

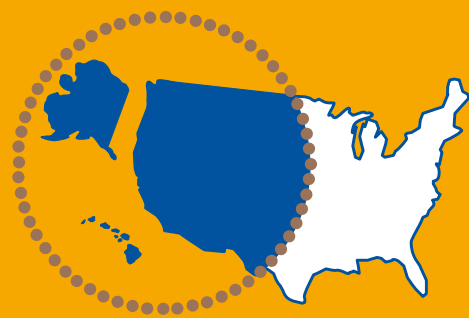
WSRCA TECHNICAL BULLETIN

No.2026 _ LSRC-02



**How to Investigate a
Roof Leak**

Summer 2026



WESTERN STATES
ROOFING CONTRACTORS ASSOCIATION



TECHNICAL BULLETIN No. 2026_LSRC-02
How to Investigate a Roof Leak

To: WSRCA Members

Summer 2026

From: WSRCA Low-Slope Roofing Committee

Introduction

Roof leaks can be a significant nuisance for building owners, managers, and occupants, as they may disrupt operations and cause property damage. Frequently, owners or operational staff attempt remedial repairs without following proper investigative practices. Such repairs are often unsuccessful because the actual leakage paths have not been verified. To accurately determine the cause of roof leakage, roofing contractors and qualified investigators (i.e., engineers, architects, IIBEC certified consultants, etc.) should conduct a thorough examination in accordance with ASTM D7035 to validate the repair location and what is required to stop the water entry. This technical bulletin summarizes the accepted industry approach for investigating roof leaks, with a primary focus on low-slope roofs.¹

Low-Slope Roof Considerations

Due to insufficient drainage, low-slope roofs often experience ponding water, typically adjacent to parapets or equipment. Ponding water can contribute to leakage, accelerate deterioration, and even exceed the roof framing's structural capacity.

Low-slope roofs consist of multiple layers, including watertight membrane, cover board, insulation, vapor barrier (if present), and the structural deck. Therefore, interior staining or leakage locations may not directly coincide with locations of water penetration through the roof system, as water can travel laterally until it finds a point to drip into the interior.

To determine the cause of any roof leak, a systematic approach should be followed. There is a widely accepted 7-step method that serves as the foundation for identifying the source of the issue, recommending appropriate repairs, and providing the client with a clear, professional report explaining both the problem and the proposed solution. While some steps may be combined in certain situations, each should be considered to ensure a thorough and accurate assessment. The step-by-step procedure is summarized below and in Figure 1.

¹ Steep slope roofs would be investigated in a similar systematic manner

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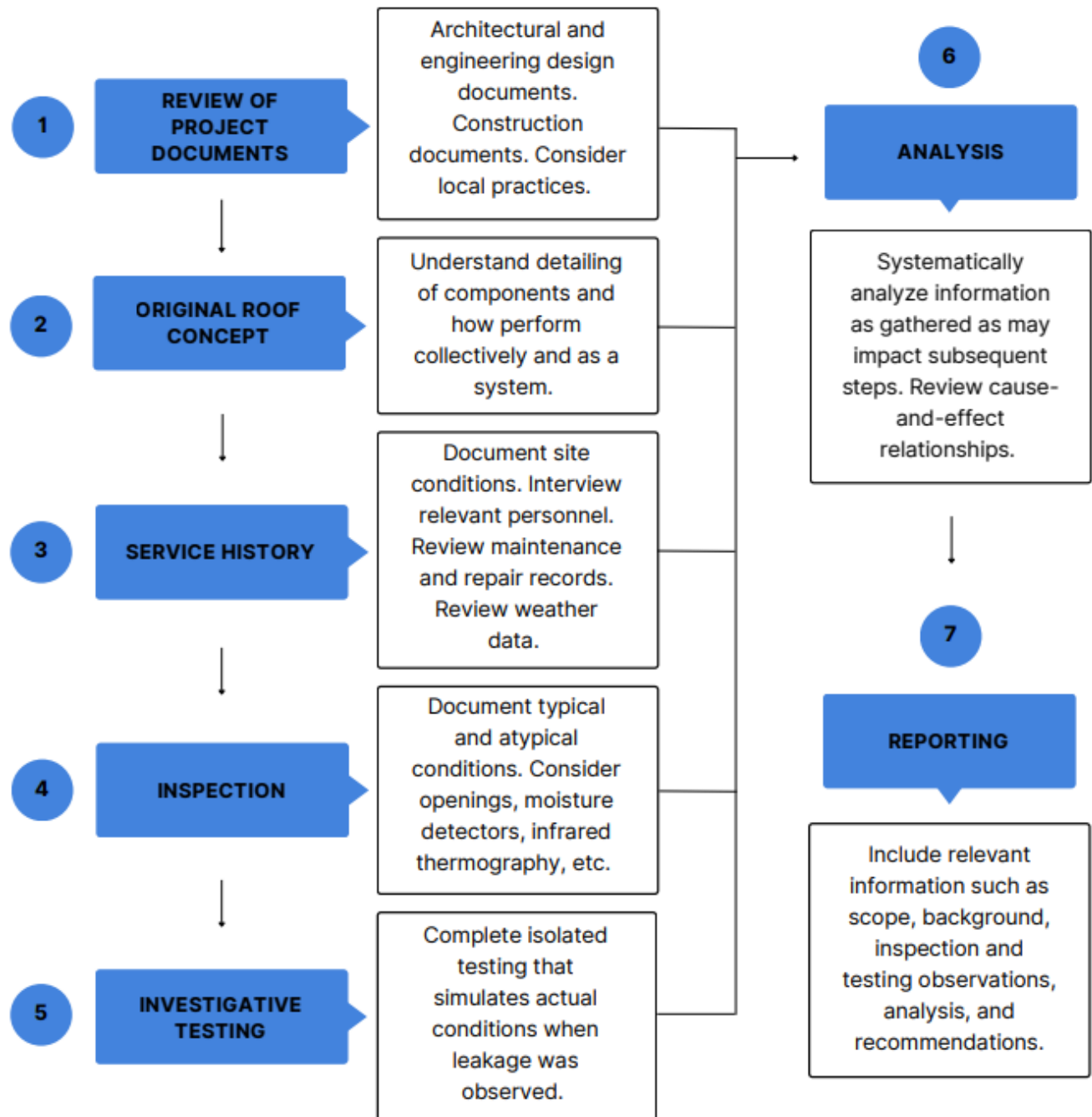


Figure 1: Summary of How to Perform a Roof Leakage Evaluation

Systematic Approach to a Roof Leakage Evaluation

1. Review of Project Documents

Ideally, project documents will be available and accessible for review. The following documents should be requested from the Owner to understand the original construction, design intent, performance criteria, roofing materials, and component interfaces.

- Architectural and engineering drawings and specifications.
- Other construction documents, which may include relevant design revisions, correspondence, meeting minutes, addenda, submittals, substitution proposals, product literature, test reports, survey reports prepared by others, shop drawings, Requests for Information (RFIs), field reports, etc.

Project conditions should be evaluated to determine if an appropriate product selection was made for the original construction. An understanding of local practices may be necessary, as local customs may influence construction in undocumented ways. Depending on the date of original construction (or roof replacement) and if owners/management have changed, not all project documents and correspondence will be readily available. Oftentimes, original building drawings can be requested from the jurisdiction's permit office (for a fee).

2. Evaluation of Original Roof Design Concept

The original roof design, provided in the project documents, should be further reviewed to clarify the detailing of components. The details should include interfaces and component integration so that each component can work together and function as a system. The details should also address issues such as construction tolerances, material compatibilities, terminations, penetrations, and building movement. Details where these items are improperly addressed may assist in focusing the investigation on suspect areas.

3. Determination and Review of Service History

Gathering information related to service history includes documenting observed leakage and damage, interviewing relevant personnel, obtaining maintenance and repair records, and comparing them with weather data at the time of the leakage. This information will help focus the leakage investigation and may identify potential source(s) of leakage.

Perform a site review to document any interior surfaces that are wet, damp, or water-saturated. Note color variations caused by organic growth, staining, or corrosion, as well as staining patterns that may indicate water flow or accumulation. For example, water may travel further from the point of ingress in metal roof decks with long flutes. Observe blistered or damaged finishes that suggest prior wetting and identify any interior or exterior areas that have been repaired or patched as part of previous leakage repair attempts. Closely examine roof detailing and component transitions in areas near the reported leakage.

Interview the most knowledgeable person (typically the building engineer) to understand the conditions under which leakage occurs. Ask about the frequency of leakage, and whether the event is isolated, recurring, or associated with specific rain or wind conditions. For rain-related leaks, determine whether leakage begins immediately or after a delay, whether it stops when rain ends or continues afterward, and

whether it occurs during all rain events or only under certain severities or wind directions. Confirm whether leaks occur during or after cold weather, with or without rain, and whether interior environmental conditions or operational differences, such as weekends versus business hours, appear to affect leakage. Ask if the leakage appears related to a specific building feature or detail, and whether building piping systems (including plumbing, HVAC, and roof drainage) could be contributing, as these leaks can be mistaken for roof failures. However, if there have been no recent rain events, condensation could lead to new staining or interior moisture.

Review maintenance logs and repair records to compare original as-built construction details with existing site conditions. Identify deviations from original design or undocumented repairs and assess the effectiveness and suitability of prior repair work, considering factors such as material compatibility and drainage. Correlate documented leakage locations with building features and overlay them on drawings to identify recurring patterns.

4. Inspection

Inspection areas are primarily based on service history, project documents, and accessible roof areas. Field notes should be completed using architectural, structural, and mechanical drawings and specifications, as well as structural and roof assembly shop drawings, to document or markup locations and site conditions. Both typical and atypical conditions should be noted. It is particularly important to include the terminations and component interfaces, such as corners, ends, joints, transitions to other materials, or changes in geometry. The inspection should include both areas with and without reported leakage.

Documentation may include the condition of flashings; the functionality of roof slopes and drainage systems; and interfaces between roofs and walls. Observations should include transitions to other building components such as copings, penetrations, mechanical equipment, and structural supports. Evidence of maintenance, attempted repairs, impact damage, or structural movement should be noted, along with an overall assessment of roof workmanship especially at penetrations, perimeters and transitions with a special emphasis at locations where there has been reported interior water infiltration.

In addition to visual observations, supplemental investigative methods may be used to gather further information. Inspection openings may be performed to expose concealed conditions by progressively removing roof materials; because materials may be damaged or destroyed during this process, the investigator should be present to document each step. When original construction drawings are unavailable, inspection openings are often required to determine the existing roof assembly configuration. The inspector should carefully consider if openings are required to complete the investigation, as the test cuts may compromise the warranty and introduce additional seams.

Moisture detection methods can also help identify concealed moisture. Capacitance and neutron backscatter meters can estimate relative moisture content within roof assemblies, and plotting the results on a roof plan can help identify wet areas and potential water-migration paths. Infrared thermography may be used to detect subsurface moisture patterns and should be conducted in accordance with Practice C1153 *Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging*. Resistance or conductance-type moisture meters can indicate the presence of moisture, though readings may vary depending on material type and exposure to water. Good practice is to calibrate the imaging results with actual roof samples to confirm the variability of wet and dry locations with actual laboratory determined roof assembly moisture contents. See Appendix 1 for a summary of testing methods.

5. Investigative Water Testing

Water testing should be completed in a controlled manner that can be reproduced, simulates actual conditions under which the leakage was observed, and is comparable to potential water pathway(s) based on staining, damage, and residue accumulation. Typically, testing of isolated areas begins at the bottom (i.e., field membrane, base flashing) and progresses up the roof slope; this helps eliminate ambiguity about the leak's origin that might result from water running down the surface of the test area. Areas can also be isolated via masking, damming, or temporary repairs. Creating new leaks during a test may provide useful information, but it is not a valid assessment of the existing leakage concern. Previous remedial measures and modifications should be accounted for in the testing plan – do not undo remedial repairs.

Note that flood testing is not suitable for identifying potential leakage sources, as roofs are intended to resist only a minimal amount of hydrostatic pressure from flowing water, rather than standing water. For more information, see *WSRCA Technical Bulletin No. 2023-LS3 – Why Not to Flood Test Low-Slope Roofs*.

Electronic detection testing is a useful nondestructive diagnostic tool that requires planning in the design phase to ensure a conductive medium is installed as a component of the roofing system. It is a testing method that uses an electrical current to identify breaches in a roofing membrane by detecting disruptions in conductivity across the roof. For more information, see *WSRCA Technical Bulletin No. 2021-WC1 – A Guide for Electronic Leak Detection of Roofing and Waterproofing Membranes*.

See Appendix 1 for a summary of testing methods.

6. Analysis

Information gathered during Steps 1 to 5 should be systematically analyzed as it is discovered, as it may impact the approach during later steps. The relationship between roof characteristics and observed leakage should be analyzed to identify conflicting data and observations, patterns, anomalies, and known roof performance issues. The layout of investigation information and the conclusions should be clear so that another professional, familiar with roof leakage, can understand or duplicate the evaluation if required.

7. Report Preparation

If requested or agreed upon, a report should be prepared documenting the evaluation. Reporting elements included will be based upon the investigator's scope, intended reader, and, as appropriate, to describe the evaluation completed. Report elements may include the objective or scope, relevant background information, a summary of inspection and testing observations, an analysis or discussion of the findings, root cause analysis, and recommendations for remedial action.

Conclusion

Repairing a roof leak without first identifying the root cause is often ineffective. Best practice is to investigate the leak first, as outlined above and in accordance with ASTM D7035, and then complete the repairs needed to stop water intrusion and replace damaged materials. Repair costs should also be weighed against the cost of full roof replacement, since replacement may ultimately be more cost-effective and less disruptive to building operations. A systematic evaluation includes reviewing project

documents and the original roof design, assessing service history, performing a site inspection, conducting investigative testing, analyzing the findings, and preparing a comprehensive report.

Sincerely,

Western States Low-Slope Roofing Committee

Reference Documents

- ASTM D7053/D7053M – 17(2024) Standard Guide for Determining and Evaluating Causes of Water Leakage of Low-Sloped Roofs
- Construction Canada. Identifying Watertightness of Low-Slope Roof Membranes. 23 January 2019. <https://www.constructioncanada.net/identifying-watertightness-of-low-slope-roof-membranes/>
- National Roofing Contractors Association. The NRCA Roofing Manual: Membrane Roof Systems – 2023. Chapter 9 Reroofing.
- Frontier Roofing. Leak Evaluation. <https://www.frontier-roofing.com/132/leak-evaluation>

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Appendix 1 – Testing Methods Summary

Testing Methods	Summary
<i>Inspection Openings</i>	Progressively removing roof materials to understand the as-built assembly and detailing. Inspection openings are often completed in conjunction with moisture detectors or meters, infrared thermography, and/or water testing. A roofing contractor will be required to patch the openings afterward with compatible materials.
<i>Moisture Detectors (Capacitance and Neutron Backscatter Meters)</i>	Meters are used to estimate the relative moisture content of roof assemblies to help identify wet areas and potential water-migration paths. ¹
<i>Infrared Thermography</i>	Infrared thermographic cameras produce images used to detect concealed moisture. This applies only to conventional roofing, and not protected or inverted roofing. ¹
<i>Moisture Meters (Resistance or Conductance)</i>	Meters are used to indicate the presence of moisture. However, moisture content readings may vary. ¹
<i>Water Testing</i>	Systematic water testing to recreate known leakage and identify potential water pathway(s). Nozzles/hoses or spray racks can be used to complete water testing.
<i>Flood Testing</i>	Not applicable for low-slope roofs.
<i>Electronic Leakage Detection (ELD) – Low Voltage Horizontal Membrane Scanning Platform</i>	A conductive medium (i.e. concrete, primer, or metal grid) must be directly below the membrane. This method requires the membrane surface to be wet and is applicable for both non-conductive (typically uncoated roofing and waterproofing systems) and semi-conductive membranes (black EPDM membranes). A scanning platform with two sets of metal sweeps is used to detect a breach when the inner sweep is directly over the membrane defect, triggering an alert.
<i>Electronic Leakage Detection (ELD) – Low Voltage Electric Field Vector Mapping</i>	A conductive medium (i.e. concrete, primer, or metal grid) must be directly below the membrane. This method requires a wire installed around the perimeter, a continuous layer of water on the membrane, and is applicable for non-conductive membranes (typically uncoated roofing and waterproofing systems). A testing technician uses two probes to identify breaches in the membrane. Overburden removal is required to identify the exact breach location.
<i>Electronic Leakage Detection (ELD) – Low Voltage Vertical Membrane Surface Screening</i>	A conductive medium (i.e. concrete, primer, or metal grid) must be directly below the membrane. This method of testing is applicable for non-conductive (typically uncoated roofing and waterproofing systems) vertical surfaces, corners, parapet walls, and seams, and small horizontal surfaces. This requires the material directly below the membrane to be conductive.
<i>Electronic Leakage Detection (ELD) – High Voltage Membrane Testing</i>	A conductive medium (i.e. concrete, primer, or metal grid) must be directly below the membrane. This method uses an electrode brush to detect breaches in non-conductive membranes (typically uncoated roofing and waterproofing systems). The surface must be dry. The membrane thickness must be known for calibration; therefore, it is not reliable for fluid-applied membranes or at sheet membrane seams.

¹ Moisture-meter readings alone may not reliably distinguish wet and dry roof areas, even when the meters are properly maintained and calibrated. To validate the results, roof assembly cores should be removed, laboratory tested for moisture content and compared with the meter readings.