HMM Reference	NIST Technical Note 2205: Item 1 Skylight

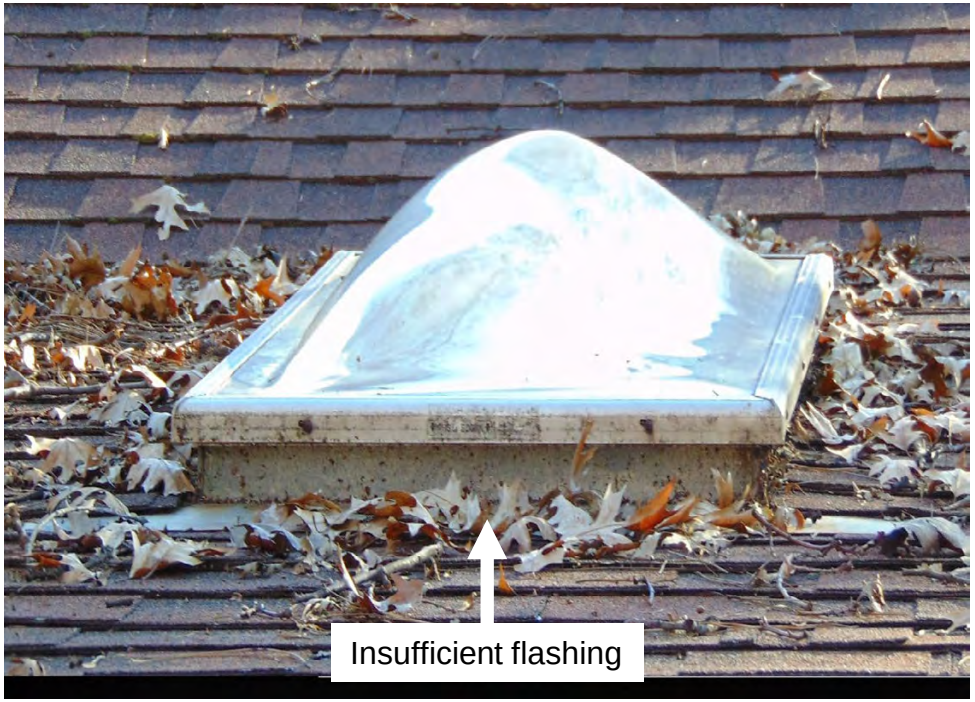
Item 1 Skylight – Skylights can melt or break from heat and allow ember intrusion.

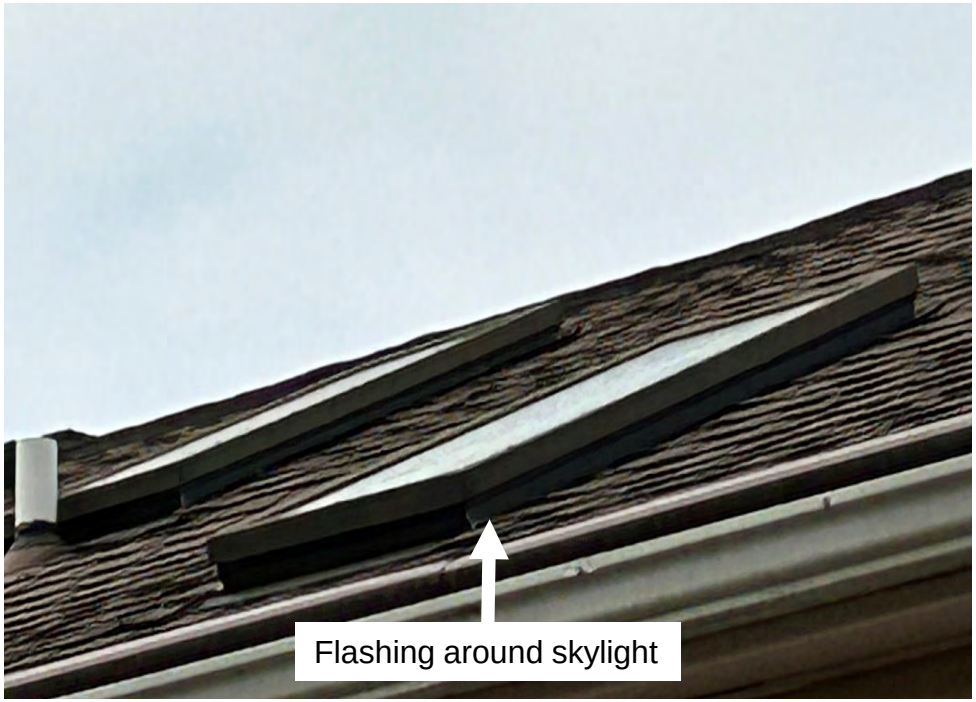
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 1: Skylight

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 2 Roof to Skylight Flashing





Item 2 Roof to Skylight Flashing – Flashing to protect sides of skylight to prevent against combustible debris ignition and embers.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

HMM Reference

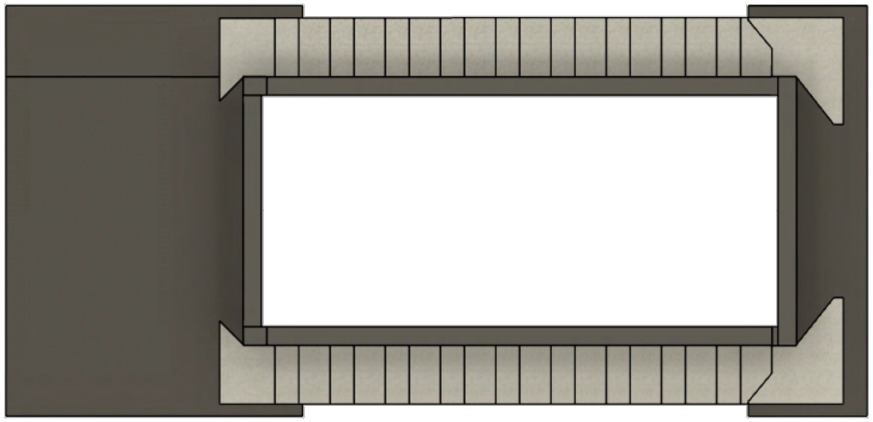
NIST Technical Note 2205, Roof-to-Skylight Flashing, Table A, Item 2 (page 58)

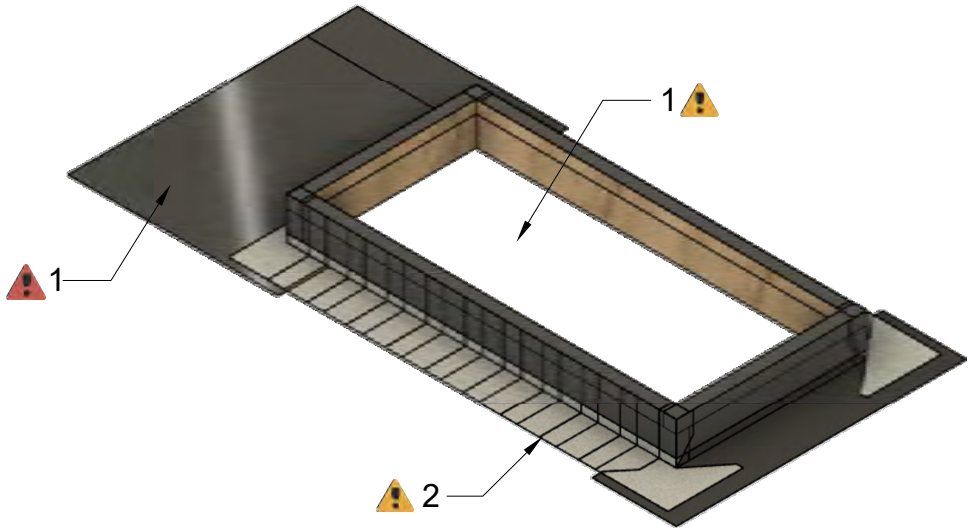
Project: HMM House	Size: A
Scale: 1/20	Sheet: 1/1

- **Hardening Action**: Check for standard metal flashing and that no exposed wood is present, repair as necessary.
- **Applicable Conditions**: Lack of metal flashing around skylight
- **Performance Goal**: Prevent ignition of combustible skylight framing

Installation Cautions

1. Use fire resistant caulking
2. No combustible material should be exposed.





Notes

Color Key:

- Brown: wood
- Gray: Metal Step Flashing
- Black/Dark Gray: Counter Flashing

Fire Hazards

1. Debris accumulation on back or surrounding skylight panels.

HMM Reference	NIST Technical Note 2205: Item 3.1 Roof Assembly Details (Flashing)

Item 3.1 Roof Assembly Details (Flashing) – Flashing to protect against ignition by combustible debris and embers.

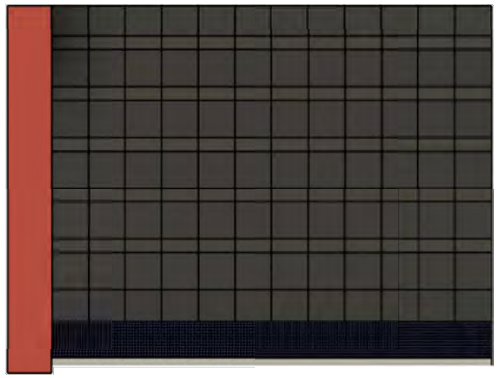
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

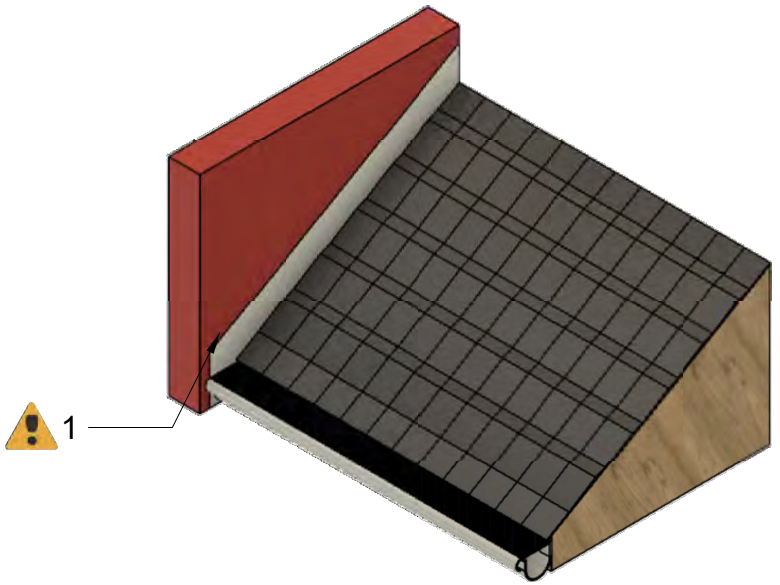
HMM Reference		
NIST Technical Note 2205, Roof Assembly Details (Flashing), Table A, Item 3.1 (Page 58)		
Project: HMM House	Size: A	
Scale: 1:30	Sheet: 1/1	

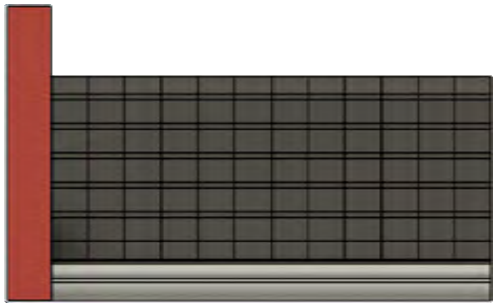
- **Hardening Actions**: Metal flashing at roof-to-wall joint
- **Applicable Conditions**: Combustible siding at roof-to-wall intersection
- **Performance Goals**: Prevent ignition of roof from burning accumulated debris

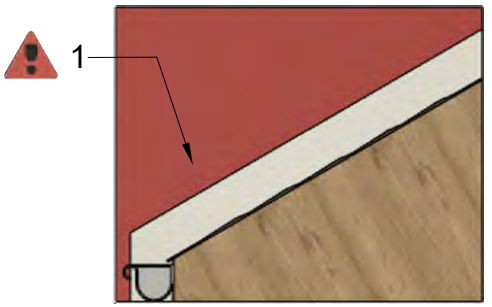
Installation Cautions

1. Use fire resistant caulking to seal flashing and do not leave combustibles exposed.









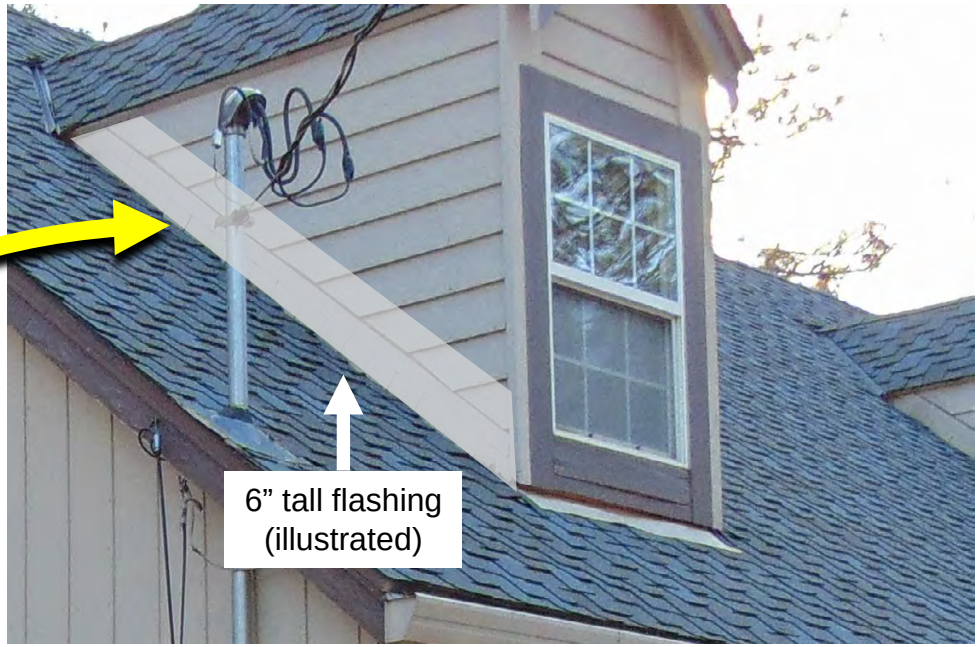
Notes

- Alternative option: Add 6-inch tall flashing over the existing siding, or remove siding and put flashing on

Fire Hazards

1. If flashing is added on top of existing siding, siding can still ignite if the surrounding ignites and risk igniting the roof

HMM Reference	NIST Technical Note 2205: Item 3.2 Roof Assembly Details (Dormers)



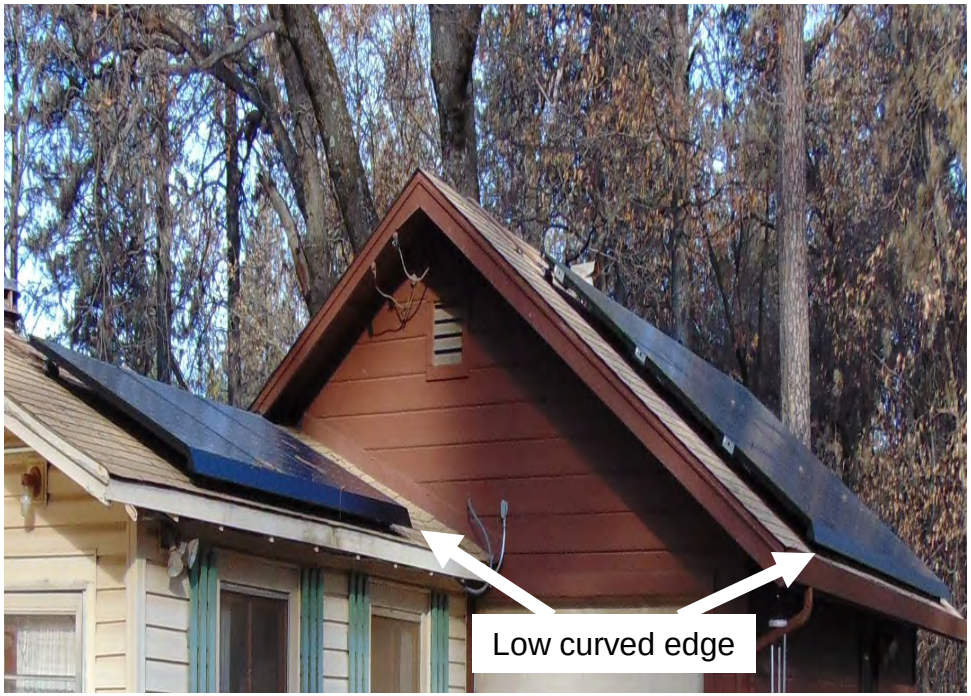
Item 3.2 Roof Assembly Details (Dormers) – Flashing and ignition resistant siding to protect dormer from ignition by combustible debris and embers.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 3.2: Assembly Details (Dormer)

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 4 Solar Panel Raised Up



Item 4 Solar Panel Raised Up – Low curved edge can trap debris.

There is no CAD drawing for
Item 4: Solar Panel Raised Up

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 5 Roof Covering (Old Wood Shake)

Photos pending.

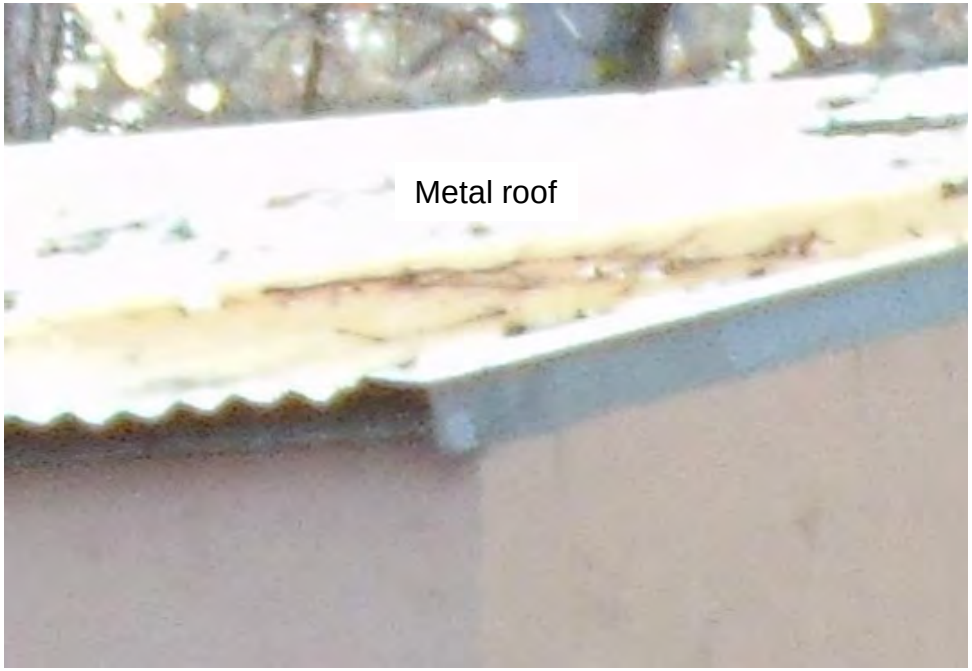
Item 5 Roof Covering (Old Wood Shake) – Old wood and cedar roof materials are a high ignition risk.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 5: Roof Covering (Old Wood Shake)

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 6 Roof Covering (Classes B and C)



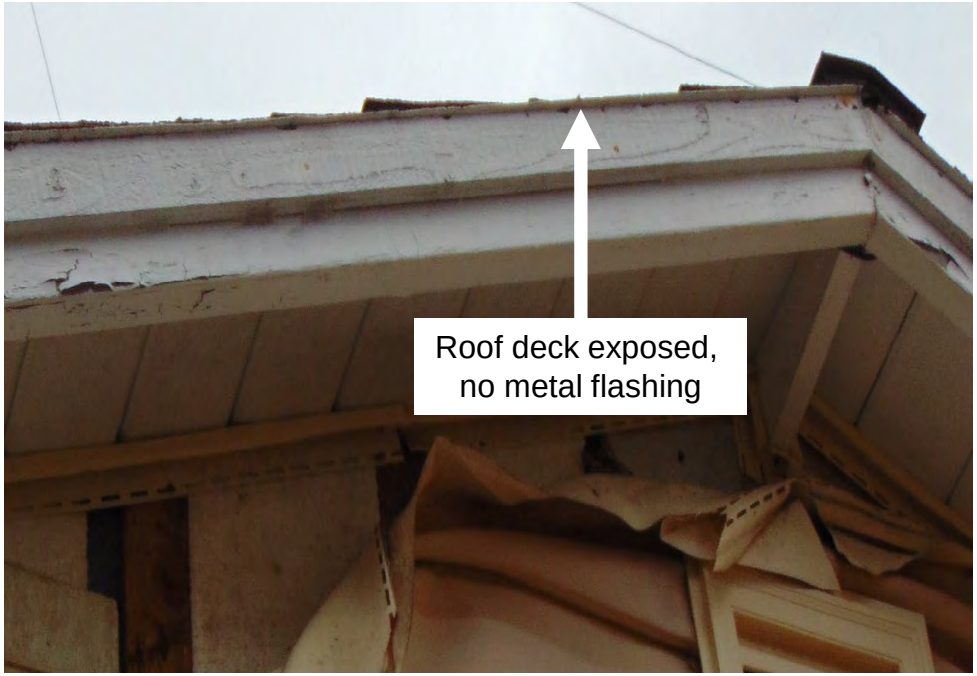
Item 6 Roof Covering (Classes B and C) – Hardened roof materials like metal and Spanish tile prevent ignition.

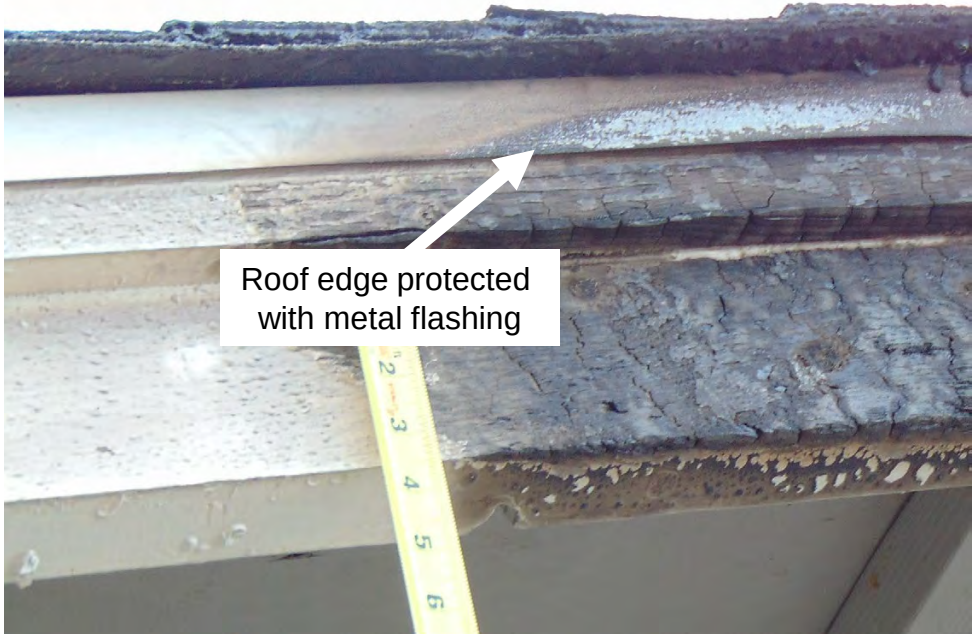
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 6: Roof Covering (Classes B and C)

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 7 Roof Covering with Openings





Item 7 Roof Covering with Openings – Roof deck exposed when roof covering material or flashing does not extend past the roof deck or is not present.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 7: Roof Covering with Openings

Please see photographs for illustrations.

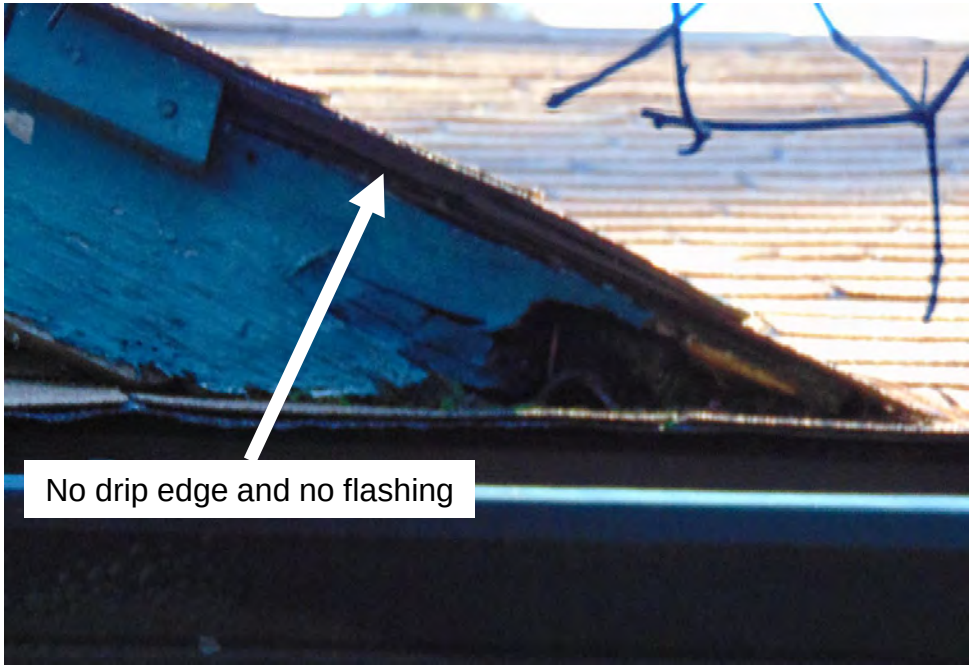
HMM Reference	NIST Technical Note 2205: Item 8.1 Gutter Mesh Covering

Item 8.1 Gutter Mesh Covering – Noncombustible gutter covers help prevent combustible debris and embers from entering gutter.

There is no CAD drawing for
Item 8.1: Gutter Mesh Covering

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 8.2 Metal Drip Edge



Item 8.2 Metal Drip Edge – Metal drip edge protects roof materials.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 8.2: Metal Drip Edge

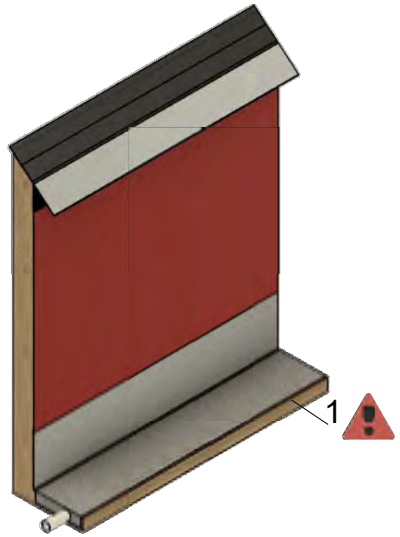
Please see photographs for illustrations.

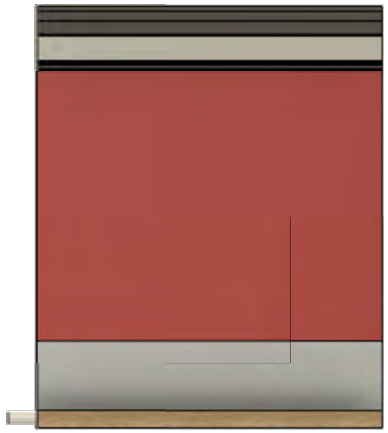
HMM Reference	NIST Technical Note 2205: Item 8.3 & 9 No Gutters

Item 8.3 & 9 No Gutters – Roof edge without gutters can leave combustible roof materials exposed.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

HMM Reference		Installation Cautions
NIST Technical Note 2205, No Gutters, Table A, Items 8.3 & 9 (Page 58)	• **Hardening Actions**: Remove gutter & add metal sheathing if fascia does not cover roof sheathing • **Applicable Conditions**: Combustible gutter cover, no gutter cover, and/or exposed sheathing • **Performance Goals**: Prevent ignition from embers and prevent accumulation of embers at sheathing intersection	
Project: HMM House / Size: A Scale: 1:70 / Sheet: 1/1		





Notes	Color Key:		Fire Hazards
• Very expensive solution - less expensive ones are available • May require subsurface-surface drainage such as ICC 11.01.6	• Red: Painted wall • Black: Roof tiles • Brown: Wood	• Gray: Metal flashing • Light Gray/White: Pipe • Mottled: Rubble filter	1. Flammable debris can accumulate in rubble filter and ignite close to house if not cleaned

HMM Reference	NIST Technical Note 2205: Item 10 Height of Wall Assembly

Item 10 Height of Wall Assembly – Hardening exterior walls and deck supports 2 ft above ground will prevent windblown debris and embers from igniting the wall.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

HMM Reference

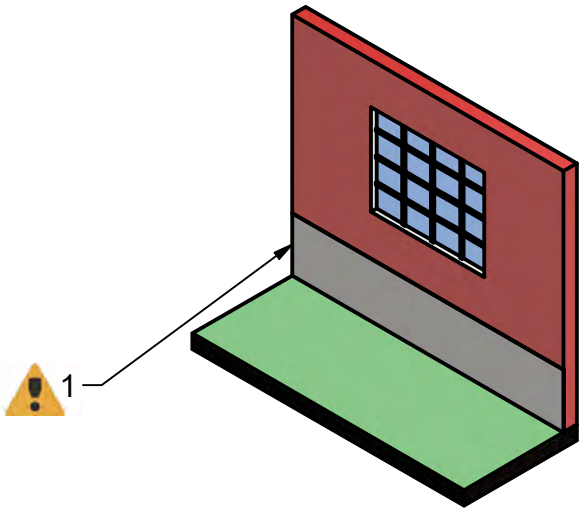
NIST Technical Note 2205, Height of Wall Assembly, Table A, Item 10 (Page 58)

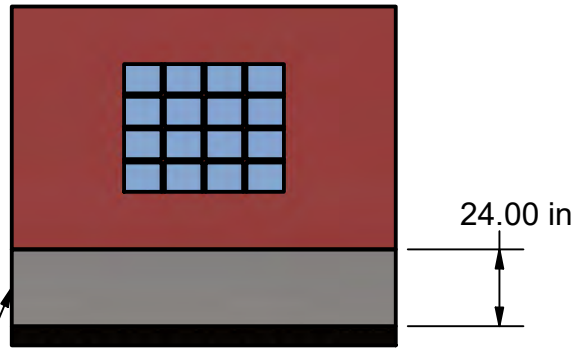
Project: HMM House	Size: A
Scale: 1:60	Sheet: 1/1

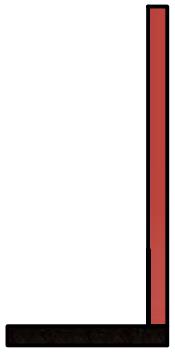
- **Hardening Action**: Replace exterior wall covering with noncombustible material for first two ft (from ground) and add metal flashing to protect bottom edge sheathing
- **Applicable Conditions**: All sheathing within two feet of the ground
- **Performance Goals**: Prevent windblown debris and embers from igniting the wall

Installation Cautions

1. Seal noncombustible wall covering to house exterior.







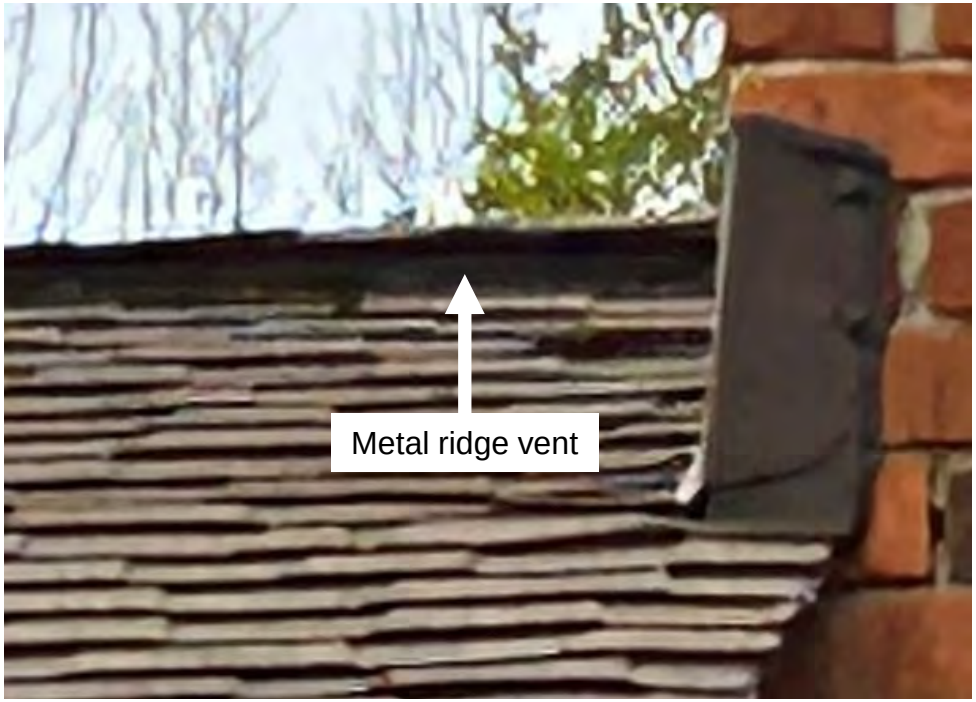
Notes

- Metal flashing is required for all claddings, including ignition resistant materials

Fire Hazards

1. If superheated by close proximity to flame, metal flashing risks igniting siding

HMM Reference	NIST Technical Note 2205: Item 11 Ridge Vent

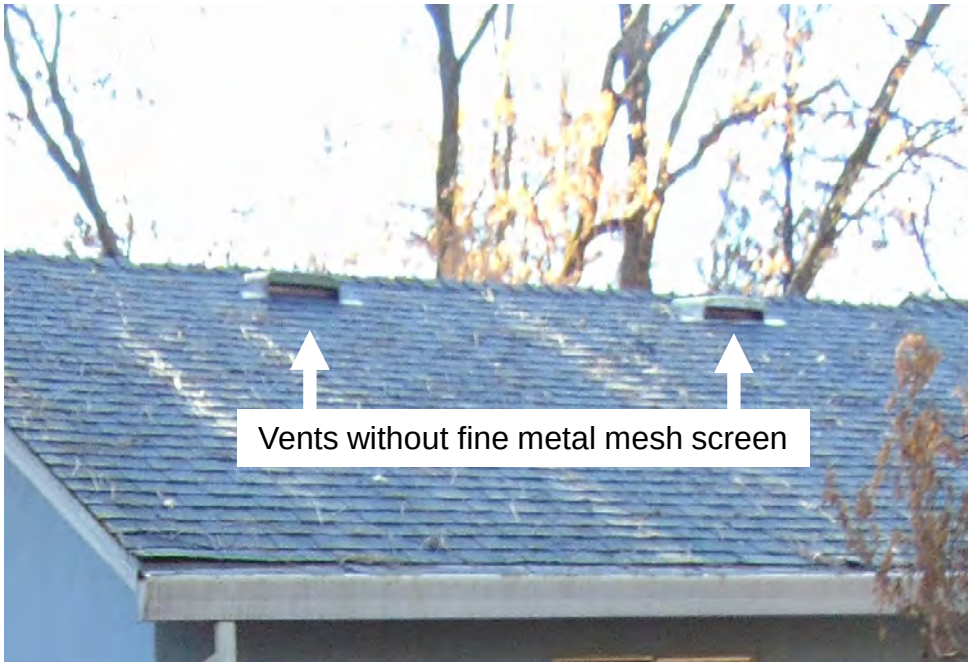


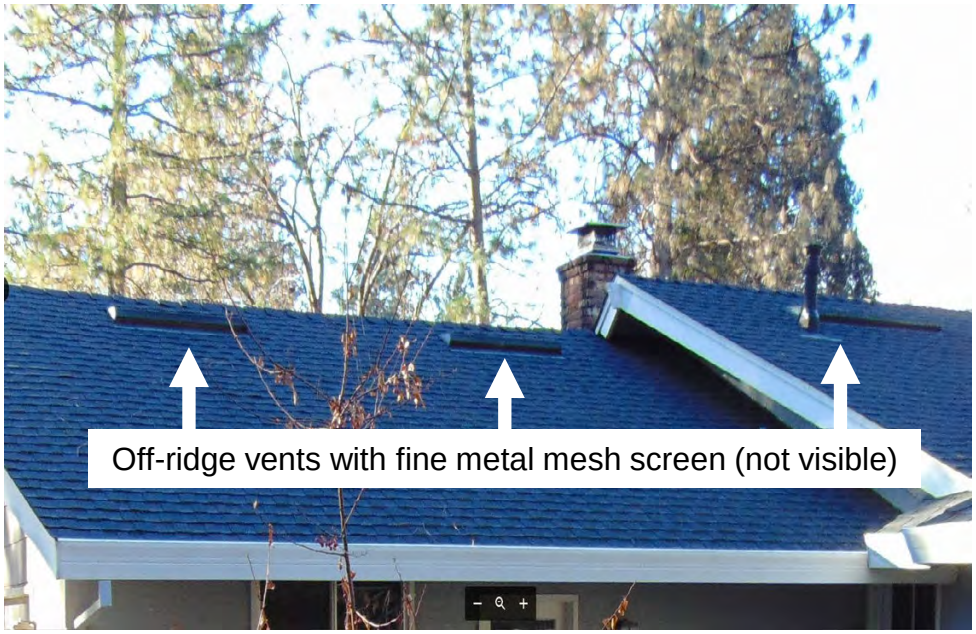
Item 11 Ridge Vent – Metal ridge vents prevent ember intrusion into house.

There is no CAD drawing for
Item 11: Ridge Vent

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 12 Off-Ridge Vents





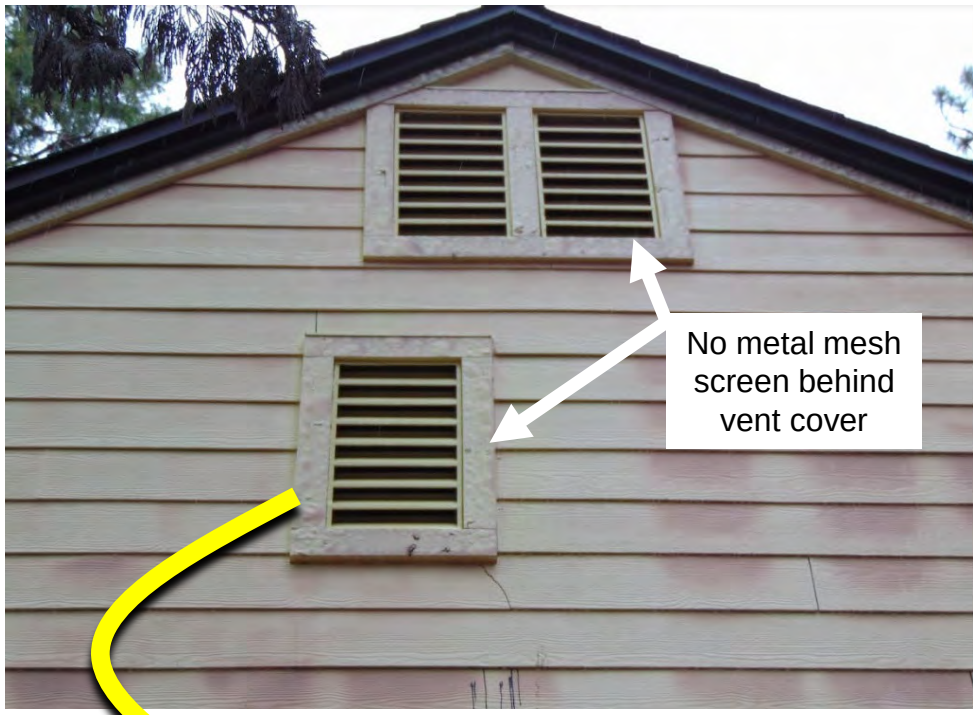
Item 12 Off-Ridge Vents – Apply fine metal mesh screens to roof vents to prevent ember intrusion.

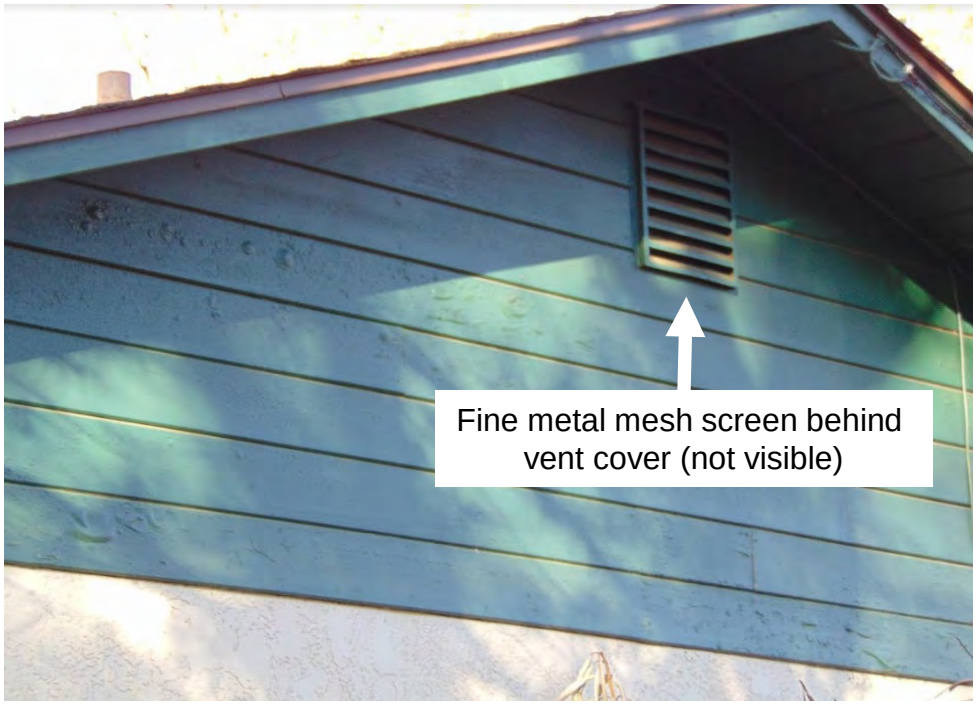
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

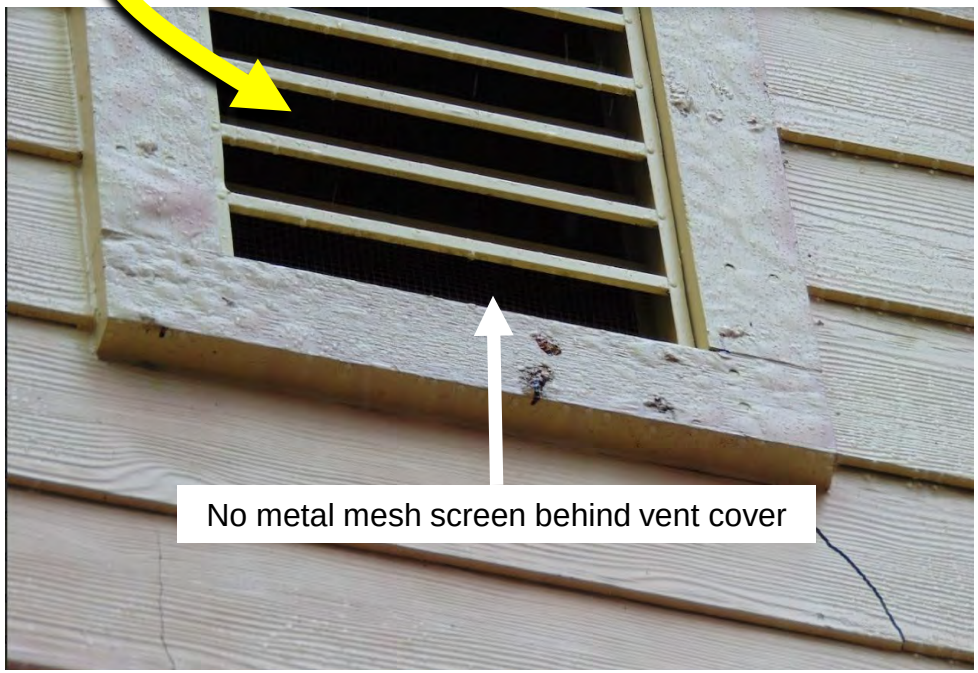
There is no CAD drawing for
Item 12: Off-Ridge Vents

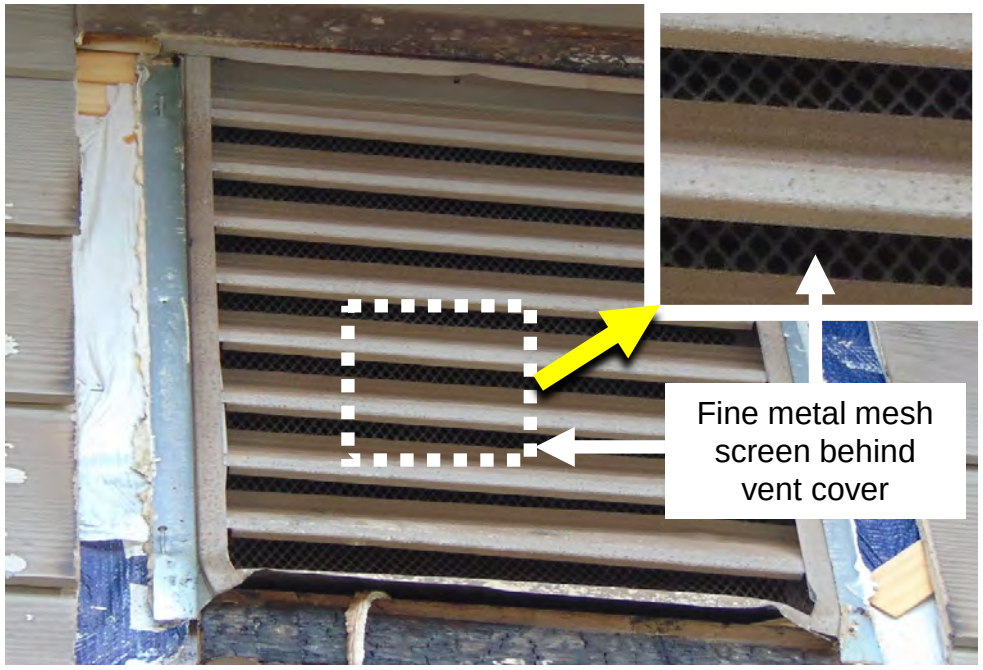
Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 13 Gable Vent









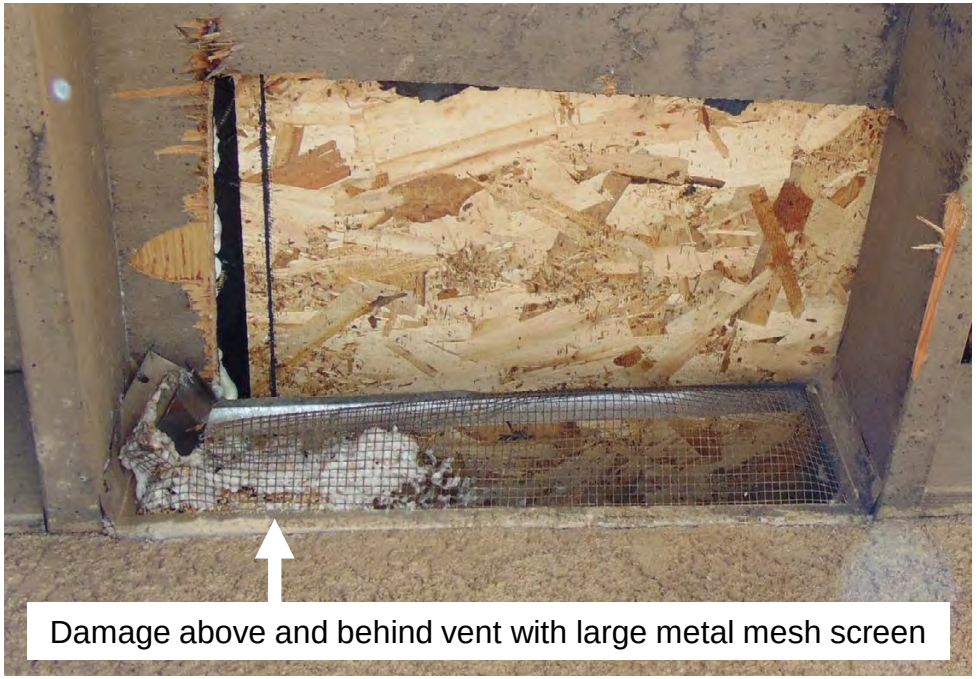
Item 13 Gable Vent – Apply 1/8th inch fine metal mesh screen inside gable vents to prevent ember intrusion.

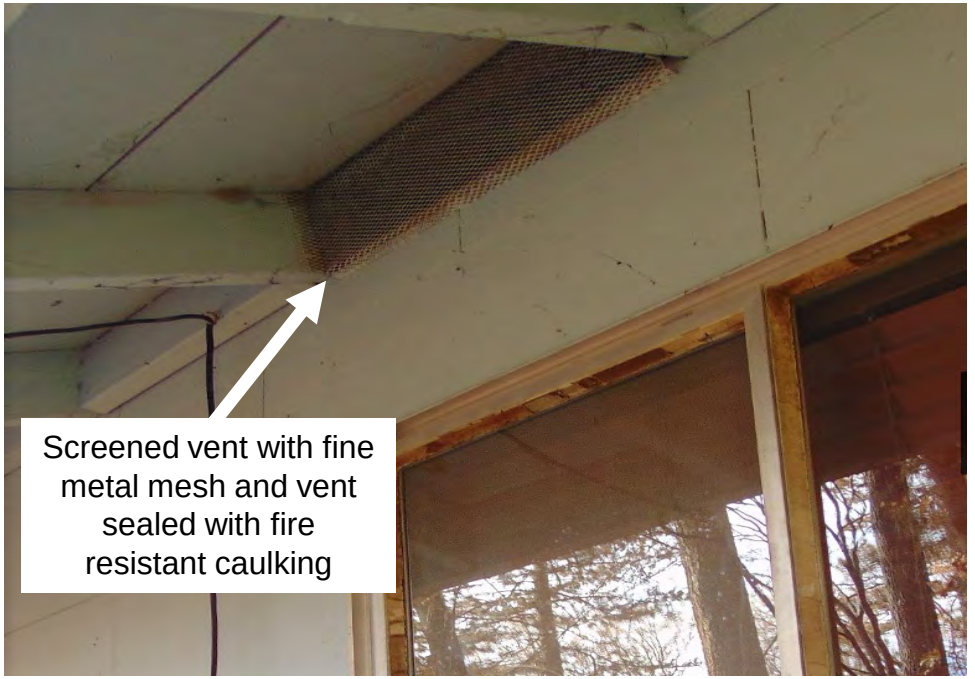
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 13: Gable Vent

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 14.1 Under Eave Vent (Vertical)





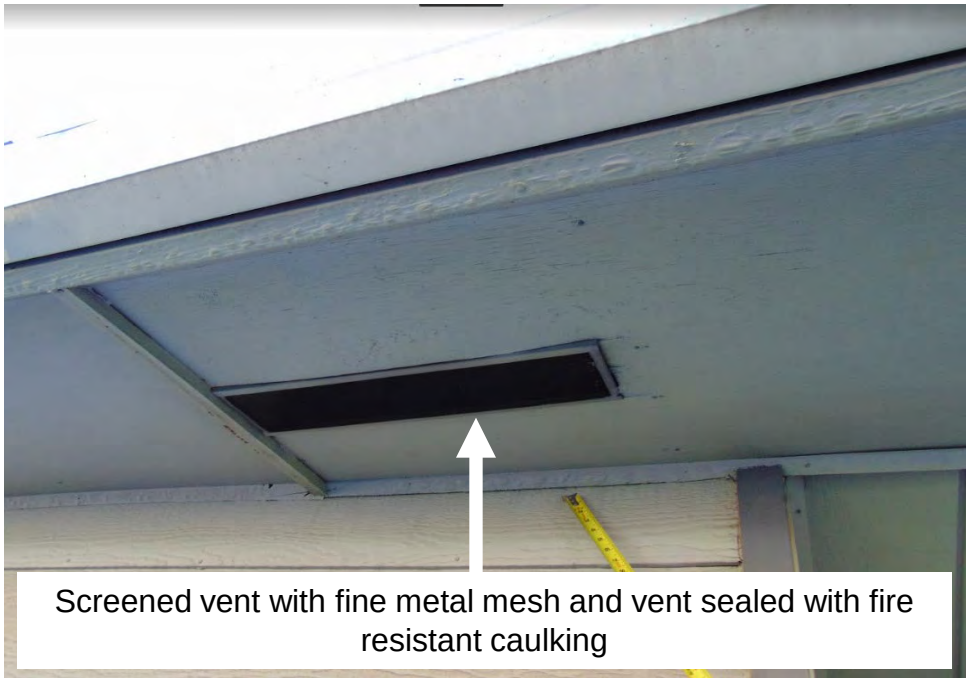
Item 14.1 Under Eave Vent (Vertical) – Keep vents clean, cover with a 1/8th inch fine metal mesh screen, and seal vent with fire-resistant caulking.

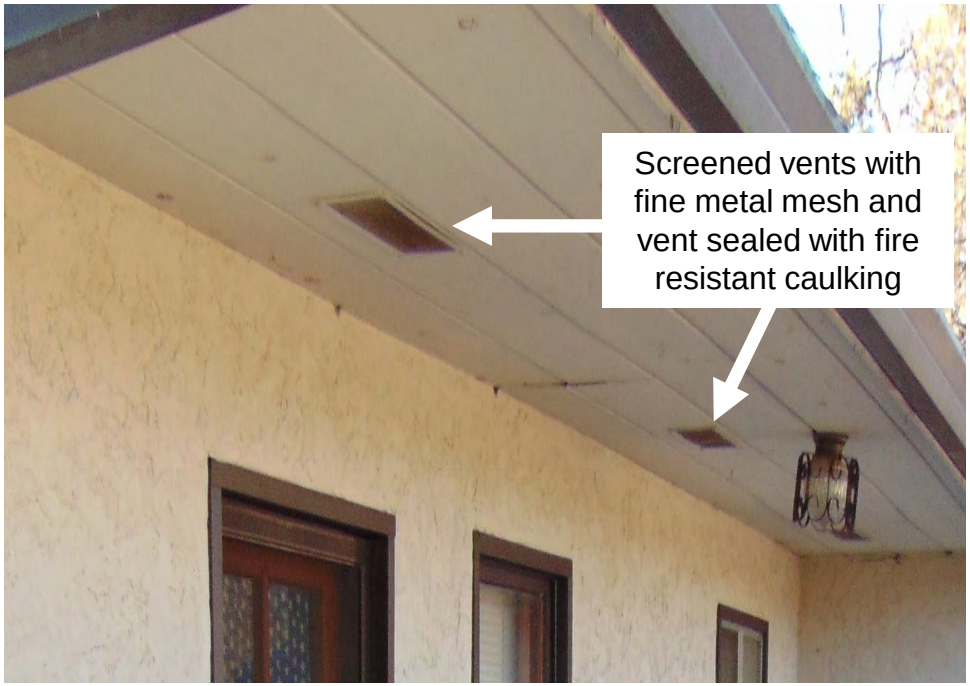
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 14.1: Under Eave Vent, Vertical

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 14.2 Under Eave Vent (Horizontal)





Item 14.2 Under Eave Vent (Horizontal) – Keep vents clean and cover with a 1/8th inch fine metal mesh screen and sealed with fire-resistant caulking.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 14.2: Under Eave Vent, Horizontal

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 15.1 & 15.2 Crawl Space Vent

Screened vent but metal mesh spacing is too large


Screened vent with fine metal mesh spacing


Screened vent but metal mesh spacing is too large


Screened vent with fine metal mesh spacing

Item 15.1 & 15.2 Crawl Space Vent – Keep vents clean and cover with a 1/8th inch fine metal mesh screen to prevent ember intrusion.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 15.1,15.2: Crawl Space Vent

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 15.3 No Crawl Space Vent

Photos pending.

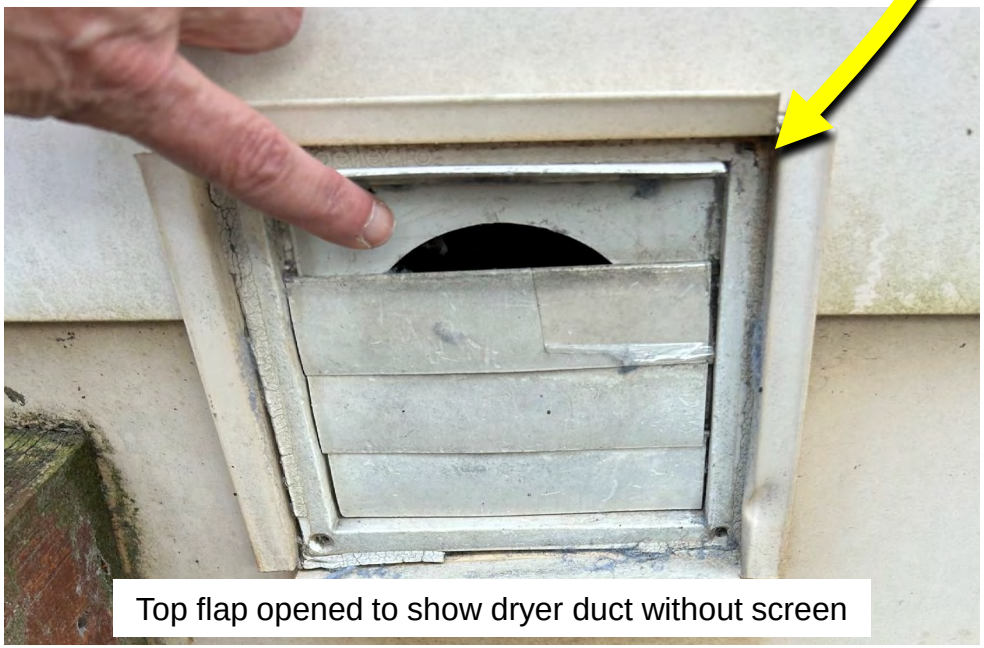
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 15.3: Crawl Space Vent, None

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 16 Dryer Vents

Plastic cover for dryer vent without fine metal mesh screen



Top flap opened to show dryer duct without screen

Item 16 Dryer Vents Caption – Hardened dryer vent exterior, use a 1/8th inch fine metal mesh screen, and metal flapper to prevent ember intrusion.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 16: Dryer Vents

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 17 Makeup Air Intake

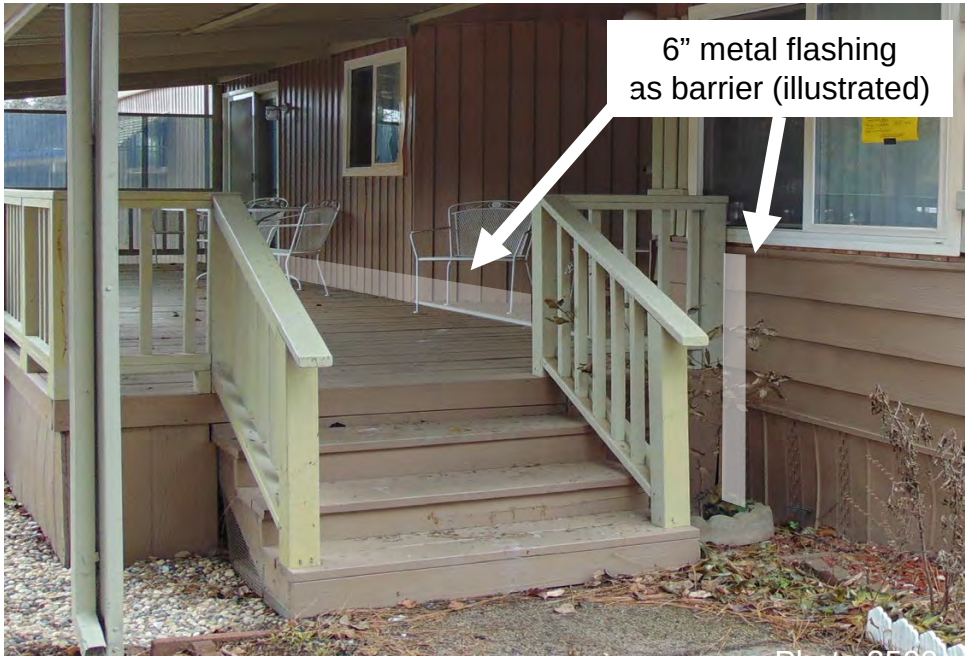
Item 17 Makeup Air Intake – Large intake vents should have a 1/8th inch fine wire mesh screen to prevent ember intrusion.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 17: Makeup Air Intake

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 19 Other Attachments to Mobile Home



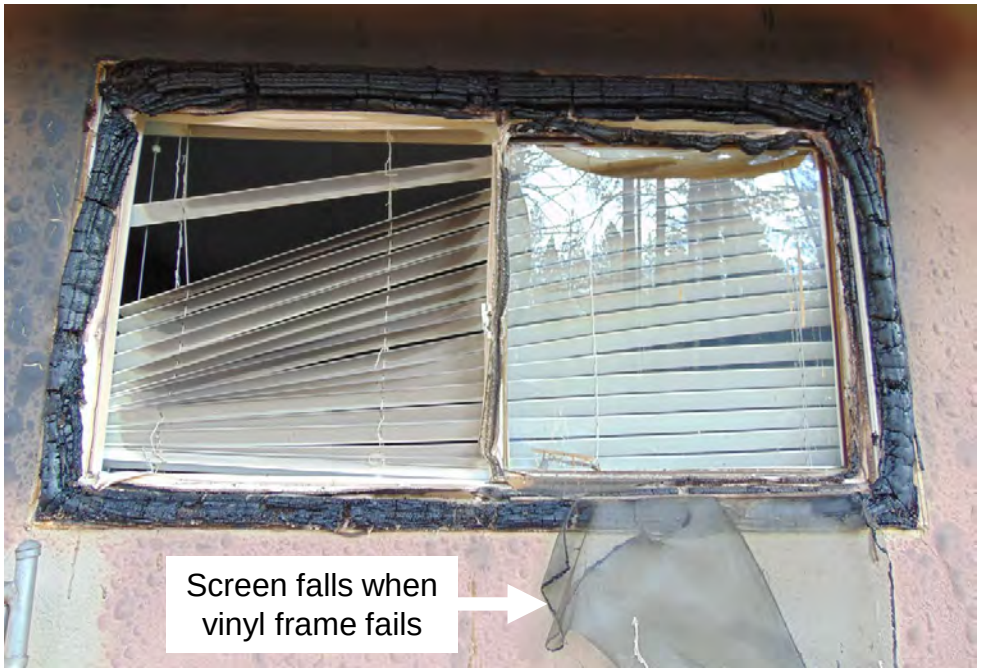
Item 19 Other Attachments to Mobile Home – Noncombustible barrier between mobile home attachments and house exterior.

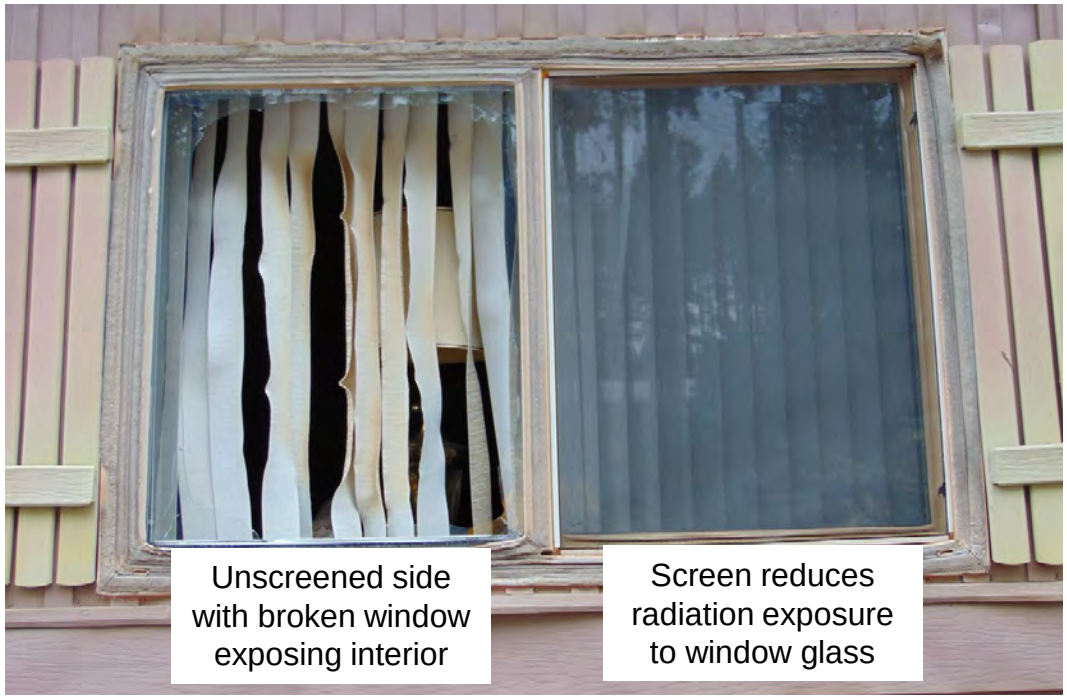
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 19: Other Attachments to Mobile Home

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 21 Window Screen





Item 21 Window Screen – Window screens reduce radiation to pane glass and prevent ember intrusion before and after glass failure.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 21: Window Screen

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 22 Window (Single Pane)

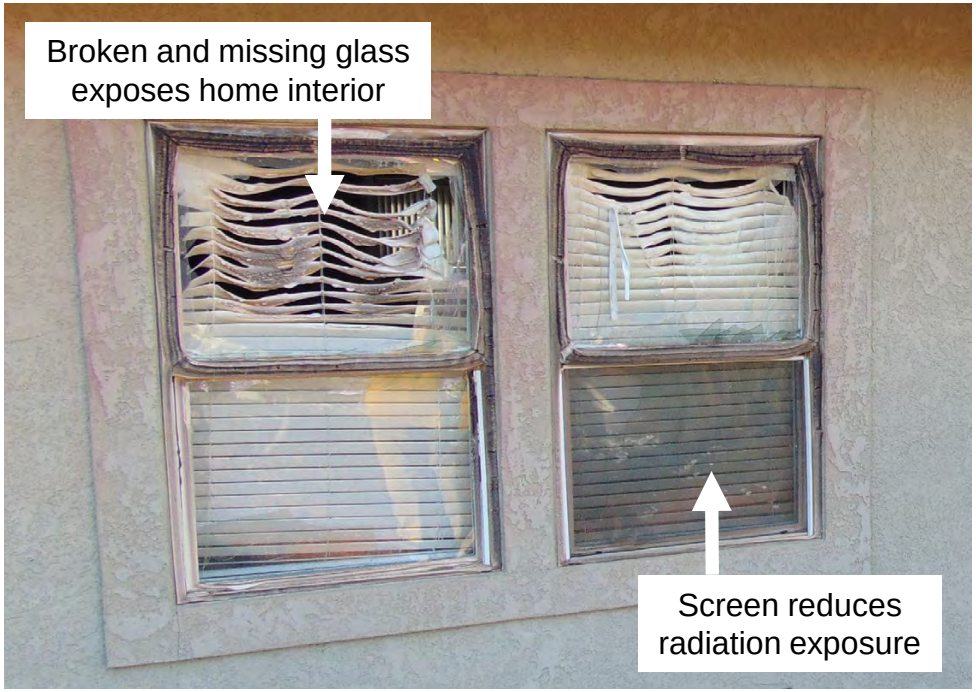
Item 22 Window (Single Pane) – Replace with non-combustible frame and double pane tempered glass window.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 22: Window (Single Panel)

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 23 Window (Double Pane)



Item 23 Window (Double Pane) – Double pane provides protection against radiation and ember intrusion.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 23: Window (Double Pane)

Please see photographs for illustrations.

Item 24.1 Exterior Door (Non-Sliding) – Combustible door and door jamb can ignite; noncombustible door materials prevent ignition.

There is no CAD drawing for
Item 24.1: Exterior Door (non-sliding)

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 24c Exterior Door (Sliding)

Item 24c Exterior Door (Sliding) – Noncombustible sliding doors reduce risk of ignition to home interior.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 24c: Exterior Door (Sliding)

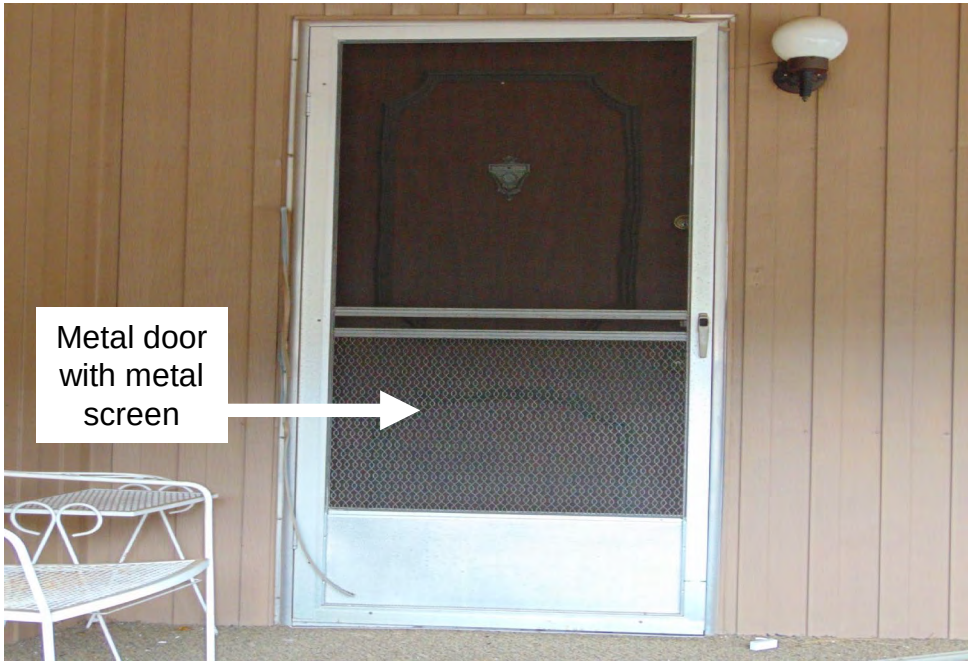
Please see photographs for illustrations.

Item 25 Wood-Frame Screen Door – Noncombustible framed metal screen doors reduce risk of ignition.

There is no CAD drawing for
Item 25: Wood-Frame Screen Door

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 26 Plastic Screen Door



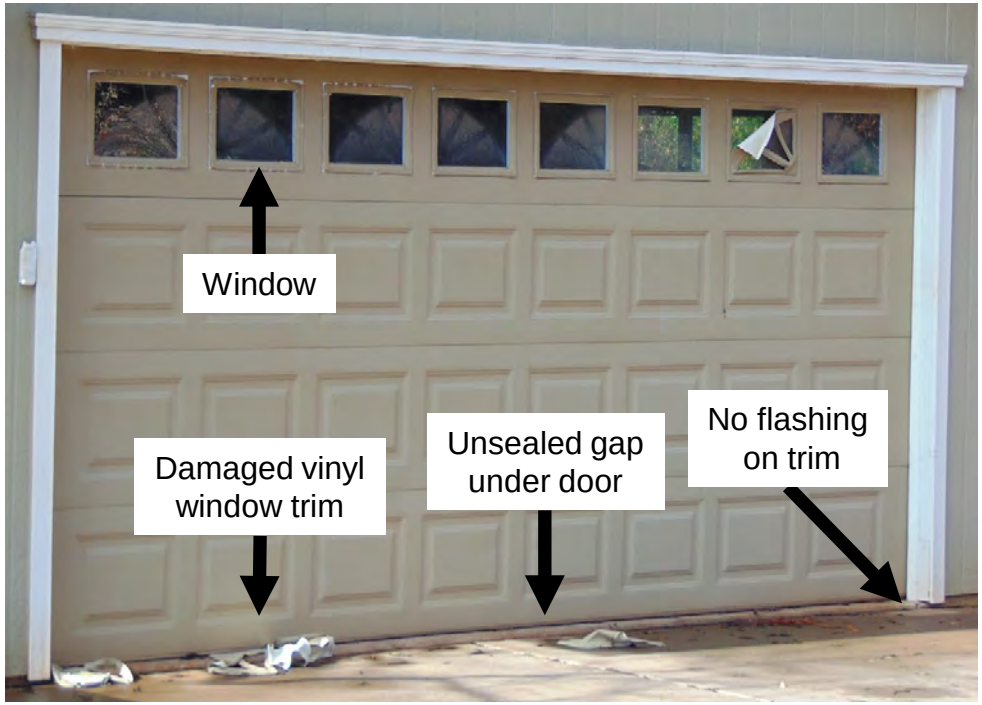
Item 26 Plastic Screen Door – Replace plastic screen doors with metal screens and doors to reduce ignition risk.

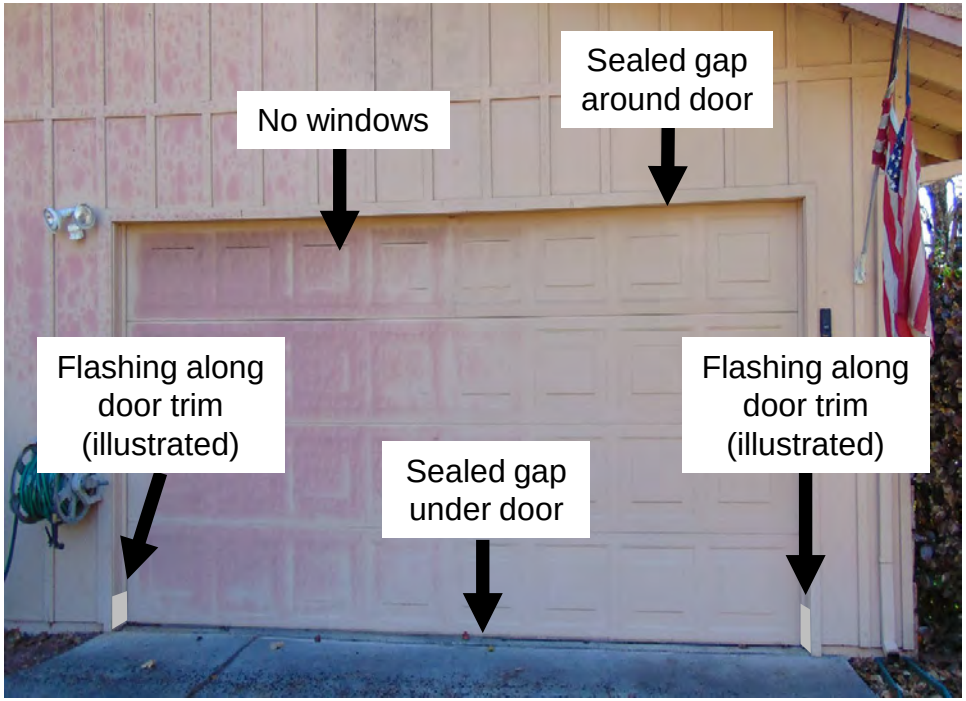
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 26: Plastic Screen Door

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 27 Garage Door





Item 27 Garage Door – Sealed garage doors with metal flashing along lower frame can reduce risk of garage ignition.

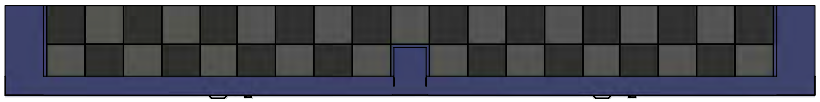
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

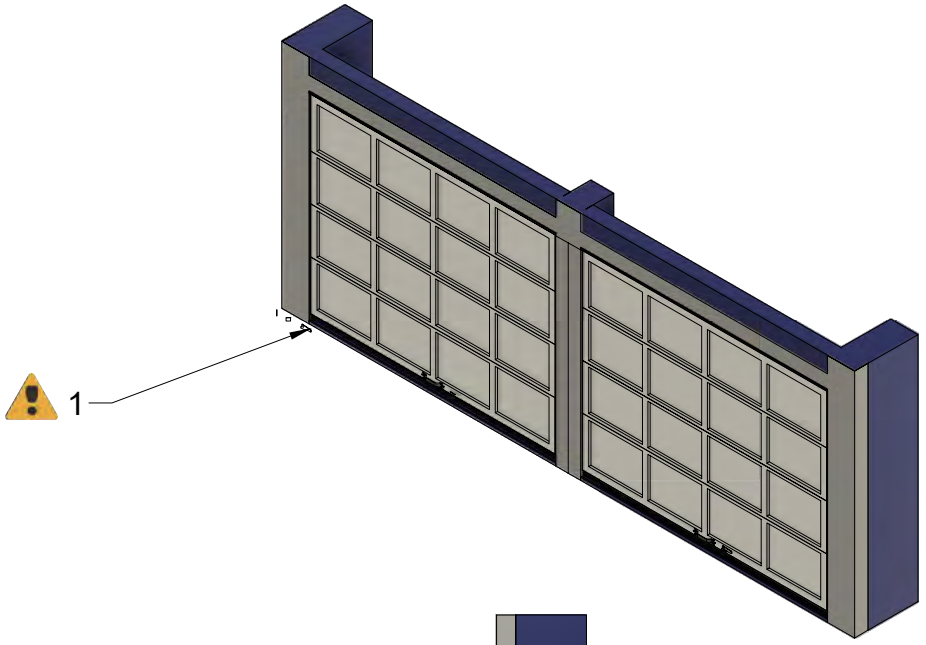
HMM Reference		
NIST Technical Note 2205 Garage Door, Table A, Item 27 (Page 60)		
Project: HMM House	Size: A	
Scale: 1:60	Sheet: 1/1	

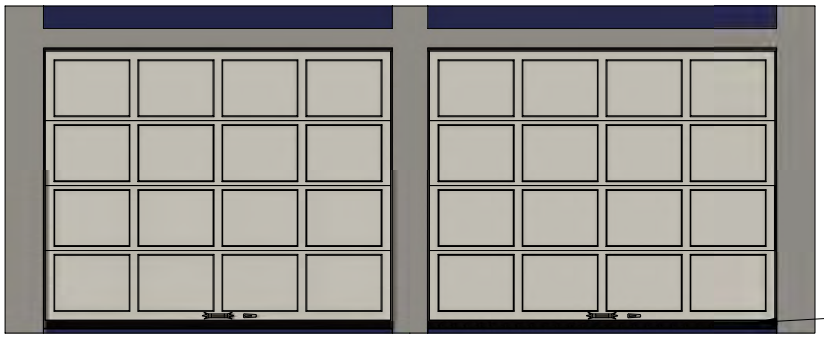
- **Hardening Actions**: Add metal flashing at base of framing for first 6 inches. Enclose bottom of door with metal flashing ("C" channel) for 6 inches if door is not metal. Add fire resistant gasketing.
- **Applicable Conditions**: Wooden door or frame; no gasket
- **Performance Goals**: Prevent ember intrusion and ignition

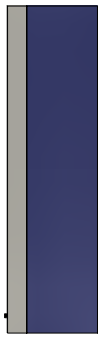
Installation Cautions

1. Seal flashing to frame.









Notes

- Gasket is matched in Chapter 7A

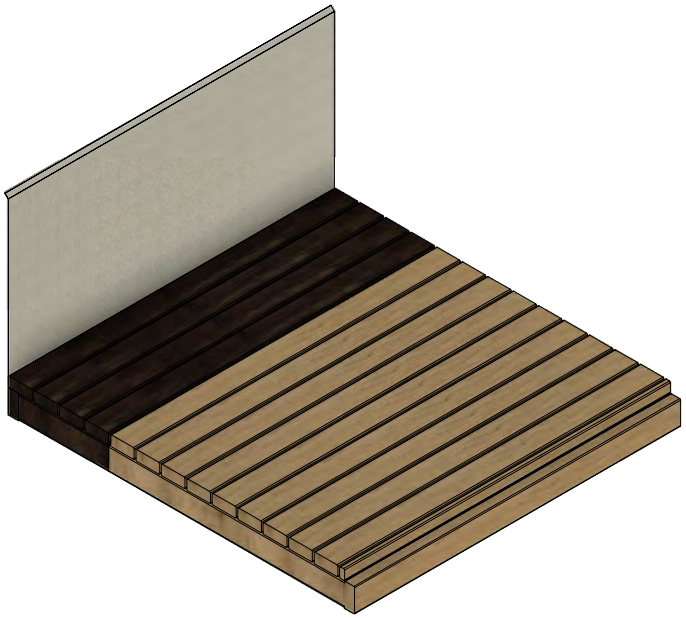
Fire Hazards

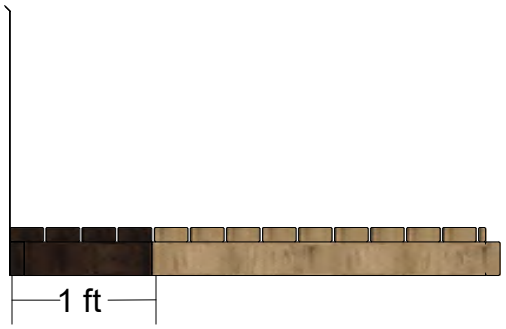
1. If gaps are present or door is left open, embers may enter the garage and ignite combustibles.

HMM Reference	NIST Technical Note 2205: Item 28.1 Deck Attached to Residence

Item 28.1 Deck Attached to Residence – Ignition resistant deck material within 1 ft of house exterior can reduce risk of ignition.

HMM Reference			Installation Cautions
NIST Technical Note 2205, Deck Attached to Residence, Table A, Item 28.1 (Page 60)		• **Hardening Action**: Replace walking surface boards with ignition resistant deck board for first 1 ft away from residence • **Applicable Conditions**: Combustible deck, stairs, and landing attached to residence • **Performance Goals**: Prevent ignition of deck and limit flame spread to exterior wall	
Project: HMM House	Size: A		
Scale: 1:20	Sheet: 1/1		





Notes	Color Coding	Fire Hazards
• Area under deck footprint must be free of combustibles	• Gray: Metal flashing • Dark Brown: ignition resistant deck boards • Light Brown: existing decking material	1. Decking beyond first 1 ft away from residence, and any combustible objects on deck, are still vulnerable to ignition.

HMM Reference	NIST Technical Note 2205: Item 28.2 Deck Attached to Residence

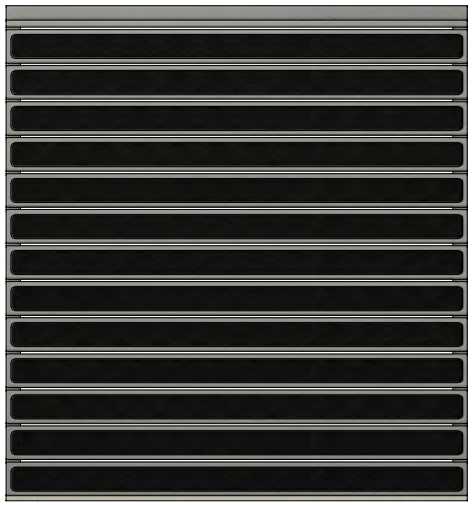
Item 28.2 Deck Attached to Residence – Replace combustible deck material with noncombustible material to reduce risk of ignition.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

HMM Reference		
NIST Technical Note 2205, Decks Attached to Residence, Table A, Item 28.2 (Page 60)		
Project: HMM House	Size: A	
Scale: 1:20	Sheet: 1/1	

- **Hardening Action**: Replace entire deck with ignition resistant option (metal or other material)
- **Applicable Conditions**: Combustible deck, stairs and landings attached to residence
- **Performance Goals**: Prevent ignition of deck and limit flame spread to exterior walls

Installation Cautions



Notes	Color Key:	Fire Hazards
• Matched in NFPA 1140, ICC IWUIC	• Light Gray: Metal flashing on exterior of residence • Dark Gray: Metal deck framing • Black: Ignition resistant decking material	

HMM Reference	NIST Technical Note 2205: Item 29 Deck-to-Wall Intersection

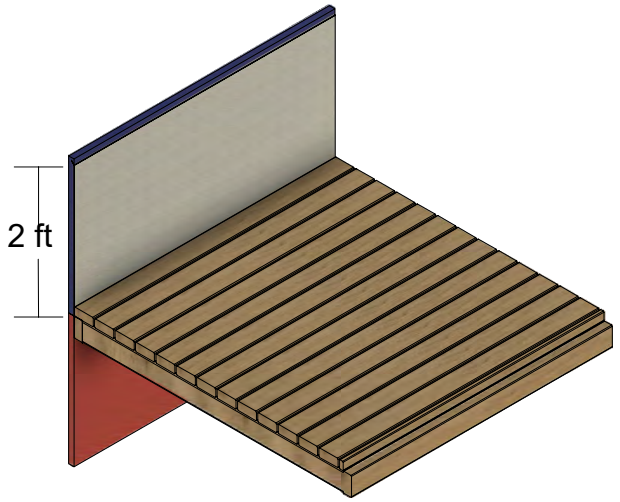
Item 29 Deck-to-Wall Intersection – Providing a 2 ft high noncombustible barrier up from deck along house exterior can reduce ignition.

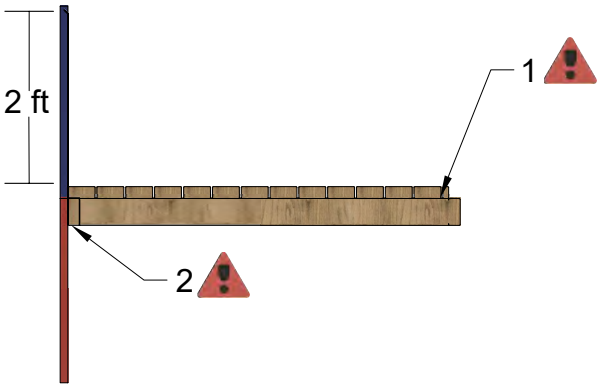
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

HMM Reference		
NIST Technical Note 2205, Deck-to-Wall Intersection, Table A, Item 29 (Page 60)		
Project: HMM House	Size: A	
Scale: 1:20	Sheet: 1/1	

- **Hardening Action**: Replace bottom 2 feet of combustible siding with noncombustible (e.g fiber cement) and add metal flashing to protect exposed sheathing
- **Applicable Conditions**: Combustible siding
- **Performance Goals**: Limit ignition of exterior wall

Installation Cautions





Notes

1. See Item 28.

Fire Hazards

1. Wooden deck can ignite
2. Wooden part inside of cladding can ignite and potentially damage the house

HMM Reference	NIST Technical Note 2205: Item 30 Combustible Decks & Nearby Fuels

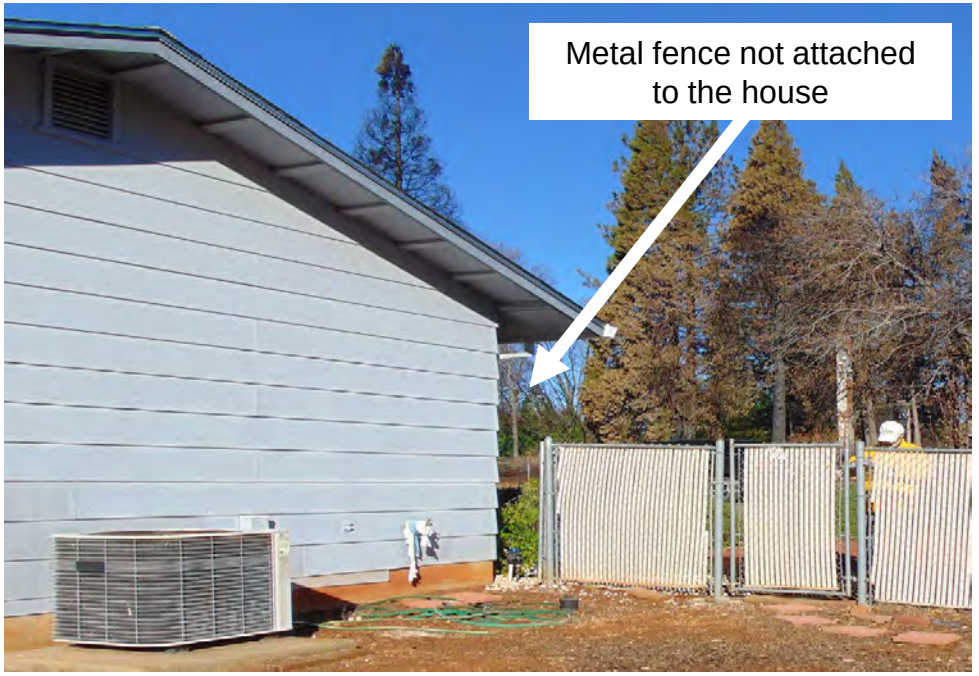
Item 30 Combustible Decks & Nearby Fuels – Remove combustibles around the house and away from the deck.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 30: Combustible Decks & Nearby Fuels

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 31 Fence Attached to Residence



Item 31 Fence Attached to Residence – Keep combustible fence away from house, use noncombustible fence within 8 ft of house.

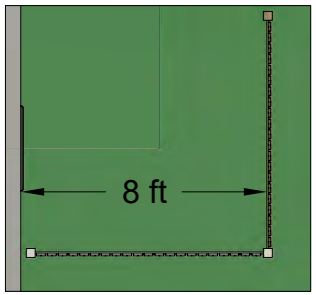
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

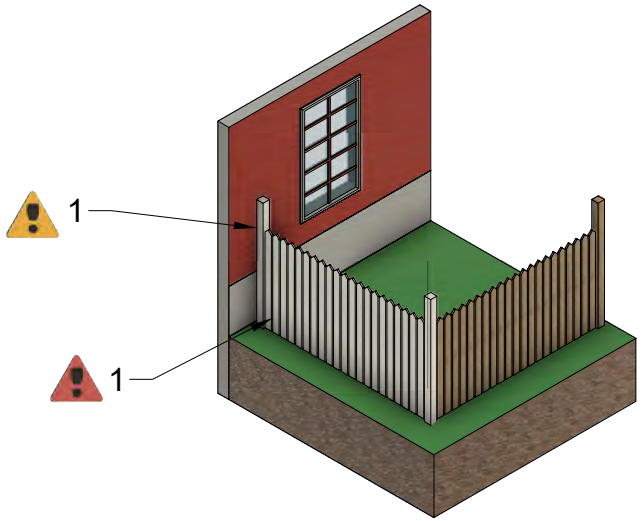
HMM Reference		
NIST Technical Note 2205, Fence Attached to Residence, Table A, Item 31 (Page 60)		
Project: HMM House	Size: A	
Scale: 1:75	Sheet: 1/1	

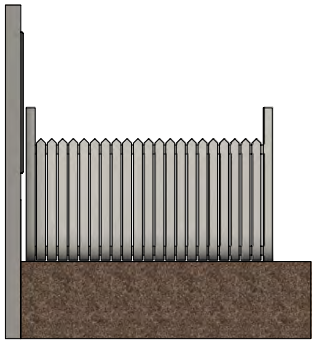
- **Hardening Action**: Replace with flame-retardant option (metal or other option), minimum 8 ft
- **Applicable Conditions**: Combustible fence
- **Performance Goals**: Prevent ignition of combustible fence from spreading to house

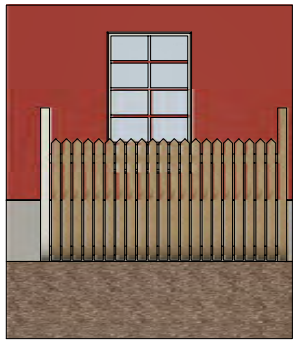
Installation Cautions

1. Do not use combustible materials to attach noncombustible fence to the house.









Notes

- Only applies to single fences - Table B, Item 10 is double fences
- Fences must be a minimum 8 ft from any residence

Color Key:

- Brown: Wood fence
- Light gray: Metal fence
- Mottled brown: Soil
- Red: Exterior wall siding
- Gray: Metal flashing
- Green: Lawn

Fire Hazards

HMM Reference	NIST Technical Note 2205: Item 32 Stairs Connected to Residence

Item 32 Stairs Connected to Residence – Use a noncombustible material for exterior stairs attached to noncombustible barrier/section between steps and house and between handrails and house (min 1') or replace with noncombustible handrail.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 32: Stairs connected to residence

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 34 Attached Retaining Walls

Item 34 Attached Retaining Walls – Replace retaining wall length equal to two times retaining wall height with noncombustible components.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

HMM Reference

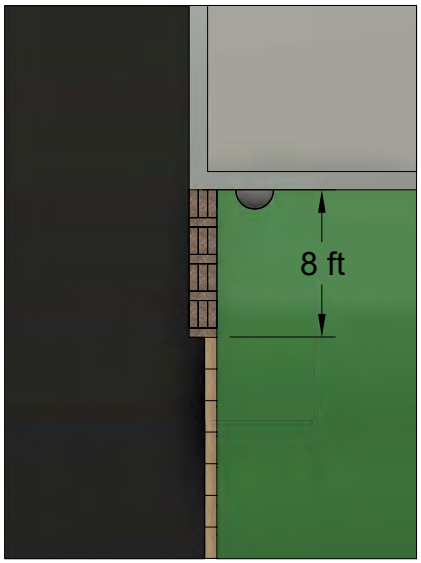
NIST Technical Note 2205, Attached Retaining Walls, Table A, Item 34 (Page 61)

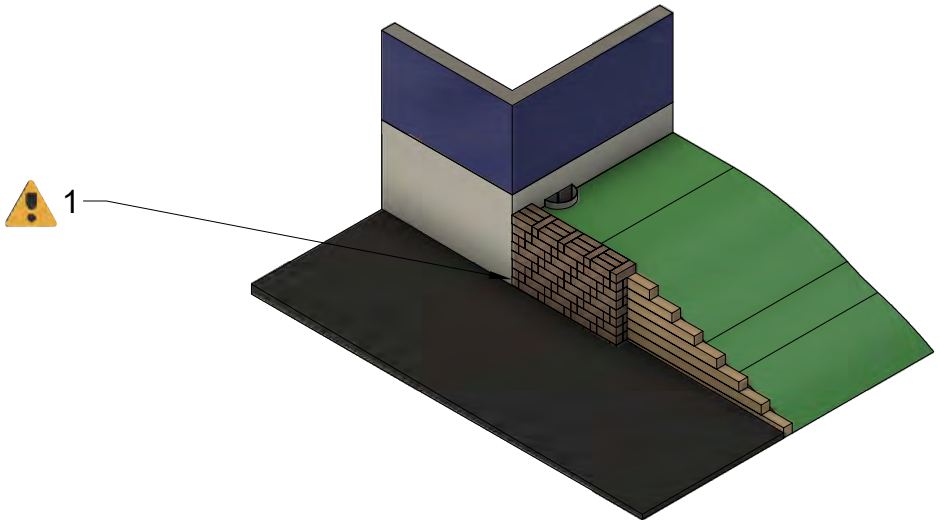
Project: HMM House	Size: A
Scale: 1:125	Sheet: 1/1

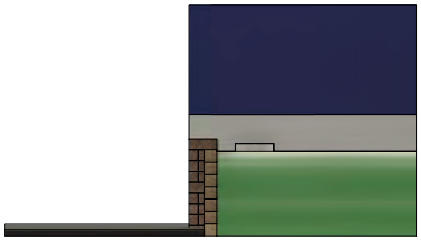
- **Hardening Actions**: Replace retaining wall length equal to two times retaining wall height with ignition resistant components
- **Applicable Conditions**: Combustible retaining wall withing two times the retaining wall height from the residence
- **Performance Goals**: Prevent flames from retaining wall from igniting residence.

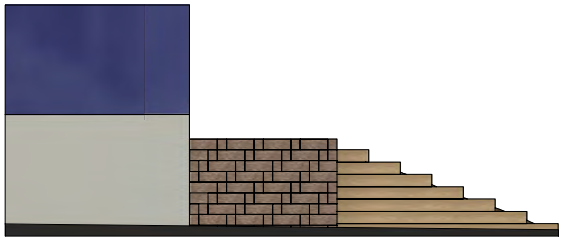
Installation Cautions

1. Seal retaining wall and house joint with ignition resistant material.









Notes

- Structural components of retaining wall must be maintained (must meet code).
- Ignition resistant material to 8 ft

Fire Hazards

HMM Reference	NIST Technical Note 2205: Item 35 Combustible Furniture

Item 35 Combustible Furniture – Move combustible furniture away from house to reduce risk of home ignition from burning combustibles.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 35: Combustible Furniture

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 36 Pergola / Trellis

Item 36 Pergola / Trellis – Do not attach combustible materials to the house exterior; keep pergola / trellis 2 ft from home.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 36: Pergola/trellis

Please see photographs for illustrations.

Item 37 Mobile Home Skirting – Noncombustible skirting can prevent mobile home underside from igniting and accumulating flammable (windblown) debris.

There is no CAD drawing for
Item 37: Skirting, Mobile Home

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 38 Mobile Home Crawl Space Access Hinged Door

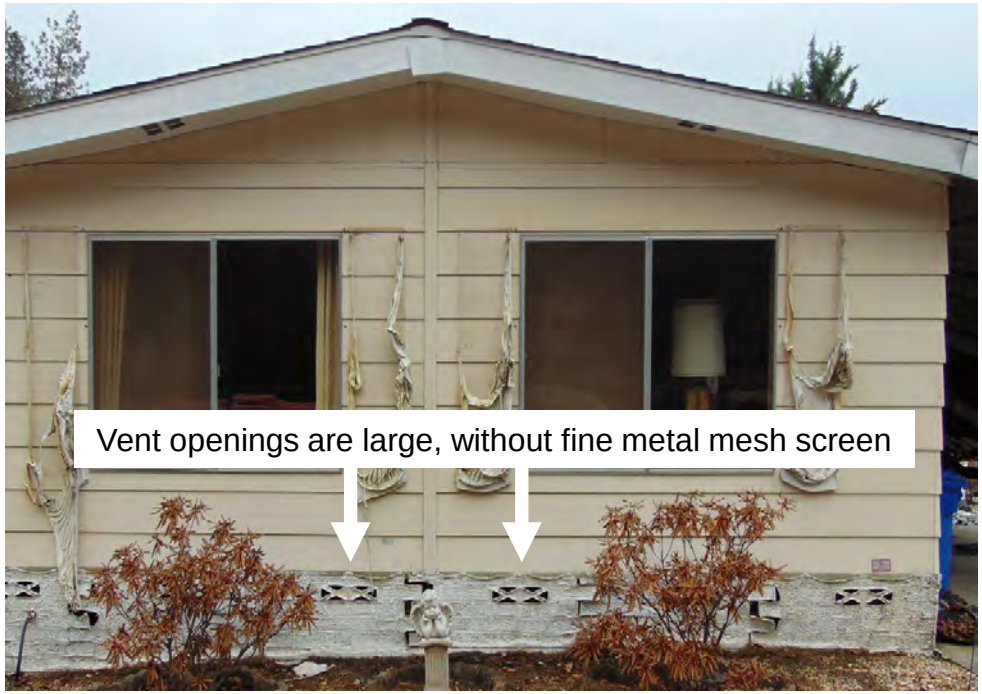
Photos pending.

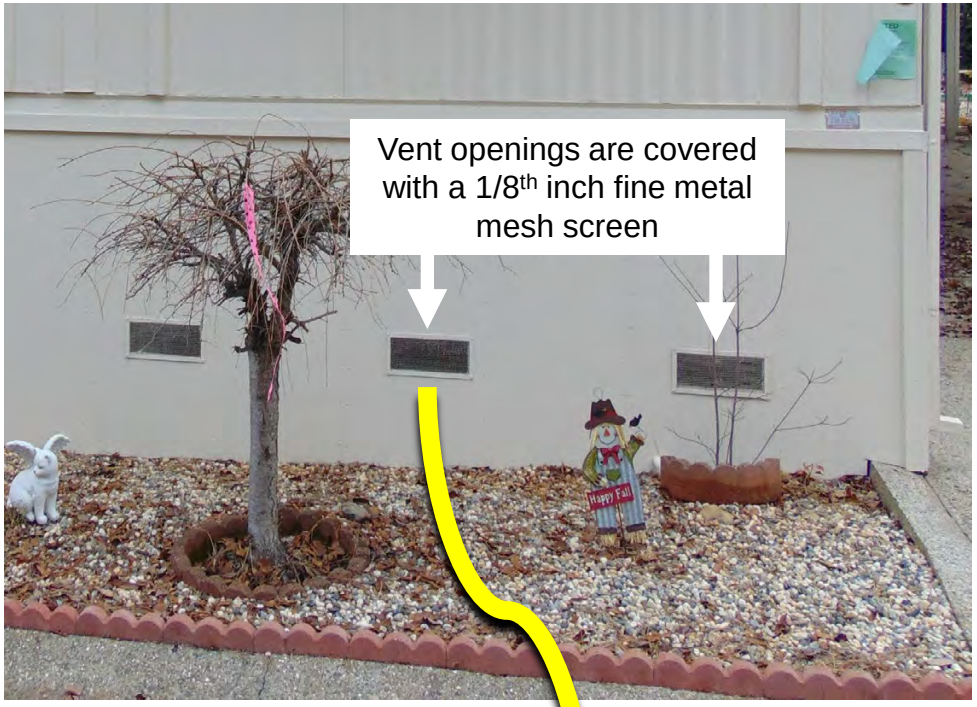
Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

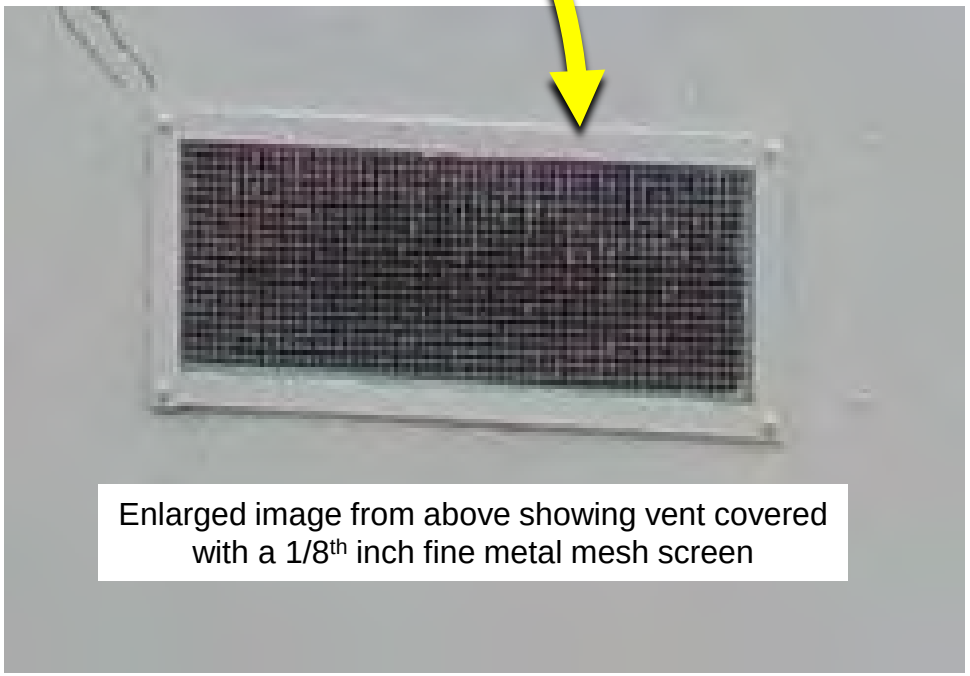
There is no CAD drawing for
Item 38: Space Access Hinged Door, Mobile Home

Please see photographs for illustrations.

HMM Reference	NIST Technical Note 2205: Item 39 Mobile Home Crawl Space Vents





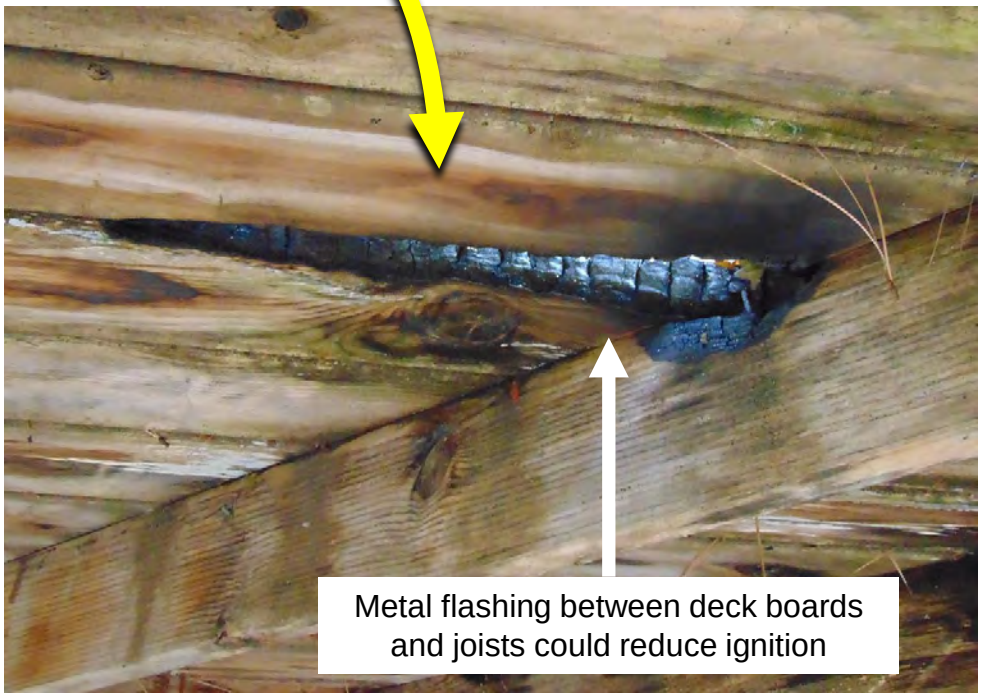


Item 39 Crawl Space Vents – Keep vents clean and covered with a 1/8th inch fine metal mesh screen to prevent ember intrusion.

Note: Selected photographs are included to illustrate each HMM hardening item. Additional vulnerabilities or hardening items may be seen in the photographs, but those are highlighted within their specific HMM item.

There is no CAD drawing for
Item 39: Crawl Space Vents, Mobile Home

Please see photographs for illustrations.



Item 40 Between Deck Boards – Insert metal flashing between deck boards and joists can reduce ignition between deck materials.

There is no CAD drawing for
Item 40: Between Deck Boards

Please see photographs for illustrations.