



Natural Resources  
Canada

Ressources naturelles  
Canada

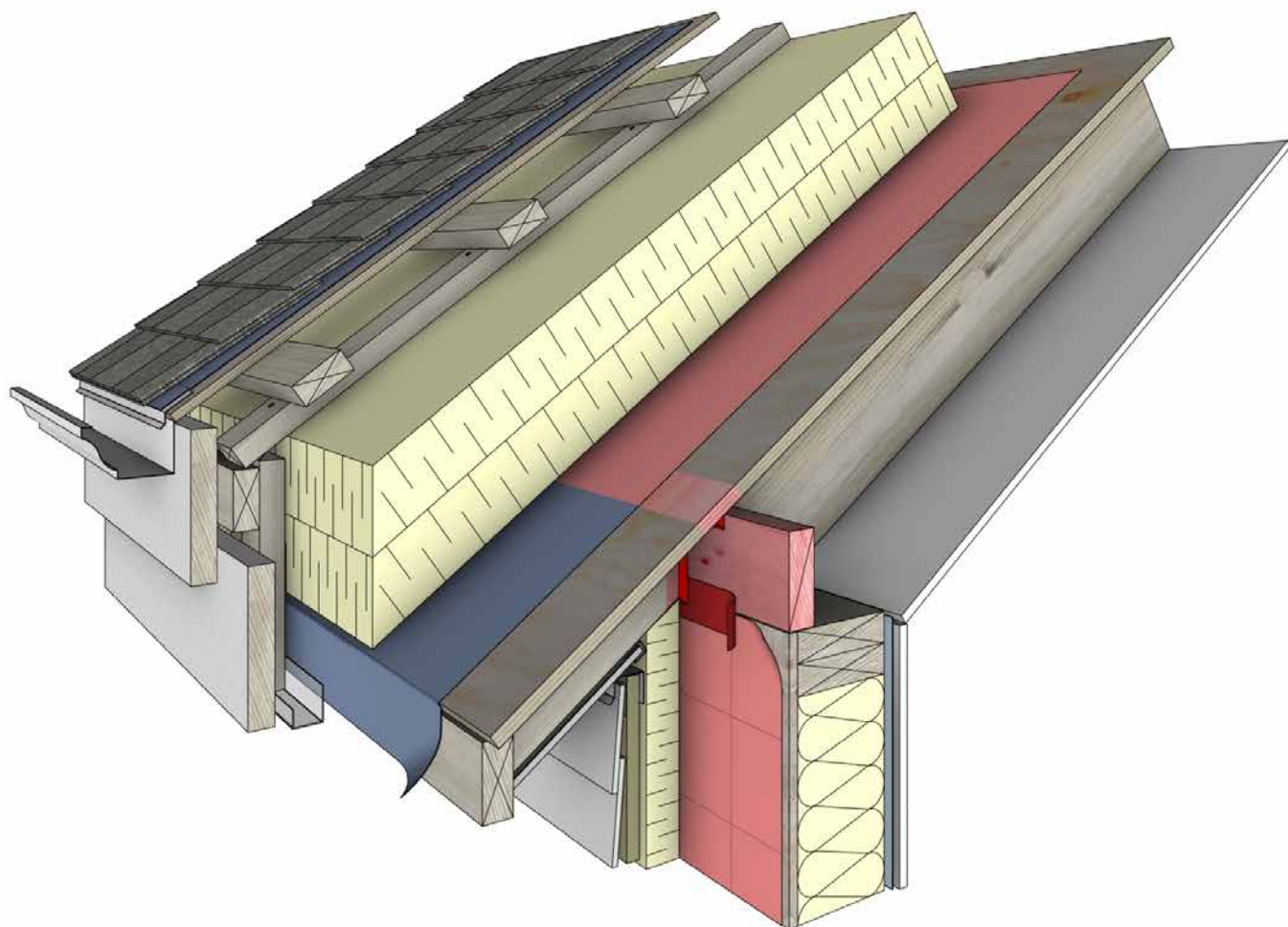
**LEEP**

LOCAL ENERGY  
EFFICIENCY  
PARTNERSHIPS

NET ZERO  
ENERGY

## Roof Guide #3

Exterior-Insulated Sloped Roof Assembly



Developed by Natural Resources Canada's  
Local Energy Efficiency Partnerships (LEEP) team

CanmetENERGY

Canada



**LEEP Net Zero Energy Roof Guide #3**  
**Exterior-Insulated Sloped Roof Assembly**

M154-221/3-2026E-PDF (On-line) ISBN 978-0-662-71855-0

Aussi disponible en français sous le titre:

«LEEP ENZ Guide #3 sur les toits : Assemblage de toit incliné isolé de l'extérieur»

Copyright © His Majesty the King in Right of Canada, as represented by the Minister of Natural Resources, 2026

## Acknowledgments

The Local Energy Efficiency Partnerships (LEEP) team at CanmetENERGY would like to express appreciation to the many Canadian builders, designers, and industry partners who participate in LEEP programs across the country. Builders are invited through their regional Home Builders Associations to take part in technical forums, workshops, and training. Their input has consistently identified the need for practical, building science based resources, including this updated guide series focused on foundation and roof assemblies for high-performance homes.

We would like to acknowledge RDH Building Science for leading the development and illustration of these guides, for coordinating the technical analysis, and for integrating the broad range of industry feedback received during the review process. We also thank our technical reviewers whose comments and technical insights strengthened the clarity and accuracy of this material.

We would like to acknowledge the valuable support of the many regional partners who help deliver and support LEEP initiatives and make this work possible. We also recognize the provincial and local Home Builders Associations whose participation has been essential, along with ongoing leadership and support from CHBA National.

This Foundation and Roof Guide Series was developed by the team at RDH Building Science under the direction of Graham Finch. This project, *LEEP guides for Net Zero Energy Construction*, was led by Clarice Kramer from the NRCan LEEP team at CanmetENERGY Ottawa. Funding for this work was provided by Natural Resources Canada through the Green Infrastructure Fund.

## Disclaimer

This document does not provide assurances or information related to structural systems, seismic performance, or fire safety. It is intended only as a guide on building enclosure science and foundation and roof assembly selection, detailing, materials and performance. The aim of this publication is to provide builders and designers with a framework for making decisions on the type of foundation and roof assemblies to use for individual homes and for new communities.

Natural Resources Canada assumes no liability for injury, property damage, or loss resulting from the use of information contained in this publication. This guide is intended to provide information only and does not express views of the Government of Canada nor does it constitute an endorsement of any commercial product, manufacturer or any individual.

Building science, related products, and construction practices change and improve over time. It is advisable to regularly consult up-to-date technical publications on building science, products, and practices rather than relying solely on this publication. Seek specific information on the use of products, the requirements of good design and construction practices and the requirements of the applicable building codes before undertaking a construction project. Consult the manufacturer's instructions for construction products and also speak with and retain professional consultants who hold a valid license and have appropriate engineering or architectural qualifications. Work with your municipality or local authority having jurisdiction to ensure compliance with issues of design, zoning and construction practices, including life and fire safety.

The effective R-value ranges and assemblies illustrated in this guide represent potential strategies to reach high-performance targets including the upper tiers of the National Building Code of Canada. As with any performance-based energy target, energy modeling must be used to determine appropriate designs for each individual project. Compliance strategies may be influenced by design choices such as building form, window placement, orientation, mechanical systems, and equipment efficiency.

The information included in this guide is generic in nature and is not tied to any specific voluntary labeling program. Builders and renovators looking to qualify their homes under the Canadian Home Builders' Association Net Zero Home Labeling Program must ensure their homes meet all the Technical Requirements of that Program.

## LEEP Context

The LEEP Team at CanmetENERGY works with groups of builders, through their Home Builders Associations (HBAs). LEEP programs offer opportunities to identify barriers and gaps in technology and to discuss and evaluate Net Zero Energy (NZE) and high-performance home building strategies. Builders use forums and workshops to identify key technology challenges and invite experts and manufacturers to respond by proposing solutions, innovations and direction on how to integrate these ideas into construction practices. Through their HBAs, builders use LEEP to define and solve technology challenges, and to connect with design professionals who can help them deliver the homes of tomorrow. The goal is builder-driven enhancement to local building practices.

## The Need

There is a need for fundamental change in roof design and construction. Canadian builders are moving beyond typical wood-framing practices to roof assemblies that reach higher levels of performance. LEEP technical forums have been delivered in many locations across Canada. Regional LEEP builder groups have consistently identified high-performance roofs as a key technological challenge. They have requested information on:

- › Increased effective R-values; continuous insulation and reduced thermal bridging
- › Continuous air barrier systems and airtight building enclosures; improved thermal performance, reduced heating and cooling loads, reduced risk of condensation within cavities
- › Water-protection systems; reduced risk of water intrusion from rain and snow using reliable water control details
- › Effective vapour control; reduced risk of trapping moisture within the assembly

There is great diversity in Canadian light wood construction. Roof details and assembly types vary by region and climate zone. Local construction practices can also vary, along with access to reliable technical information and training. Coordination with trades and consultants is critical when introducing new technology and this should not be overlooked. It is our hope that by providing these guidelines for roof assemblies with construction details, we will help builders select, plan and construct robust roof assemblies with success. Project-specific details should always be developed to account for the unique conditions of each project.

We see the LEEP guides for Net Zero Energy Construction not as the end goal, but as an essential tool for the next generation of high-performance buildings.

## Documents in This Series

The following is a list of the documents in the LEEP Net Zero Energy Foundation and Roof Technical Guide series:

- › **Foundation Guide #1:** Basement Below-Grade Assemblies
- › **Foundation Guide #2:** Crawl Space and At-Grade Assemblies
- › **Foundation Guide #3:** Exposed Floor Assemblies
- › **Roof Guide #1:** Vented Attic Roof Assembly
- › **Roof Guide #2:** Vented Vaulted Roof Assembly
- › **Roof Guide #3:** Exterior-Insulated Sloped Roof Assembly
- › **Roof Guide #4:** Vented Flat Roof Assembly
- › **Roof Guide #5:** Conventional Flat Roof Assembly

YOU  
ARE  
HERE



# Contents

- Exterior-Insulated Sloped Roof Assembly Overview . . . . . 7
- Exterior Insulation Attachment . . . . . 10
- Venting and Insulation . . . . . 11
- Air Barrier Best Practices . . . . . 11
- Construction Details . . . . . 13
- Glossary . . . . . 20

## List of Figures

- Figure 1 Typical assembly layers of the exterior-insulated sloped roof assembly. . . . . 7
- Figure 2 Self-adhered vapour barrier membrane (beige) adhered with epoxy primer on the wood roof deck (red). . . . . 8
- Figure 3 XPS rigid insulation installed over the vapour barrier membrane in preparation for structural cross-strapping. . . . . 9
- Figure 4 Tapered overhang framing using joists set at a shallower slope to produce a conventional fascia appearance. . . . . 9
- Figure 5 Section view of an exterior-insulated sloped roof showing rigid insulation attachment with long screws through strapping. . . . . 10
- Figure 6 Section view of an exterior-insulated sloped roof showing semi-rigid insulation attachment using intermittent clips and rails. . . . . 11
- Figure 7 Overview of the key steps to achieving a continuous air barrier connection between the exterior roof air barrier and the exterior wall air barrier using the sealing blocking approach. . . . . 12
- Figure 8 Air seal at plumbing vent penetration using EPDM gasket and perimeter tape. . . . . 12

## List of Construction Details

- Detail 3.01 Above-Grade Wall at Overhanging Sloped Roof. . . . . 14
- Detail 3.02 Roof Over Conditioned Attic/Utility Space . . . . . 15
- Detail 3.03 Renewable Roof Abutment at Above-Grade Wall . . . . . 16
- Detail 3.04 Above-Grade Wall at Roof Overhang at Gable End . . . . . 17
- Detail 3.05 Renewable Roof Deck at Gable Upstand Wall and Roof . . . . . 18
- Detail 3.06 Roof Service Penetration . . . . . 19

## Exterior-Insulated Sloped Roof Assembly Overview

This roof assembly has a continuous rigid insulation layer located above the structural roof deck. Structural cross-strapping between the insulation and the roofing layers holds the insulation in place as part of the insulation attachment system and creates a ventilation space under the roofing. A self-adhered vapour barrier membrane is installed on the structural roof deck beneath the insulation to provide the exterior air barrier and secondary water control layer. This assembly can be paired with a variety of sloped roofing types including conventional shingles, metal panels, and roof tile. The roofing is typically installed on underlayment and sheathing mounted on the cross-strapping.

By placing continuous insulation outside the framing, this assembly achieves high effective R-values and keeps the moisture-sensitive structural wood components warm and dry. Exterior insulation combined with a continuous exterior air barrier system provides long-term durability.

### Water-Shedding Surface (Roof Finish)

The sloped roofing, trim, flashings, and any adjoining wall cladding together form the water-shedding surface (WSS). Sloped roof assemblies have a minimum slope of 2:12, but at least 4:12 slope is typical for most roofing types. An overhang helps protect the wall below from wind-driven rain and provides water control continuity.

The WSS typically consists of roofing shingles or metal panels. These finishes direct most water away by gravity drainage into perimeter gutters. The WSS and the water control layer are usually in direct contact, so these assemblies rely on adequate sloping and drainage from the surface. Flashings, gutters, and downspouts are critical for directing water away from the building. Uninterrupted roof drainage is the key to reducing the potential for roof leaks and maintaining roof performance.

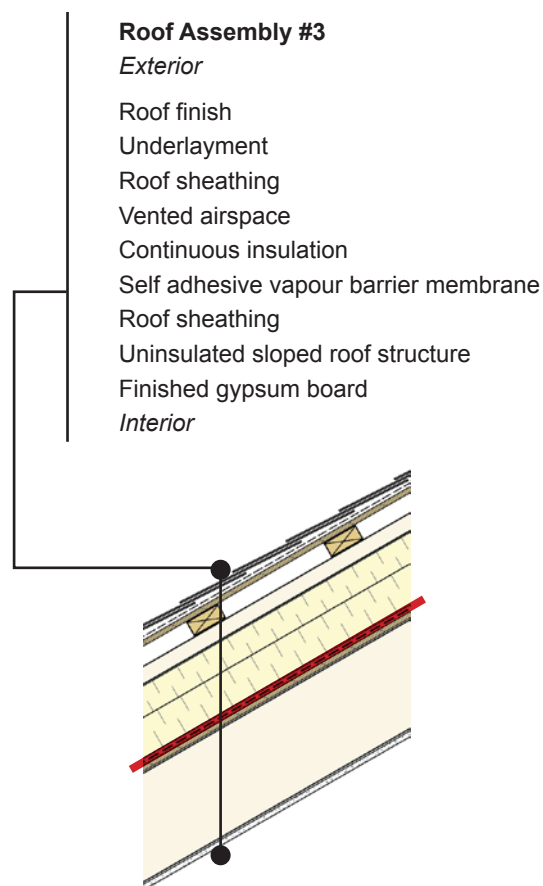


Figure 1 Typical assembly layers of the exterior-insulated sloped roof assembly.

**Airtightness is essential for high-performance NZE roof assemblies. NZE homes target very low air leakage, verified through testing at completion. Strong airtightness improves energy performance and reduces condensation risk in roof cavities. Continuity at transitions and penetrations is critical.**

Exterior-insulated sloped roofs face minimal risk from ice-dam formation in winter because of the secondary water control layer on the roof deck. Refer to Roof Guide #1 and #2 for more information on ice damming.

## Water Control Layer

In sloped roof assemblies, the roof underlayment beneath the roofing finish serves as the water control layer. Traditional asphalt-saturated organic building paper has often been used, but modern synthetic sheathing membrane can be more durable and easier to install. It is typically lighter weight and more flexible. Self-adhered non-permeable membrane is used for eaves protection.

The self-adhered membrane on the roof deck provides secondary water control. Incidental moisture from roof leaks or condensation pose a much lower risk of moisture ingress because the water can drain out of the roof ventilation space.

## Air Control Layer (Air Barrier System)

This assembly uses an exterior air barrier system over the structural roof deck. It relies on robust air barrier detailing at exterior roof penetrations and adequate tie-in to the wall air barrier system below. The exterior air barrier system can help provide very low air leakage because ceiling penetrations at fixtures and penetrations through top plates do not penetrate the air barrier. See [Air Barrier Best Practices on page 12](#) for more information.

## Vapour Control Layer (Vapour Barrier)

The self-adhered vapour barrier membrane on the roof deck controls vapour flow through the roof assembly. This arrangement also limits inward vapour drive from incidental moisture that may be trapped between the exterior insulation and the roof deck. Although some wood components remain within the vented space above the insulation, these elements benefit from ventilation and drying potential, reducing moisture accumulation risk. With vapour control provided at the roof deck, an interior polyethylene vapour barrier is not required.

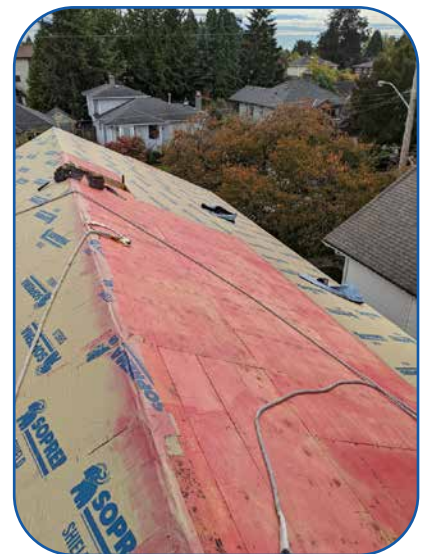


Figure 2 Self-adhered vapour barrier membrane (beige) adhered with epoxy primer on the wood roof deck (red).

## Thermal Control Layer (Insulation)

Roof insulation may use a range of materials depending on the attachment approach. Refer to [Exterior Insulation Attachment Requirements and Best Practices on page 11](#) for additional guidance.

When structural cross-strapping is fastened with long screws through the insulation, suitable options include high density rigid mineral wool, XPS, EPS, GPS, or polyisocyanurate. Insulation must have adequate compressive strength as part of a structural attachment system designed by a qualified structural engineer. Insulation must also be suitable for the elevated temperatures expected within roof assemblies. A top layer of polyisocyanurate is commonly used in assemblies with dark coloured roofing.

Where insulation is supported by a dedicated intermittent clip or blocking system, semi-rigid mineral wool is appropriate. Moisture resistant insulation helps reduce the risk of damage from incidental moisture within the roof assembly. Clip-based attachment systems must be designed by a qualified structural engineer.

The roof joist cavity is typically not insulated. If supplemental insulation such as batt insulation is used, involvement of a qualified professional and project-specific hygrothermal analysis is typically needed to confirm condensation control and moisture performance.

### Tapered Overhang for Smaller Fascia

Note that exterior insulation is not needed at the roof overhang. Therefore, separate overhang joists can be set at a shallower slope than the main roof to create a tapered eave profile that produces a conventional fascia appearance. The strapping at the eave taper can be supported with wood blocking instead of insulation.



Figure 3 XPS rigid insulation installed over the vapour barrier in preparation for structural cross-strapping.

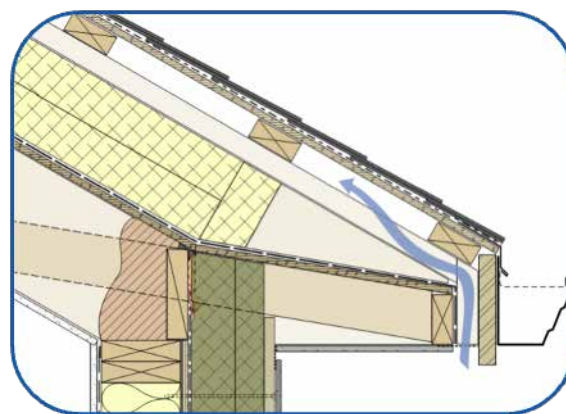


Figure 4 Tapered overhang framing using joists set at a shallower slope to produce a conventional fascia appearance.

## Exterior Insulation Attachment

*Note: This guidance is for reference only and does not replace project-specific design by a registered professional. Qualified structural engineers must be consulted to design roofing attachment systems for exterior-insulated roofs.*

Exterior-insulated sloped roofs commonly use attachment systems that transfer gravity and uplift loads through the insulation to the roof structure. Wood strapping systems and proprietary clip or spacer systems can be used for this purpose.

### Wood Strapping Systems

Wood strapping systems typically use vertical strapping installed over the exterior insulation and fastened with long screws that penetrate the insulation and secure into the roof structure. Cross-strapping is installed over the vertical strapping to support roof sheathing and roofing materials and provide space for cross-ventilation. Galvanized or coated hardened carbon steel long screws with salt spray resistance of at least 1000 hours per ASTM B117 are typically used. Heavy-duty construction screws may be required to accommodate installation torque through thick insulation. Typical strapping and long screw spacing aims to achieve 12" x 16" fastener grid layout, though tighter spacing may be needed.

### Proprietary Clip or Spacer Systems

Proprietary thermally efficient clips or spacers may be installed through the exterior insulation to create dedicated load paths between the roof structure and the exterior sheathing or roofing supports, rather than through the insulation. These systems avoid reliance on screw bending and insulation compression and are commonly used where insulation thickness is significant. The clip spacing is typically designed in a 16" x 24" grid layout, though tighter spacing may be needed. Intermittent insulation fasteners with wind washers may be needed to retain semi-rigid insulation between clips.

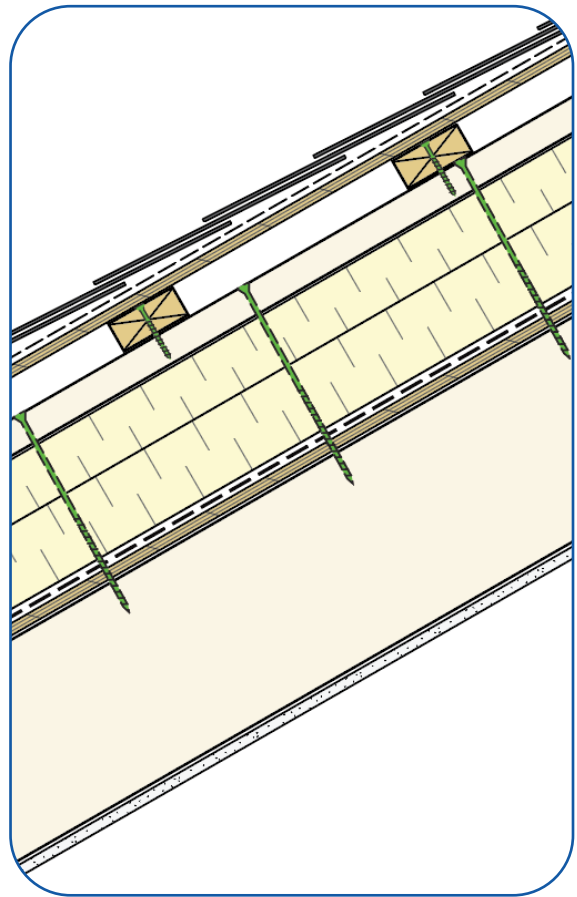


Figure 5 Section view of an exterior-insulated sloped roof showing rigid insulation attachment with long screws through strapping.

## Thermal Performance Considerations

Under Part 9 of the applicable building code, thermal bridging from fasteners and intermittent clips typically does not need to be included in effective R-value calculations provided these elements do not form continuous insulation interruptions and the insulation is installed tightly around them. Therefore, the effective R-value of exterior-insulated sloped roofs with continuous exterior insulation typically includes the full nominal R-value of the insulation layers.

## Venting and Insulation

Exterior-insulated vaulted roof assemblies typically include a dedicated vented air space above the insulation. Improved airtightness and exterior vapour control significantly reduce moisture risk compared to interior-insulated roofs.

The vented space provides drying capacity, helps manage residual vapour or air leakage from the interior, moderates roof sheathing temperatures, and reduces the risk of ice damming. Roof airtightness remains essential, as ventilation cannot compensate for heat loss or uncontrolled interior air movement.

Refer to Roof Guide #2 for detailed guidance on venting strategies, vent layout, and minimum venting requirements for joist-insulated roof assemblies. This exterior-insulated assembly will typically follow the same approach.

## Air Barrier Best Practices

This approach uses a fully adhered membrane as the primary air barrier element. Self-adhered membranes rely on adhesion to both the substrate and at membrane laps. Epoxy primer is typically used to achieve strong adhesion.

This approach is considered an exterior air barrier system because the air barrier is outside the roof structure. It offers several advantages compared to roof assemblies with an interior air barrier system. The key benefit is that there are far fewer penetrations and interruptions from ceiling fixtures and intersecting partition walls. This eliminates the need for either a dedicated service cavity or air barrier detailing at wire penetrations, pot lights, and ceiling electrical boxes. Interior services can be run within the roof joist space without impacting airtightness. The most common roof air barrier penetration is typically the plumbing vent stack.

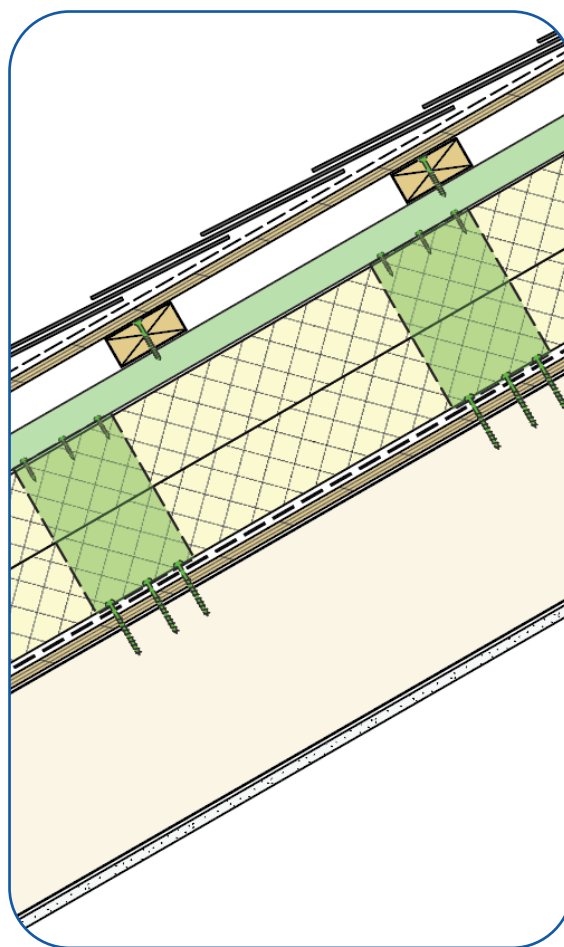


Figure 6 Section view of an exterior-insulated sloped roof showing semi-rigid insulation attachment using intermittent clips and rails.

## Roof to Wall Interface

This roof-to-wall air barrier transition uses a continuous exterior air barrier approach to maintain airtightness between the sloped roof and the wall. Sealant is applied at the roof deck sheathing in line with the perimeter blocking to bridge between the roof sheathing, including at joints, and the wall air barrier layers below. Sealant and high-performance tape are used to transition from the wall sheathing membrane air barrier up to and around all blocking and overhang joists. This approach maintains the typical roof overhang framing and sheathing approach. The following figure shows the key steps for this detail.

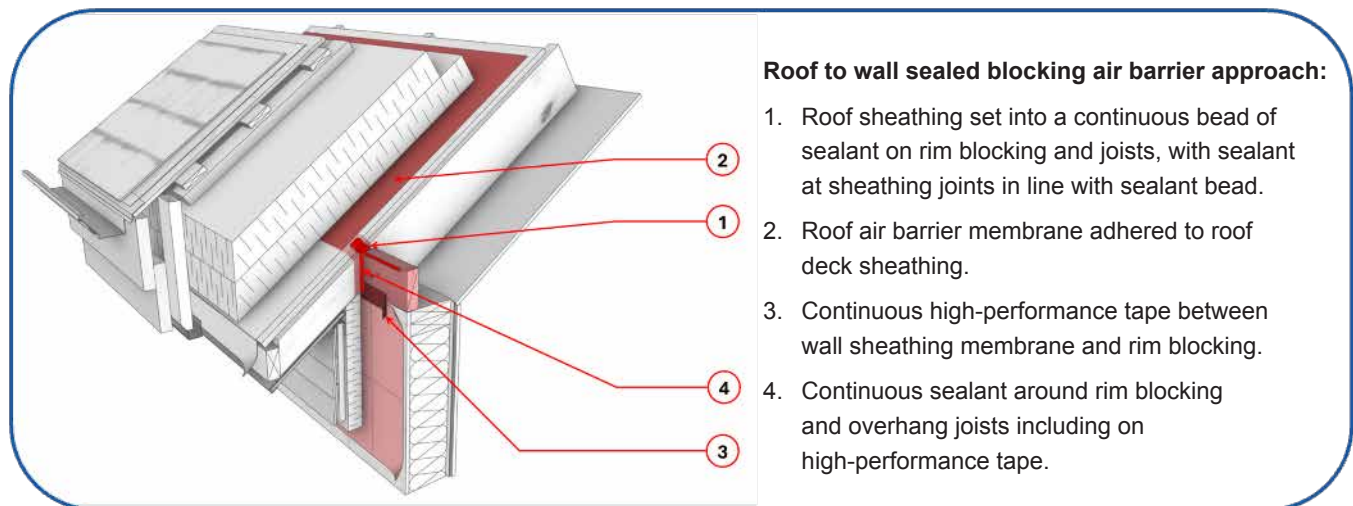


Figure 7 Overview of the key steps to achieving a continuous air barrier connection between the exterior roof air barrier and the exterior wall air barrier using the sealing blocking approach.

## Roof Deck Penetrations

Penetrations through the roof air barrier need clear and inspectable air barrier detailing to maintain continuity. The recommended approach is to use an EPDM gasket. During rough-in, the pre-formed EPDM gasket is installed around each penetration so the gasket is located on the roof deck air barrier membrane. The perimeter of the gasket is taped or set into a continuous bead of sealant. This provides a durable and visible air seal. High-performance tape, sealant, or utility putty works as well.

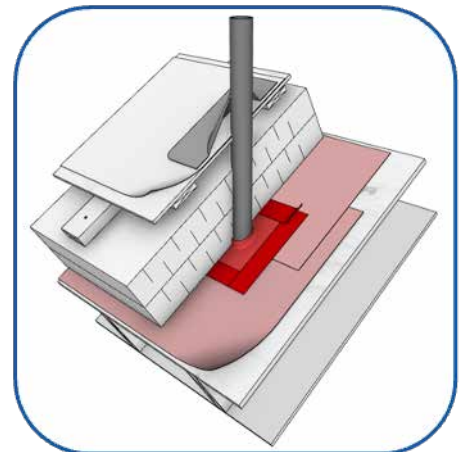


Figure 8 Air seal at plumbing vent penetration using EPDM gasket and perimeter tape.

## Construction Details

The example details in the following pages establish a common level of detailing for Exterior-Insulated Sloped Roof Assembly Guide #3. Each guide in this series provides a similar set of details for its respective assembly. Builders may replicate or adapt these details to meet Net Zero Energy or other high-performance targets, provided the core principles of air barrier continuity, water-resistive barrier continuity, and insulation continuity are maintained.

The assemblies shown were selected through LEEP initiatives where builder groups requested a focus on practical, regionally appropriate high-performance solutions. Building-science experts reviewed these assemblies based on climate, local construction practices, and code requirements. The details highlight key transition strategies, with red “AB” and “AB/WRB” icons identifying air barrier and water-resistive-barrier components.

These illustrations represent best practices. Project-specific work may require additional details, cladding-specific adjustments, and coordination with structural, mechanical, electrical, and life-safety systems. Any modifications should be prepared or reviewed by qualified professionals, as provincial requirements vary.

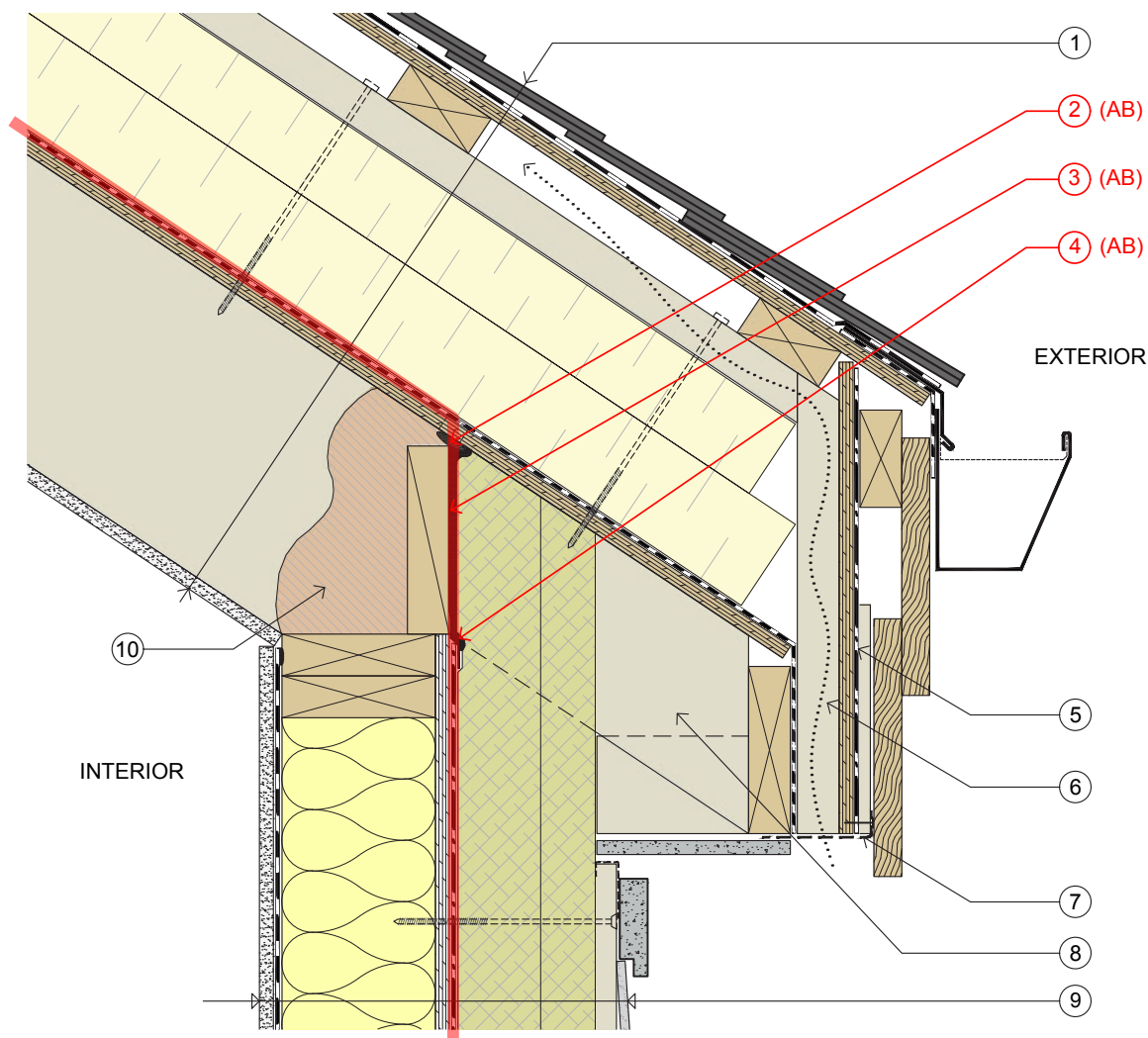
To reduce the risk of water penetration, mould, or other deficiencies, builders are encouraged to review details with a building-science engineer or architect, and to practice installation techniques using full-scale mockups for training and quality control.

Each unique project will require the development of specific details and construction documents to address the varied conditions found in each building and the capacity of local construction trades. In addition, each builder must provide quality control and assume liability for the work they complete. Reliable technical information and training are critical to your success. We recommend that builders take advantage of technical guides and training opportunities offered by credible sources and share this training with everyone on your crew. Work with your local Home Builders Association to find more information and to build local capacity.

For more guidance and example detailing for net zero energy roof assemblies, refer to the following additional resources:

- › Illustrated Guide— R30+ Effective Vaulted & Flat Roofs in Residential Construction, BC Housing
- › Building Envelope Guide for Houses, BC Housing
- › Canadian Home Builders' Association of BC Building Science for New Homes, CHBA BC
- › BC Energy Step Code Builder Guide, BC Housing
- › Building Enclosure Design Guide, BC Housing

## Detail 3.01 Above-Grade Wall at Overhanging Sloped Roof

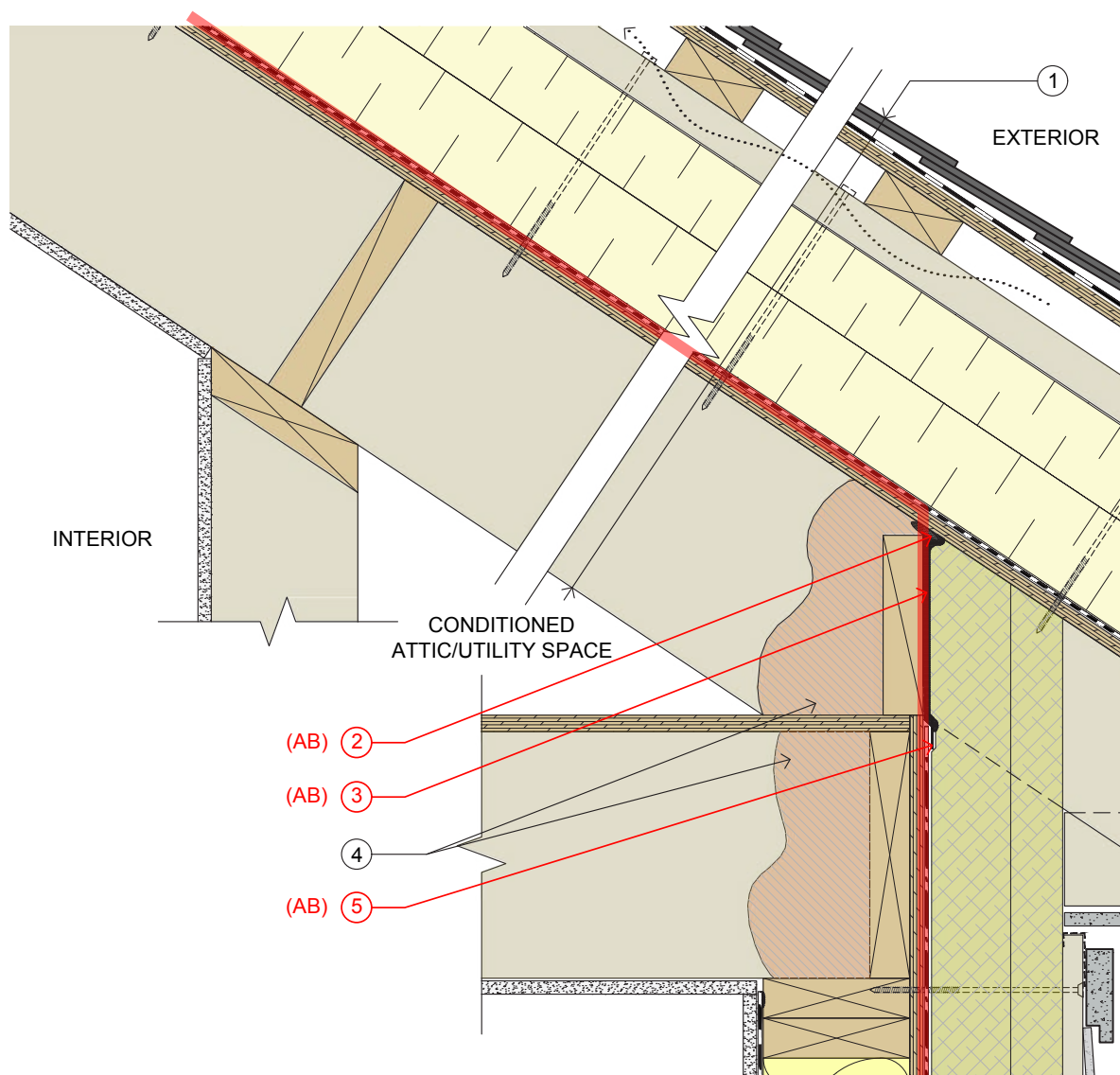


### LEGEND

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>① Exterior-insulated sloped roof assembly</p> <ul style="list-style-type: none"> <li>• Roofing shingle</li> <li>• Roofing underlayment including eave protection</li> <li>• Air space at cross-strapping</li> <li>• 2 layers rigid insulation</li> <li>• Self-adhesive vapour barrier membrane (AB)</li> <li>• Roof sheathing</li> <li>• Joist framing</li> <li>• Interior gypsum ceiling</li> </ul> <p>② Roof sheathing set into continuous sealant bead on rim blocking and at sheathing joints (AB)</p> <p>③ Continuous sealant around rim blocking and onto high performance tape (AB)</p> | <p>④ High performance tape between blocking/joists and wall sheathing membrane (AB)</p> <p>⑤ VP Sheathing membrane on fascia sheathing</p> <p>⑥ Intermittent vertical strapping</p> <p>⑦ Perforated pre-finished metal closure for roof venting</p> <p>⑧ Continuous roof joist with reduced overhang framing</p> <p>⑨ Above-grade wall assembly with exterior air barrier system (AB)</p> <p>⑩ Spray foam insulation or batt and poly</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**ABOVE-GRADE WALL AT OVERHANGING SLOPED ROOF | D3.01**  
**ROOF #3 - EXTERIOR-INSULATED SLOPED ROOF**

## Detail 3.02 Roof Over Conditioned Attic/Utility Space

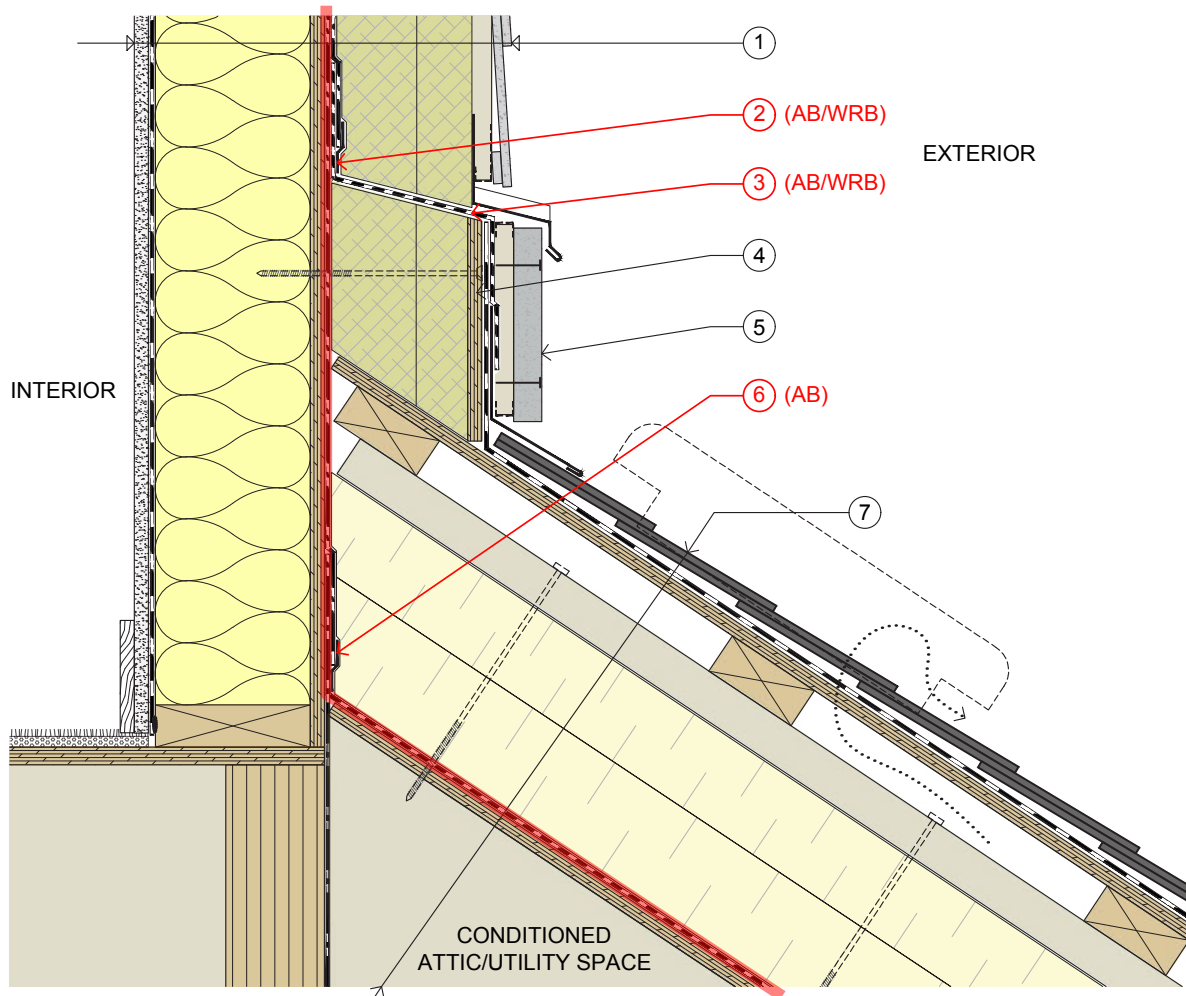


### LEGEND

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>① Exterior-insulated sloped roof assembly</p> <ul style="list-style-type: none"> <li>• Roofing shingle</li> <li>• Roofing underlayment including eave protection</li> <li>• Air space at cross-strapping</li> <li>• 2 layers rigid insulation</li> <li>• Self-adhesive vapour barrier membrane (AB)</li> <li>• Roof sheathing</li> <li>• Joist framing</li> </ul> <p>② Roof sheathing set into continuous sealant bead on rim blocking and at sheathing joints (AB)</p> | <p>③ Continuous sealant around rim blocking and onto high performance tape (AB)</p> <p>④ Spray foam insulation or batt and poly</p> <p>⑤ High performance tape between blocking/joists and wall sheathing membrane (AB)</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

ROOF OVER CONDITIONED ATTIC/UTILITY SPACE | D3.02  
 ROOF #3 - EXTERIOR-INSULATED SLOPED ROOF

### Detail 3.03 Renewable Roof Abutment at Above-Grade Wall

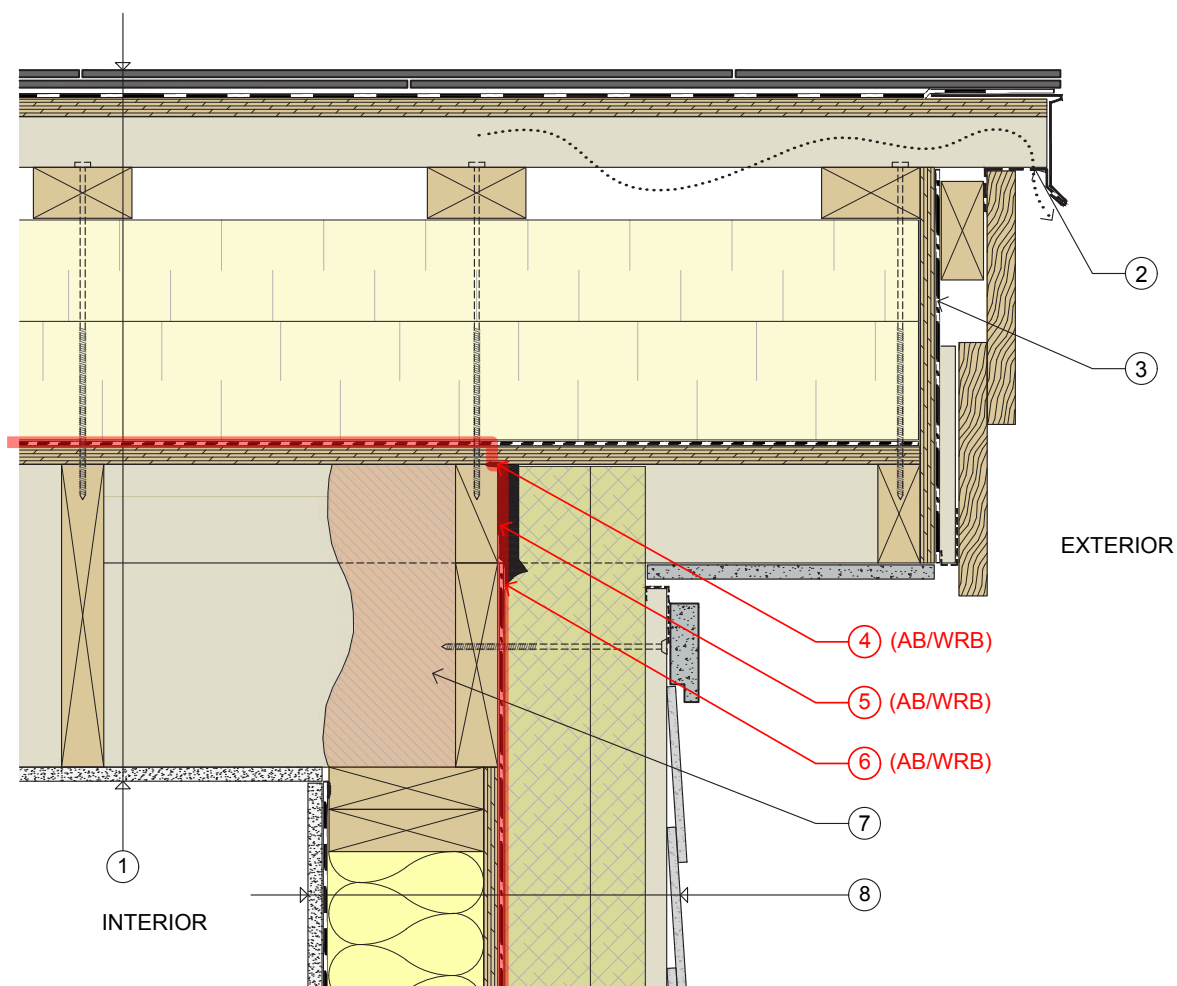


#### LEGEND

- ① Above-grade wall assembly with exterior air barrier system (AB)
- ② VP sheathing membrane taped to through-wall membrane (AB/WRB)
- ③ Self-adhesive through-wall membrane lapped onto roof underlay and flashing (AB/WRB)
- ④ Plywood starter curb for roof renewals
- ⑤ Exterior trim
- ⑥ VP sheathing membrane pre-strip lapped and taped onto self-adhesive vapour barrier membrane (AB)
- ⑦ Exterior-insulated sloped roof assembly with self-adhesive vapour barrier membrane air barrier system (AB)

RENEWABLE ROOF ABUTMENT AT ABOVE-GRADE WALL | D3.03  
 ROOF #3 - EXTERIOR-INSULATED SLOPED ROOF

### Detail 3.04 Above-Grade Wall at Roof Overhang at Gable End

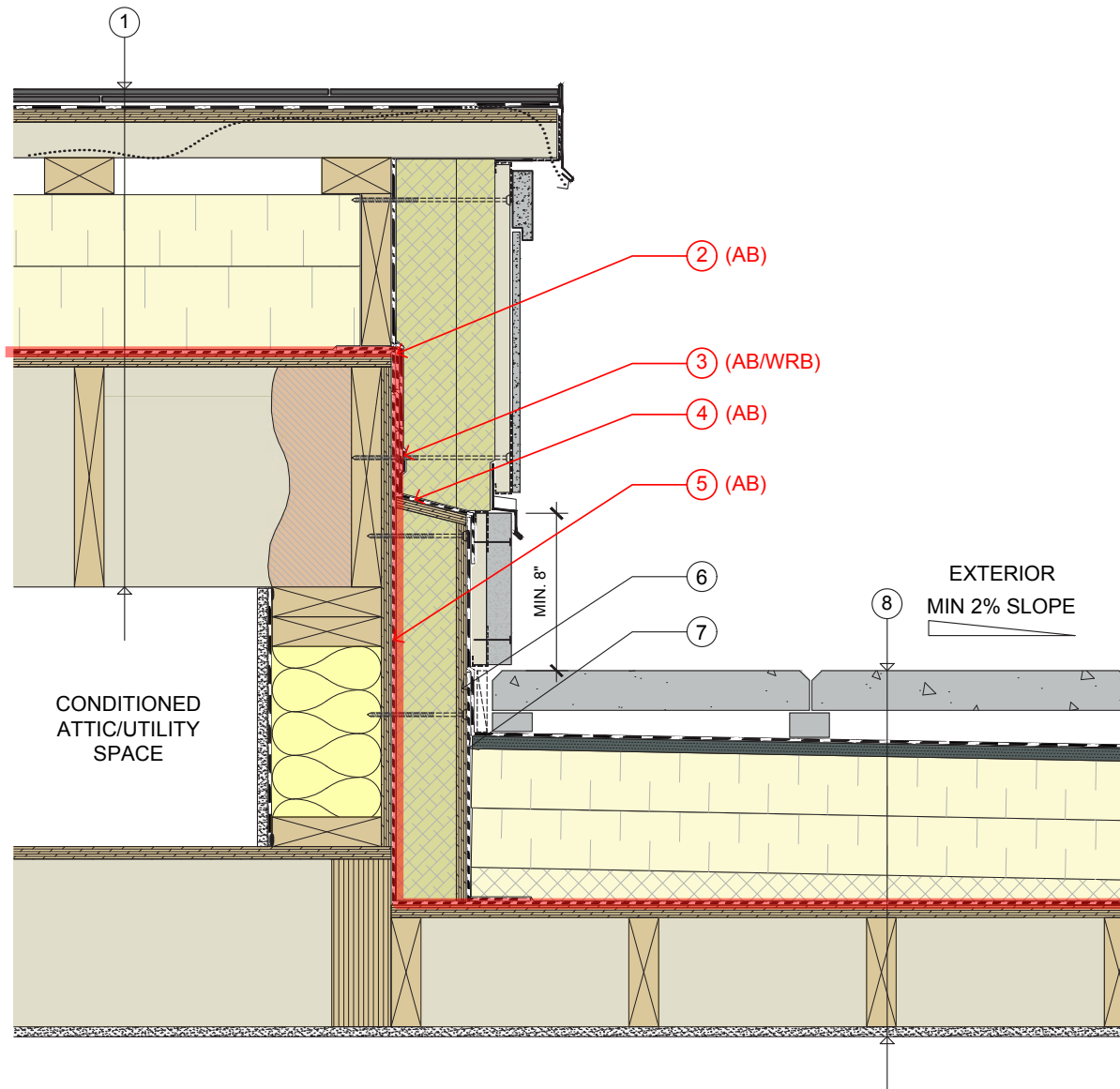


#### LEGEND

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>① Exterior-insulated sloped roof assembly</p> <ul style="list-style-type: none"> <li>• Roofing shingle</li> <li>• Roofing underlayment including eave protection</li> <li>• Air space at cross-strapping</li> <li>• 2 layers rigid insulation</li> <li>• Self-adhesive vapour barrier membrane (AB)</li> <li>• Roof sheathing</li> <li>• Joist framing</li> <li>• Interior gypsum ceiling</li> </ul> <p>② Perforated pre-finished metal flashing for venting</p> <p>③ VP sheathing membrane on fascia sheathing</p> <p>④ Roof sheathing set into continuous sealant bead on rim blocking and at sheathing joints (AB)</p> | <p>⑤ Continuous sealant around rim blocking and onto high performance tape (AB)</p> <p>⑥ High performance tape between blocking/joists and wall sheathing membrane (AB)</p> <p>⑦ Spray foam insulation or batt and poly</p> <p>⑧ Above-grade wall assembly with exterior air barrier system (AB)</p> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

ABOVE-GRADE WALL AT ROOF OVERHANG AT GABLE END | D3.04  
 ROOF #3 - EXTERIOR-INSULATED SLOPED ROOF

### Detail 3.05 Renewable Roof Deck at Gable Upstand Wall and Roof

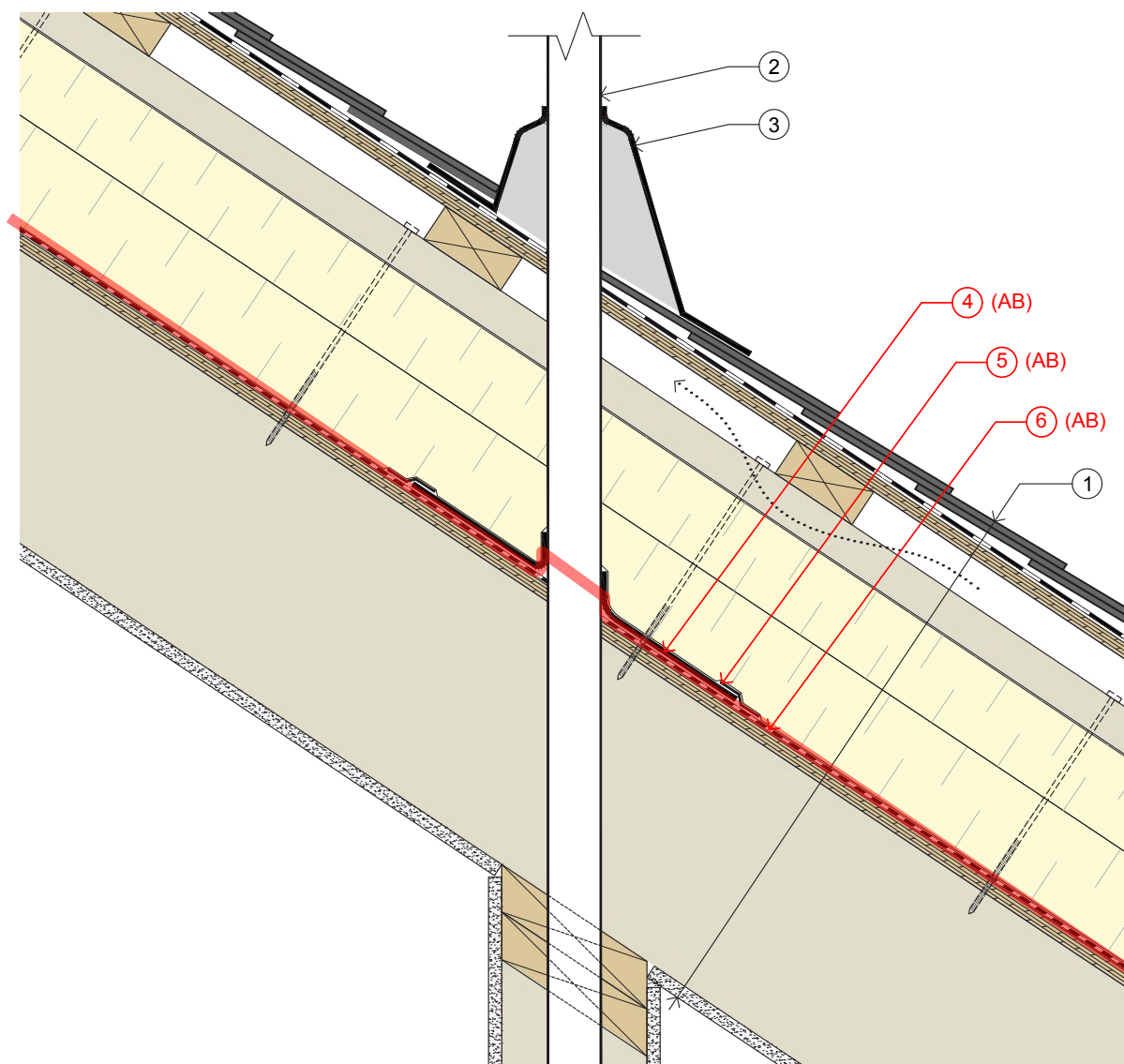


#### LEGEND

- |                                                                                                                                                                  |                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| ① Exterior-insulated sloped roof assembly with self-adhesive vapour barrier membrane (AB)                                                                        | ⑤ Self-adhesive vapour barrier wall prestrip adhered to roof vapour barrier membrane (AB)      |
| ② Self-adhesive pre-strip membrane between roof vapour barrier membrane and gable wall VP sheathing membrane and lapped onto through-wall flashing membrane (AB) | ⑥ Starter curb for roof renewals                                                               |
| ③ VP sheathing membrane lapped and taped to through wall membrane (AB)                                                                                           | ⑦ Self-adhesive vapour barrier membrane starter curb prestrip adhered to roof barrier membrane |
| ④ Self-adhesive through-wall membrane lapped onto roofing membrane (AB/WRB)                                                                                      | ⑧ Conventional flat roof deck with self-adhesive vapour barrier membrane (AB)                  |

**RENEWABLE ROOF DECK AT GABLE UPSTAND WALL & ROOF | D3.05**  
**ROOF #3 - EXTERIOR-INSULATED SLOPED ROOF**

## Detail 3.06 Roof Service Penetration



### LEGEND

- |                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>① Exterior-insulated sloped roof assembly</p> <ul style="list-style-type: none"> <li>• Roofing shingle</li> <li>• Roofing underlayment including eave protection</li> <li>• Air space at cross-strapping</li> <li>• 2 layers rigid insulation</li> <li>• Self-adhesive vapour barrier membrane (AB)</li> <li>• Roof sheathing</li> <li>• Joist framing</li> <li>• Interior gypsum ceiling</li> </ul> | <p>② Penetrating element (vent stack shown)</p> <p>③ Roof jack</p> <p>④ EPDM gasket around penetrating component (AB)</p> <p>⑤ High performance tape around EPDM gasket (AB)</p> <p>⑥ Self-adhesive membrane vapour barrier (AB)</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

ROOF SERVICE PENETRATION | D3.06  
ROOF #3 - EXTERIOR-INSULATED SLOPED ROOF

## Glossary

|                                                                |                                                                                                                                                 |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Air control layer</b>                                       | The control layer designed to resist the flow of air through the building enclosure. Also referred to as the air barrier system.                |
| <b>Air leakage</b>                                             | Uncontrolled airflow through openings in the building enclosure.                                                                                |
| <b>Air permeance</b>                                           | The degree to which a material allows air to flow through it.                                                                                   |
| <b>Vapour control layer (vapour barrier / vapour retarder)</b> | The control layer that manages the diffusion of water vapour through materials and resists movement of water vapour across the enclosure.       |
| <b>Vapour diffusion</b>                                        | The movement of water vapour through a material.                                                                                                |
| <b>Water control layer</b>                                     | The innermost boundary against liquid water intrusion.                                                                                          |
| <b>Water-resistive barrier (WRB) membrane</b>                  | A sheathing membrane capable of resisting non-hydrostatic water pressure and deflecting water off vertical or high-sloped conditions.           |
| <b>Water load</b>                                              | The liquid water the enclosure manages, including precipitation, runoff, groundwater, and ice melt.                                             |
| <b>Water-shedding surface (WSS)</b>                            | The outer surface of the building enclosure that deflects most exterior precipitation away from inner layers.                                   |
| <b>Thermal control layer</b>                                   | The control layer designed to primarily resist heat flow through the building enclosure.                                                        |
| <b>R-value / RSI value</b>                                     | The measure of the thermal resistance of a material or assembly of materials.                                                                   |
| <b>Service cavity</b>                                          | An intentional space between interior finishes and the air barrier designed to contain services that would otherwise penetrate the air barrier. |
| <b>Penetration</b>                                             | Any intentional opening through an assembly to allow ducts, wires, pipes, or fasteners to pass.                                                 |
| <b>Condensation</b>                                            | The change of water vapour to liquid water.                                                                                                     |
| <b>Continuity (of control layers)</b>                          | Control layers that span across different material types, transitions, interfaces, and joints without breaks.                                   |





Natural Resources  
Canada

Ressources naturelles  
Canada



Developed by Natural Resources Canada's Local Energy Efficiency Partnerships (LEEP) team

LEEP Technology Guides and Tools available online. Search "NRCan LEEP".

CanmetENERGY

Canada