ROOF FLASHING GUIDE

POWERHOUSE™ DOW SOLAR

ROOF FLASHING GUIDE

The **DOW POWERHOUSE™** Solar Shingle system is an aesthetically pleasing photovoltaic roofing product designed to integrate with standard roofing shingles. It silently generates power that feeds into a home's circuit breaker panel. The amount of power varies throughout the day and depends on cloud cover, temperature, and position of the sun. If the system generates more power than is being consumed by the home, the utility meter will run backward if it is capable of "net-metering."

This document details the steps involved in a proper flashing installation on the roof.

Table of Contents

SYMBOLS

Introduction

This section describes the symbols used throughout the product manual. This unit of the product manual does not necessarily use all of the symbols listed below.

Symbol	Definition
	**Danger!** Risk of electric shock
	**Danger!** Risk of injury
	**Caution!** Risk of damage
	**Note!** Useful information

SAFETY

Introduction

This section highlights special hazards that may be of concern during roofing installation.

Concern	Explanation
Do not attempt to repair or modify an installed system. 	600V may be present during daylight hours even with no connection to the utility. Connection or disconnection under load may cause electrical arcing. Electric shock may cause severe injury or death.
Never insert material into the connectors. 	Metal or other conductive materials may result in arcing and electrical shock. 
Do not use nail guns. 	Electrical components near the nail hole locations can be damaged if the nails are not properly positioned. This can lead to electric shock or arcing. 
Do not use or attempt to repair cracked or damaged shingles. 	The 20-year life of the electrical insulation may be compromised. Return all cracked or damaged shingles to Dow. Do not replace adhesive strip with field-applied adhesive.
Do not install in the rain or inclement weather. 	Glass surfaces are extremely slippery when wet. 

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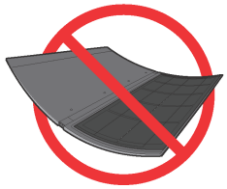
Safety, Continued

Safety, cont.

Do not concentrate sunlight on the solar shingles. 	Concentrating sunlight may cause electrical current to exceed the maximum rating.
Handle with care. 	The shingles are not designed to withstand abuse beyond what is expected during normal installation. 
Do not install components when wet or soiled. 	Water, ice, or dirt in the connectors may cause corrosion over time and early product failure.
Store at less than 120°F. 	Store in a covered, ventilated area; maximum temperature of 120°F. Do not store in sunlight.
Do not modify the shingles. 	**DOW POWERHOUSE™** Solar Shingles and integrated flashings must never be cut, trimmed, or modified from the original state in any way. Alterations void any warranty and could potentially expose the user to harmful electrical shock.

FLASHING DETAIL – WIND ZONES UP TO 110 MPH

Introduction

The following pictures progress through a small system installation with a straight (non-staggered) row, a row that steps out (up a valley), and a row that steps in (up a hip roof).

Flashing up to 110MPH

Figure 1. Ensure roof deck is clean and flat prior to shingle installation.

Figure 2. Install ice dam protection if required by local code.

Continued on next page

Flashing up to 110MPH

Figure 3. Install VersaShield®

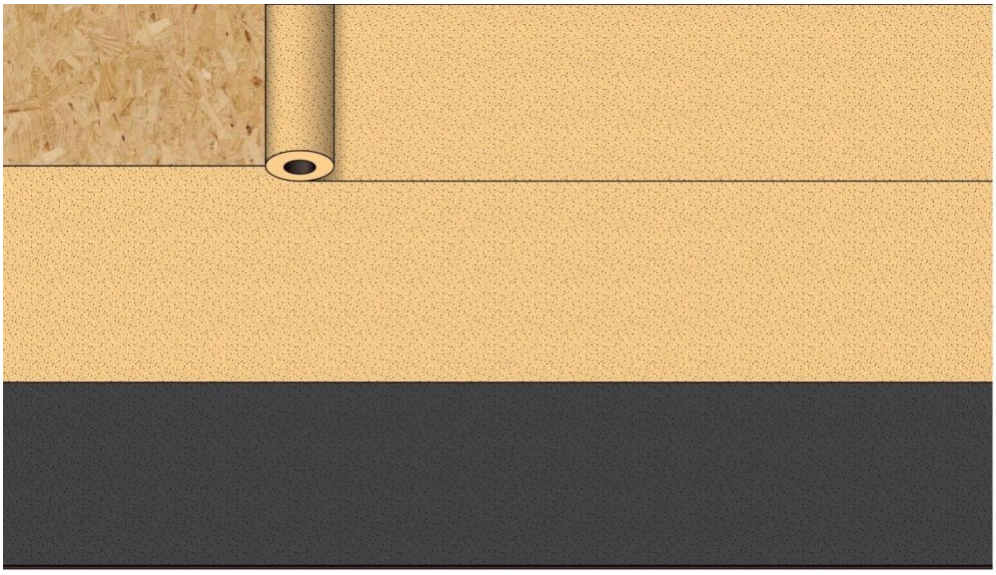
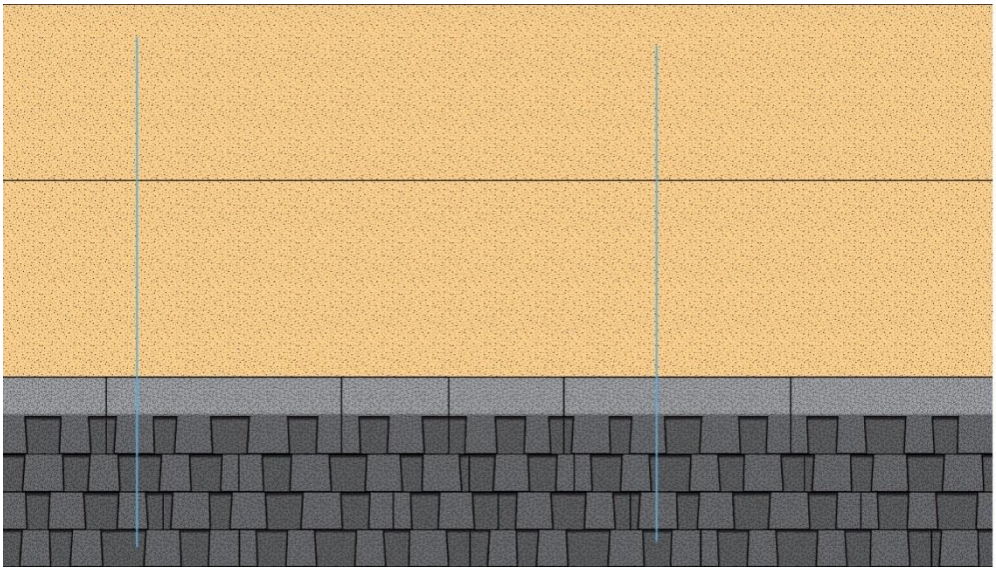


Figure 4. Install asphalt shingles up to array starting point.
The lines shown indicate the visible edges of the PV array.



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Flashing up to 110MPH

Figure 5. Install snow and ice barrier transition sheet at starting line.

The transition sheet should be at least 14" wide and extend 4-8" beyond the visible portion of the array. It is needed to ensure sufficient side lap where products of two different sizes come together.

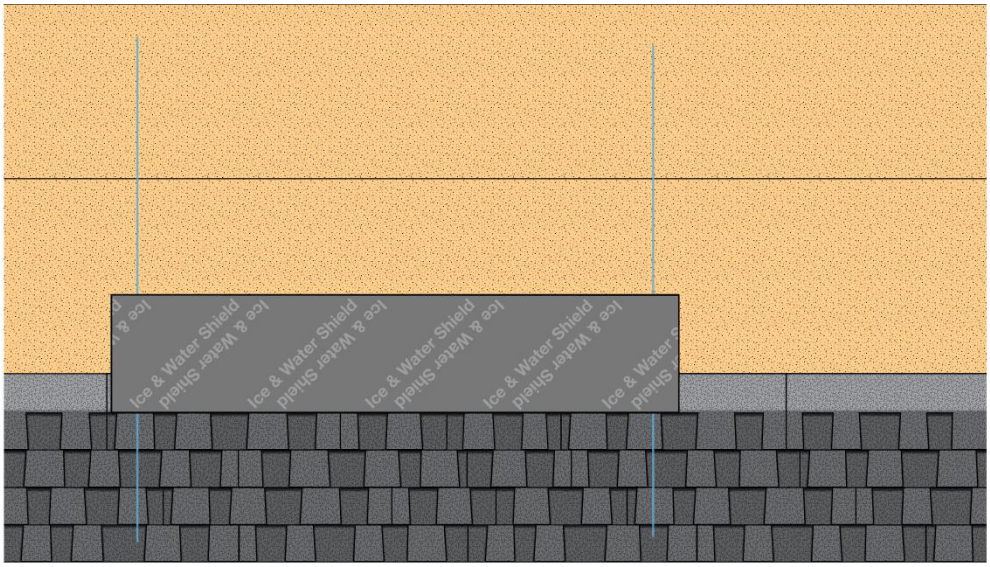
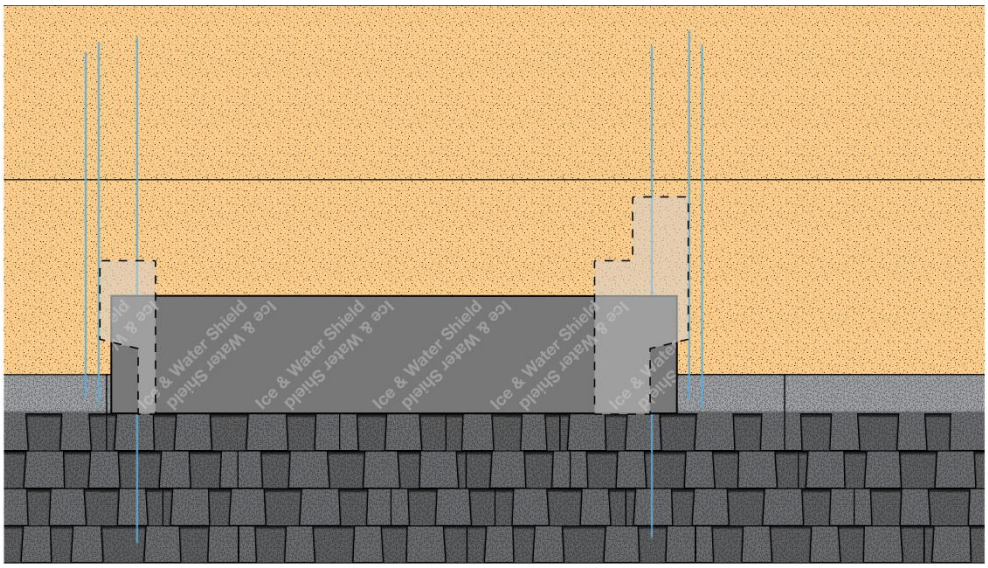


Figure 6. Location of underlayment cuts (optional).

The process shown is recommended, and it is designed to ensure that leaks from elsewhere in the roof do not migrate under the solar array. Cutting the underlayment is optional and up to the discretion of the installer.



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Flashing up to 110MPH

Figure 7. Trim VersaShield® to expose roof deck (optional).
Exposed width should be about 2 inches wide. This step is easier done after the integrated flashing pieces are installed, but shown here for clarity.

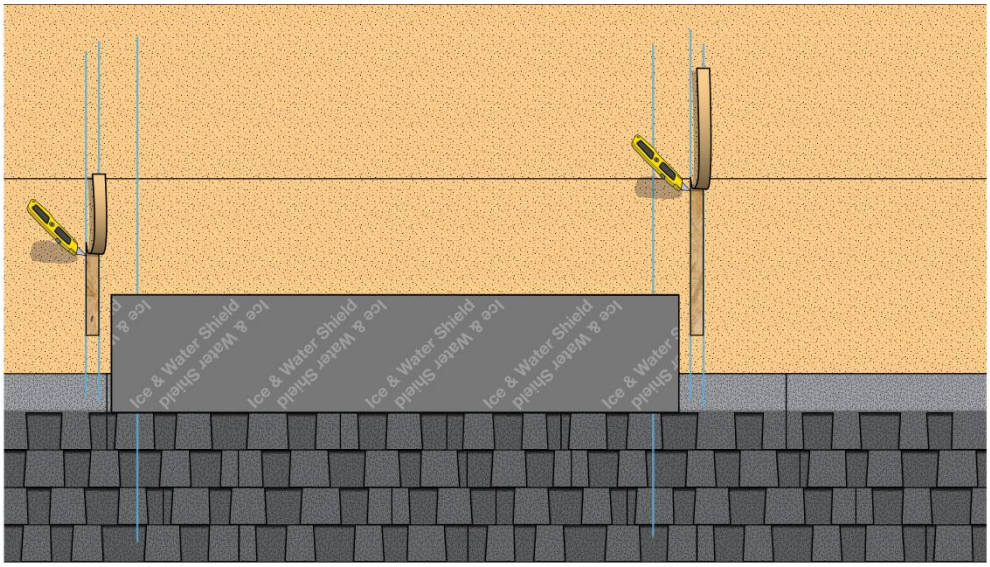
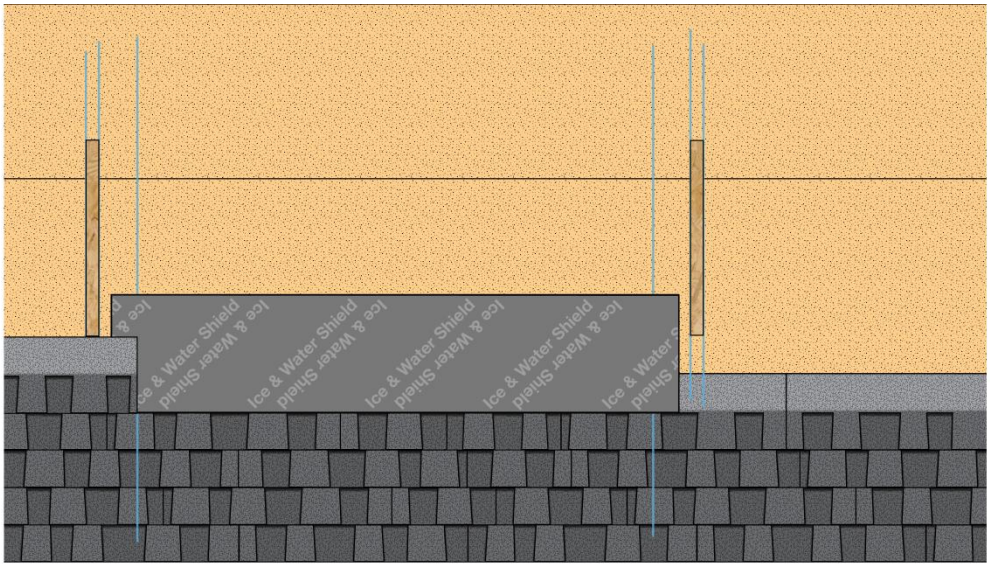


Figure 8. Step flash asphalt shingles.
The integrated flashing should rest on top of the upper tab of the asphalt shingle. This is demonstrated here as another row of asphalt shingles (on the left) being applied before the integrated flashing is installed.



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 9. Install integrated flashing.
Flashing tape is adhered to the asphalt tab, VersaShield, deck and integrated flashing. Integrated flashing lays on top of asphalt upper tab.

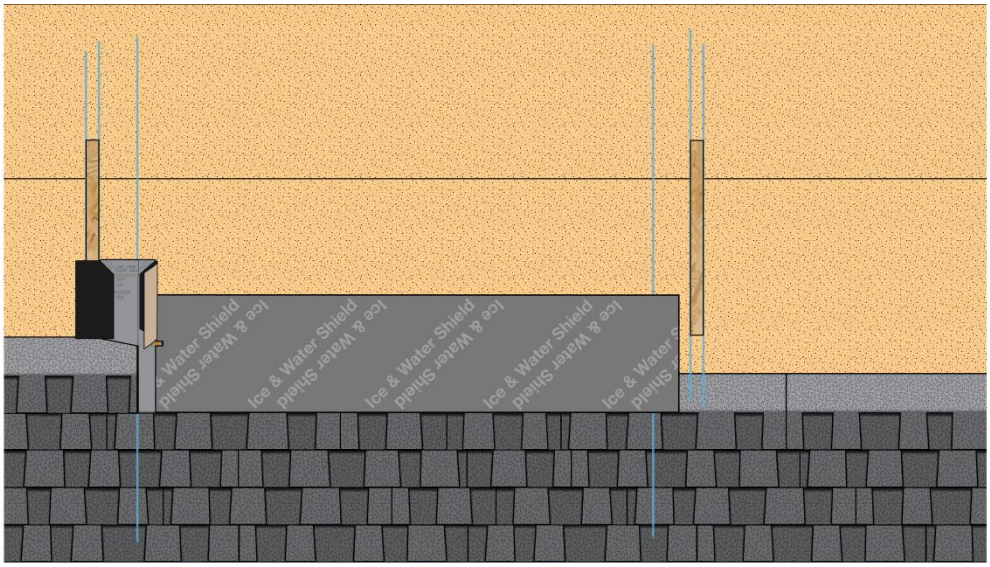
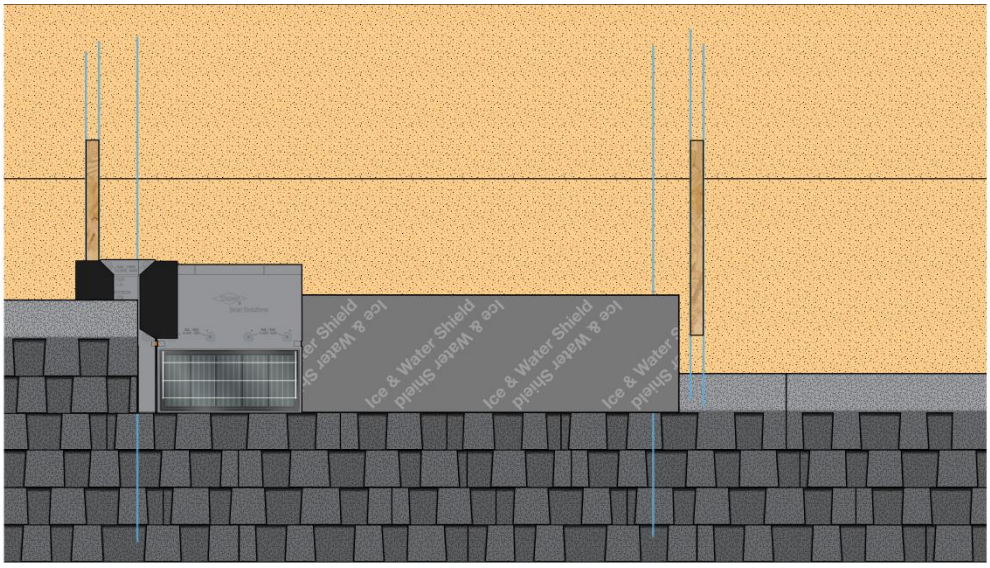


Figure 10. First solar shingle installed.
Flashing tape is adhered to first solar shingle. Next layer of asphalt shingles lays on top of integrated flashing.



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Flashing up to 110MPH

Figure 11.Remaining solar shingles installed in first row.
Additional row of asphalt shingles applied (on right).

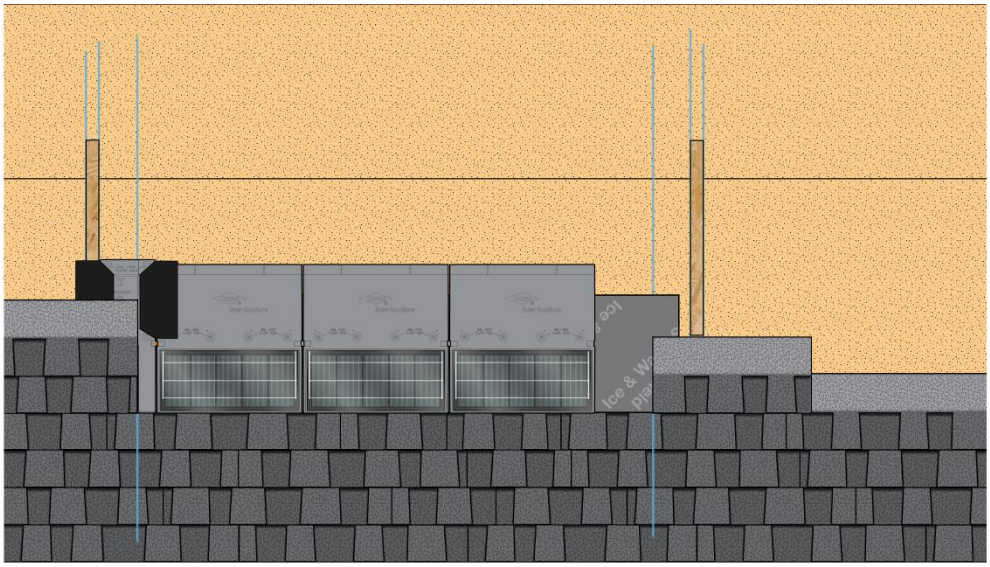
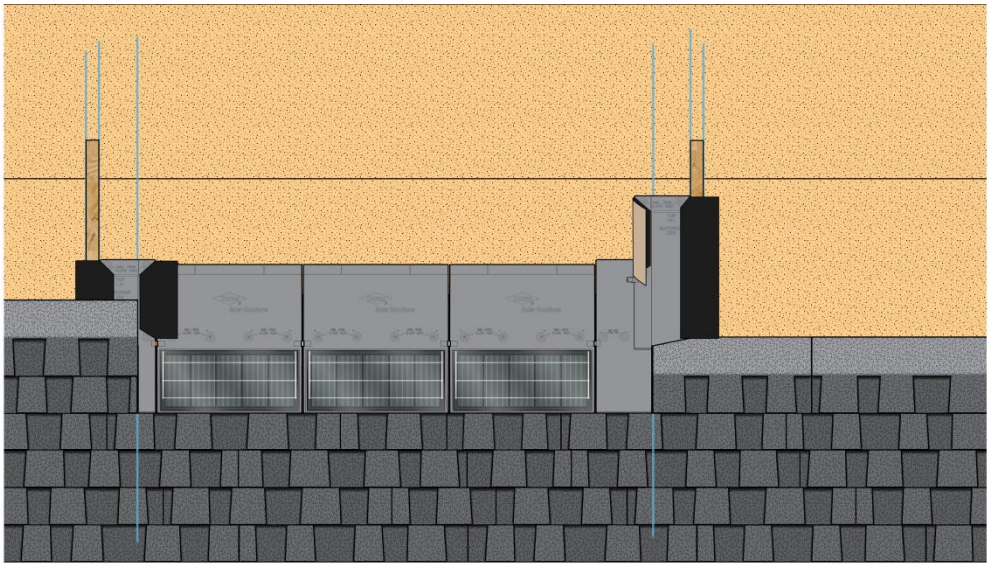


Figure 12. Row-to-row installed and flashing tape adhered to deck at end of first row of solar shingles.
Integrated flashing lays on top of asphalt upper tab.



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 13.Continue pattern up side.
Asphalt shingles lay on top of integrated flashing.

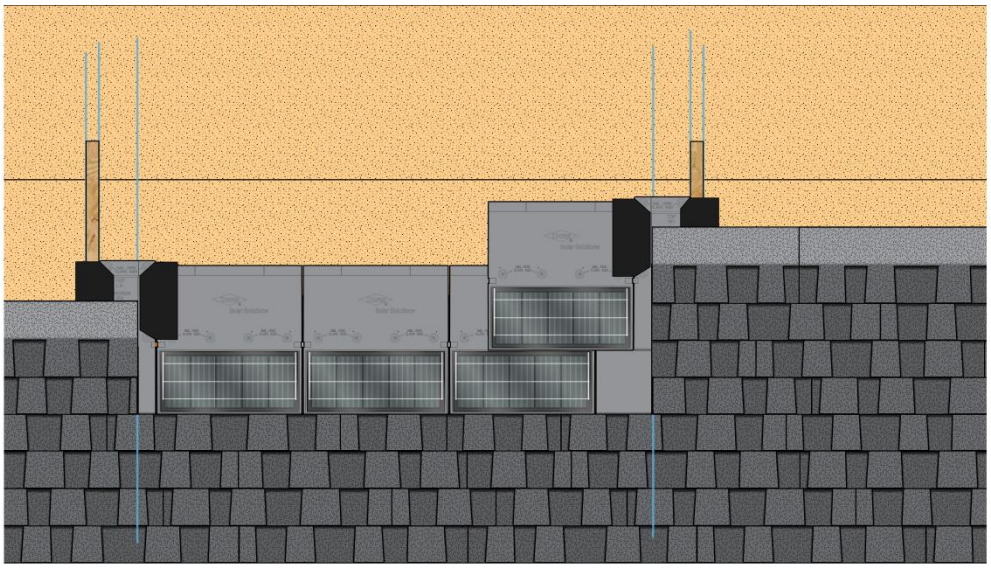
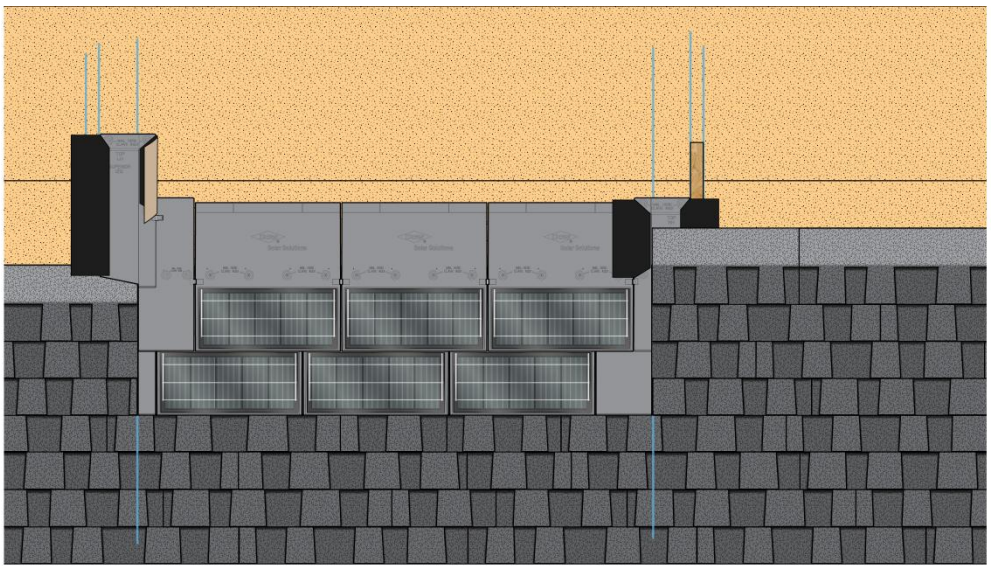


Figure 14. Row-to-row installed and flashing tape adhered to deck at end of second row.
Integrated flashing lays on top of asphalt upper tab.



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 15.Start third row.

Asphalt shingles lay on top of integrated flashing.

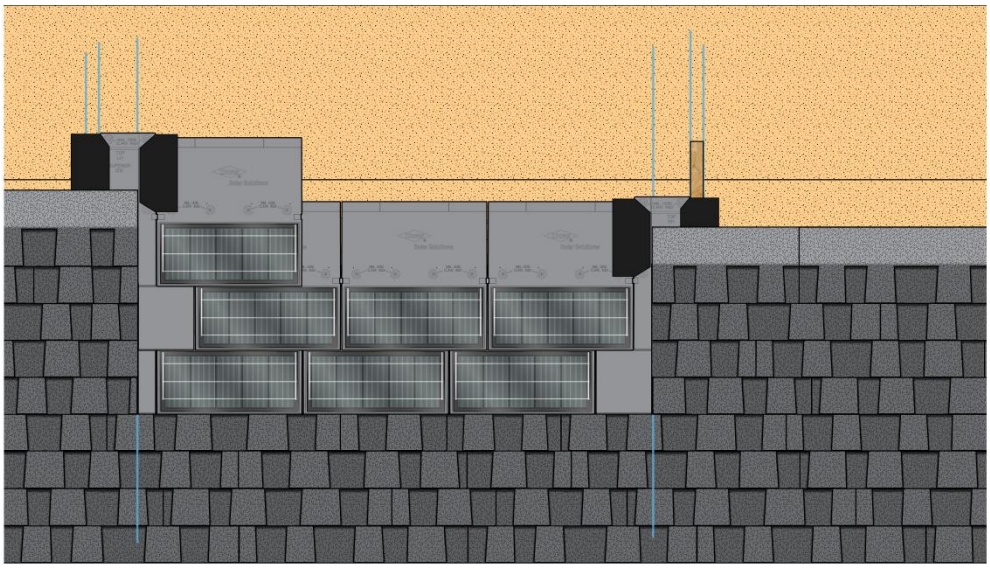
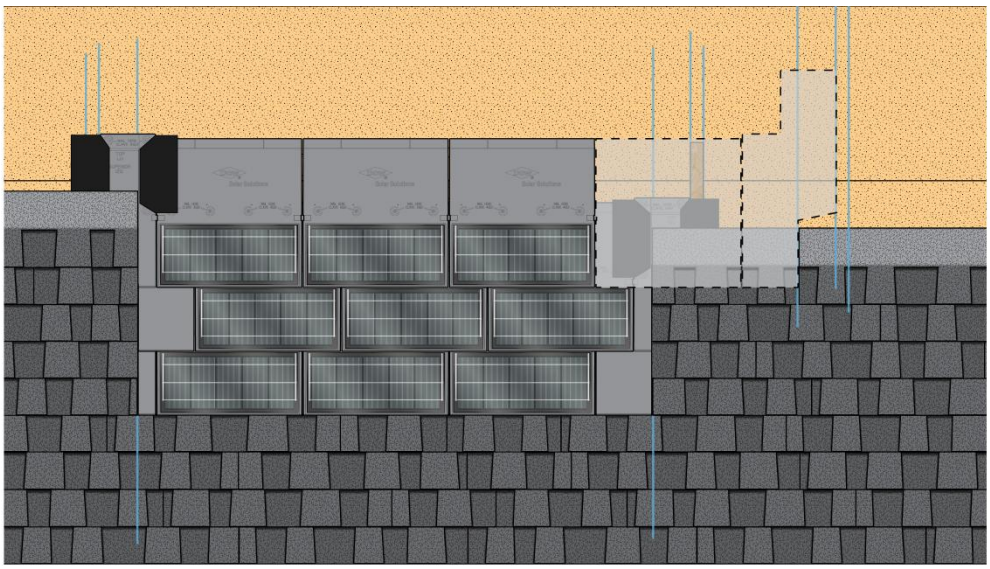


Figure 16. Step out example.

Plan for step out, estimate locaton of integrated flashing piece.



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 17.Snow and ice barrier transition sheet for step-out.
Align with edge of solar array, at least 14” wide, extend 4-8” beyond visible portion of array.

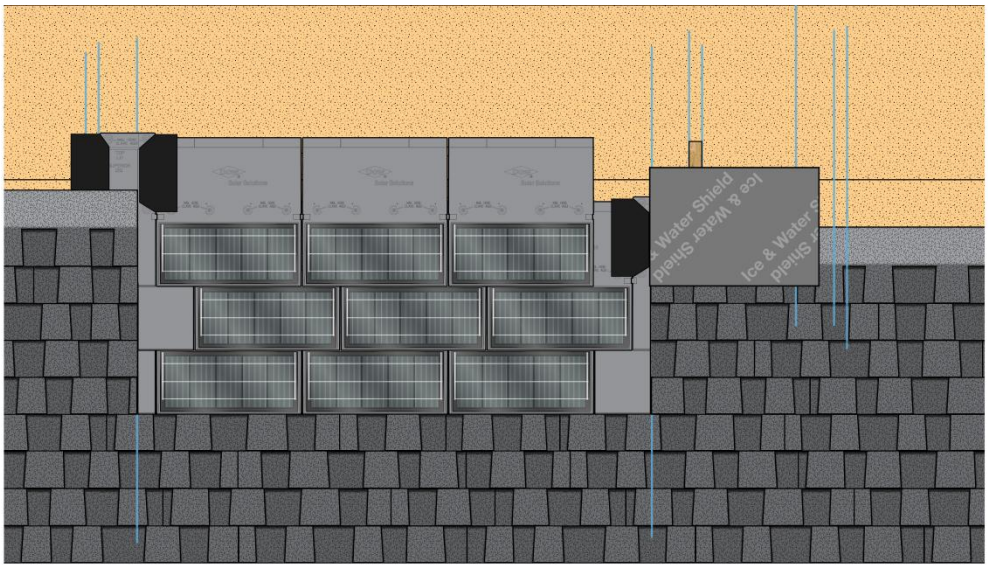
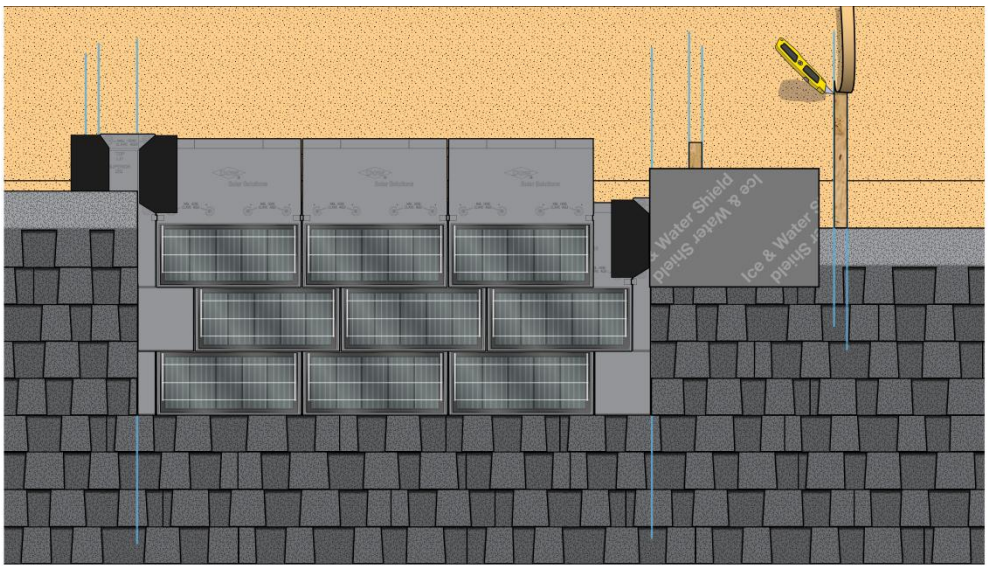


Figure 18. Cut underlayment (optional).
Should be about 2” wide to expose roof deck.



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Flashing up to 110MPH

Figure 19.Completed step-out with row-to-row.
Integrated flashing lays on top of asphalt upper tab.

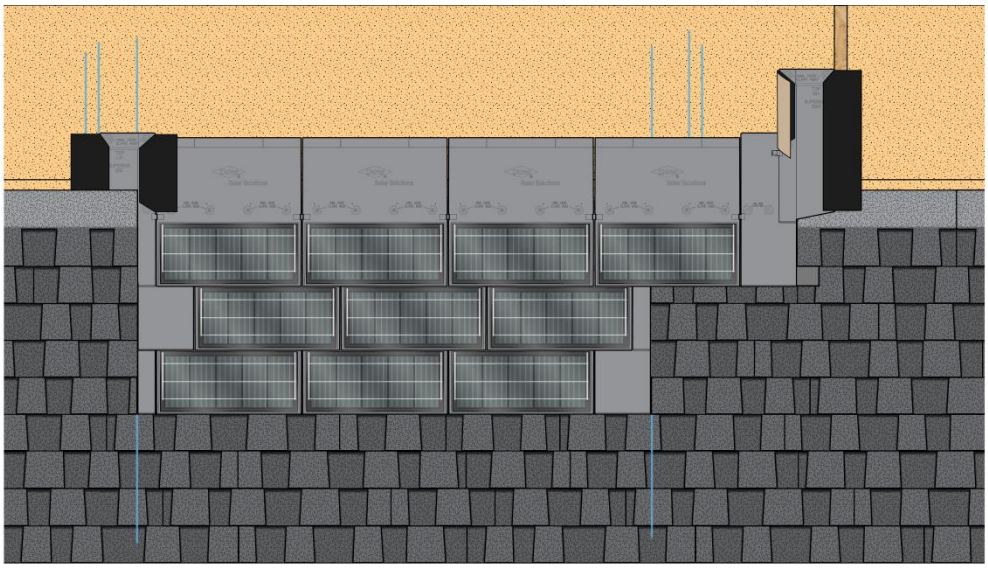
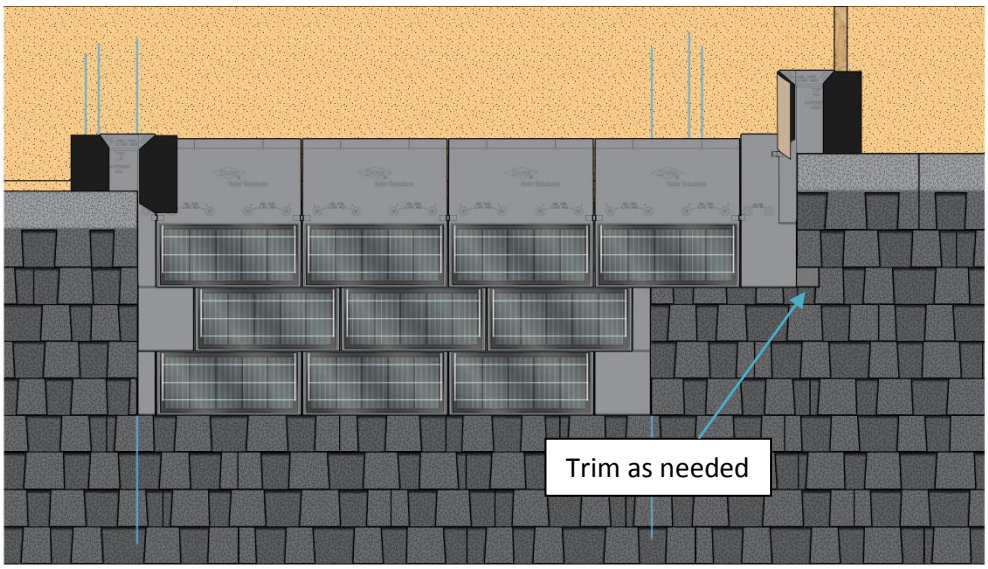


Figure 20. Continue pattern up the side.
Trim exposed transition sheet as needed.



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 21.Plan for step-in.

Cut underlayment to expose deck about 2” wide (optional).

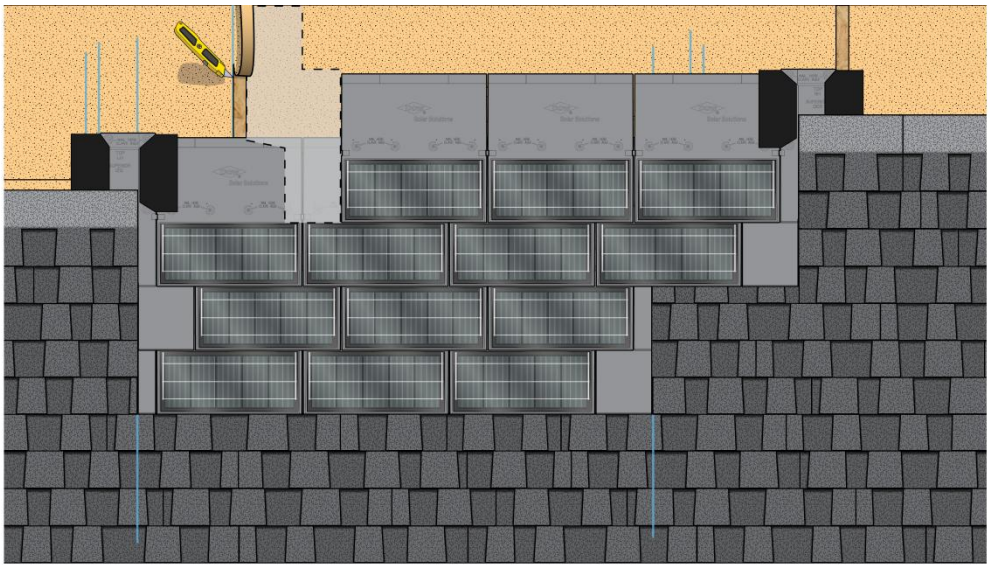
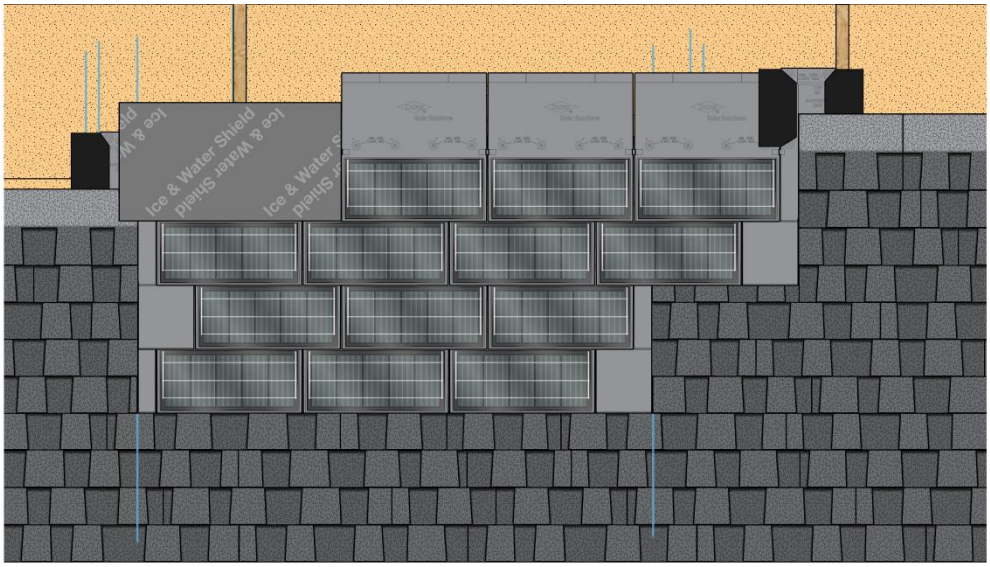


Figure 22. Snow and ice barrier transition sheet for step-in.

Minimum 14” wide, extend from the last solar shingle in the row to 4-8” beyond the visible edge of the solar array, align with solar shingle row.



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 23.Row-to-row installed and first shingle in next row.

Flashing tape adhered to VersaShield, transition sheet, deck, and integrated flashing.

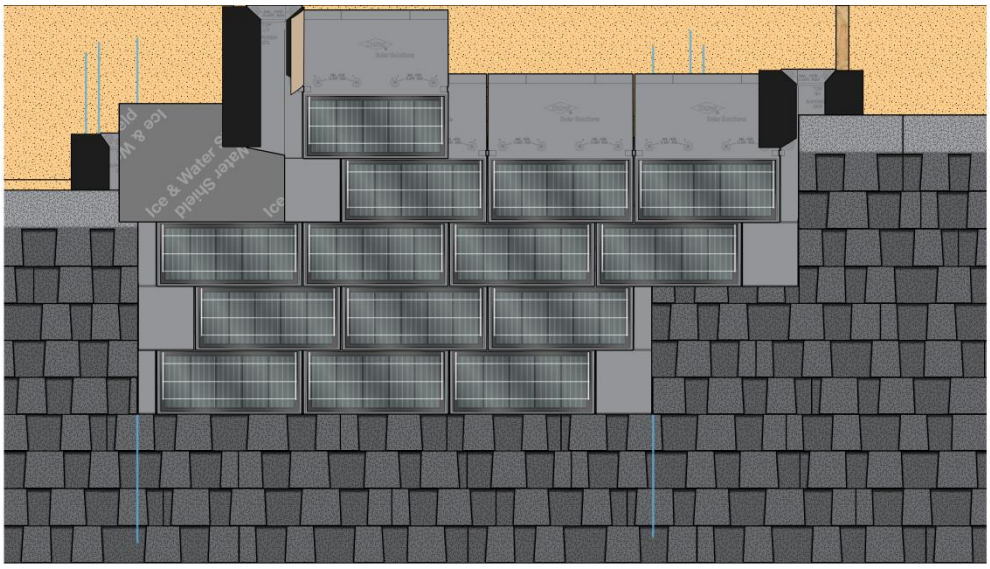
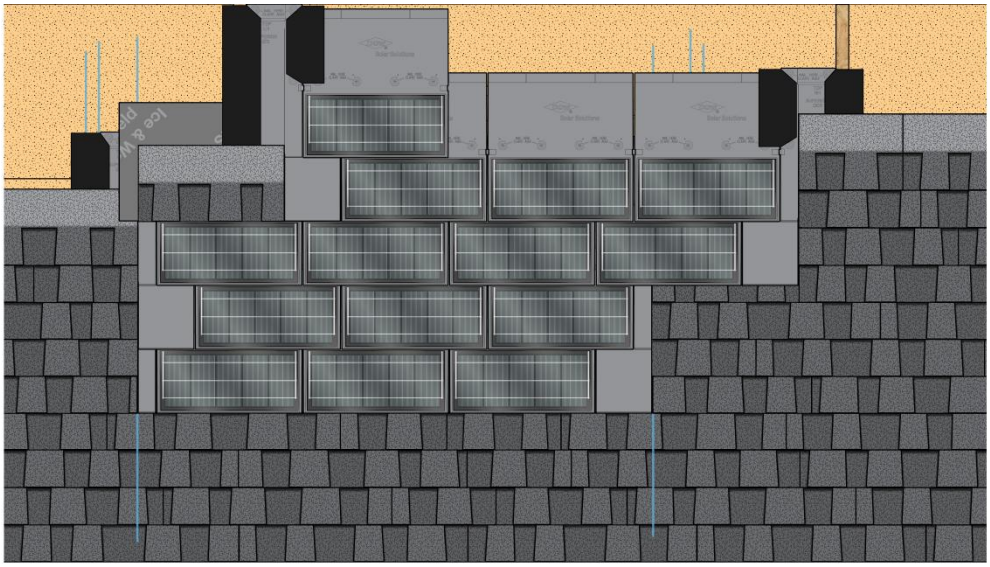


Figure 24. Use short reveal row, if needed.

If the next row of asphalt lower reveal edge will not align with the top of the shingle glass, use a short reveal row to cover the transition sheet.



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 25.Ensure seams do not line up.

Need at least 2" offset between asphalt shingles and solar shingles.

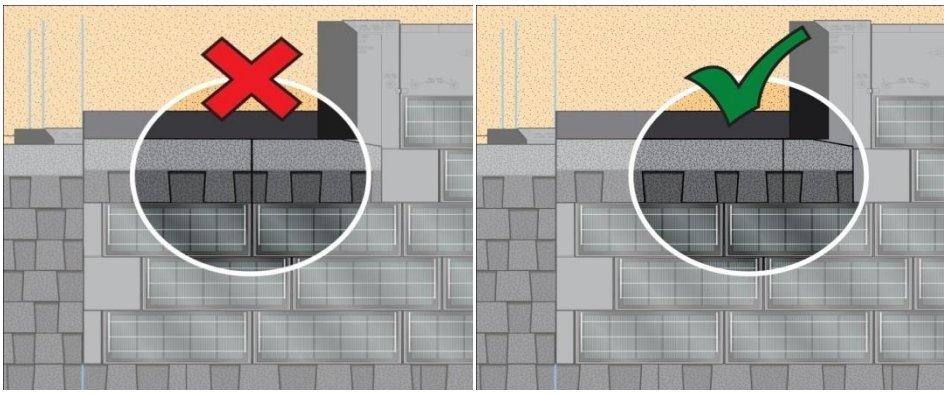
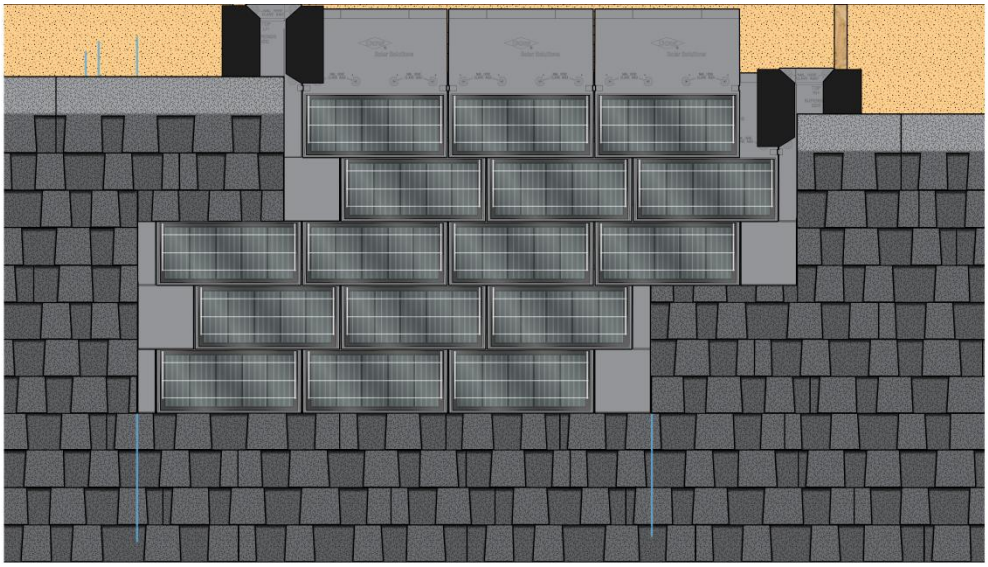


Figure 26. Continue pattern up side, continue solar shingle installation.



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 27.End of string: locate through-roof hole

Hole will be 4”-6” directly across from connector.

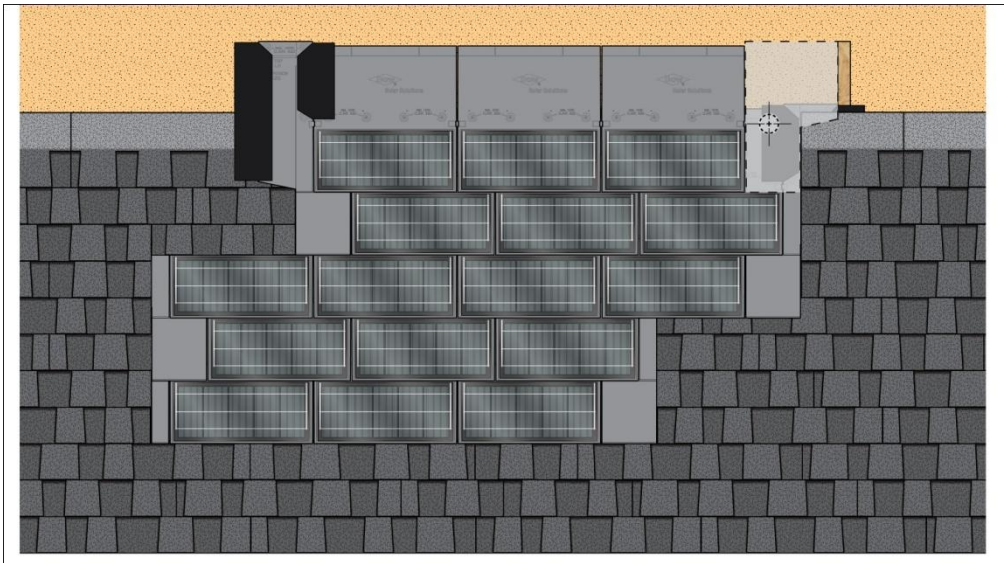
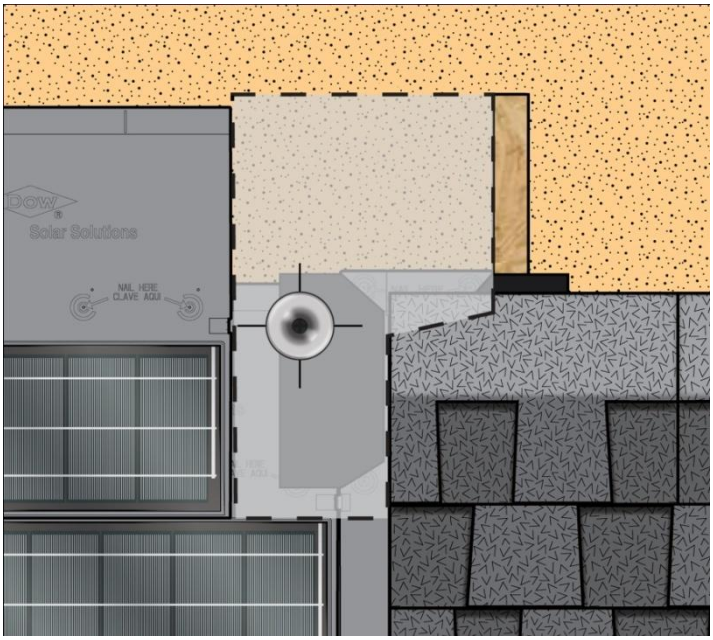


Figure 28.Drill through-roof hole.

Cover the connector in the adjacent solar shingle before drilling a 3” hole. Secure grommet in the hole with two ring-shank nails.



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Flashing up to 110MPH

Figure 29.Cover grommet with small piece of ice & water.
Cut a small X to feed through-roof wires.

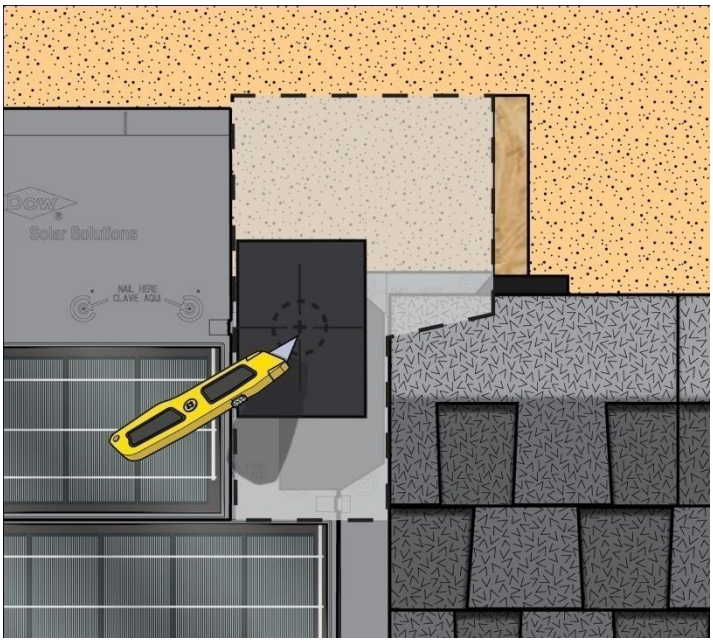
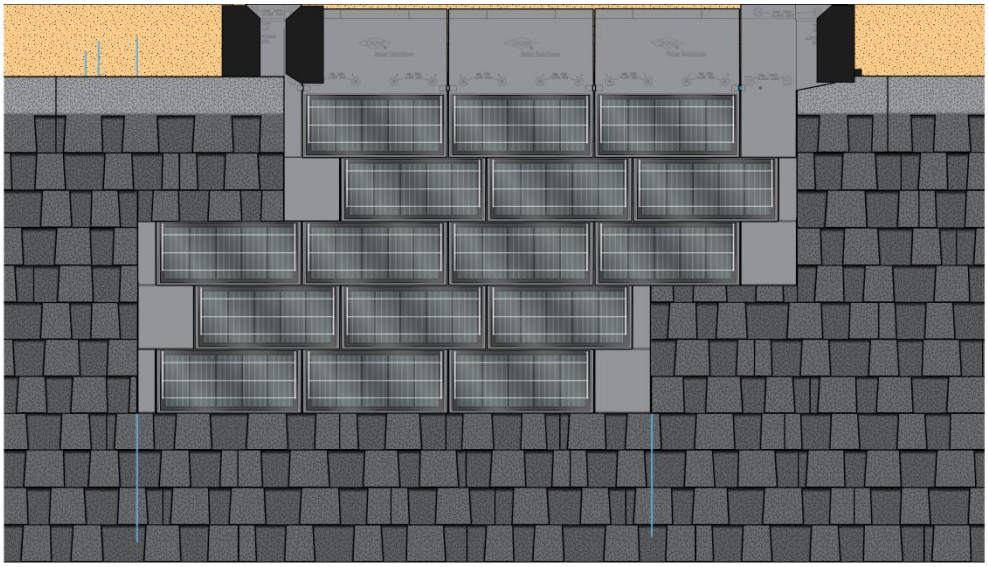


Figure 30.Push wires through grommet and install finisher.
Integrated flashing lays on top of asphalt upper tab.



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 31.Cut underlayment to expose deck (optional).

This is recommended to ensure leaks elsewhere on the roof do not migrate under the solar array. The underlayment can be lapped on top of transition sheet if desired.

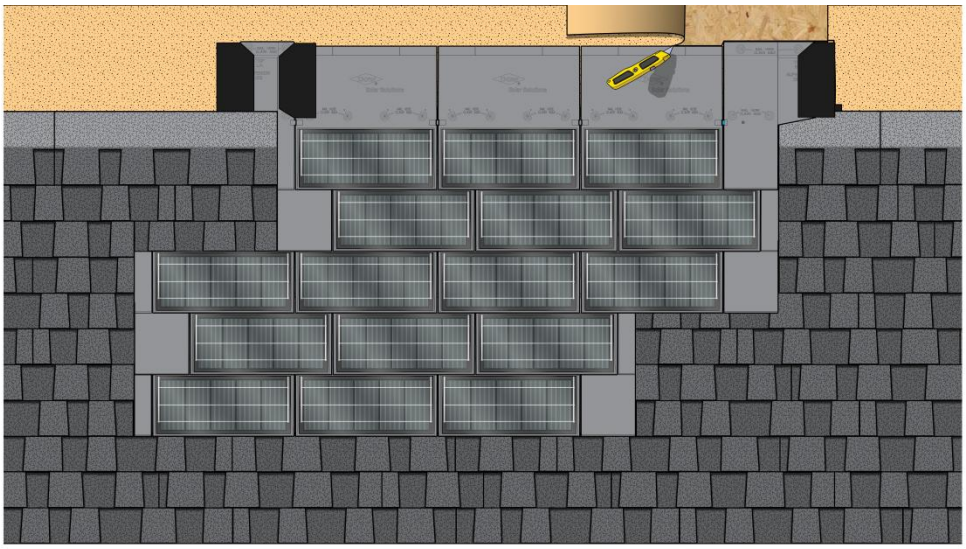
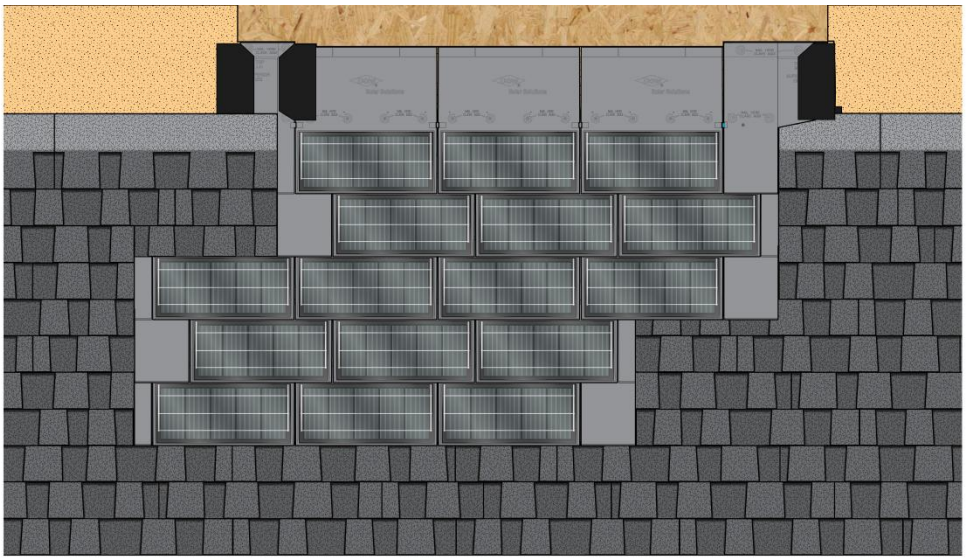


Figure 32.Deck exposed (optional).



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 33.Apply ice and water over top row of solar shingles.
Minimum 14” wide, should cover integrated flashing on either side, align with top of glass.

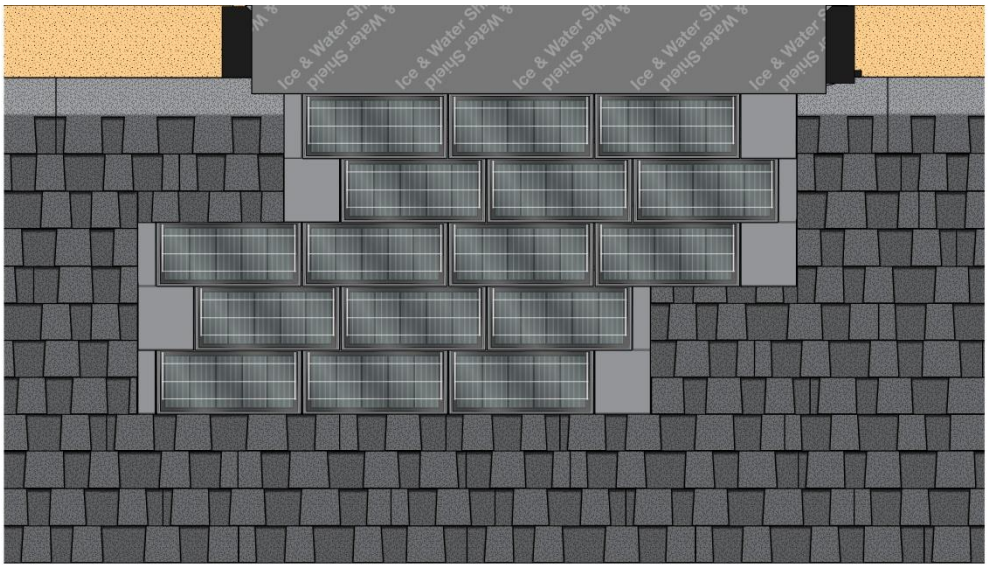
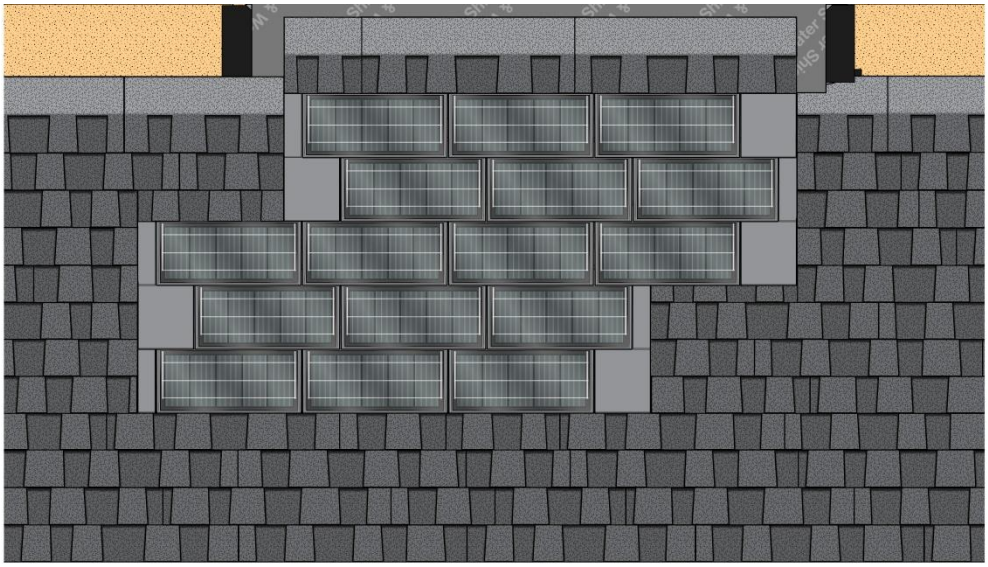


Figure 34.Use short reveal row, if needed.
If the next row of asphalt lower reveal edge will not align with the top of the shingle glass, use a short reveal row to cover the transition sheet.



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Flashing Detail, Continued

Flashing up to 110MPH

Figure 35.Ensure seams do not line up.

Need at least 2” offset between asphalt shingles and solar shingles.

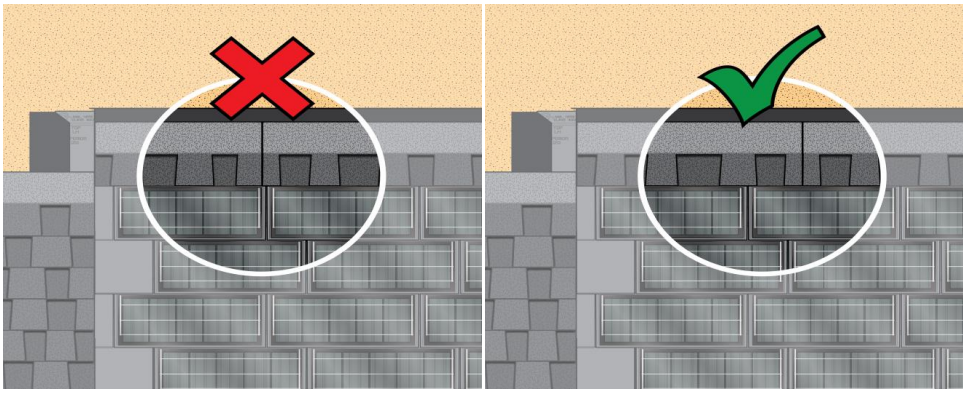
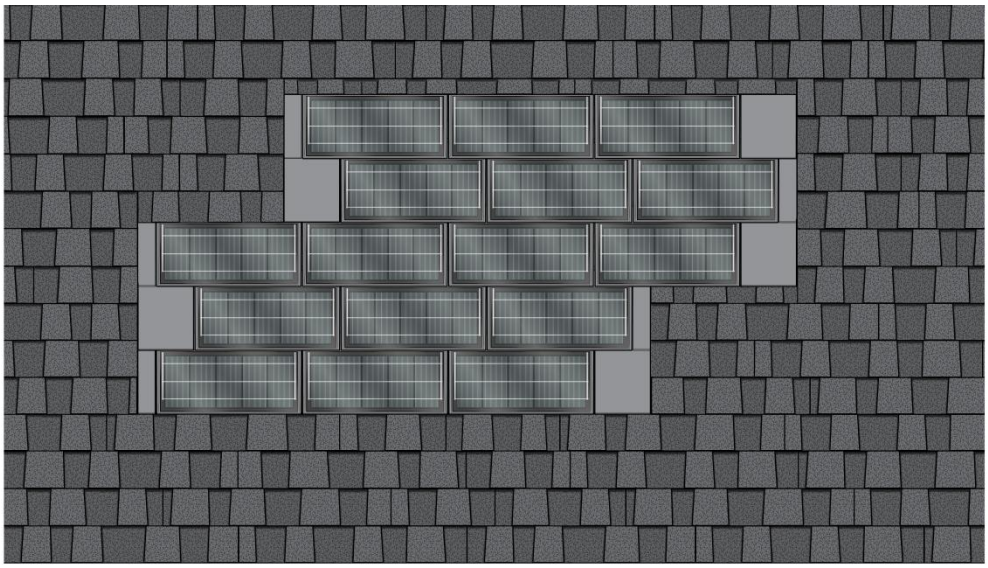


Figure 36.Continue with asphalt shingle pattern.



FLASHING DETAIL – WIND ZONES UP TO 150 MPH

Introduction

The following pictorial progresses through a small system installation with a straight (non-staggered) row, a row that steps out (up a valley), and a row that steps in (up a hip roof).

Flashing up to 150MPH

Figure 37. Ensure roof deck is clean and flat prior to shingle installation.

Figure 38. Install ice dam protection if required by local code.

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Flashing up to 150MPH

Figure 39. Install VersaShield®

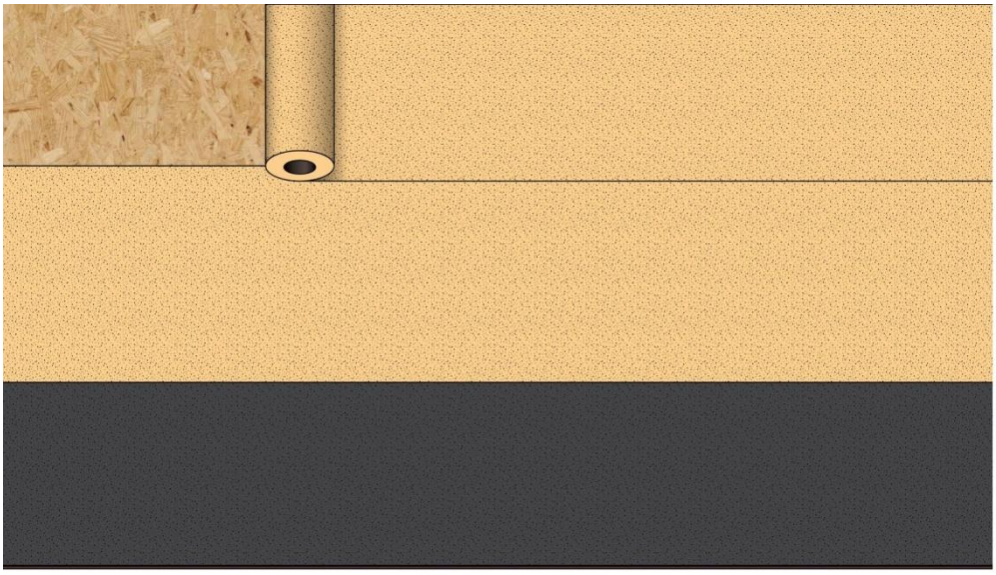
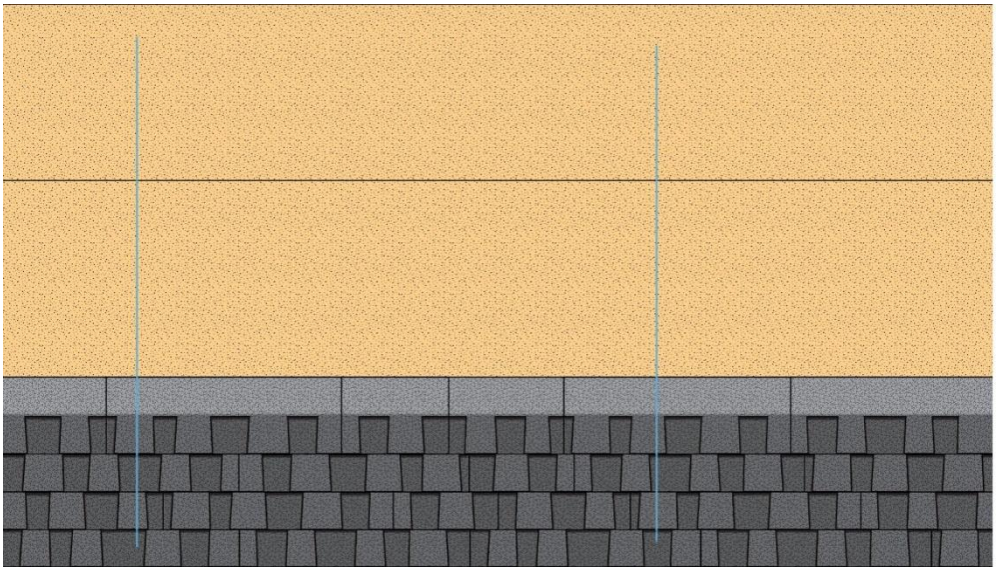


Figure 40. Install asphalt shingles up to array starting point.
The blue lines shown indicate the visible edges of the solar array.



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Flashing Detail, Continued

Flashing up to 150MPH

Figure 41. Apply 26Ga black factory-painted galvanized steel at reveal top edge.

Tack-nail along top edge with 11 Gauge 1 ½" Hot Dipped Galvanized or Stainless Steel Ring Shank Nails (Must be Miami Dade County Approved). Seal all nail heads with Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586. Metal should be at least 14" wide and extend 4-8" beyond the visible portion of the solar array. It is needed to ensure sufficient side lap where products of two different sizes come together.

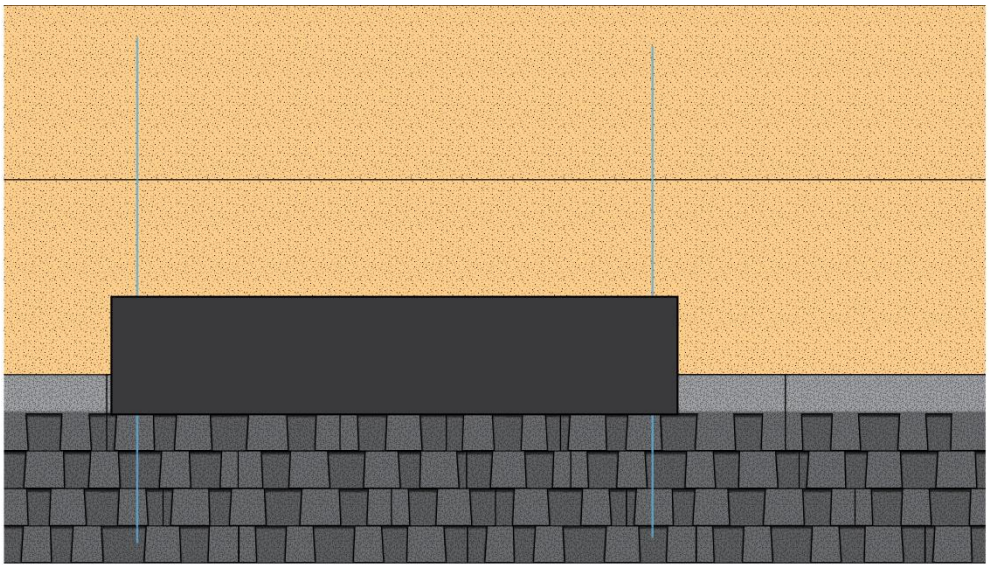
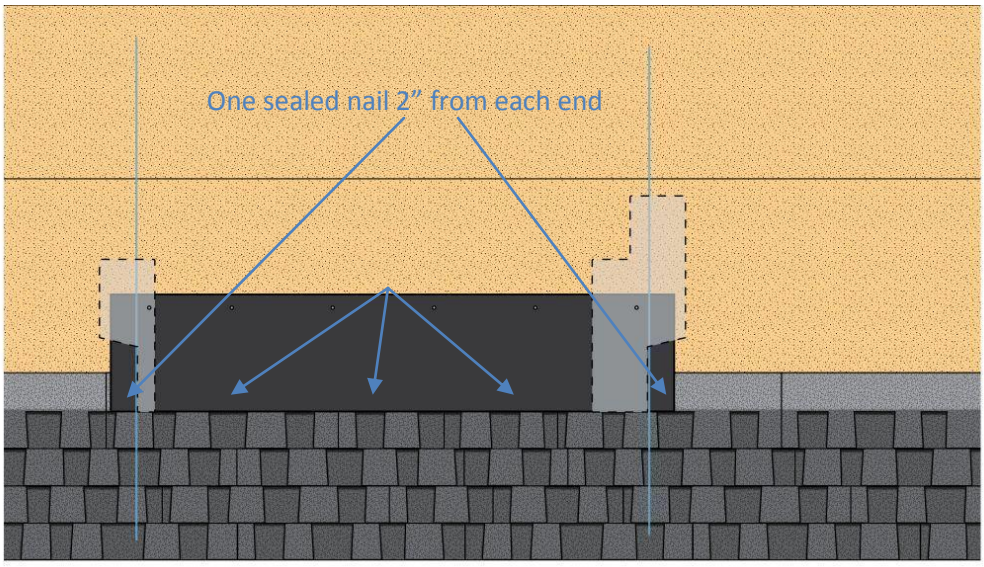


Figure 42. Fasten lower edge of galvanized steel.

Install one nail centered under each solar shingle prior to each solar shingle being applied. Fasten the lower corners of the transition sheet with one nail 2" in from the edge, 2-3" up from the bottom. Use 11 Gauge 1 ½" Hot Dipped Galvanized or Stainless Steel Ring Shank Nails (Must be Miami Dade County Approved). Seal all nail heads with Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586.



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Flashing up to 150MPH

Figure 43. Preparing for the installation of the integrated flashing left hand starter.

The first row of asphalt shingles surrounding the solar array is applied before the integrated flashing so that the flashing can rest on top of the upper tab of the asphalt shingle.

Note:Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the back of the asphalt shingle reveal in an 8" wide area adjacent to the solar array. Maximum thickness of roofing cement shall be 1/8" as excessive use of the cement may cause blistering, or bleed through.

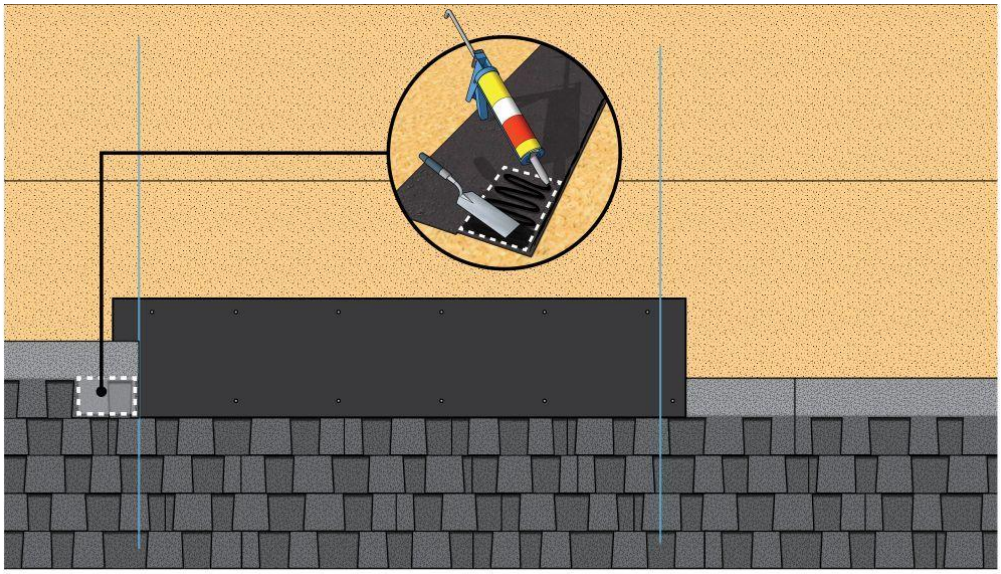
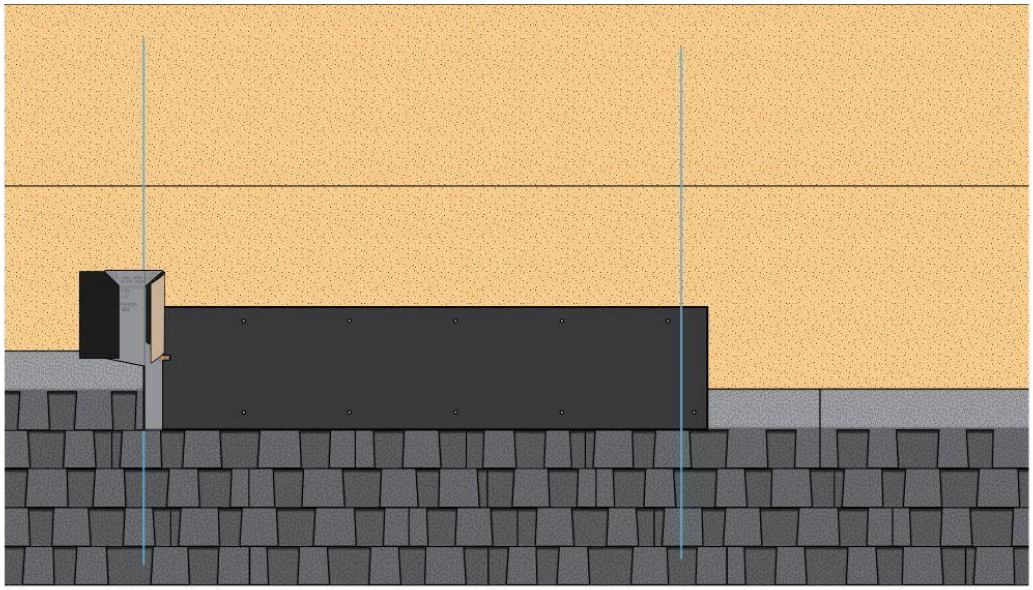


Figure 44. Install the integrated flashing

The integrated flashing should rest on top of the upper tab of the asphalt shingle. Maintain a ¼" of space between the integrated flashing and the surrounding asphalt shingles.



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Flashing up to 150MPH

Figure 45. First solar shingle is installed.

Install the first solar shingle. Peel and stick the flashing tape on the left side of the integrated flashing to the upper tab of the asphalt shingle in the first row surrounding the solar array and the VersaShield. Peel and stick the flashing tape on the right side of the Integrated flashing to the top tab of the first solar shingle. Install a second row of asphalt shingles surrounding the solar array.

Note: Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the back of the asphalt shingle reveal in an 8" wide area adjacent to the solar array. Maximum thickness of roofing cement shall be 1/8" as excessive use of the cement may cause blistering, or bleed through.

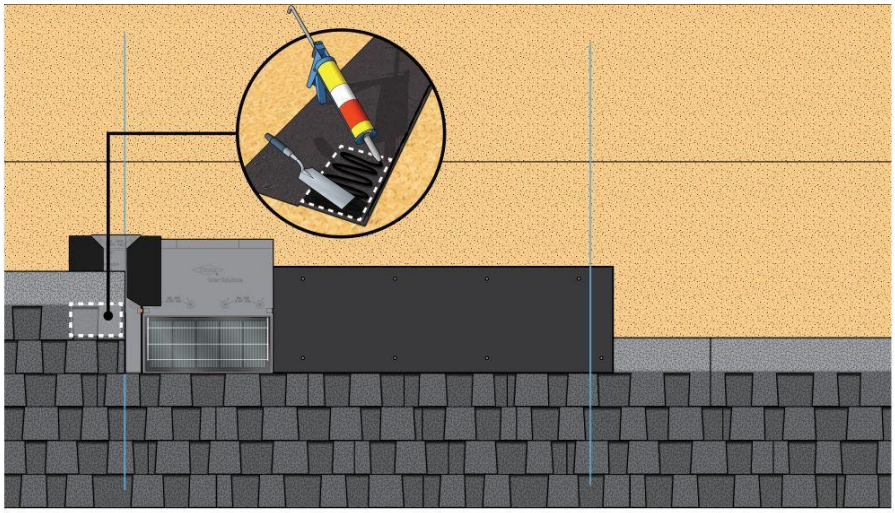
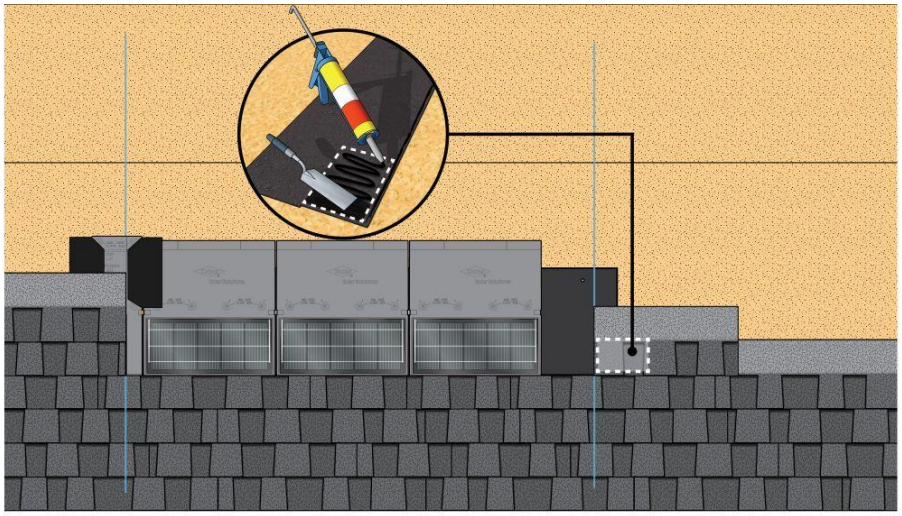


Figure 46. Install remaining solar shingles in first row, preparing for installation of integrated flashing right hand row to row

Install first row of right side asphalt shingles surrounding the solar array.

Note:Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the back of the asphalt shingle reveal in an 8" wide area adjacent to the solar array. Maximum thickness of roofing cement shall be 1/8" as excessive use of the cement may cause blistering, or bleed through.



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Flashing Detail, Continued

Flashing up to 150MPH

Figure 47. Install Integrated flashing right hand row to row.

Peel and stick the flashing tape on the right side of the integrated flashing to the upper tab of the asphalt shingle in the first row surrounding the solar array and the VersaShield. Maintain a ¼" of space between the integrated flashing and the surrounding asphalt shingles.

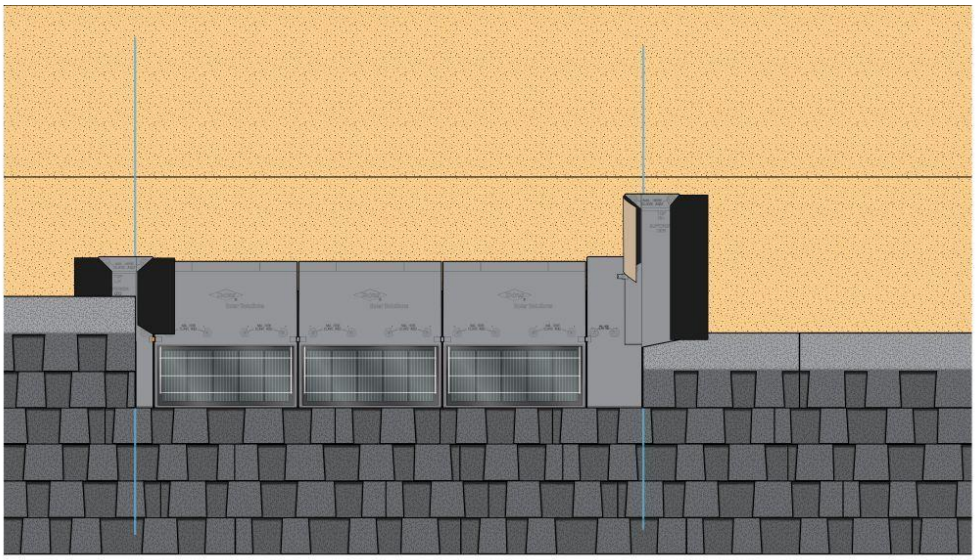
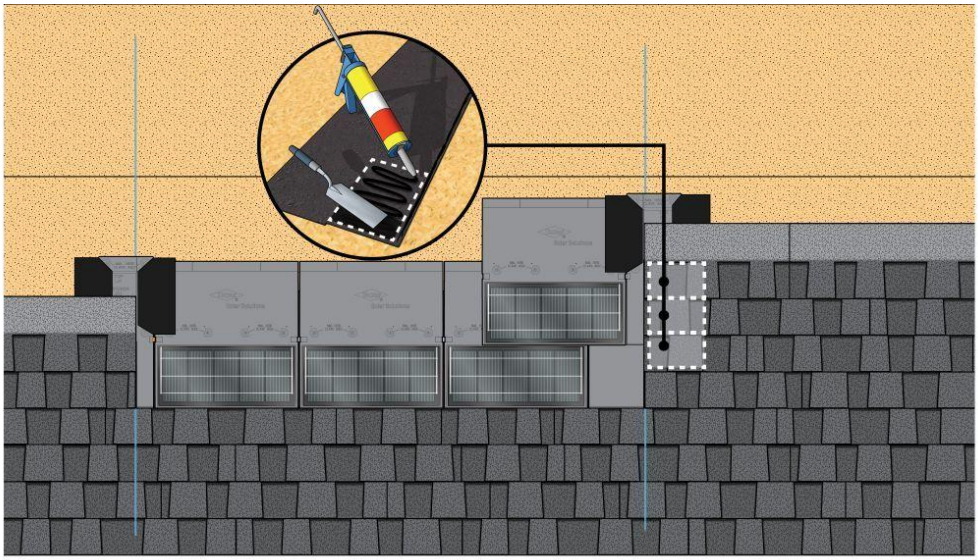


Figure 48. Continue with installation of solar shingles and surrounding asphalt shingles.

Peel and stick the flashing tape on the left side of the Integrated flashing to the top tab of the first solar shingle in second row.

Note:Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the back of the asphalt shingle reveal in an 8" wide area adjacent to the solar array. Maximum thickness of roofing cement shall be 1/8" as excessive use of the cement may cause blistering, or bleed through.



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Flashing up to 150MPH

Figure 49. Install remaining solar shingles in second row, preparing for installation of integrated flashing left hand row to row.

Continue the pattern of aspalt shingles surrounding the solar array. The integrated flashing should rest on top of the upper tab of the asphalt shingle as shown below. Peel and stick the flashing tape on the left side of the integrated flashing to the upper tab of the asphalt shingle surrounding the solar array and the VersaShield.
Note:Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the back of the asphalt shingle reveal in an 8" wide area adjacent to the solar array. Maximum thickness of roofing cement shall be 1/8" as excessive use of the cement may cause blistering, or bleed through.

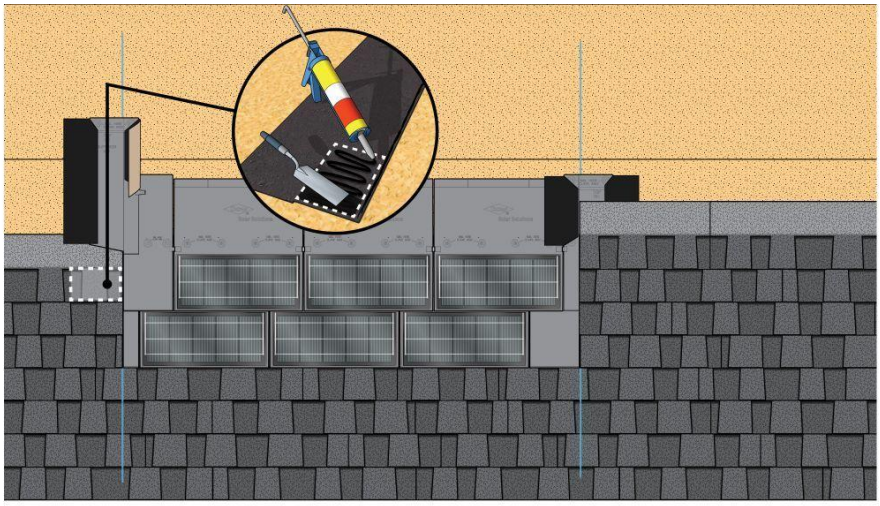
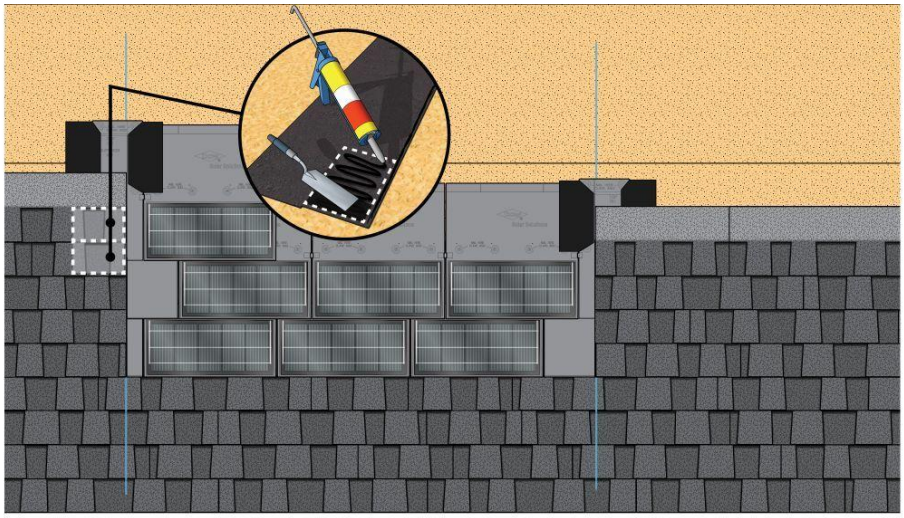


Figure 50. Continue with installation of solar shingles and surrounding asphalt shingles.

Peel and stick the flashing tape on the right side of the Integrated flashing to the top tab of the first solar shingle in third row.
Note:Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the back of the asphalt shingle reveal in an 8" wide area adjacent to the solar array. Maximum thickness of roofing cement shall be 1/8" as excessive use of the cement may cause blistering, or bleed through.



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Flashing Detail, Continued

Flashing up to 150MPH

Figure 51. Step out example.
Plan for step out, estimate locaton of integrated flashing piece.

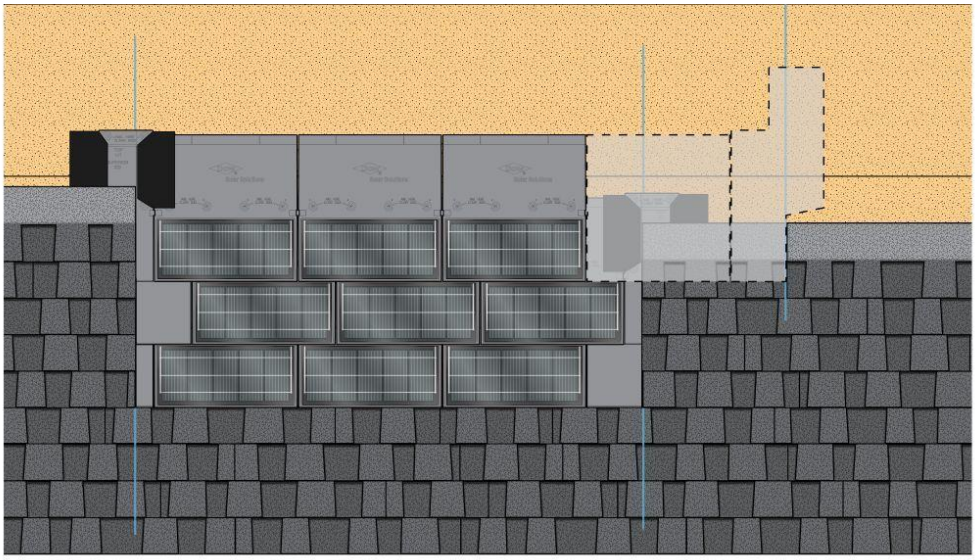
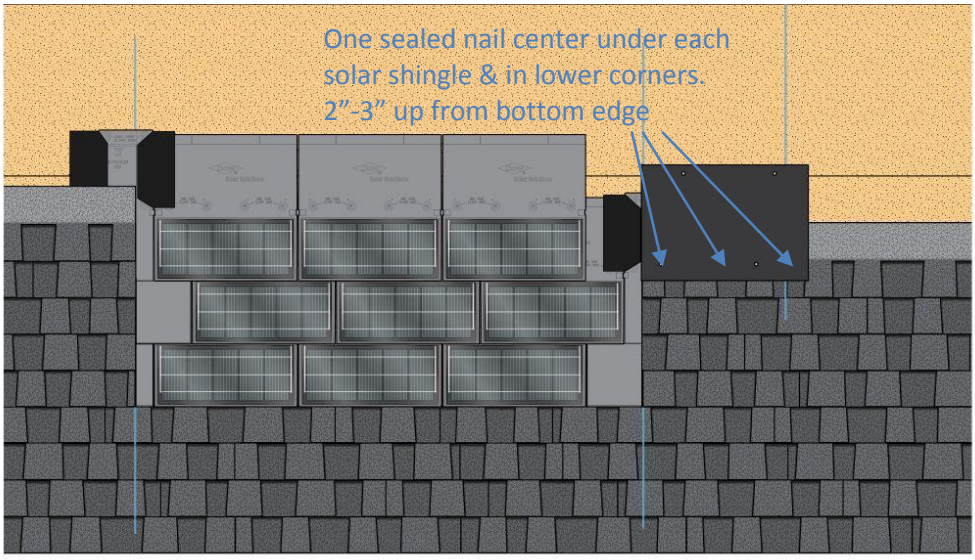


Figure 52. 26ga black factory-painted galvanized steel transition sheet for step-out.
Align with edge of solar array, at least 14" wide, extend 4-8" beyond visible portion of array. **Tack nail along top edge**. Also install one nail centered under each solar shingle and in the lower corners . Use 11 Gauge 1 ½" Hot Dipped Galvanized or Stainless Steel Ring Shank Nails (Must be Miami Dade County Approved). Seal all nail heads with Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586.



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Flashing up to 150MPH

Figure 53. Install remaining solar shingles in third row, preparing for installation of integrated flashing right hand row to row.

Continue the pattern of aspalt shingles surrounding the solar array. The integrated flashing should rest on top of the upper tab of the asphalt shingle (shown below). Peel and stick the flashing tape on the right side of the integrated flashing to the upper tab of the asphalt shingle surrounding the solar array and the VersaShield.

Note:Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the back of the asphalt shingle reveal in an 8" wide area adjacent to the solar array. Maintain a ¼" of space between the integrated flashing and the surrounding asphalt shingles. Maximum thickness of roofing cement shall be 1/8" as excessive use of the cement may cause blistering, or bleed through.

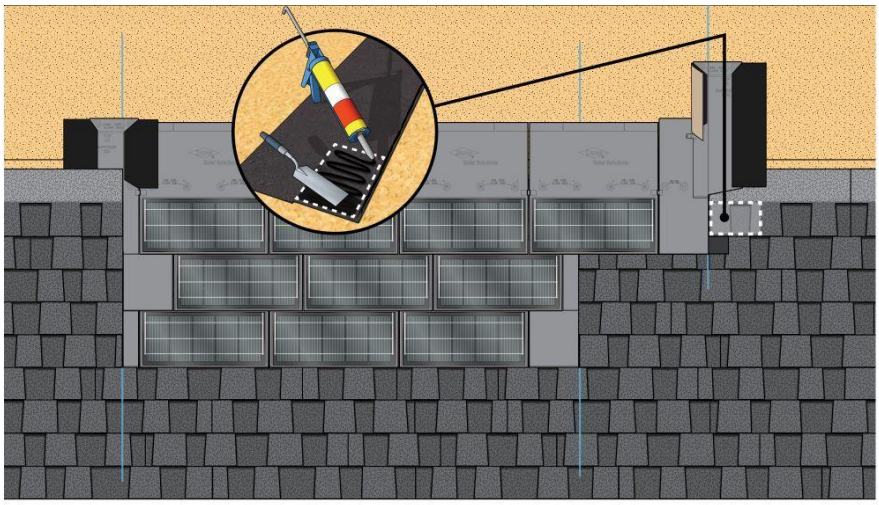
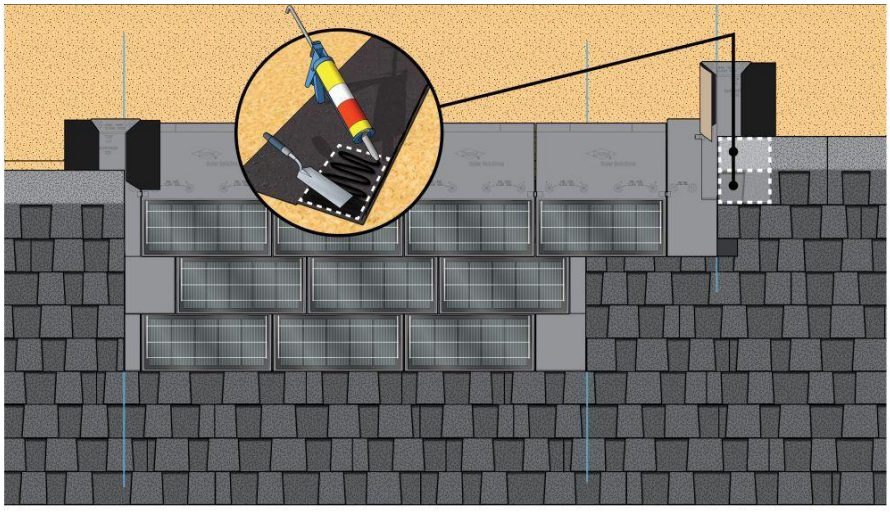


Figure 54. Continue with asphalt pattern up the side.

Note:Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the back of the asphalt shingle reveal in an 8" wide area adjacent to the solar array. Maximum thickness of roofing cement shall be 1/8" as excessive use of the cement may cause blistering, or bleed through.



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Flashing Detail, Continued

Flashing up to 150MPH

Figure 55. Completed installation of shingles in the fourth row, prepare for step in.
Peel and stick the flashing tape on the left side of the Integrated flashing to the top tab of the first solar shingle in fourth row. Prepare for step in by installing a piece of Grace Ice & Water as demonstrated below.

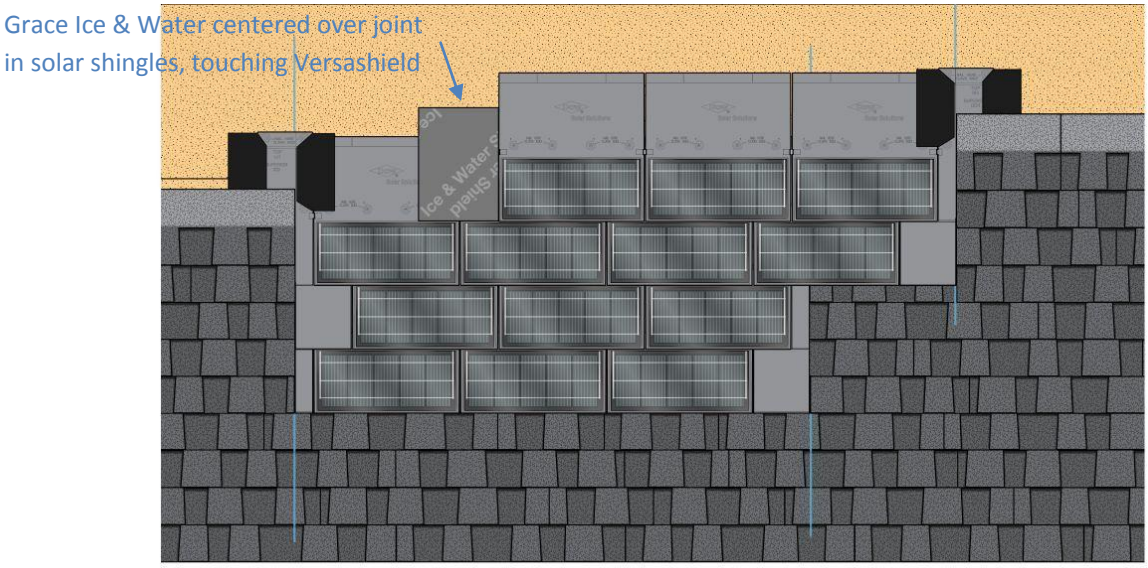
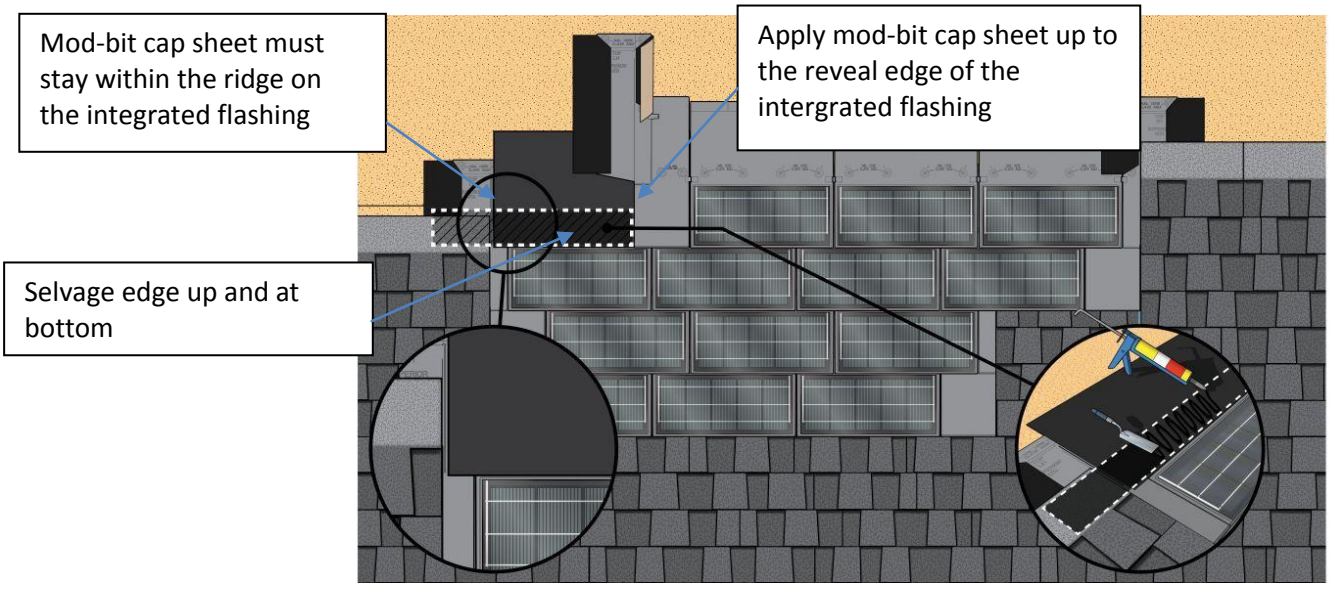


Figure 56. Apply mod-bit cap sheet over step in area of solar shingles.
There are two approved mod-bit cap sheets, GAF Liberty SBS or CertainTeed Flintlastic SA. Cut mod-bit cap sheet a minimum of 14" wide, align with top of glass, selvage edge up and at the bottom. **The Mod-bit cap sheet must stop inside of the ridge line on the intregrated flashing.** Ensure that the mod-bit is relaxed per the manufacturer's instructions.
Note: Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the top surface of the bottom edge of the mod-bit cap sheet. Maximum thickness of roofing cement shall be 1/8" as excessive use of the cement may cause blistering, or bleed through.



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Flashing up to 150MPH

Figure 57. Use short reveal row, if needed.
If the next row of asphalt lower edge will not align with the top of the solar shingle glass, use a short reveal row to cover the mod-bit transition sheet.

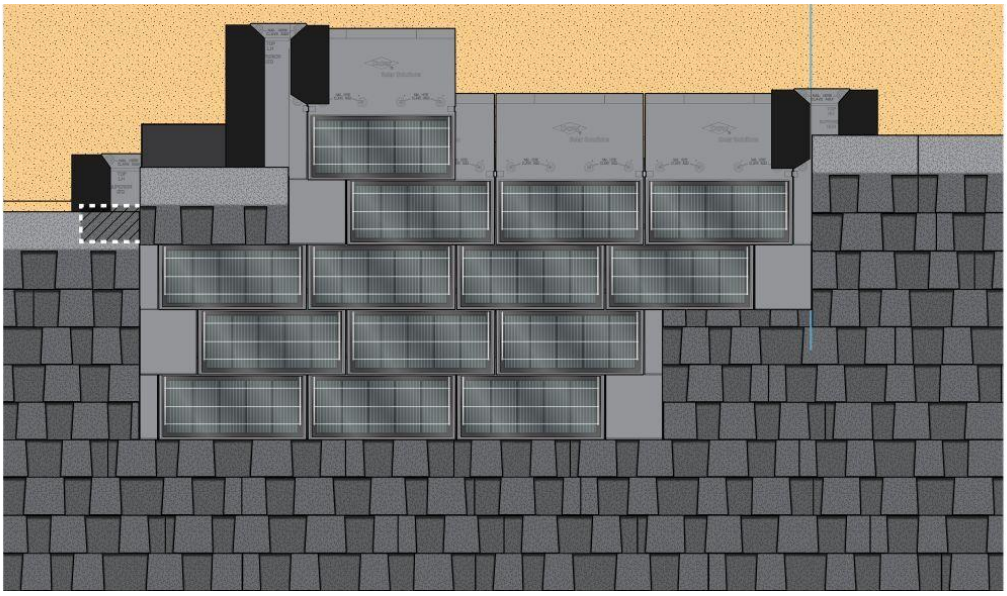
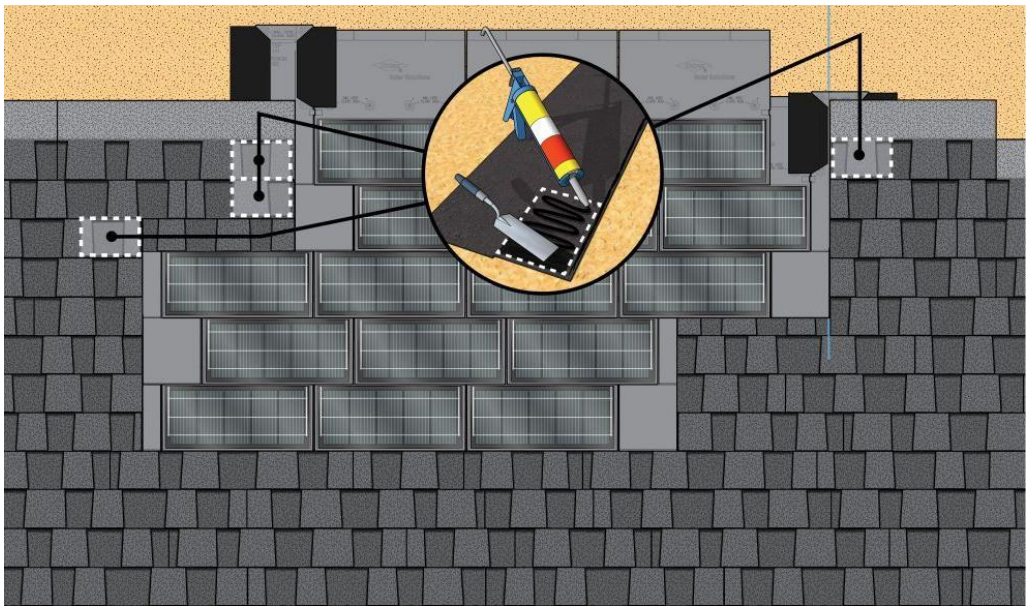


Figure 58. Continue asphalt shingle pattern up the sides, continue solar shingle installation.
Note:Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the back of the asphalt shingle reveal in an 8” wide area adjacent to the solar array. Maximum thickness of roofing cement shall be 1/8” as excessive use of the cement may cause blistering, or bleed through.



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Flashing Detail, Continued

Flashing up to 150MPH

Figure 59. End of string: locate through-roof hole

Hole will be 4”-6” from adjacent connector.

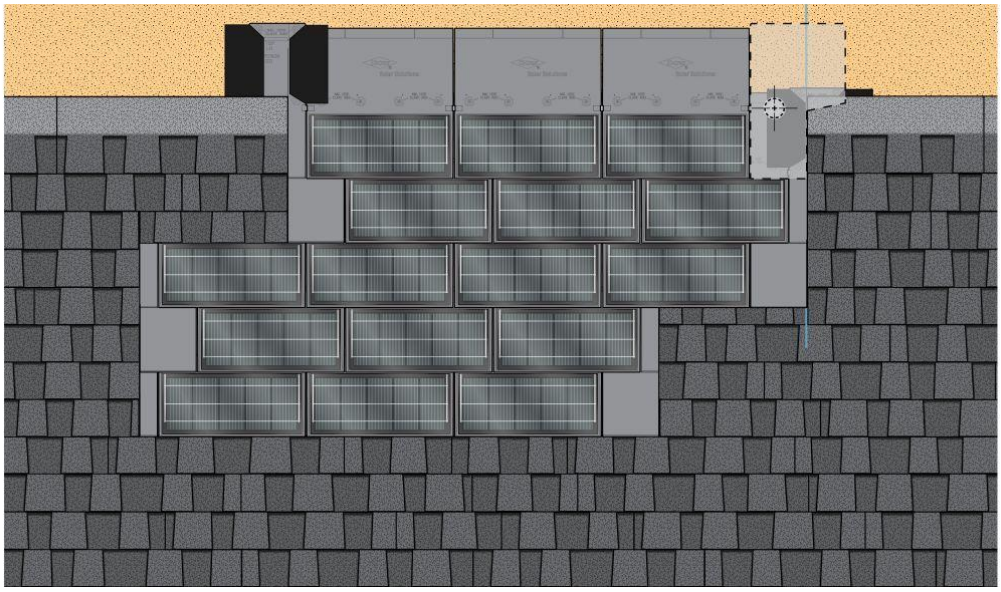


Figure 60. Drill through-roof hole.

Cover the connector in the adjacent solar shingle before drilling a 3” hole. Secure grommet in the hole with two ring-shank nails.

Continued on next page

Flashing up to 150MPH

Figure 61. Cover grommet with a small piece of Grace Ice & Water
Cut a small X to feed through-roof wires.

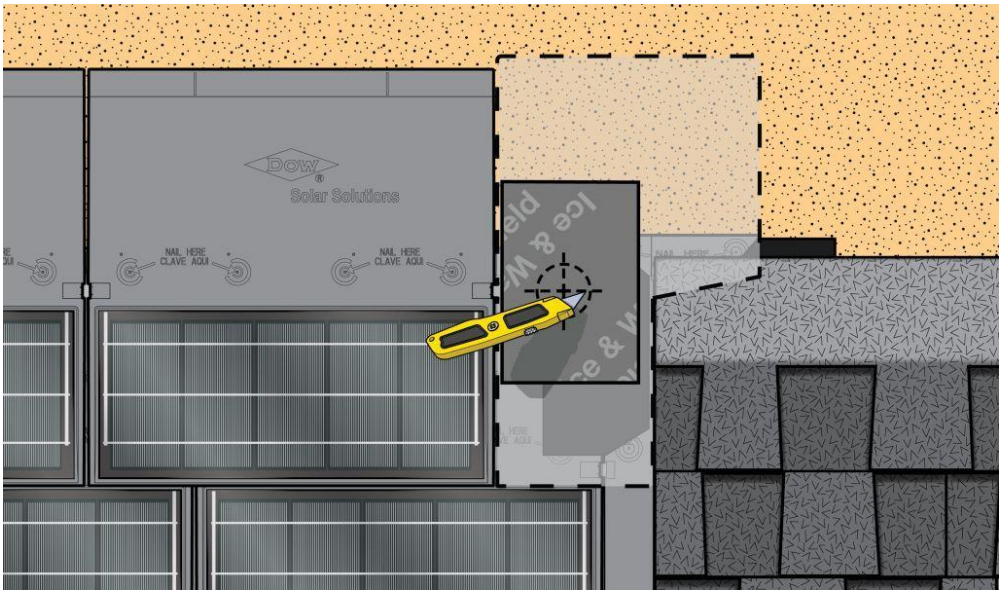
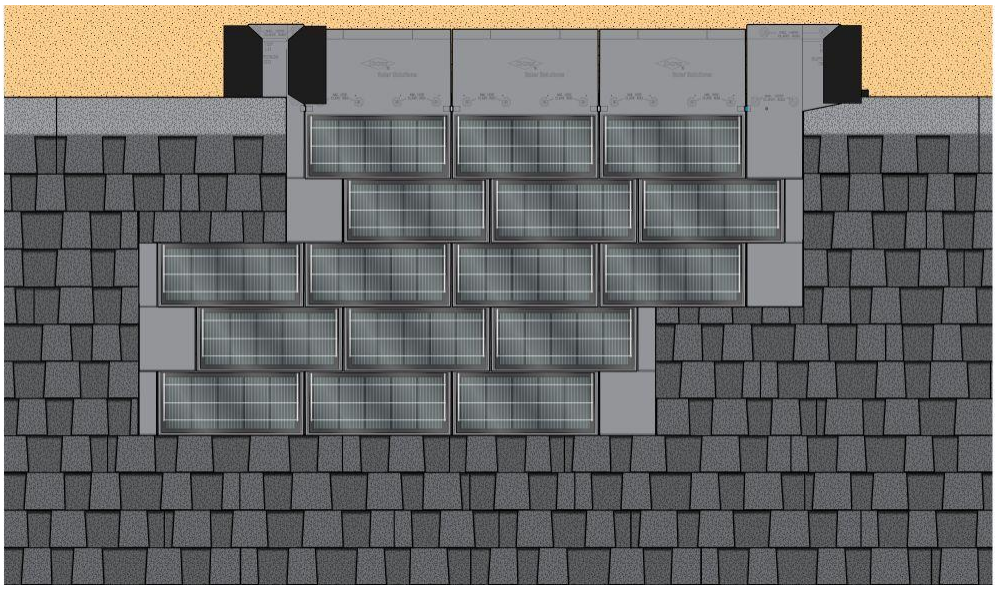


Figure 62. Push wires through grommet and install integrated flashing, right hand finisher.
Integrated flashing lays on top of the asphalt shingle upper tab



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Flashing up to 150MPH

Figure 63. Continue with asphalt shingle pattern.

Note:Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the back of the asphalt shingle reveal in an 8" wide area adjacent to the solar array. Maximum thickness of flashing cement shall be 1/8" as excessive use of the cement may cause blistering , or bleed through. Maintain a ¼" of space between the integrated flashing and the surrounding asphalt shingles.

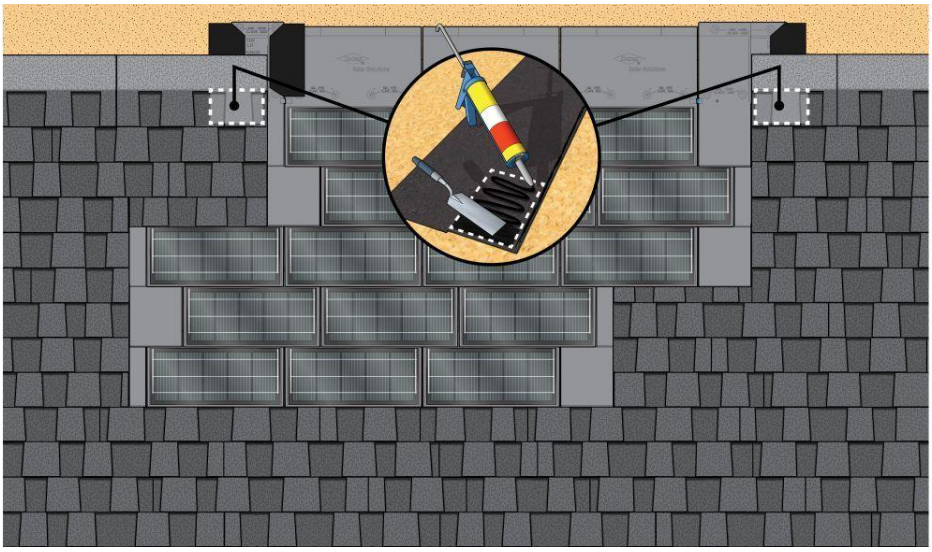
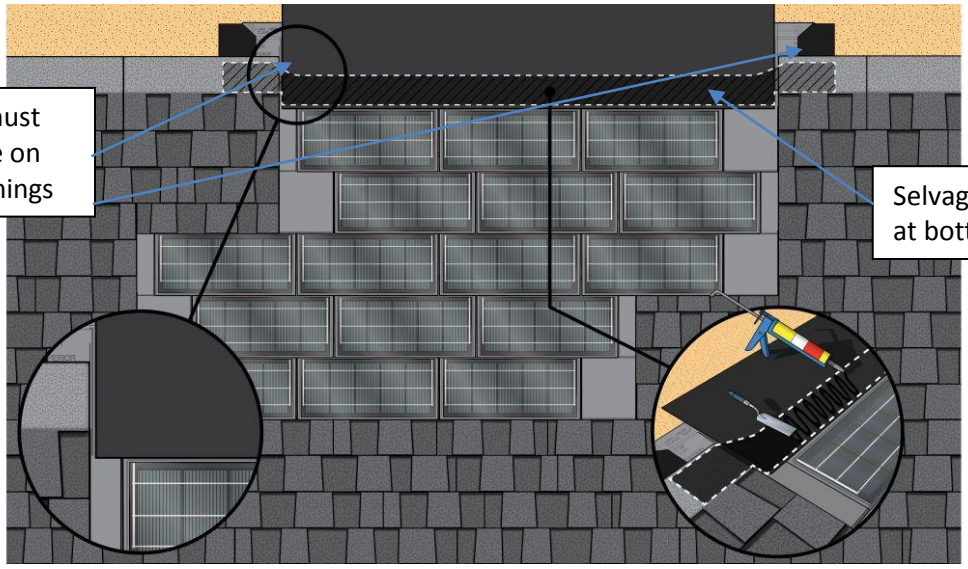


Figure 64. Apply mod-bit cap sheet over top row of soalr shingle (upper transition area).

There are two approved mod-bit cap sheets, GAF Liberty SBS or CertainTeed Flintlastic SA. Cut mod-bit cap sheet a minimum of 14" wide, align with top of glass, selvage edge up and at the bottom. Ensure that the mod-bit is relaxed per the manufacturer's instructions.

Note: Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied and uniformly troweled level on the top surface of the bottom edge of the mod-bit cap sheet. Maximum thickness of flashing cement shall be 1/8" as excessive use of the cement may cause blistering , or bleed through.



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Flashing Detail, Continued

Flashing up to 150MPH

Figure 65. Use short reveal row, if needed.

If the next row of asphalt lower edge will not align with the top of the solar shingle glass, use a short reveal row to cover the mod-bit transition sheet.

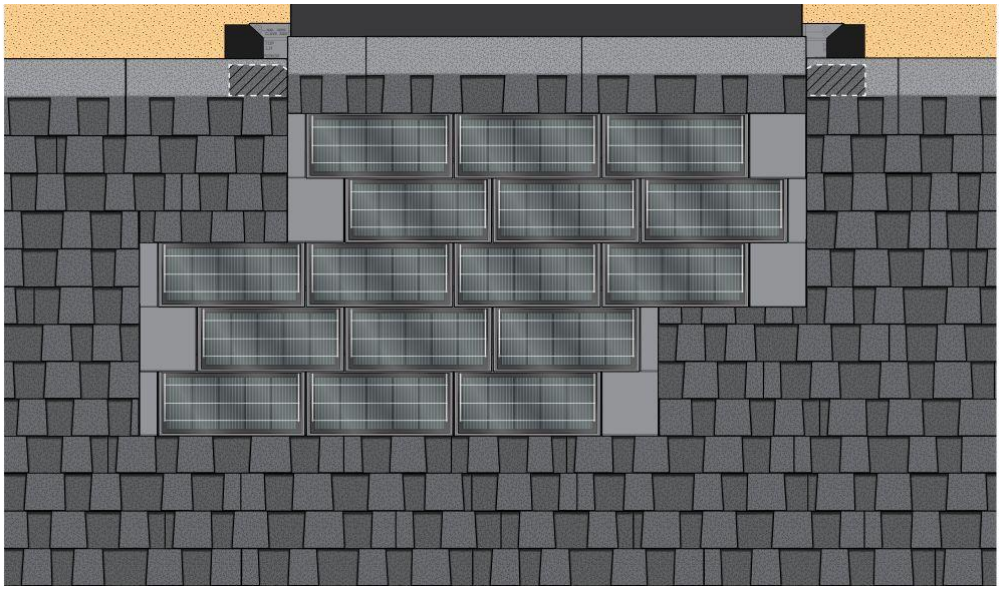
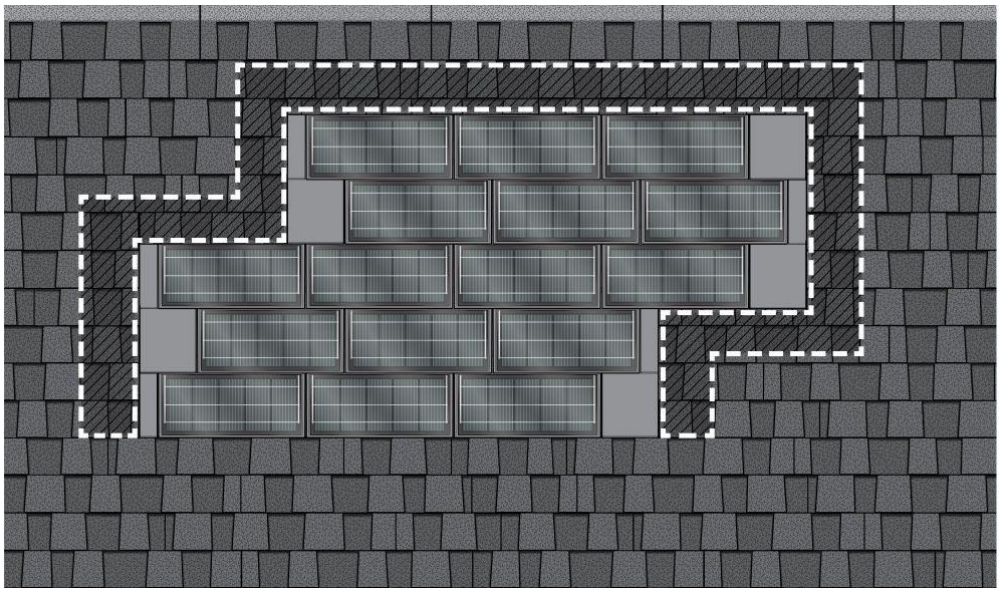


Figure 66. Asphalt Roofing Cement zone.

Karnak 19 or Asphalt Roofing Cement conforming to ASTM D4586 must be applied to the back side of the asphalt shingle reveal in an 8” wide area adjacent to the solar array



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REVISION HISTORY

Revision history

The following information documents at least the last three changes to this document, with all the changes listed for the last 6 months.

Revision	Date	Revised By	Changes
F	2012-07-31	J. Horwath	Updated figures 35 and 36.
G	2012-08-01	S. Pisklak	Move top VersaShield to lie on top of shingle tab.
H	2013-02-13	J. Horwath	Updated Figures to represent current model integrated flashing.
J	2013-09-30	S.Pisklak	No longer cover a complete asphalt reveal, add metal/capsheet method for >110mph zones, emphasize underlayment cuts are optional.
K	2014-02-21	J. Horwath	Updated 150mph zone figures
K	2014-03-21	B. Smith	Updated 150 mph figure titles and text to match new images