

NTSA Forensic Methods Series

Destructive Testing Without Destroying the Evidence

Planning, Documentation, Sampling, and Preservation in Tile and Stone Failure Investigations

Before the first tile is removed, the concealed assembly exists in a condition that cannot be recreated.

Once cutting, prying, coring, or demolition begins, the investigator changes the evidence. A separation plane may be exposed, but a new fracture may also be created. Residue may be disturbed, adjacent materials may be damaged, and a specimen may lose its location or orientation.

Destructive testing is often necessary because it can reveal evidence no surface inspection can provide. It can also create ambiguity if the work is not planned, documented, and preserved carefully.

The objective is not simply to remove material. It is to expose concealed evidence without losing the information that gives that evidence meaning.

ASTM E860-22 specifically addresses examinations and testing that may alter evidence involved in litigation. It emphasizes documenting the condition of the evidence before testing, the work performed, and any deviations that may affect later examination or interpretation.

Begin With the Question the Removal Must Answer

Where did the assembly separate? Does a substrate crack continue beneath the tile? Is a membrane present and continuous? What material is on the back of the tile? Does a concealed detail match the drawings?

The question determines the location, removal method, specimen size, documentation, and possible laboratory needs. Without a defined objective, demolition can produce damaged materials without resolving the issue that justified the intrusion.

The expert should also identify what the test is not intended to establish. A targeted opening may explain one location without representing the entire project.

Plan the Locations Before the First Cut

Some locations are selected because they contain the reported distress. Others may be needed to evaluate transitions, penetrations, drains, movement joints, substrate discontinuities, or changes in exposure. Performing areas may provide comparison.

A useful plan identifies each proposed location, why it was selected, what the test is expected to expose, and what documentation or specimen is required. The plan may change when early removals reveal unexpected construction, but the reason for the change should be recorded.

The vulnerability arises when locations are selected only because they are expected to support one theory, or when targeted samples are later described as representative of the entire installation.

Document the Original Condition

Overall photographs establish context. Close views document cracks, staining, movement, joints, or other distress. Measurements, room references, grid coordinates, and marked drawings preserve location.

Relevant sounding, moisture readings, flatness measurements, and other non-destructive observations should be completed before removal. If a tile moves under hand pressure or differs from adjacent pieces, that condition should be recorded before tools are introduced.

A close-up photograph of a removed tile is not enough if the reader cannot determine where it came from or why the location mattered. Location is part of the evidence.

Record How the Specimen Was Obtained

Was the tile already loose? Was its perimeter isolated? Was impact used? How much force was required? Did the separation occur suddenly or progressively? Which material moved first?

Those observations help distinguish an existing separation from a fracture created during testing. Video can be useful when sequence matters, while still photographs should document each meaningful stage rather than only the final removed materials.

The testing method is part of the evidentiary foundation. It should not disappear from the report once the specimen is on the table.

Do Not Confuse Test Damage With Service Failure

Destructive testing can crack tile, tear membranes, fracture mortar, and separate interfaces that remained intact before the test. That does not make the evidence useless. It requires the expert to distinguish preexisting conditions from damage introduced during removal.

A fracture that follows the reported distress or opens with minimal force may have different significance from one created after heavy prying in an otherwise performing area.

The final appearance should be interpreted together with the pre-removal record, the sequence of work, the tools and force used, and the behavior of adjacent materials.

Preserve Context and Traceability

A specimen without context can lose much of its forensic value. A removed tile may need to remain associated with the mortar below, membrane, substrate fragments, grout, backing materials, or residue from the separation plane.

Orientation may matter. The top, bottom, room side, drain side, or crack direction may need to be marked. Each item should receive a unique identifier tied to field notes, photographs, and a location map.

Labels should be applied at collection, not reconstructed later from memory. If pieces are divided or transferred, each portion should remain traceable to the original sample.

Chain of custody records who collected the item, where it was stored, who received it, whether the package was opened, and what work was performed. The objective is to show that the item examined later is the item removed from the identified location.

ASTM E1188-23 provides corresponding guidance for collecting, identifying, preserving, and maintaining the traceability of information and physical items obtained during a technical investigation.

Comparison Samples Must Be Chosen Deliberately

A distressed location may reveal the claimed condition. A performing location may show whether the same material, detail, or deficiency exists without the same result.

The comparison area should be evaluated for differences in materials, exposure, age, substrate, installation sequence, and service conditions. An apparently intact location is not automatically a control if it differs in every condition that matters.

Likewise, a sample from the worst visible distress should not be extrapolated to the entire project without a reliable basis. The significance of a sample depends on what it is being used to represent.

Coordinate Laboratory Needs Before Sampling

Laboratory testing may require a particular specimen size, orientation, quantity, packaging method, or condition. If the laboratory is contacted only after removal, the available sample may be too small, damaged, contaminated, dried, or otherwise unsuitable.

The field plan should identify which questions may require laboratory support and what is needed to answer them. A modified or limited test may still provide useful information, but its limitations should remain visible.

Packaging should protect the characteristic being evaluated. Fragile pieces may need rigid support. Loose residue may need a sealed container. Moisture-sensitive material may require immediate documentation and a preservation method selected with the test objective in mind.

Joint Inspections Need a Clear Protocol

Destructive testing may occur while attorneys, contractors, consultants, and other experts are present. A clear protocol can reduce disputes about location selection, removal sequence, photography, specimen division, and possession.

The expert should know who may direct the work, who may handle specimens, how disagreements will be documented, and when work should pause before an unexpected condition is altered.

Counsel controls notice and access. The expert should control the technical method within the authorized scope and document any deviation that may affect interpretation.

Know When to Stop

Unexpected evidence may justify expanding the testing. It may also show that continued removal would destroy more information than it is likely to produce.

A concealed transition may need to remain partly intact for photography or measurement. A unique specimen may need to be preserved rather than consumed immediately. A second opinion or laboratory consultation may be appropriate before further alteration.

Stopping is not a failure to complete the work when the reason is to protect evidence or obtain the information needed to proceed responsibly. The record should explain what was exposed, why work stopped, and what step is recommended next.

The Report Should Describe the Method Honestly

The report should identify the objective, locations, selection method, removal procedure, observations, specimens, limitations, and meaningful changes from the planned work.

It should distinguish targeted testing from representative sampling, identify removal-created damage or uncertainty, and avoid implying that untested areas were evaluated.

Under oath, the expert should be prepared to explain why a location was selected, whether the tile was loose before removal, what tools and force were used, how test damage was distinguished from service failure, who handled the specimens, and which areas were not tested.

Those questions do not defeat destructive testing. They test whether the method preserved enough context to support the opinion.

Final Thoughts

Destructive testing is often the point at which a concealed assembly begins to explain itself.

It is also the point at which the investigator can permanently alter the evidence.

The value of the work depends on why the location was selected, what existed before removal, how the work was performed, what changed during the process, and whether each specimen remained traceable afterward.

The objective is not merely to open the assembly. It is to reveal the evidence without destroying the ability to understand it.

Technical References

- [*ASTM E860-22, Standard Practice for Examining and Preparing Items That Are or May Become Involved in Criminal or Civil Litigation.*](#)
- [*ASTM E1188-23, Standard Practice for Collection and Preservation of Information and Physical Items by a Technical Investigator.*](#)

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For forensic consulting or expert-witness assistance involving tile, stone, waterproofing, or pool-tile matters, submit a brief [NTSA inquiry](#).