

A PLUS CERTIFIED REMODELING llc

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Condominium Roof Condensation Investigation Hudson Townhome Community Prepared by Certified Roofing – Building Envelope Specialists

Report Created on March 5, 2026 9:38 PM

Inspector

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Interpretation of Facts

Items

Notes

Executive Summary

Several condominium owners reported ceiling staining and moisture concerns during extremely cold winter weather conditions.

Certified Roofing conducted an investigation including:

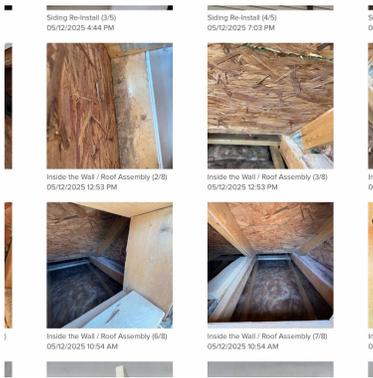
- roof inspections

	<ul style="list-style-type: none"> • parapet wall exploratory work • roof core sampling • thermal imaging • pilot mitigation installation <p>The investigation confirmed the issue is not active roof leakage, but rather condensation forming within the roof assembly during frigid temperatures.</p> <p>Evidence supporting this conclusion includes:</p> <ul style="list-style-type: none"> • structural moisture damage discovered behind parapet walls • roof assembly configuration placing insulation below the deck • lack of thermal anomalies during rainfall inspections • successful mitigation results at Unit 45 <p>This report documents the cause of the condensation and a tested mitigation strategy for the community.</p>
<p>Understanding Condensation in Flat Roof Systems</p>	<p>In cold climates such as Northeast Ohio, interior air during winter is warm and humid compared to the exterior environment.</p> <p>Warm air naturally rises toward the ceiling and roof cavity.</p> <p>When this warm air encounters a cold roof membrane or roof deck, moisture in the air condenses into liquid water.</p> <p>Factors contributing to condensation in these townhomes</p> <ol style="list-style-type: none"> 1. White TPO roofing membrane reflects heat and remains colder in winter 2. Limited ventilation within roof cavities 3. Primary insulation located below the roof deck <p>Because insulation is located on the ceiling instead of above the roof deck, the structural roof deck becomes extremely cold during winter conditions.</p> <p>This creates an environment where condensation can form within the roof assembly.</p>
<p>Condensation Damage Evidence – Unit 21</p>	<p>During investigative work at Unit 21, siding was removed from the parapet wall to inspect the building envelope.</p> <p>Behind the siding, the OSB wall sheathing was severely deteriorated.</p> <p>The sheathing showed:</p> <ul style="list-style-type: none"> • moisture saturation • delamination • structural degradation <p>The moisture damage originated from within the wall assembly, not from exterior water intrusion.</p>

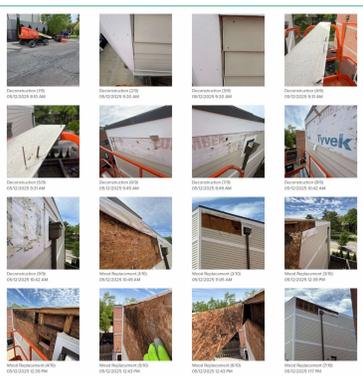
	<p>This pattern is consistent with condensation accumulation inside the roof and wall cavity.</p>
<p>Roof Assembly Investigation</p>	<p>Certified Roofing performed a roof core sample to confirm the roof assembly configuration.</p> <p>The core sample revealed the following construction:</p> <ul style="list-style-type: none">• TPO roofing membrane• ½-inch cover board• OSB roof deck• fiberglass batt insulation• drywall ceiling <p>The insulation is located below the roof deck rather than above it.</p> <p>This configuration allows the roof deck and membrane to remain very cold during winter conditions, increasing condensation potential.</p>
<p>Additional Field Observations</p>	<p>Units 35 and 37</p> <p>Certified Roofing conducted additional inspections of Unit 35 and Unit 37 during active rainfall.</p> <p>The purpose was to determine whether ceiling staining was caused by roof leaks.</p> <p>Thermal Imaging Inspection</p> <p>A thermal imaging camera was used to observe temperature patterns in ceilings and upper wall assemblies.</p> <p>Thermal imaging typically reveals cool anomalies where moisture intrusion is present.</p> <p>During the inspection:</p> <ul style="list-style-type: none">• No temperature anomalies were detected• No active roof leaks were observed• Interior finishes were dry despite rainfall <p>This confirms that the staining observed in these units is not caused by roof leakage.</p> <p>Instead, the evidence supports the conclusion that condensation occurs during extreme cold weather conditions.</p> <p>Roof Area Measurements</p> <p>Roof sections above each unit measure approximately:</p> <p>600 square feet per unit</p>

	<p>This information assists in estimating mitigation work for additional units.</p>
<p>Pilot Mitigation Installation – Unit 45</p>	<p>Certified Roofing installed a condensation mitigation system at Unit 45 as a pilot project.</p> <p>The system included:</p> <p>Roof Ventilation Improvements</p> <p>Installation of parapet box vents and roof breather vents to allow trapped moisture vapor to escape.</p> <p>Thermal Roof Surface Modification</p> <p>Application of a silicone roof coating system over the existing TPO membrane.</p> <p>Benefits include:</p> <ul style="list-style-type: none"> • increased winter roof surface temperature • reduced condensation formation • extended life of roof
<p>Performance Results and Conclusion</p>	<p>After installation of the mitigation system at Unit 45, the homeowner reported no condensation issues during winter conditions.</p> <p>Homeowner Statement</p> <p>“Everything looks great. Mike I think you did a great job and I would highly recommend it to everybody else. I haven’t seen any signs of water ingress or leaking in the ceiling.”</p> <p>This successful pilot installation demonstrates that condensation mitigation can be achieved without replacing the roof system.</p> <p>Because the surrounding townhomes were constructed using identical roof assemblies, similar mitigation strategies may be appropriate for other units experiencing condensation.</p> <p>Certified Roofing recommends that the condominium association consider community-wide mitigation planning to address the issue proactively.</p>

Photos



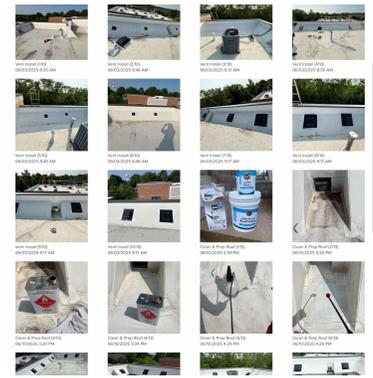
Condensation Damage Evidence
 – Unit 21 (1/2)
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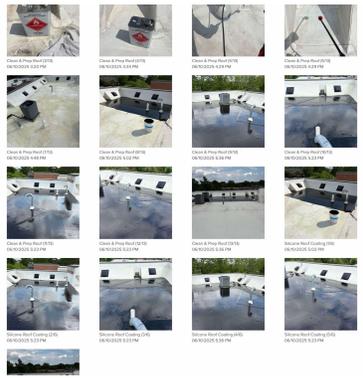
Condensation Damage Evidence
 – Unit 21 (2/2)
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Roof Assembly Investigation
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Pilot Mitigation Installation – Unit
 45 (1/2)
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Pilot Mitigation Installation – Unit
 45 (2/2)
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