

Fort Collins Building Science + Beer · July 29, 2026

P7 — Bulk Water Control

WRBs, cladding, roofing

12 minutes, then the part that matters: 40 minutes of your experience. Three questions at the end.

Bulk water is the fastest, most severe envelope killer.

Rot, mold and structural damage in seasons — not decades.

Every other enclosure load gives you years of warning. This one does not.

BEAT 1 — AND IT IS AN AFFORDABILITY PROBLEM

~50%

of a Front Range homeowner's
insurance premium is hail
(26–54% by county)

#2

Colorado's national rank
for hail claims

\$2.3B

May 2017 Front Range storm —
still CO's costliest insured
catastrophe

Much bulk water comes through rain entering via faulty or failing details, but hail is one of bulk water's delivery vehicle, as hail creates openings for bulk water.

Most consequential failure mechanisms in Fort Collins' climate



BEAT 2 — THE CHAIN (THE PF SPINE)



Every link is a place where design and execution either manage the risk or pass it downstream to somebody else.

BEAT 3 — HOW WATER ACTUALLY GETS IN

Gravity

runs downhill — until
something interrupts it

Capillarity

wicks through gaps and
porous materials

Wind / pressure

pushed through any hole
with Δp across it

Kinetic energy

driven rain arrives with
momentum

None of the four is stopped by caulk (long term).

Overlap, drainage and pressure management stop water. Sealant is a maintenance item, not a mechanism.

BEAT 3 — SO THE STRATEGY FOLLOWS THE MECHANISMS

SHED

most of it

roof geometry,
overhangs, cladding

>

DRAIN

what gets past

WRB + flashings, lapped
shingle-style, path to daylight

>

DRY

what remains

ventilation gap,
vapor-open direction

"Waterproof everything" is the amateur strategy.

"Manage the pathways and the exits" is the professional one.

A semi-arid climate gives us enormous drying forgiveness. How many local assemblies quietly survive on it?

- 1 Hail-driven re-roof and re-side cycles put the water-control layers back in play every few years — storm-repair speed becomes the de facto detailing standard.
- 2 Better assemblies reduce drying capacity on purpose — exterior insulation, tighter enclosures, reservoir claddings like stucco and stone.
- 3 Our rain arrives as short, violent, wind-driven monsoon events that find every unflashed transition.

The dry climate is why we get away with it. It is not a reason it works.

The roof-to-wall dump zone

Concentrated runoff lands on the wall. No kick-out. Chronic wetting behind the cladding, invisible until the sheathing is gone.

VERIFICATION STEP

Kick-out or diverter at EVERY roof-to-wall termination, verified before cladding goes on.



Photos: EPA ENERGY STAR Water Management System Builder Checklist Guide (US Gov, public domain), via DOE Building America Solution Center

The "looks sealed" window

Lots of sealant, no drainage path. Water that does get in has nowhere to go except the framing it is sitting on.

VERIFICATION STEP

Water-test the sill pan before the window is set. Confirm a weep path to daylight.



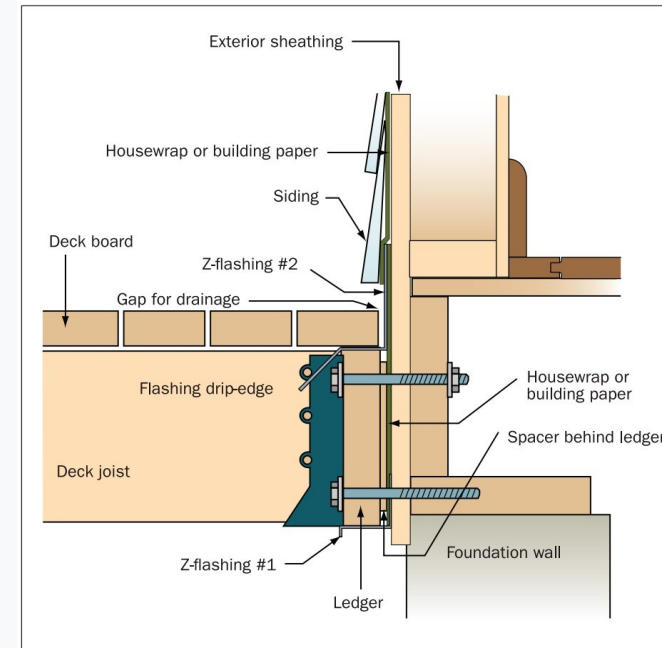
Photos: EPA ENERGY STAR Water Management System Builder Checklist Guide (US Gov, public domain), via DOE Building America Solution Center

Deck ledger / penetration confusion

Several trades touch one interface, so flashing continuity quietly becomes somebody else's problem.

VERIFICATION STEP

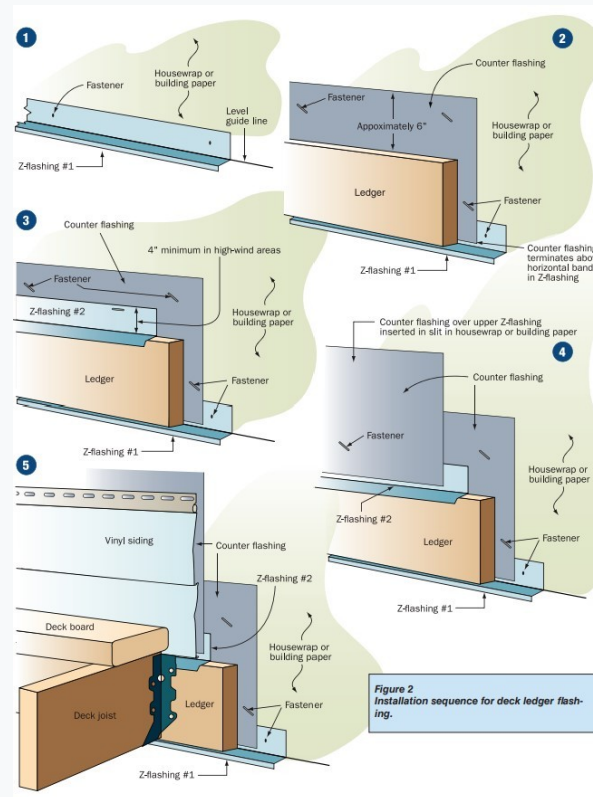
Flashing ownership assigned BY NAME. Lap continuity inspected before ledger bolts.



Z-flashing #1 behind the ledger, #2 over it, a drainage gap, and a spacer so the ledger is not a dam.

FEMA P-499 Home Builder's Guide to Coastal Construction (US Gov, public domain), via DOE BASC

Deck ledger flashing is a five-step lap, not a bead of caulk.



All three are sequencing and handoff failures — not product failures.

And we scored ourselves on this

2.8

out of 5 — tracing a failure back to its mechanism

Nobody scored us as a 5

0%

40% scored 3 — the rest jump to "bad product" or "bad trade"

YOU ALSO TOLD US WHERE YOU'D CATCH IT

Which inspection checkpoint would catch the highest-consequence failure chain?

“Framing inspection”

Also named:

Blower door before drywall

Waterproofing / vapor barriers

Window r.o. inspection

Flashing

Sill plate seal

Air sealing

Design first

But: is the WRB / flashing stage ever actually visible to an inspector before cover-up?

What's the most common bulk water failure you've seen in Northern Colorado — and could it have been caught during construction?

IF IT NEEDS A NUDGE

- Where did the chain break: design, product, sequencing, or trade handoff?
- Who found it, and how long after cover-up?
- What single verification step would have caught it — and does anyone here actually perform it?
- Code officials: what do you actually get to see at inspection time?

At which details does product choice matter less than sequencing — and where can the wrong product defeat a good sequence?

IF IT NEEDS A NUDGE

- Sequencing side: kick-outs, housewrap laps, window integration order, ledger flashing, penetrations made after the WRB pass.
- Product side: tape on dusty or cold OSB, vapor-closed WRB behind stucco or stone, sealant-dependent “flashing”, flat wrap behind reservoir cladding.
- The general rule: products fail at their edges and laps — which is to say, in sequencing. Where does the room disagree?

Assume water gets behind the cladding. Where does it drain to daylight, how will the assembly dry, and what must be verified before cover-up?

IF IT NEEDS A NUDGE

- Pick one wall you build regularly and trace the drop of water out loud.
- Is there an actual gap, or just “drainable” wrap — and is that enough?
- Weeps: where, and who confirms they're open at final?
- Would a pre-cladding hold-point inspection be worth it in Fort Collins?

GO DEEPER — FROM OUR OWN RESOURCES LIBRARY

Understanding Drainage Planes

BSC · BSD-105

Reservoir Claddings

BSC · Info-305

Capillarity — Small Sacrifices

BSC · BSI-011

Kickout Flashing: Required by Code, Yet Often Overlooked

JLC

All About Flashing · All About Rainscreens

Green Building Advisor

Drainage Plane / Water-Resistive Barrier

BSC · Info-301

Drainage, Holes and Moderation

BSC · BSI-004

Bulk Water Control Methods for Foundations

DOE Building America · BA-1015

How to Flash a Window Sill

Fine Homebuilding

Pan Flashing; Windows and Doors are Fully Flashed

DOE BASC (PNNL)

“P7's failure pattern was sequencing and handoffs — trades passing water-control responsibility downstream.

A factory internalizes those handoffs under one roof with a QC checklist... and then ships the wall down I-25 at 65 mph and sets it with a crane.”

So where did the water-control risk go?