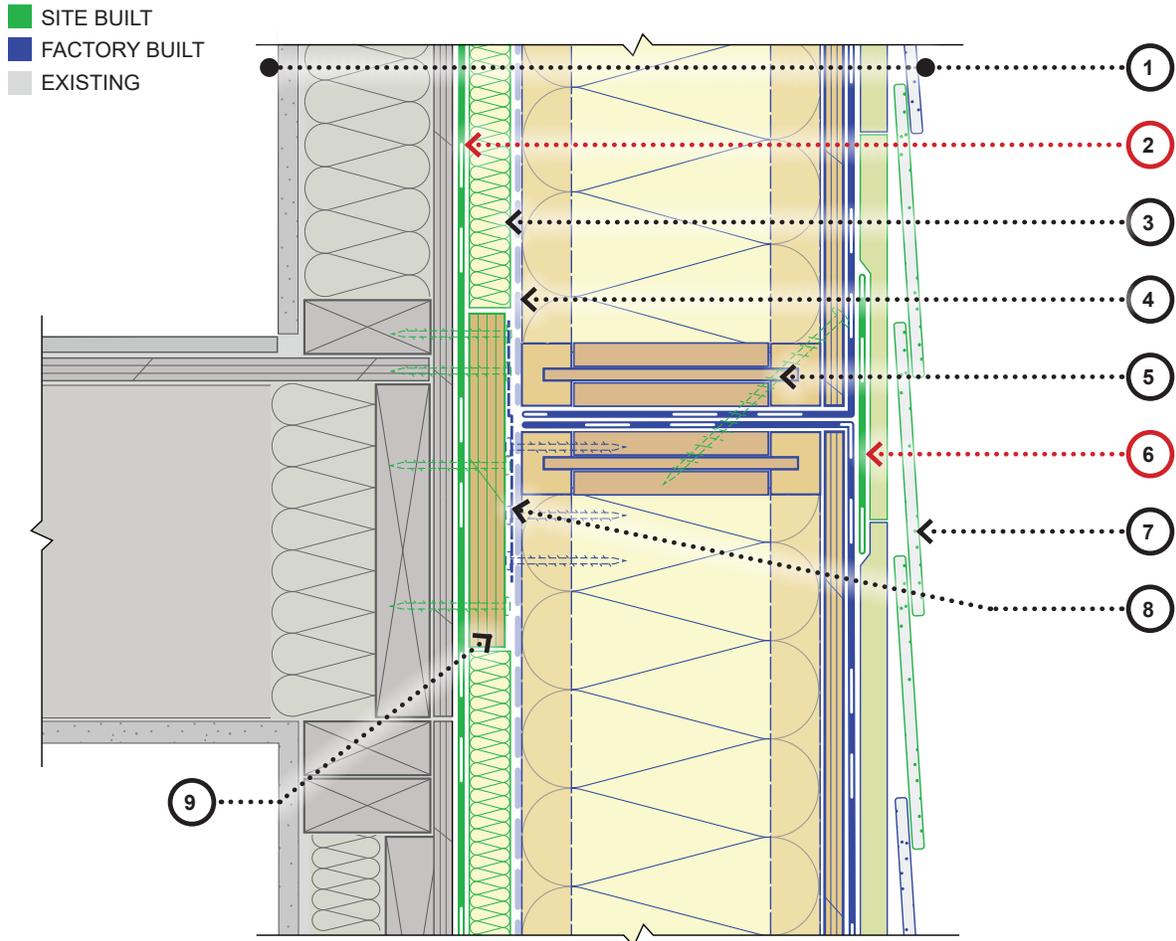


## LEGEND

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Below-grade wall assembly:             <ul style="list-style-type: none"> <li>• Fiber cement board</li> <li>• EPS foam insulation</li> <li>• Self-adhered transition membrane (AB/WRB)</li> <li>• Existing assembly</li> </ul> </li> <li>2. Pre-strip transition membrane prior to foundation bracket install. (AB/WRB)</li> <li>3. Intermittent foundation bracket surrounded with mineral wool insulation.</li> <li>4. Continuous insulated box beam fastened to existing structure with intermittent deck ties.</li> </ol> | <ol style="list-style-type: none"> <li>5. Self-adhered VP membrane lapped over box beam. Leading edge sealed with high performance tape at base of wall flashing. (WRB)</li> <li>6. Retaining mesh for batt insulation.</li> <li>7. Compressible mineral fibre gap fill insulation.</li> <li>8. Self-adhered VP membrane adhered to existing sheathing. (AB)</li> <li>9. I-Joist Framed Panel Wall Assembly.</li> </ol> |
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### Detail A.4-01 | Base of Wall at Foundation

PEER Wall A.4 — I-Joist Panel



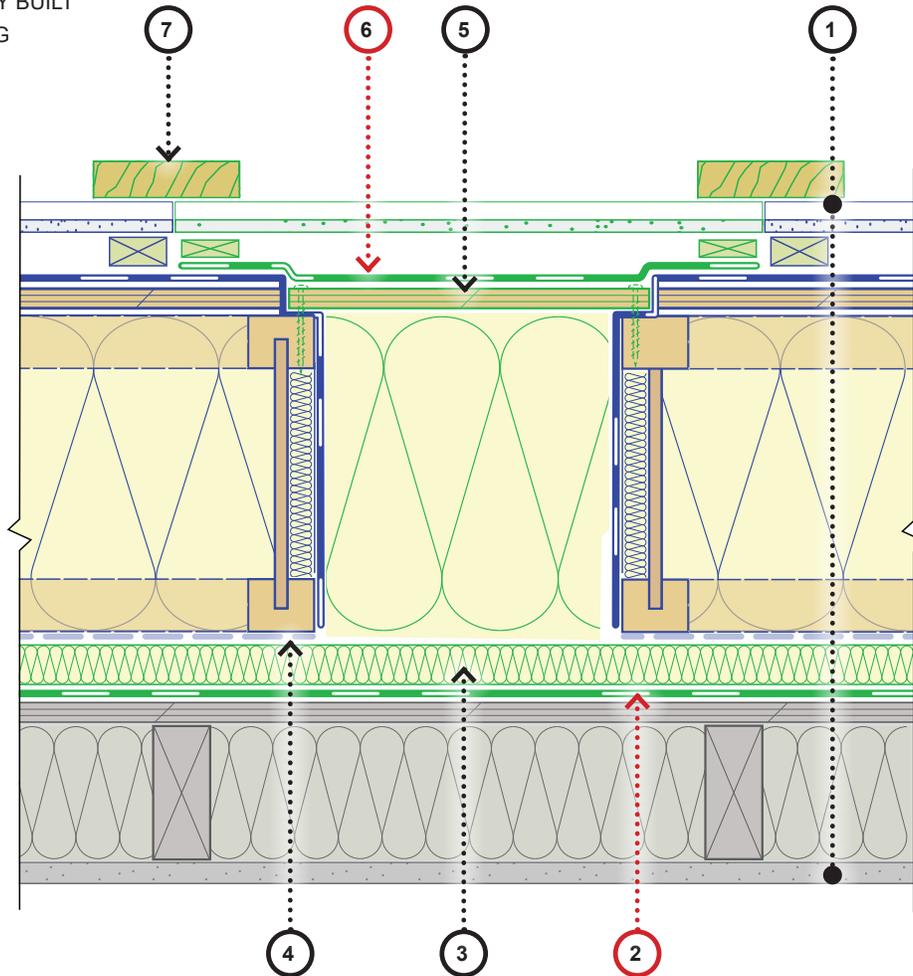
### LEGEND

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. I-Joist Framed Panel Wall Assembly.</li> <li>2. Self-adhered VP membrane adhered to existing sheathing. (AB)</li> <li>3. Compressible mineral fibre gap fill insulation.</li> <li>4. Retaining mesh for batt insulation.</li> <li>5. Screw toe-nailed through bottom plate into top plate of first floor panel.</li> </ol> | <ol style="list-style-type: none"> <li>6. Second floor VP membrane sealed to first floor membrane with high performance tape. (WRB)</li> <li>7. Site applied cladding across joint.</li> <li>8. Intermittent lifting strap secured to plywood plumb shim.</li> <li>9. Plywood plumb shim fastened to existing structure at floorline.</li> </ol> |
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### Detail A.4-02 | Horizontal Panel Joint

PEER Wall A.4 — I-Joist Panel

- SITE BUILT
- FACTORY BUILT
- EXISTING

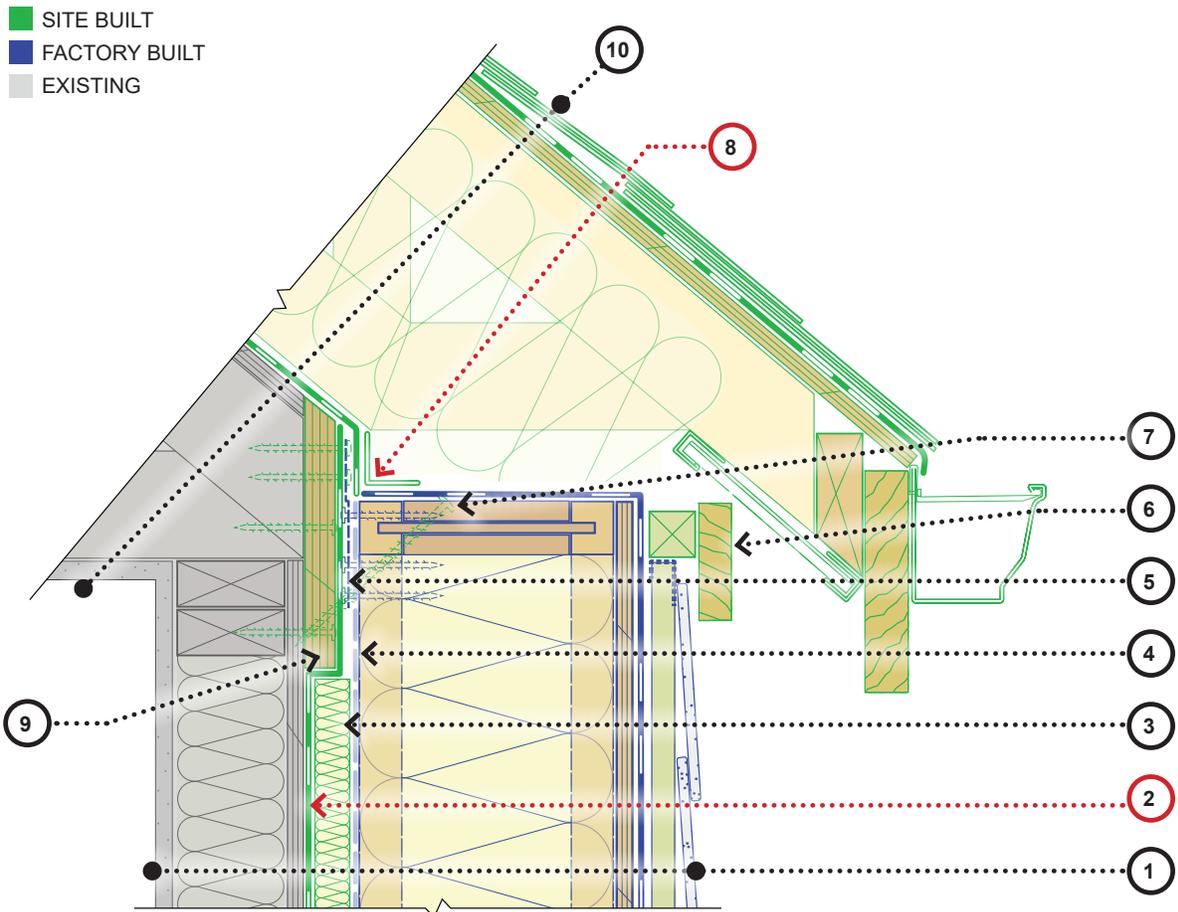


### LEGEND

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. I-Joist Framed Panel Wall Assembly.</li> <li>2. Self-adhered VP membrane adhered to existing sheathing. (AB)</li> <li>3. Compressible mineral fibre gap fill insulation.</li> <li>4. Retaining mesh for batt insulation.</li> </ul> | <ul style="list-style-type: none"> <li>5. Plywood spline fastened to panel framing.</li> <li>6. Self-adhered VP membrane. (WRB)</li> <li>7. Trim installed over vertical cladding joints.</li> </ul> |
|---|--|

### Detail A.4-03 | Vertical Panel Joint

PEER Wall A.4 — I-Joist Panel

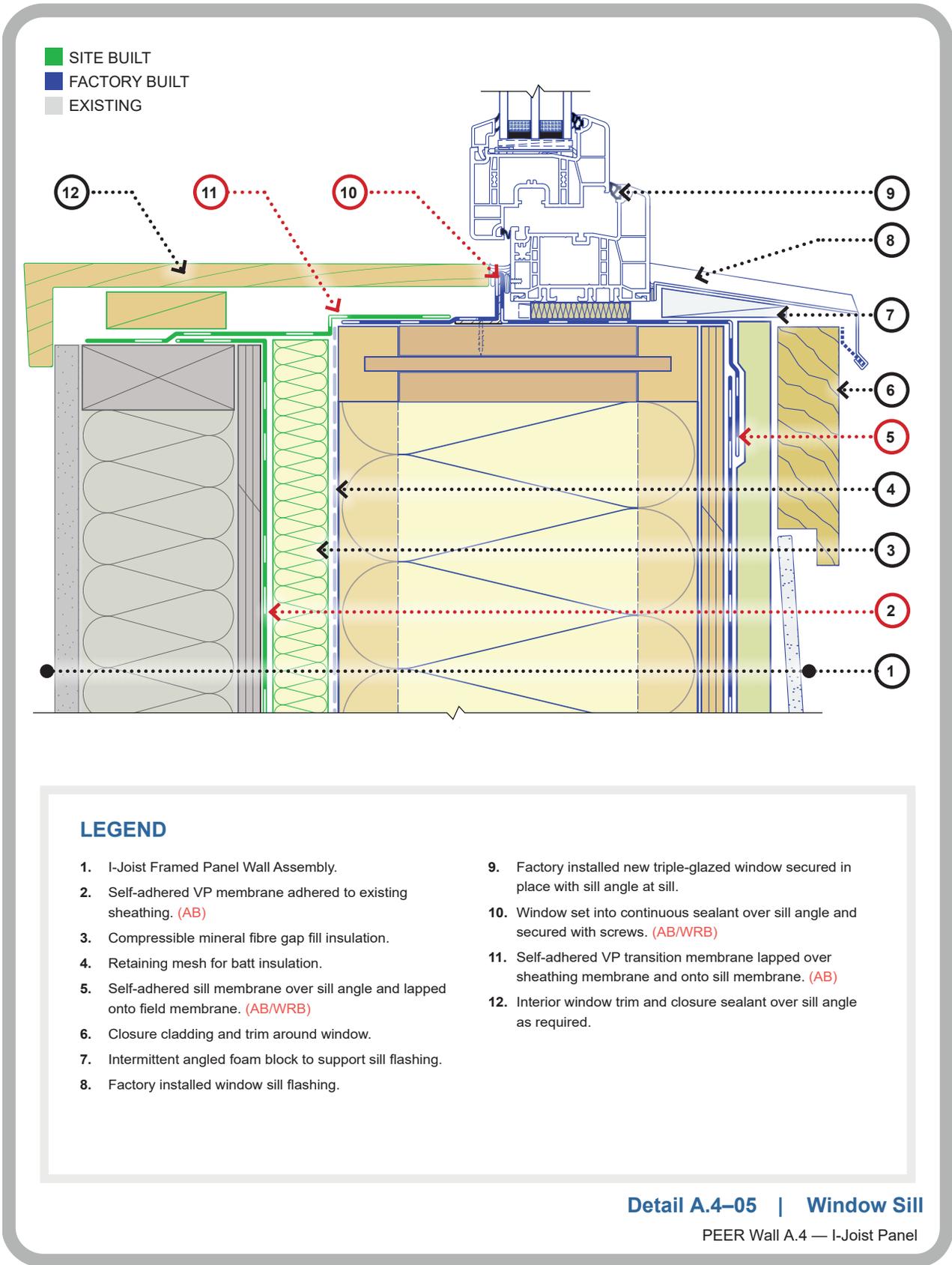


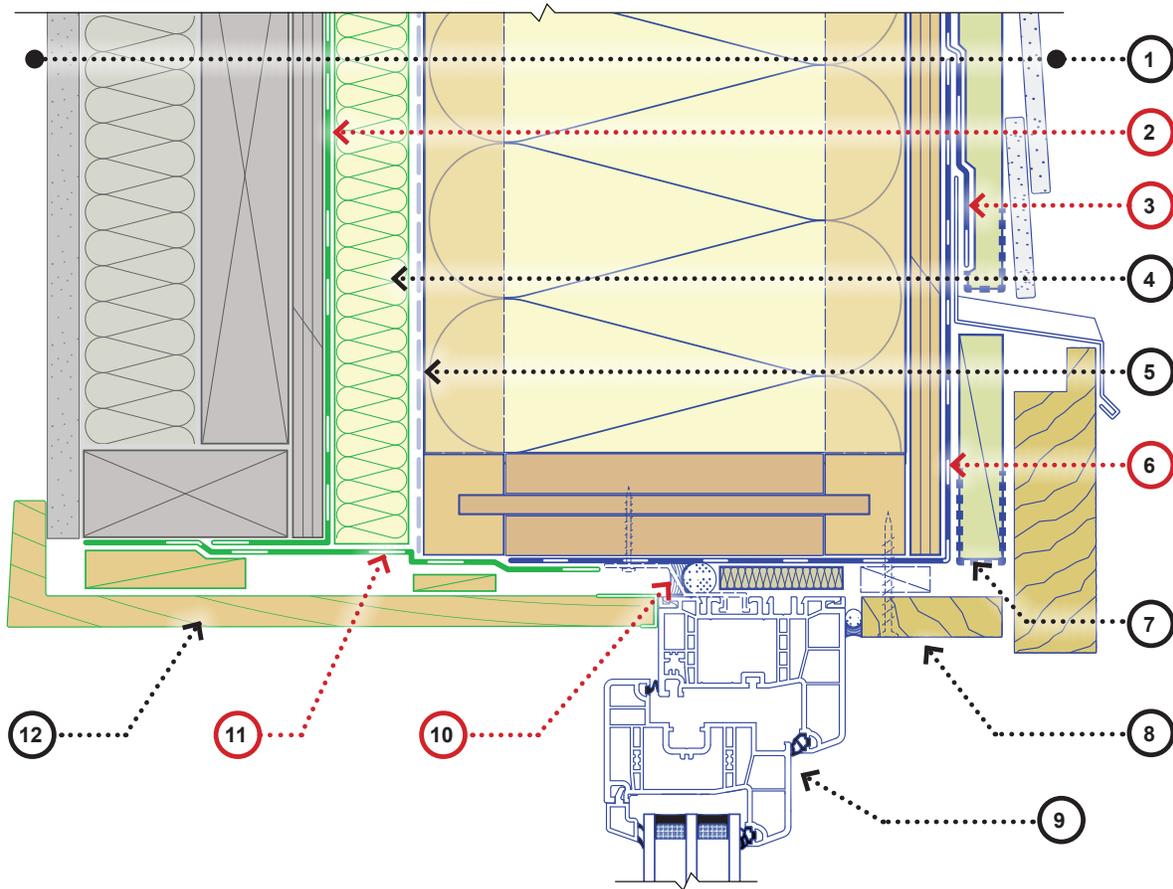
### LEGEND

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. I-Joist Framed Panel Wall Assembly.</li> <li>2. Self-adhered VP membrane adhered to existing sheathing. (AB)</li> <li>3. Compressible mineral fibre gap fill insulation.</li> <li>4. Retaining mesh for batt insulation.</li> <li>5. Intermittent lifting strap secured to plywood plumb shim.</li> <li>6. Site-applied trim at top of wall.</li> <li>7. Panel secured fasteners toe-nailed into plywood plumb shim.</li> </ol> | <ol style="list-style-type: none"> <li>8. High performance tape sealed to factory installed self-adhered membrane and roof assembly membrane. (AB/WRB)</li> <li>9. Plywood plumb shim fastened at cut back existing roof structure (chainsaw retrofit).</li> <li>10. Chainsaw retrofit roof assembly.</li> </ol> |
|---|--|

### Detail A.4-04 | Top of Wall

PEER Wall A.4 — I-Joist Panel





- SITE BUILT
- FACTORY BUILT
- EXISTING

### LEGEND

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. I-Joist Framed Panel Wall Assembly.</li> <li>2. Self-adhered VP membrane adhered to existing sheathing and lapped onto sill membrane. (AB)</li> <li>3. Self-adhered membrane over head flashing and lapped over head flashing membrane. (WRB)</li> <li>4. Compressible mineral fibre gap fill insulation.</li> <li>5. Retaining mesh for batt insulation.</li> <li>6. VP head flashing membrane. (WRB)</li> <li>7. Factory installed window head prestrip and strapping.</li> <li>8. Head trim fastened to top plate.</li> </ol> | <ol style="list-style-type: none"> <li>9. Factory installed new triple-glazed window secured in place with clips at head and jambs.</li> <li>10. Continuous sealant installed between rough-opening and window head/jambs. (AB/WRB)</li> <li>11. Self-adhered VP transition membrane lapped over sheathing membrane and onto head flashing membrane. (AB)</li> <li>12. Interior window trim and closure sealant as required.</li> </ol> |
|--|---|

### Detail A.4-06 | Window Head

PEER Wall A.4 — I-Joist Panel