Topping it off

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- Watch your footing
- Avoid being on wet roof
- # of people allowed on each side at once
- Don’t leave tools on roof
  - HUGS Safety

Notes
2A. **Blue Board/Housewrap**

The exterior layer of wall insulation/The moisture barrier of the wall

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**Quiz Question**

R-value measures how well a material resists the transfer of heat.

- The 3½” of insulation we use inside the walls provides an R-value of 13.
- The ½” of Blue Board gives an additional R-value of 2.5.

Which material has a higher R-value per square inch?

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**Tools Needed**

- Hammer
- Utility Knife
- 8-FT Ladder (x2)

**Hardware Needed**

- 1 3/4” Caps (or 2”)

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**Utility Knife Safety**

- Cut away from your body, not towards it.
- Always retract the blade before storing.
Blue Board

Insulation that is applied outside the OSB sheets

1. Offset blue board from the OSB seams by starting pieces 2’ away from vertical seams. Nail blue board into OSB sheets using 1 ¾” cap nails (Image 1).

2. Using a utility knife, cut out the blue board to match where the OSB has been cut for the windows.
Housewrap

Moisture barrier applied over the blue board

When installing the house wrap for the front or back of the house, a 30’ piece should be adequate to overlap each corner. For the sides of the house, cut a 30’ piece, and measure the remaining length to be covered.

1. Position top edge of house wrap to cover top plates and bottom edge to overlap the foundation by at least 1”.

2. Nail 1 3/4” caps every 16” in all directions (nail every other diamond since the diamond marks are spaced 8” apart).

3. Overlap all vertical seams at least 6”. Avoid creating an overlap in which nails are within 2” of the seam.

*Alternate method: Keep the housewrap on the roll, and nail as you go.

Note: Make sure the top piece goes over the bottom piece. This prevents water flow from getting underneath the house wrap.

4. Overlap all horizontal seams at least 2”. Again, avoid creating seams too close to nails.
Housewrap: Gables

**HOUSE WRAPPING A GABLE**

1. Cut a piece 18’ long.
2. Cut from corner to corner.

These 2 pieces will cover one gable.

Image 1. Gable Housewrap Detail
Housewrap: Windows

An “upside-down martini glass” - Kitty Dillewyn

The red dashed lines in Image 1 are your cutting guidelines for cutting over a window.

After making the cut, staple the bottom piece and the two side pieces to the inside of the window frame.

But fold the top piece up, and tack it in place. This top piece will end up folding over the actual window.

Housewrap: Doors

A capital “T”

The red dashed lines in Image 2 are your cutting guidelines for cutting over a door.

After making the cut, staple the two side pieces to the inside of the door frame.
Housewrap: Taping Seams

A crucial detail in sealing the house

In order to prevent air leakage and moisture intrusion, the housewrap needs to be taped with Dow WEATHERMATE™ tape at all seams.

1. Make sure the housewrap is clean and dry. If not, the tape will not adhere properly, and moisture will seep in over time, which will lead to rotting wood.

2. Make sure no nails or other objects are in the area that the tape will be placed - these too will prevent a complete seal of the tape.

3. Finally, smooth out any wrinkles in the housewrap before applying tape over it.

4. Tape all vertical seams. Use a roller to smooth it out - do not rely on your hands to do this!

5. DO NOT tape horizontal seams. The lap is sufficient for keeping moisture out. Images 1 & 2 portray common issues with taping horizontal seams.

1 Photos courtesy of GreenBuildingAdvisor.com
3D Roof Layout

1. Align with middle ridge of previous row.

2. Ensure consistent roof overhang.
   - 2 nails per cap.

3. Start and end ridge vent 2' from the edges.

Roof Peak

Step 1. Beauty Course
Step 2. Cap Shingles
   - (use 1 3/4" roofing nails)
Step 3A. Ridge Vent
   - (use 3" roofing nails attached to vent)
Step 3B. Cap over Vent
   - Work from the ends to the center.
   - Cut and tar last cap shingle.

CUTTING & BENDING THE DRIP EDGE FOR THE PEAK

Step 1. Cut out this area.
Step 2. Bend angled cut over straight cut.
Top-Down Roof Layout

Step 1: Drip Edge
- Place the drip edge at the eave (bottom) before placing the tar paper.

Step 2: Tar Paper
- Step 2A: Place a nail every ~10 inches on the bottom section of each row as it is being unrolled.
- Step 2B: Finish by nailing every 12 inches in the bottom section, every 24 inches in the middle, and 2 extra nails at the beginning and end of each row and at overlaps.

Step 3: Chalk Lines
- Chalk lines every 22.5 inches after 2nd line (every 4th row of shingles).

Step 4: Starter Strip
- Place the starter strip at the 6-inch chalk line.

Step 5: Shingles
- Shingles in the same row should touch...
- but not overlap!
- 4 nails per full size shingle
- 18 inches from roof edge
- Chalk line 6 inches from roof edge
- 22.5 inches
- 22.5 inches

Overlap the previous row where the tabs begin (you will feel a ridge there).

1/2 inch Roof Overhang (extend shingles 1 inch past drip edge)

No nails at seams!

Do NOT place nails at overlap seams!
2B. Drip Edge

Directs water away from the sub-fascia and into gutters

**Tools Needed**

- Hammer
- Extension ladder
- Siding shears
- Pencil
- Speed square

**Hardware Needed**

- Roofing nails

**Notes:**
Drip Edge: Eaves

Install before roofing paper is put down

Once the roof is sheathed, install drip edge on the roof eaves (the bottom overhangs). Do not install on the rakes (the side overhangs) until roofing paper is laid (Image 1).

1. Start in the corner at the back of the house, and work from there to the front corner.

2. The first piece (and all other outside corners) will need to bend at the corner and extend slightly up the side of the roof. Use a speed square and shears to make a partial cut (Image 2).

3. Lay drip edge flat with the pitch of the roof, not flush against the sub-fascia (or it will buckle).

4. Bend at the cut, and overlap bottom piece with side piece (Image 3). Tack a nail into the short piece going up the side of the roof to hold it in place.

5. Place roofing nails where pieces overlap and every 24” in between.

Drip Edge: When to Install

Before Tar Paper

ROOF PEAK

After Tar Paper

Before Tar Paper

Image 1. Drip Edge Timeline

Image 2. Outside Corner Cuts

Image 3. Outside Corner Overlap
Drip Edge: Inside Corners

1. Cut out a piece at the top, and make a tab at the bottom.

2. Nail in this first piece.

3. Cut the second piece, only without the tab.

4. Fit the second piece over the first one, and nail.

Install before roofing paper is put down
**Drip Edge: Rakes**

Install after roofing paper is put down

**After the underlayment has been nailed:**

Install the drip edge on the rakes (the side overhangs) of the roof, this time over the tar paper. When overlapping, higher pieces fit over lower pieces in order to maintain water flow above the surface.

At the peak of the roof, make two partial cuts to bend a piece down and continue along the other side (Image 1).

After the cuts are made, bend the material so that the side with the angled cut fits over the straight cut.
2C. **Roofing Paper**

The vapor barrier of the roof

**Tools Needed**

- Hammer
- Extension Ladder
- Utility Knife
- Felt Paper
- Tar Paper

**Hardware Needed**

- 1" Caps (or 1 1/4"

**Safety Note**

Step on the paper only where nails have been fastened!
Roofing Paper

After the bottom drip edge has been installed but before the side drip edge is in place, install roofing paper:

1. Start at a bottom corner, and work to the end. Lay down the lowest edge of the paper flush with the outside edge of the eave (bottom) drip edge.

   *Note: If the paper on the roll is torn, cut the torn part off.

2. Follow the nailing pattern as seen on p. __. Before nailing every 10’, pull tight to straighten any creases.

   *Note: Do not nail above the top line on the paper - the next row will overlap here, and nails will be placed through both layers of paper.

3. At the end of a row, cut the paper flush with the edge of the roof sheathing, **not the edge of the drip edge** (or it will not fit under the drip edge). (Image 1)

4. Once both sides are complete, cap the roof with one row of paper, overlapping both sides of the roof.

   *If using felt paper instead of tar paper, there will be 1 extra nailing row in the middle section.*

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Image 1. Start and end point for roofing paper
Roofing Paper Do’s & Don’ts

Pay close attention, sonny.

<table>
<thead>
<tr>
<th>DON’T</th>
<th>DO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Don't stand on unfastened roof paper - you may easily slip.</td>
<td>1. Do stand on the nails that have been placed in the paper (for the first row, stand above the paper as you nail.)</td>
</tr>
<tr>
<td>2. Don’t remove a bent nail without replacing a nail in that same hole.</td>
<td>2. Do make sure a nail is in every hole that has been made in the roof.</td>
</tr>
<tr>
<td>3. Don’t nail above the top line on a section of roof paper.</td>
<td>3. Do place nails below the bottom line on each row, which should fasten two layers of paper at once.</td>
</tr>
<tr>
<td>4. If you notice a tear in the paper after it has already been nailed, don’t remove it.</td>
<td>4. Do nail another section of paper on top of the torn part.</td>
</tr>
<tr>
<td>5. Don’t place end laps within 6 feet of one another on adjoining rows.</td>
<td>5. Do plan ahead so that end laps are at least 6 feet apart on adjoining rows.</td>
</tr>
</tbody>
</table>
2D. **Roof Shingles**

The final layer of protection for the roof

**Tools Needed**
- Hammer
- Extension Ladder
- Shingle Lift
- Scrap OSB
- Speed Square
- Utility Knife
- Chalk Line

**Hardware Needed**
- Roofing Nails
- Ice & Water Shield

**Notes**
Shingles Cut Sheet

Cutting the first and last courses of the roof

To cut the starter strip (the 1st row of shingles), grab a bundle of architectural shingles and a scrap OSB.

Lay a shingle on this board with the back (the side with the tar bead) facing up, and cut along the middle ridge.

The white piece is called a beauty course. These are not needed until after the ridge vent is installed, so stack these pieces, alternating face up and face down (make sure that when the backs of two pieces touch, the tar beads are on opposite sides).

Store in the shade (inside the house or shed) until later.

The other piece from this cut is the starter strip.

Grab another bundle to cut sets of step shingles. Each set consists of: a 6” piece and its leftover, an 11” piece and its leftover, and a full piece (Image 2).

Stack a dozen sets of these 5 pieces.

Grab 3 bundles of 3-tab shingles to cut the cap shingles (Image 3).
How to Nail a Shingle

General principles for shingle nailing patterns:

♦ Since each row of shingles overlaps the previous one, **roofing nails** should be placed in between the top two blue lines so that the nails go through both rows (Image 1).

♦ Every full-size shingle needs 4 nails. Start and end ~1” from each end, and equally space the other two nails in between (Image 2).

♦ Avoid placing a nail 6” in from the end where a seam will exist (Image 3). A sure way to prevent this is by placing the 2nd nail a hammer’s length in from the end.

♦ Try to use the factory edge (the edge that does not get cut) as the visible side that hangs over the roof.

The more movement there is on the roof, the more wear and tear on the grit of the shingles. When you do have to move, **pick up your feet - do not drag them!**

*The underlying principle of roofing is managing water—direct the flow of it off the roof, and avoid placing nails (holes) at areas of high water runoff.*
Roofing the Valley

1. Lay down the ice & water shield, extending it just above the peak. Carefully place without creases by only pulling off half of the plastic at a time (Image 1).

2. Lay down starter strip, overlapping intersecting pieces at the bottom of the valley (Image 2).

*Note: Follow the typical rules for nailing and shingle alignment (see p. 58).

3. Starting on the porch side of the valley, lay the first shingle with the top corner about 6” past the valley crease. Push shingles flush into the crease—no bubbles. Keep nails at least 6” away from the valley.

4. Continue diagonally up the valley, maintaining a 6” stagger between rows (Image 4). For the last piece, use the beauty course.
5. Measure 2” from the crease (on the main roof side) at the top and bottom of the valley. Snap a chalk line along this 2” offset (Image 1).

6. Place shingles so that their bottom edge runs along this line. Continue until you extend just past the peak of the valley (Image 1).

7. Install cap shingles on the peak of the porch (see p. 47 for this process).

8. Shingle the opposite side of the valley (main roof side), aligning a corner of each piece with the 2” offset so that these shingles do not extend past this line (this alignment should result in a 6” stagger between these rows) (Image 2). The last piece will lay over the peak.
Teamwork & Overhangs

Working well together; making a neat roof edge

♦ Have the bundles of shingles sent up, along with 6 sets of step shingles. Organize the bundles as seen in Image 1.

♦ Ideally, groups of 3 should work on different areas of the roof. Two people can nail a single shingle at a time while the third supplies the shingles to them.

♦ Instead of moving horizontally across the roof and staying on the same row, work diagonally, doing 4 rows at a time (starting and ending at chalk lines).

*Note: When supplying shingles to the other members of your group, always pull the shingles apart after taking them out of the bag - each shingle comes stuck to another one.

♦ Cut the last shingle of each row to leave a ½“ overhang.

♦ Grit side down, align the shingle flush with a ½” piece of OSB, and mark for the cut (Image 2).

♦ Place grit side down on scrap OSB, and cut with a utility knife. This way, the factory edge is what is seen from the ground (Image 3).

On hot days, the morning should be the only time that shingles are installed.

Image 1. Laying Out the Bundles of Shingles

Image 2. Marking Where to Cut

Image 3. Cut with a Square
Step Flashing

Maintaining a moisture barrier at roof-wall joints

Where the roof meets a wall, use step flashing.

1. Lay down starter strip.

2. If house wrap is attached, pull up and tack to the wall so that the flashing can be installed. The house wrap will lay on top of the flashing.

3. Fasten kick-out flashing to the roof with a roofing nail 1” from the top of the flashing.

4. Place 1st shingle of 1st course (full-size).

5. Align step flashing so that it covers the nail, and nail 1” from the top of the flashing.

**DO NOT NAIL FLASHING TO THE WALL.**

Water is a home’s greatest enemy. Take care to get this detail right!

6. Continue alternating shingles and step flashing up to the 5th course. Each overlapping piece should cover the underlying nail.

7. Before starting the 6th course, place a full-size shingle on each course.

8. Continue 5 courses at a time, alternating shingles and step flashing, to the peak.
Installing moisture-repellent windows

### Tools Needed
- **Hammer**
- **8-FT Ladder**
- **Torpedo Level**
- **Utility Knife**
- **Caulk Gun**
- **Flat Bar/Wonder Bar/Nail Puller**

### Hardware Needed
- **3" Roofing Nails**
- **Shims**
- **Silicone Caulk**
- **Housewrap Tape**
- **Window Tape**
- **Sill Pans**

### Notes:
- Take caution when moving windows.
- Remove screens prior to install.
1. Cut back OSB and/or blue board if either is protruding into the window opening.

2. Place the left and right sill pans on the window sill (Image 1).

3. Push tight on the sill pans, and apply black window tape to the left and right edges of the pan (more specific?) (Image 2).

4. Tape the seam, starting just outside the ridge of the pan down to below the bottom of the pan (Image 3).

5. Make sure the window fits in the rough opening before proceeding.
6. Take the window back out so that you are looking at the inside surface. Caulk the top and side nail flanges, but not the bottom (Image 1).

Note: Apply caulk just inside the nail holes - if the caulk is too close to the window, it will end up in the gap.

7. Set the window in place. From the inside, adjust so that the gaps on all four sides are even (Image 2).

8. Use a pry bar to lift up the window, and shim each side to make the gap on top and bottom even. Set the torpedo level on the horizontal ledge. Adjust/add shims to make level (Image 3).
9. Once level, place roofing nails through every other hole in the nail flanges outside.

10. Tape the sides using the window tape, covering all the nails from top to bottom but leaving \( \sim \frac{1}{4} \)" gap inside the channel. Extend the tape slightly above the top flange and slightly below the bottom flange (Image 1).

11. Tape across the top, covering the nails and leaving the \( \frac{1}{4} \)” gap, extending past both side pieces of tape (Image 1).

12. Let the housewrap flap that is above the window cover the window tape from the previous step, and apply the Dow WEATHERMATE™ housewrap tape across the 45° slits in each top corner (Image 1).
2F. **Exterior Doors**

The entry points into the conditioned space

**Tools Needed**
- 6-FT LEVEL
- CAULK GUN
- DRILL

**Hardware Needed**
- 3-IN. SCREWS
- SHIMS
- SILICONE CAULK

**Notes**
**Exterior Doors**

1. Make sure the housewrap is stapled on the inside.

2. Level the hinge side of the door opening, adding shims if necessary.

3. Check the distance of the rough opening versus the door. If the difference is more than ½”, add shims to the hinge side equal to half this difference.

4. Remove the temporary lock on the door, and do a dry fit.

**CRAWLSPACE-ONLY STEPS**

5. Apply window tape across both bottom corners (Image 1).

6. Apply metal flashing along bottom. Cut where it needs to bend, and use a hammer to bend it. Nail it to the studs, and tape the sides to the housewrap (Image 2).

7. Generously apply construction adhesive across the brick to cover the bottom of the door (Image 4).

*Note: On a crawlspace, apply the adhesive across the flashing (Image 3).*

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![Image 1. Tape bottom and up the sides](Image 1)

![Image 2. Metal flashing nailed and taped](Image 2)

![Image 3. Adhesive on flashing](Image 3)

![Image 4. Adhesive on brick](Image 4)

It will likely take the whole tube of adhesive to apply the right amount.
8. Put door in place, and push tight on hinge side.

9. Set at least one 3” screw in each hinge to connect it to the frame (Image 1).

10. Check for alignment of door knob hardware. 
    Note: Ideally, you will have a ¼” gap between the door and the jamb on all sides (Image 2).

11. Remove the weatherstripping so that you can shim and place three 3” screws on the opposite side of the door (Image 3).

If the fit is not right, you can adjust by:
- Loosening/tightening the 3” screws to push the frame
- Adding shims on the bottom on either side

12. Use a nail set to set trim nails on the outside of the frame; then, caulk over the holes.
Bird Boxes

Tools Needed

- Hammer
- 8-FT Ladder
- Miter (Chop) Saw
- Speed Square
- Tape Measure
- Chalk Line

Hardware Needed

- Wood Screws

The star bit screws work best here.
Bird Boxes

1. Measure from the inside of the sub-fascia to the blue board (if there is no blue board, measure to the OSB). This dimension is X.

2. Measure from the inside of the angled sub-fascia to the OSB. This dimension is Y.

3. Measure the width of a 2x10. Cut to a length that is double that width.
   - (If it’s 9 ¼” wide, cut a piece 18 ½” long.)

4. Chalk a line from corner to corner. Cut this line. Set one of these pieces aside (for the next bird box).

5. Trim the length of this triangle-shaped piece to X”.

6. Cut another 2x10 to Y”.

7. Assemble the two pieces from Step 5 and Step 6 together using 3” wood screws.

8. Start screws in the bird box before climbing on the ladder to install it.

9. Set your screws to install.

Note: Don’t forget to install 2x6 blocking for the two flood lights as you install the bird boxes.