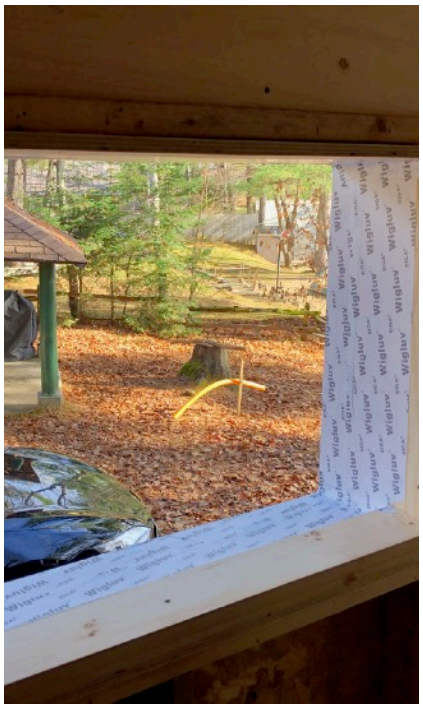


OPENINGS

Architect	Thomson Architecture, Inc.
Project number	Open Buildings Standard: Openings Part 1 of 2
Date	Monday, November 21, 2022

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Openings: Best Practice Guide

Zero emission, low-carbon buildings require thick walls, and thick walls require special consideration of window and door openings. This guide is aimed at providing one best practice among a few approaches to the 'deep buck' method for exterior-insulated buildings. We prefer exterior insulation, using rigid mineral boards, as it reduces the number of required control layers, and facilitates the execution of a continuous air and weather-tight membrane membrane, that serves as the secondary plane of drainage should water ingress past the first plane of drainage.

Deep window buck wrapped in SIGA Majvest SA - our preferred detail because of speed of assembly, and tight fit and finish with no opportunity for any ingressed water to 'travel' under the membrane.

GOALS

1. Reduce the number of steps required by builders struggling to build their first or even most recent airtight and/or net zero home.
2. Reduce the cost of construction through reduction of materials but more importantly labour
3. Reduce the amount of thermoplastic and foam materials in assemblies due to their very high embodied carbon content and vapour trapping potential
4. Provide for superior durability, ease of maintenance, and sacrificial exterior components that are easily replaced without destroying an assembly
5. Consider detailing for the circular economy and material re-use through design for disassembly
6. Permit for a wide range of exterior claddings, combustible and non-combustible
7. Always consider bi-directional drying where possible for changing weather due to climate change
8. Always consider two plans of drainage, one at the plane of the water shedding cladding, and a second behind that primary layer as an extra line of defence and as required by code and Pro-Demnity Insurance.

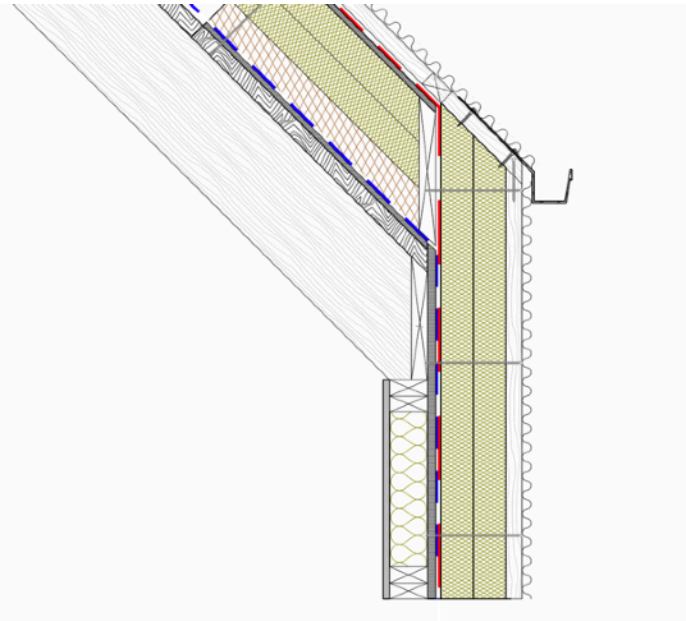
THE 'ADVANCED FRAMING' 2x4 WALL

We'll start with just a word on advanced framing details as that guides the design of our window grids, sizes, and rough opening stud, sill, jamb and header details. Advanced framing refers to a set of guidelines that target a reduction in bulk framing lumber (up to 30% less) through clever alignment of structural components. Most Part 9 residential buildings in Canada do not need 2x6 stud framed walls - this change in the 1980-90's really was about facilitating deeper primary bat

insulation material with a rigid foam exterior insulation as a thermal break and secondary air control layer. For structural adequacy, 2x4 is still sufficient - we are just transferring most of the insulation to the exterior. While this could be considered 'double stud' wall construction, in effect only one 2x4 wall needs to load-bear, the other/exterior 2x4 wall is primarily a form of strapping for cladding and to retain insulation.

Some of the key features of advanced wall framing:

1. Use of 2x4 for walls instead of 2x6 or 2x8, except where tall walls or masonry veneer require greater lateral and/or vertical load resistance.
2. Vertical alignment of studs with roof rafters and/or floor joists above in platform framing, so that a single top plate may be used and the load path better transfers from roof/floor members to the stud below.
3. 24" OC spacing. 16" OC spacing may still be required as a function of loading, but for non-loadbearing walls 24" OC framing is perfectly adequate.
4. Where a floor header is directly above a window or door opening, a lintel or window header is often redundant, elimination of redundant headers saves expensive deeper joist material for where it is doing real work.
5. Reduction of corner studs - the 2 stud corner is possible with a batten to 'catch' the drywall at the corner, or 3-stud corners where only 2 are touching exterior sheathing, helping to reduce the structural redundancy at corners and limit thermal bridging. *For more advanced framing tips, see the PDF appended to the end of this guide.*



*Our typical 2x4 frame wall section at a roof. Note 2/3rds of the insulation is **exterior** to the wall and roof sheathing, so the exterior face of sheathing can be used as a substrate to easily apply the WRB to, where we specify SIGA Majvest SA, this forms the blue dashed line. The red line is the vapour-open but waterproof roof membrane which ties into the wall membrane.*

ROUGH OPENINGS CAN BE PRECISE: THE DEEP WINDOW BUCK

In a perfect world, structural framed openings are large enough to permit the windows and doors to plug into a hole and be finished with shims, trims, foams and sealants later. but often rough openings are framed too small or too large, and when not properly coordinated or windows arrive larger or smaller than specified in an architect's plans and specifications - we remember we're not in a perfect world.

One solution is to receive and stage windows onsite, then create 'prefabricated' window bucks tailor made to the door or window, and then build framing directly to this opening - it's a little backwards but far more reliable. Then instead of referring to rough openings, we can frame precise openings.

A 1/4" space surrounding the interior of the buck can readily allow for waterproof membranes or soft flashings and backer rods, foam and caulk sealants.

Less 'slop' at the opening allows for a more accurate interior finish, where drywall can but right up to the interior projection of the window buck, where it can receive a simple cased cover, or T, L or J mould.

Here we fit the 3/4" Window buck right to the window, allowing for a 2x6 back dam which can be in PT or regular SPF material. The back dam keeps the window and window opening above any standing water that may make it past the primary water shedding plane, preventing water ingress and allowing standing water to dry to the exterior, rather than work its way into the assembly.

Image right: 1/4" is allowed for the frame Rough Opening, and additionally 1/4" for the window, resulting in less 'slop' and a tighter fit for air-sealing and trims. One can skip a step and frame structure tight to the prefabricated window buck where possible.

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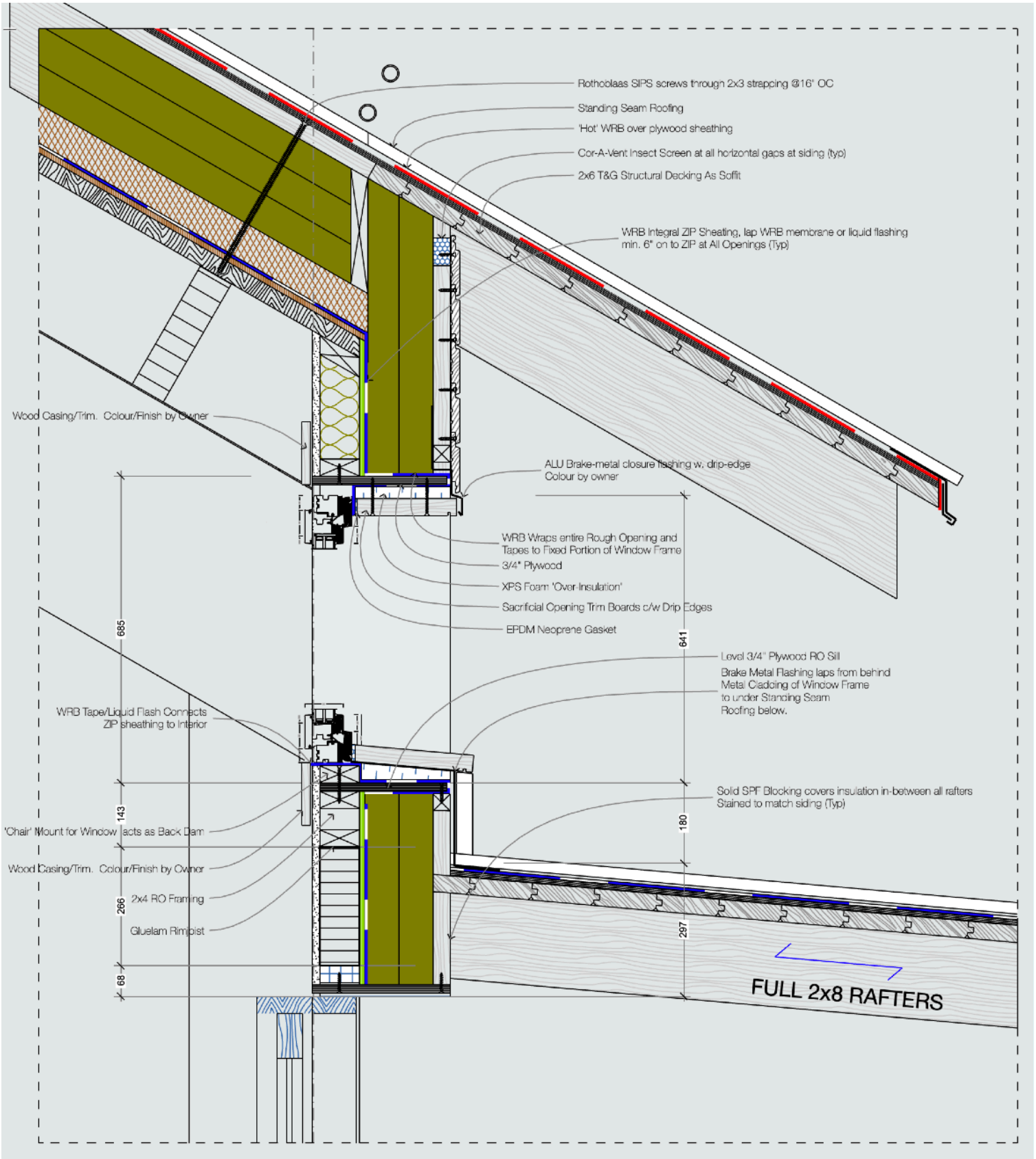

Typical window section with plywood buck, foam sill slope, and sacrificial cedar sills, jambs and head, all easily replaced.

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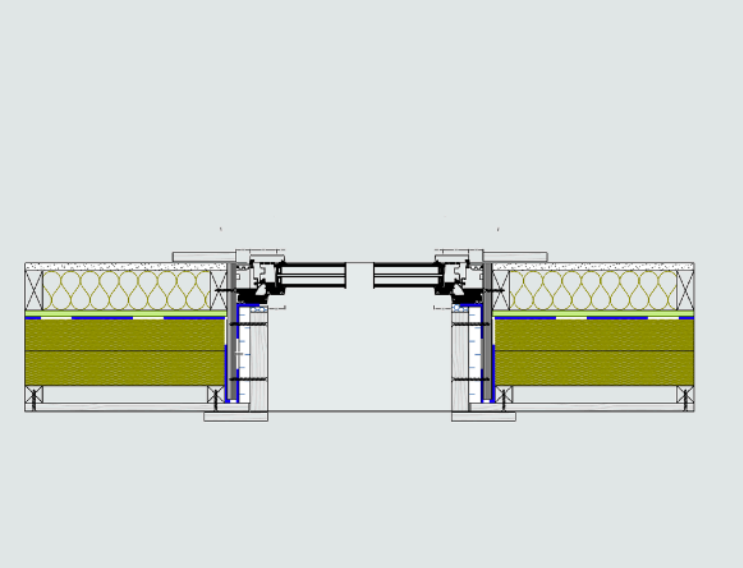

Typical jamb detail where interior is up, showing how deep buck extends to interior drywall plane and to exterior of strapping supporting finished exterior cladding

Where possible, structural framing can even frame tight to the window buck, making for fewer gaps to air seal. In this case, the window is in a renovated wall so we could frame below an existing header and support the buck with a simple 2x4 frame around the plywood buck. Note the impact driver is sitting on the sill below the back dam.

SEQUENCING THE WEATHER RESISTIVE MEMBRANE aka WRB - ALWAYS LAP WITH GRAVITY IN MIND; SILL/JAMB/HEAD

1. Tape the interior sill corners with **WIGLUV** (vapour open) - our photos don't get this 100% right yet
2. Tape the exterior corners with **WIGLUV** gussets per manufacturer's instructions
3. Tape or soft flash the entire sill and back dam with soft flashing (**WIGLUV**)
4. Apply the ***sill*** **MAJVEST SA** using the 'taco' method followed by
5. Apply the buck ***jamb*** **MAJVEST SA** - using the taco method
6. Apply the buck ***head*** **MAJVEST SA** - using the taco method
7. Tape any remaining gaps or seams to the primary sheathing membrane with **WIGLUV**

Images below follow the numbered steps noted above:

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1-3. Just to give an idea of interior buck corner taping to guide any water away and out, lapping layers up and over the back dam

This is a redundant step, but it's good to have a waterproof sill at the very least, which is why we tape off the plywood buck sill right up and over the back dam. An additional layer of Majvest SA gets added to this.

4. Get your 5' wide MAJVEST SA (self adhered), and slice it down the centre for two long strips of 30" wide SA material to make your sill, jamb and head wraps.

Cut one of your 30" wide strips to the exact length of the interior of your window buck, carefully start peeling the backing from interior to exterior - using the + signs to align with your opening, use a plastic spreader tool to pack the MAJVEST tight to the interior corners before smoothing out the adhesive to the entire back dam and sill - the membrane should lap from the interior (where it ties in to your AVB if you are using one) to the exterior wall sheathing.

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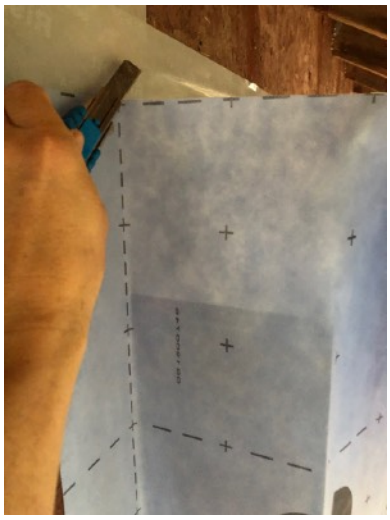
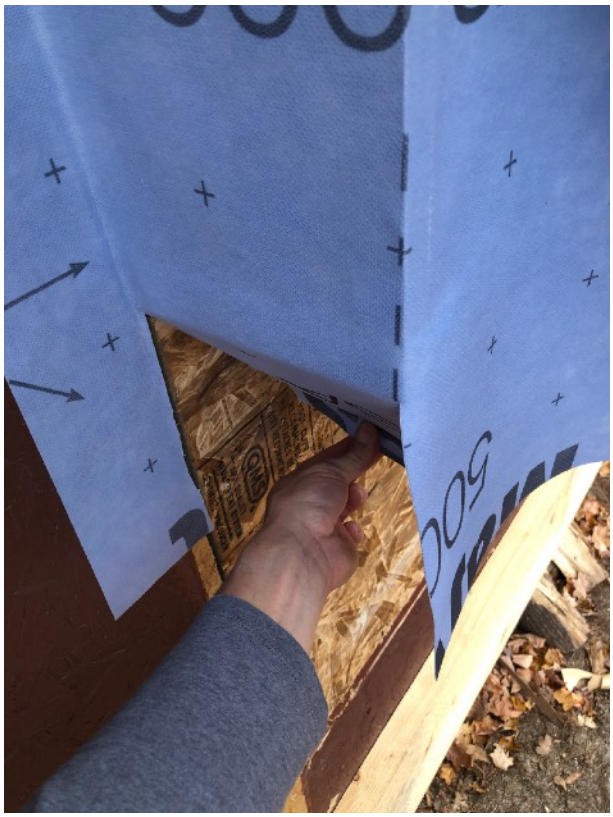


5. Apply a strip of MAJVEST SA to the jambs of the buck, starting at the wall sheathing, work the material right into the corner, and smooth it out along the exterior sides of the buck



Slice the bottom and top like this, and fold them in to the head and jamb (note, there should be WIGLUV gussets under the SA (not shown here) - practice makes perfect!

Smooth the MAJVEST SA on to the front edges of the buck

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One material is flat, use your fingers to create a fine crease along the edge and use a spreader tool to smooth the material so that the adhesive applies

Cut the side/jambs and fold the material to the interior of the jamb.

Notch it to clear the back dam (note: there should be WIGLUV tape flashing under the SA at this junction, not shown here.

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6. Then apply the MAJVEST SA over the head of the buck, trim and fold inwards.

Pull flat to interior head of buck

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How the interior should look - there's just enough SA material to tie-in any interior membrane, or form a nice tight seal to your interior finish, which butts up to the window buck.

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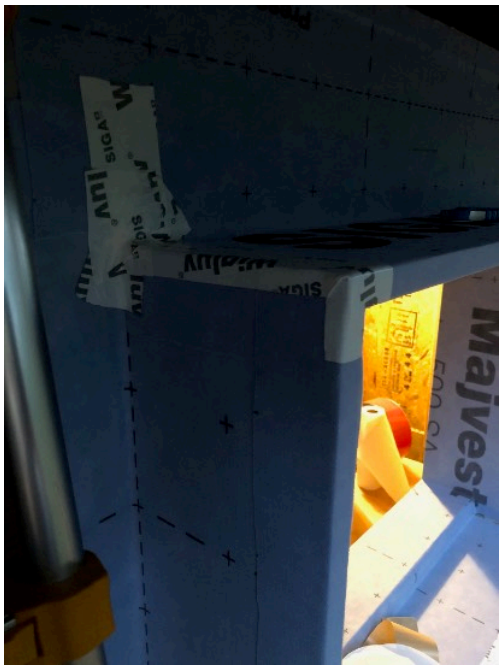
How the exterior should look. We're closing all of the seams of the SA with WIGLUV tape, but this is an extra measure. ***It would be better*** *if we had taped off all corners first* ***before*** *applying the MAJVEST SA so that positive lapping is assured.*



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Windows can now be installed, openings filled with backer rod, and foam-sealed. Cladding and hard flashing up next!

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