U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Window Retrofit: Bellingham, WA

Builder Profile

[bundle] design studio
Dan Welch
360-296-2657
dan@bundledesignstudio.com

Project Home

- Name: Cedar Siding Retrofit
- Location: Bellingham, WA
- Layout: 4 bdrm, 2.5 bath, 2 fl, 1,959 ft²
- Climate: IECC 4C, marine
- Year Built: 1977
- Retrofit Completed: Dec. 2021

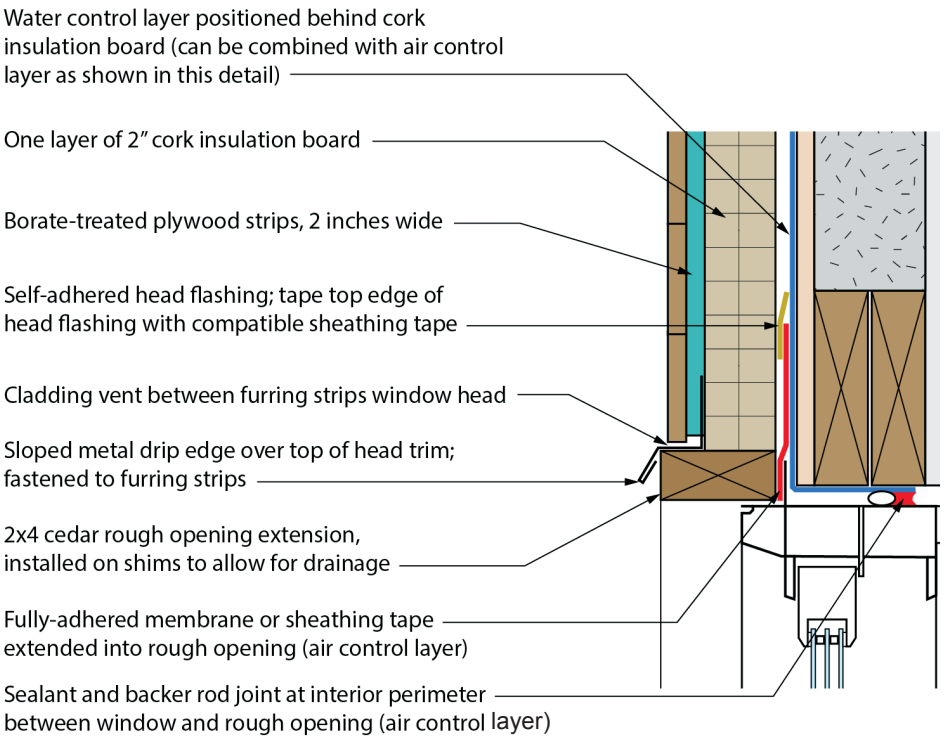
Bellingham – Windows

Pre-Retrofit (1977)	Post-Retrofit (2022)
Double-pane, clear glass, uninsulated aluminum-frame windows	New triple-pane, aluminum-clad wood-framed insulated windows

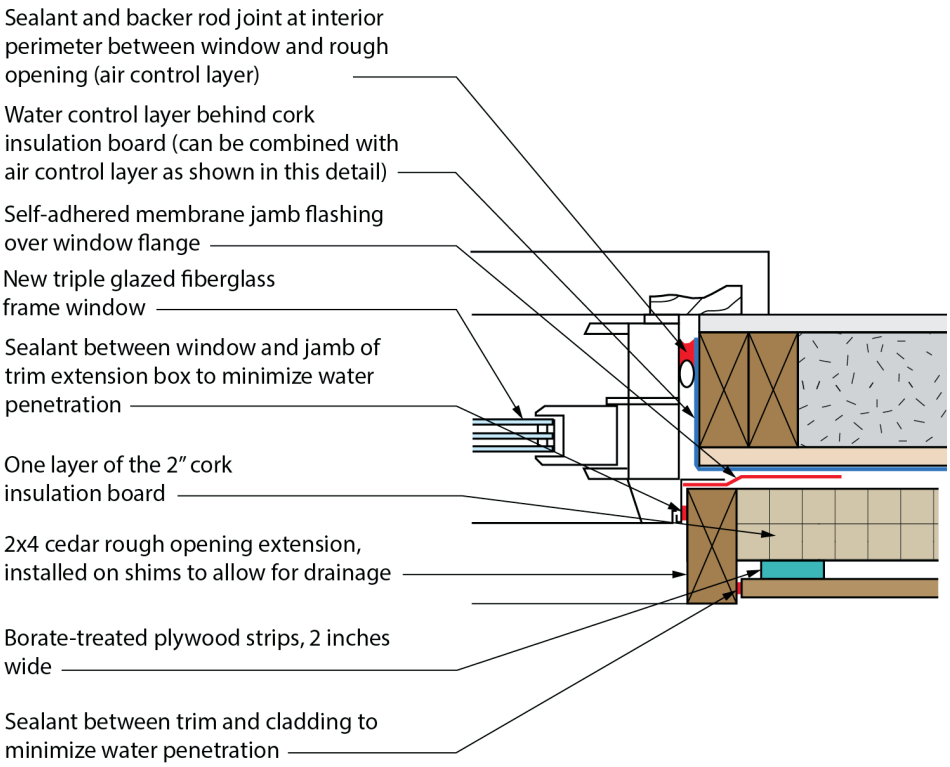
Bellingham Project	Windows
Upgrade	Replaced double- with triple-pane windows
Number of Windows Upgraded	13
Planned Material Cost	$8,954
Planned Labor Cost	$1,450
Total Planned Cost	$10,404
Added Upgrade Material Cost	$3,555
Added Upgrade Labor Cost	$0
Upgrade Incremental Cost	$3,555
Total Project Cost with Upgrades	$13,959

As part of a larger remodeling project on this 1970s split-level Bellingham, WA, home, in addition to replacing old cedar siding and adding 2 inches of rigid cork insulation to the exterior walls, 13 of the home's original double-pane, clear-glass, uninsulated, aluminum-frame windows were replaced with triple-pane, aluminum-clad wood-framed insulated windows. The contractor estimated that replacing the 13 windows with triple-pane rather than double-pane windows added about $3,500 to the double-pane price of $9,000 but substituting triple- for double-pane windows added nothing to the labor estimate of $1,150 for the window replacement. Together materials and labor for the new windows added $14,000 to the cost of the remodeling project. The builder noted he often uses pultruded fiberglass-framed windows for new and retrofit construction because he appreciates that fiberglass frames have a coefficient of thermal expansion similar to glass, reducing seasonal movement and joint stresses. However, on this project, he went with aluminum-clad wood-framed windows due to supply chain issues.

Head Detail

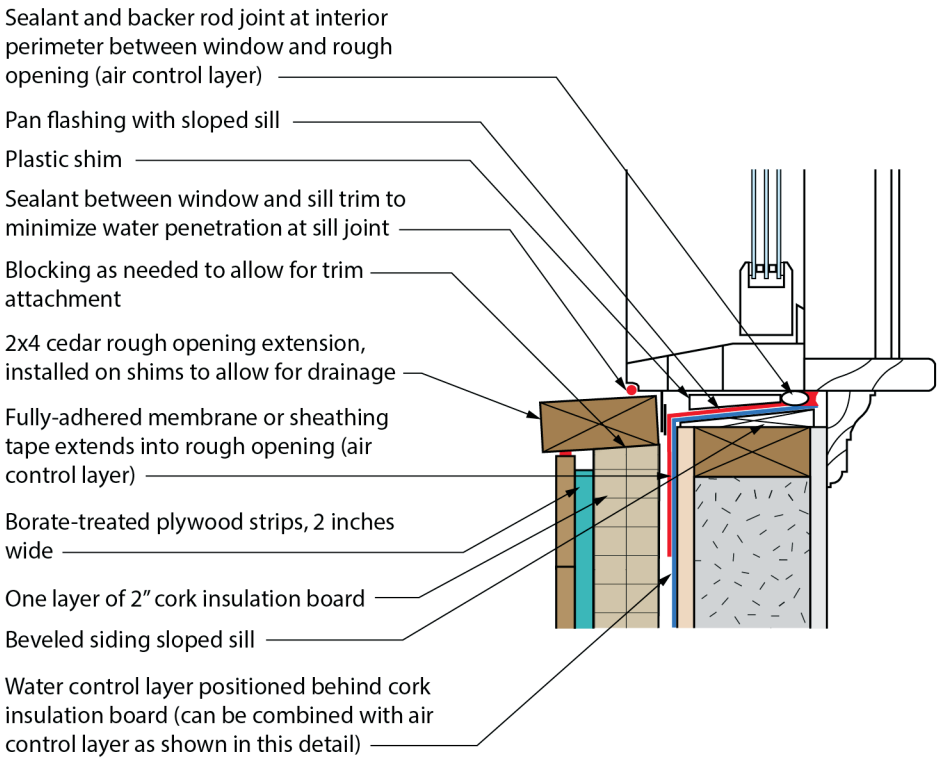


Jamb Detail



The installation of new windows provided the opportunity to to wrap the rough opening with the self-adhered water-resistant membrane, to install flexible pan flashing on the window sill, and to properly integrate head and jamb flashing with the window flanges.

Sill Detail



The new aluminum-clad-wood-framed windows have three panes of glass and low-emissivity coatings to resist heat transfer and to almost completely eliminate condensation risks.

For the head and sill details, the view is from the side and the interior of the home is to the right of the wall. For the jamb detail, the view is from the top and the interior of the home is above the wall.

U.S. DEPARTMENT OF ENERGY
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

For more information, visit:
Building America Solution Center
basc.pnnl.gov.

PNNL-SA-173314 · December 2022