

A EXISTING CONDITIONS

Each window and door replacement project is unique. Site, building characteristics and owner expectations combine to create a particular context for each project. The appropriate assessment of the existing conditions is critical to the success of the project, both for the replacement contractor and for the homeowner.

Sections 1 to 5 identify the main areas to be considered in a thorough assessment.

1. Homeowner Consultation

The initial visit to the building is the best opportunity to identify the majority of the parameters that need to be considered in a replacement project. An important part of the assessment is the conversation with the homeowner. Key questions that should be posed to the homeowner are:

Why have you decided to proceed with a replacement project? The homeowner's motivation may dictate particular solutions. The reasons for replacing the windows and doors may include a combination of factors:

- Improve appearance
- Upgrade energy performance
- Address thermal comfort problems
- Solve water penetration problems
- Alleviate condensation problems
- Improve operational characteristics
- Take advantage of new functionality that was not available when the existing windows were selected

Selection of the appropriate window and door products (Sections 6 to 11) and developing appropriate installation details (Sections 12 to 21) can address these factors.

Do you experience water penetration problems at or around the windows? Water penetration may be related to the existing window and door products but could also be related to how they interface with the walls. Alternatively, leaks could be occurring within the adjacent wall or roof construction but are showing up as damage at the windows or doors. It is important that the cause of any existing problems be understood since the scope of the window replacement project may not address water penetration that originates elsewhere. Existing moisture problems are discussed later in this section and in [Appendix A-2](#).

Is your objective to reduce your home's energy use? Because of the *BC Energy Efficiency Act*, today's windows and doors are more effective in reducing heat loss than they were just a few years ago, and many manufacturers now offer ENERGY STAR® qualified products that go well beyond the minimum requirements of the Act. It is worth exploring the range of products available to reduce energy use, many with glass options that also make a home more comfortable throughout the year. Some installation methods are more appropriate than others when the primary objective of window and door replacement is to improve the home's energy use.

Are you intending to take advantage of any incentive programs? Incentive programs typically require specific performance attributes to be provided in order to qualify for the incentive or rebate. The replacement contractor should assist the homeowner in product selection and compliance documentation associated with these incentive programs.

Do you want to upgrade the look of the windows? The primary motivation for the window replacement project may simply be to improve the appearance of the home. The owners may want different arrangements or configurations, more or less glazed area, different frame colours, different trim, or other aesthetic changes.

Do you want to change how the windows operate? The owners may want to change the type of operable units or add more operable units to improve ventilation. The variety of different operator types and vent configurations need to be discussed with the homeowner.

Do you experience condensation problems on or around the windows and doors? The presence of condensation does not necessarily point to a window performance problem. It is usually a combination of factors that result in condensation. These are discussed in [Section 4, Interior Environment](#) on page 9 and in [Appendix A-2](#).

Do you experience comfort problems that you believe are associated with the windows? Discomfort arises when we feel too cold or too hot in areas within a home in spite of measures to heat or cool it. Feeling cold could be related to poor airtightness or to cold surface temperatures of the windows or doors. Overheating can be related to excessive solar heat gain through the windows at certain times of the year. New window and door products and appropriate installation can significantly address thermal comfort issues. Other factors such as lack of external shading, the orientation of windows and the home's heating/cooling systems can have a significant impact on comfort but are generally not within the scope of a replacement project. While windows and doors can play a significant role in creating a more comfortable home, replacing them may not address all comfort issues.

Do you want your windows to block unwanted outdoor noise? Unwanted sound may include noise from aircraft, road or rail traffic, as well as neighbourhood activities. Windows and doors that are very airtight help to block noise, and many manufacturers offer glass options that significantly reduce sound transmission.

Do you want to make your windows and doors more resistant to intruders? There are glass and hardware options as well as product design features

that make some windows and doors significantly more resistant to forced entry than others. While the Building Code requires all windows and doors to provide a minimum level of forced entry resistance, some products achieve higher ratings than others.

Do you need to **protect your home's finishes or contents** from fading due to solar exposure? There are glass options available that can significantly reduce damage from both visible and invisible parts of the solar spectrum.

Determining the answers to these questions will generally dictate some additional assessment of the existing conditions. The factors to consider in undertaking this more detailed assessment are the subject of the following sections.

Many but not all existing performance problems can be addressed through the window and door replacement project. It is therefore important to identify issues that are beyond the scope of the replacement project and that the owner will need to address independently. This is helpful to the owner and appropriately limits the responsibilities of the contractor.

2. Initial Visual Assessment

2.1 Moisture Damage Symptoms

A visual review of conditions can be performed from both the exterior and the interior of the building. The primary focus of this review is on evidence of moisture related problems.

A visual examination of the existing windows, doors and walls will provide clues about the extent to which rain penetration control is an issue. Dry conditions in materials at the window or door, as well as the absence of staining or deterioration are an indication that the balance of wetting and drying for the particular window or door is acceptable. Conversely, signs of deterioration or staining indicate

that more robust rain penetration control strategies will be required to provide acceptable performance.

Moisture staining, mildew, or mould on the interior finishes and window frames are generally an indication of a moisture problem related to condensation, but can sometimes be related to water penetration.

Staining on cladding, warping or visible decay of trim boards are indications of an exterior moisture related problem. In some cases rain will penetrate into the walls to cause staining and other damage. It is not always easy to differentiate between interior and exterior moisture sources in these instances.

Other symptoms such as sashes not sitting square in the frame, cracks between the frames and adjacent cladding, or sagging frame members may be an indication of a moisture problem, poor original construction or simply aging or deterioration of the window unit itself.

Examples of typical symptoms are shown in [Appendix A-2](#).

2.2 Wall Assembly Design

The nature of the adjoining wall assembly is a key factor in the development of appropriate window and door interface details. It is important that the selected window or door is suitable for use with the adjoining wall assembly and in particular that the installation details are developed with consideration for the water management and air barrier strategies employed in the existing wall construction.

For most replacement window and door projects the existing wall assembly will be of either face seal or concealed barrier construction, meaning the wall relies solely on the elimination of holes or cracks to control water penetration.

Other common wall assemblies incorporate vinyl siding or brick veneer. The air gap that typically exists between the vinyl or brick cladding and the

wall behind it allows water to drain, thus the face of the cladding is not expected to be completely watertight. Installation detailing for these drained wall assemblies will be different from the face sealed and concealed barrier walls detailing.

Examples of typical existing wall assembly designs are shown in [Appendix A-2](#).

2.3 Assessment Findings

The knowledge gained through the initial meeting with the owners, combined with observations made on the interior and exterior during the initial visit to the building is an important first step in establishing a fair and professional relationship between the homeowner and replacement contractor.

A range of existing performance issues may have been identified. Alternately, factors outside the control of the replacement contractor may be identified that potentially could contribute to future problems.

It is important that these observations be documented in writing. This documentation will assist in the accurate definition of the scope and costs and reduce disputes regarding the condition of the building prior to the replacement project.

Each of these observations will generate a certain response in the communication with the owner. This includes advising the homeowner that:

- Symptoms are noted for the record but no action is required. Examples include recording existing damage to siding, or the presence of a significant air leakage path that is not related to windows and doors.
- Observations have been made, and while no action is required now, it is recommended that that some action be taken in the future. Examples include: dysfunctional exhaust fans, lack of carbon monoxide (CO) detectors, or furniture in front of windows blocking heat vents.
- The source of the problem can be addressed as part of the window and door replacement

project, but the costs of that additional work are uncertain at this stage. An example is the need to add an overhang over a door to protect it from driving rain. The cost of this additional work may be identified as an item to be completed on a time and materials basis.

- Symptoms indicate a performance problem that needs to be addressed, but is not within the scope of the window and door replacement project. An example is a water leak that is associated with a part of the building that does not form part of the replacement project.
- Additional expertise is required to investigate and determine the cause of the problem (ventilation issue, excessive interior moisture generation, water leakage problem not related to windows and doors). Examples include a complicated condensation related problem, the possible presence of a hazardous material, or a water leak that impacts the window and doors but the exact source is not clear.
- Additional observations will need to be made as the existing windows and doors are removed to better determine the extent and severity of the existing problems, as well as the possible corrective action that needs to be taken. An example would be decay of trim noted initially where the extent of decay in the framing is not currently known.

2.4 Assessment During Construction

As the existing windows, doors and associated trim are removed during the replacement project there is an opportunity to gain additional information regarding cause, extent and severity of some symptoms that were observed. The stained trim or interior drywall may reveal more extensive decay in the sheathing or framing. See [Figure 2-1](#) and [Figure 2-2](#). In some instances there may be no outward evidence of a performance problem but once the window or door is removed, decay is apparent beneath the sill or threshold.



Figure 2-1 Decay visible under door threshold upon removal of interior trim.

Trim had only minor staining visible.



Figure 2-2 Extensive decay visible at sill to jamb interface detail upon removal of cladding.

Damage extends well beyond window replacement work area.

The critical issue at this stage is to ensure that the source of the moisture problem is addressed, and not just the symptoms, such as the presence of decayed wood. The new windows and doors will address leakage that occurred directly through existing window or door frames, but water penetration or condensation issues due to other causes need to be addressed to prevent the problems from recurring.

Installation Detail Series 15

Detail Series 15

Existing Condition: Old Wood Window – Stucco Cladding

Rain Exposure Conditions: Low to Moderate

Existing Frame Left in Place – Sashes Removed, Face Flange/Box Frame Replacement Window

Approach

Older wood windows, manufactured prior to the 1950s, are typically cased with flat boards edged with casing moldings, and are lined with wood on the interior. Depending on their age and significance of the building there may be a requirement to replace the existing window with a very similar new wood window. When the perimeter framing is in good condition and it is desirable to leave the interior and exterior finishes in place, the glass retaining members are removed and replaced with a new window installed within the existing perimeter frame from the interior. This is generally accomplished by using a box frame window that has a face flange at the sill that can be trimmed to meet the existing sloped wood sill. The interior and exterior finishes are not disturbed. A liquid applied membrane can be added to the existing wood sill to improve durability. Sealant is added between the new window and the existing wood wall framing both on the interior and exterior except that the sill is left open to allow drainage of the subsill area.

About the Details

The details address the five key installation objectives as discussed below. Alternate details are provided to show several additional ways to achieve the objectives. The details are not meant to show the only acceptable ways to meet the installation objectives. Other solutions may be developed provided that they address all of the key installation objectives.

Rain Exposure Conditions

The rain exposure conditions must be evaluated for each window situation on the building, and must consider any evidence of moisture staining or damage on the existing window framing. Generally, wood-framed windows are not appropriate for use in moderate to high rain exposure conditions. However if the existing perimeter frames are sound and free of moisture damage, the use of appropriately detailed vinyl windows in this application should be adequate for low and moderate rain exposure conditions.

Water Penetration Control Strategy

For windows and doors in walls with low rain exposure, the new installation details are primarily focussed on airtightness rather than watertightness. Two planes of protection and subsill membranes are generally not required. However, subsill membranes make it easy to ensure air barrier continuity and provide a cost effective second plane of protection when exposure conditions are uncertain.

Air Barrier Continuity

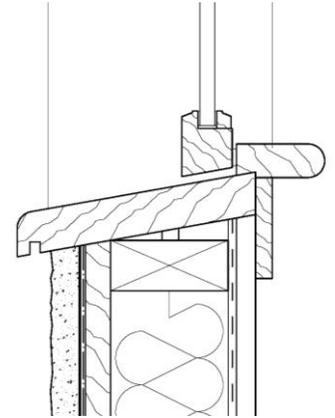
The new installation must provide a continuous and effective air barrier between the new window and the wall on all four sides. The approach to window replacement for this type of window dictates that the air barrier continuity strategy involves sealing to the existing wood window frame.

Minimize Condensation Risk

The use of vinyl frames (low conductivity) is the key aspect of lowering condensation risk. The details also avoid the use of metal flashing or anchors passing from the interior to the exterior of the space (thermal bridges).

Structural Anchoring and Support

The windows are supported by shims at the sill and generally are attached to the rough opening framing through the existing interior finishes with screws. Follow manufacturer's instructions for product shimming and anchoring.



Acceptable Solution

Sealant connects the existing window frame to the interior of the new window frame around the full perimeter and provides the air barrier continuity that is the key performance objective under low rain exposure conditions. Sealant is also used at the window exterior (except at sill) as part of the water shedding surface. Foam backer rod should be used to control the sealant profile, and the sealant must be tooled to ensure adhesion between the window frame and the finish materials.

Sill Detail 15.01

Low rain exposure conditions indicate that foil faced self-adhered membrane is not required on the subsill, although it is a relatively simple precaution to take in order to reduce the risk of water penetration during unusual rain events, or when the assessment of rain exposure is not clear. In this detail liquid applied membrane is shown as it will likely be easier to apply within the recesses of an older wood window. Sealant is used to provide continuity of the air barrier. New wood trim may be provided on the interior to hide the sealant but is not required from a performance perspective. The sill is left open to allow for subsill drainage.

Head Detail 15.02

Low rain exposure conditions also permit a very simple head detail, with no flashing, and a simple interior air seal provided by sealant. Again, new wood trim may be installed on the interior. Sealant is installed between the new window and the existing frame as part of the water shedding surface.

Jamb Detail 15.03

The jamb detail is very similar to the head and sill with sealant on the interior as the air seal and exterior sealant as part of the water shedding surface.

Alternate Details (sill only)

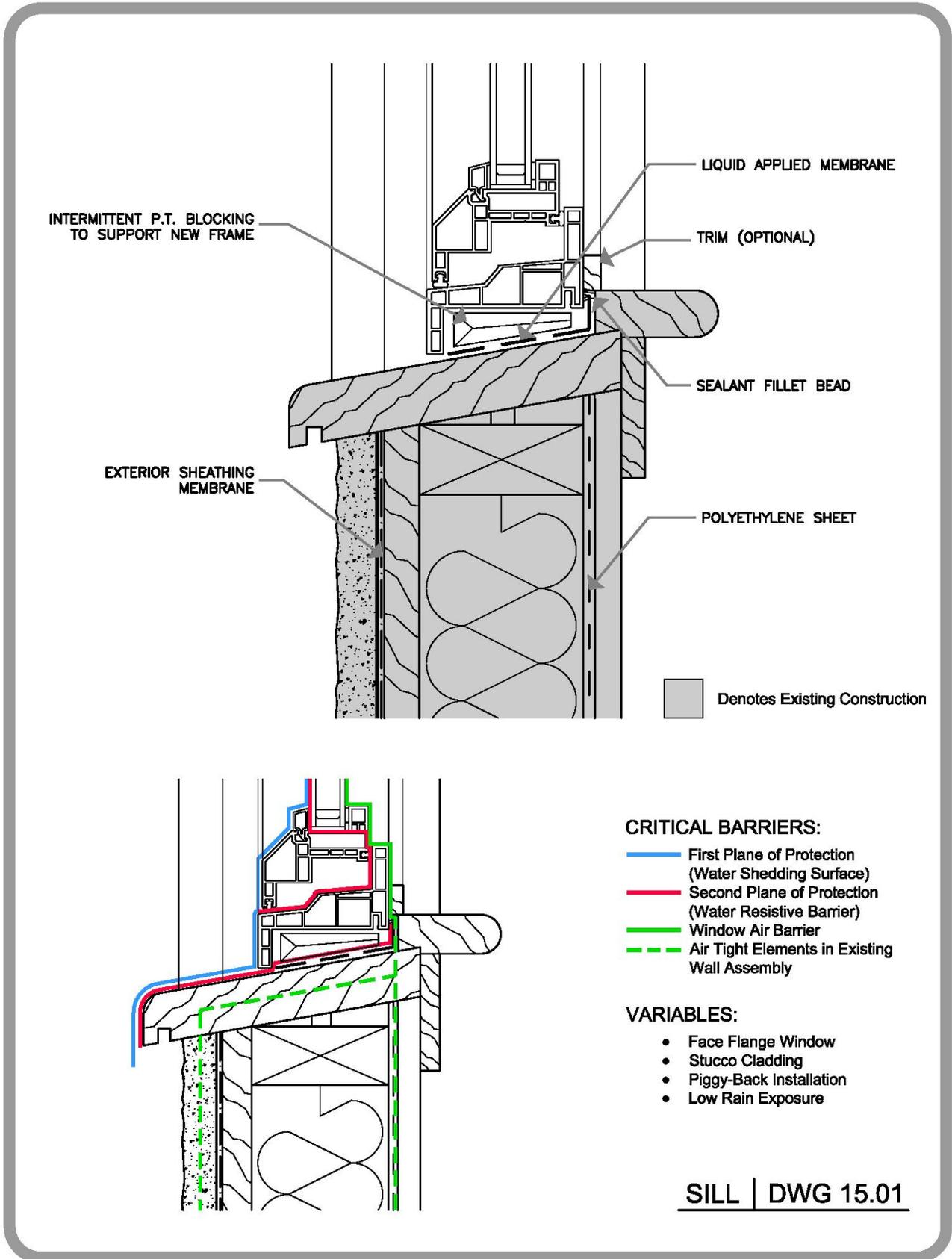
- a) New window sits on existing interior stool rather than being placed to the exterior of the stool. This may be required due to existing geometry and results in a slightly smaller window opening.
- b) New window sits on existing stool and a metal cover flashing is provided to protect the existing wood sill. This approach is merited when some damage has occurred to the existing frame or there is a desire to minimize future maintenance. The metal flashing should be separated (shimmed) from the wood sill to facilitate drying.

Materials

Foil faced self-adhesive membrane is shown in the details. However, other self-adhesive sheet membranes as well as liquid applied flashings may be used. The replacement contractor should ensure good adhesive properties between the sealant and all substrates, and that all membrane, flashing and sealant materials are compatible with one another, with the window frame, and with the existing wall materials they are in contact with. For guidance on compatible sealant selection, see [Appendix A-16](#).

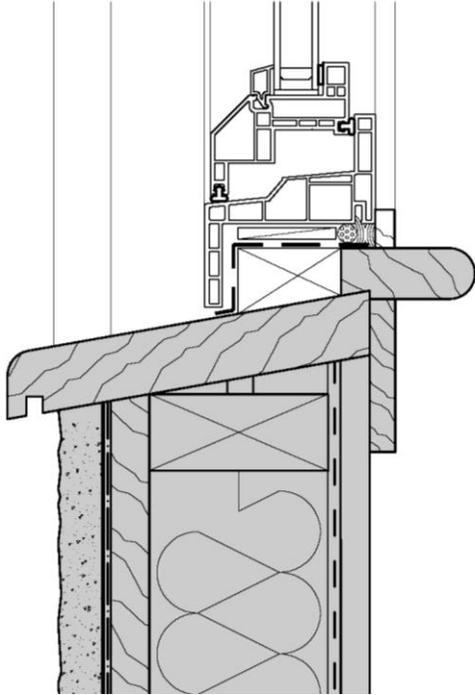
Spray-in-place foam should have low expansive properties to reduce the risk of pressure warping the window frame.

Installation Detail Series 15



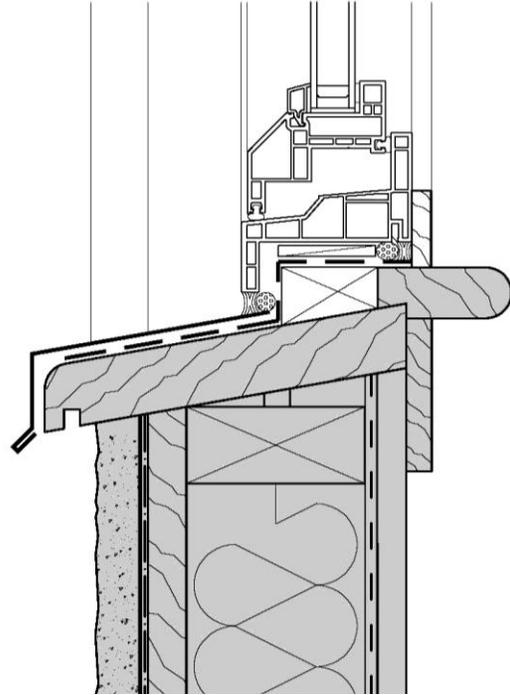
Sill 15.01 – Alternate Details

a.



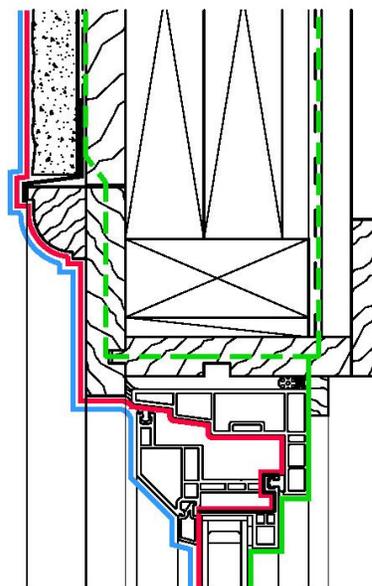
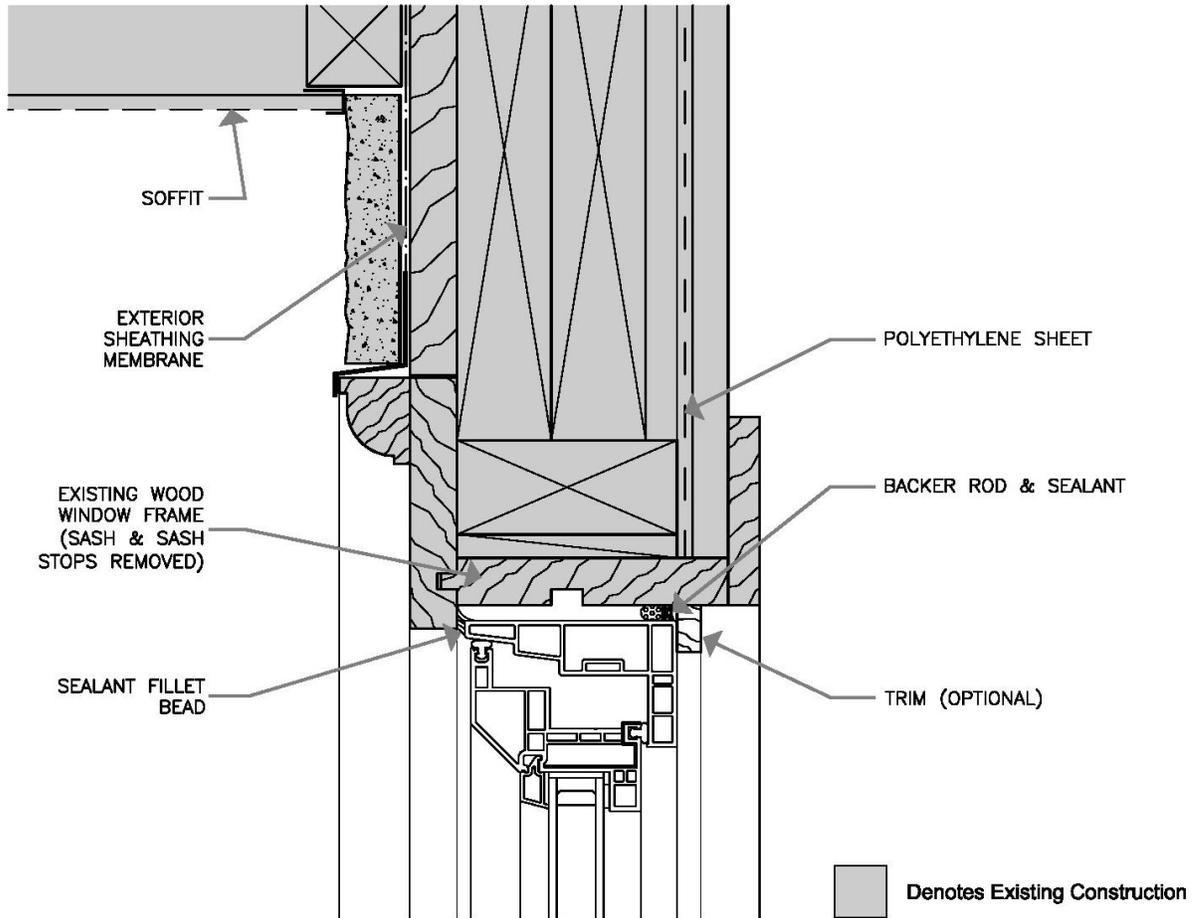
- New vinyl window sits on existing interior stool rather than being placed to the exterior of the stool.

b.



- New vinyl window sits on existing interior stool and a metal cover flashing is added to protect existing wood sill.

Installation Detail Series 15



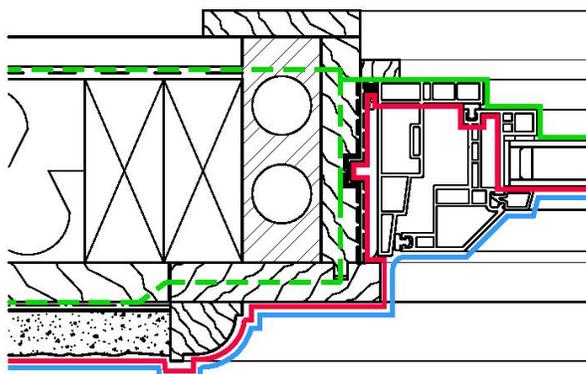
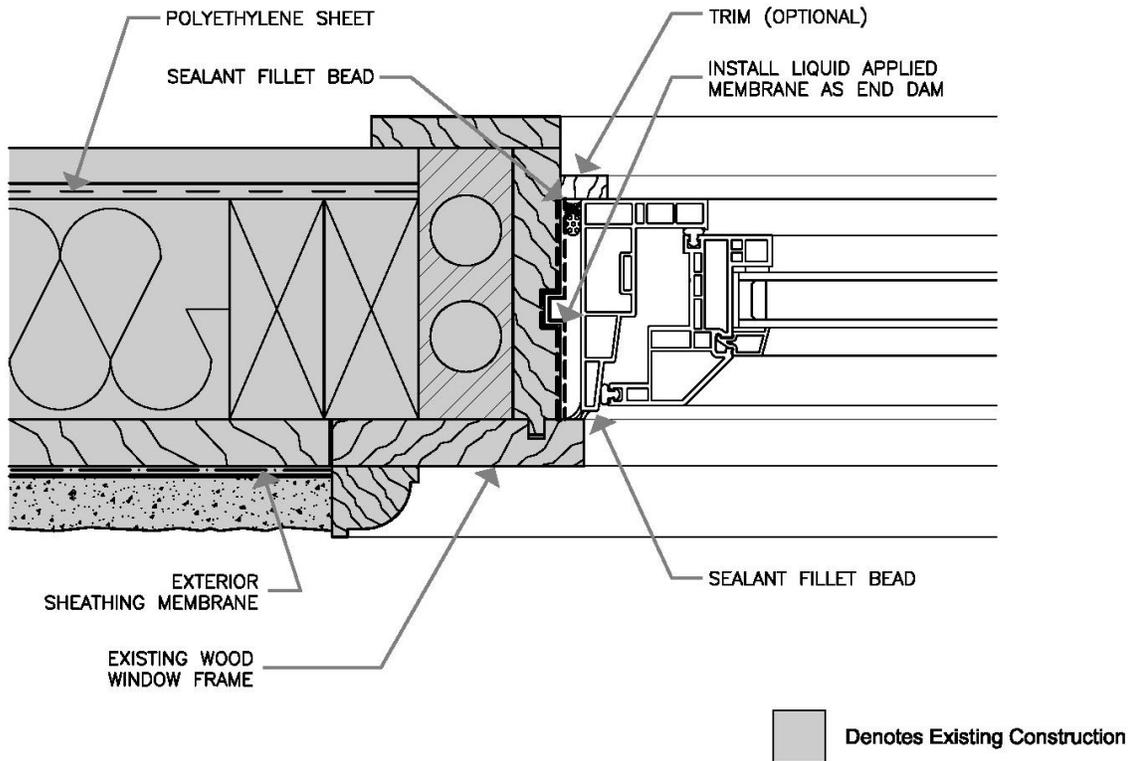
CRITICAL BARRIERS:

- First Plane of Protection (Water Shedding Surface)
- Second Plane of Protection (Water Resistive Barrier)
- Window Air Barrier
- - - Air Tight Elements in Existing Wall Assembly

VARIABLES:

- Box Frame Window
- Stucco Cladding
- Piggy-Back Installation
- Low Rain Exposure

HEAD | DWG 15.02



CRITICAL BARRIERS:

- First Plane of Protection (Water Shedding Surface)
- Second Plane of Protection (Water Resistive Barrier)
- Window Air Barrier
- - - Air Tight Elements in Existing Wall Assembly

VARIABLES:

- Box Frame Window
- Stucco Cladding
- Piggy-Back Installation
- Low Rain Exposure

JAMB | DWG 15.03