

Building Defect Analysis Report

Root Cause Analysis

Report Generated: 1/28/2026, 9:43:05 AM
Property ID: P6
Historical Data Analyzed: 3 records

Identified Root Causes

1. Differential Foundation Settlement

Confidence: HIGH

Reasoning: The large diagonal crack (3mm wide) running from the ceiling corner to the window frame in R1, explicitly stating 'shows signs of recent structural movement,' is a classic indicator of differential foundation settlement. This type of crack pattern results from uneven support or movement of the building's foundation, causing stress concentrations in the superstructure. The crack itself is a symptom; the underlying foundation movement is the root cause, which can stem from various factors like soil conditions, inadequate footings, or water management issues.

Affected Systems:

- Foundation
- Structural Frame
- Building Envelope (Wall Finishes)

2. Active Plumbing or Waterproofing Failure

Confidence: HIGH

Reasoning: The 'significant water staining on ceiling near bathroom area' in R2, covering 2 square meters with visible discoloration and paint peeling, directly indicates an active and substantial water leak. The subsequent 'black mold growth visible in corner where ceiling meets wall' in the same room, with a pattern suggesting 'moisture accumulation over extended period,' confirms a persistent moisture source. The proximity to the bathroom strongly suggests a failure within the plumbing system (supply or drain lines) or the bathroom's waterproofing components (e.g., shower pan, tub surround, grout, fixture seals), allowing water to escape and accumulate.

Affected Systems:

- Plumbing System
- Waterproofing (e.g., shower pan, grout, seals)
- Building Envelope (Ceiling/Wall Finishes)
- Indoor Air Quality

3. Inadequate Site Drainage and/or Expansive Soils

Confidence: MEDIUM

Reasoning: While not directly observed, the 'South' region often presents challenges with expansive clay soils that swell and shrink with moisture changes, or areas prone to heavy rainfall leading to soil erosion or subsidence. Inadequate site drainage (e.g., improper grading, clogged gutters, downspouts discharging too close to the foundation) can exacerbate these environmental factors by causing uneven saturation or drying of soils around the foundation, directly contributing to the differential foundation settlement observed in R1. This is a common systemic issue that leads to structural movement over time, especially in susceptible regions.

Affected Systems:

- Site Drainage

- Foundation
- Landscape

Ø=Üj Immediate Action Recommendations

1. Immediately engage a qualified structural engineer to conduct a thorough assessment of the building's foundation and structural integrity, focusing on the cause and extent of the movement indicated by the crack in R1. This assessment should include soil analysis if deemed necessary.
2. Promptly identify and repair the source of the active water leak in R2. This will likely require opening up the ceiling/wall in the bathroom area to pinpoint the exact failure point within the plumbing or waterproofing system. Ensure all affected materials are dried thoroughly.
3. Following leak repair, professionally remediate all visible mold growth in R2. This involves containment, removal of mold-affected porous materials, and cleaning/disinfection of non-porous surfaces to restore indoor air quality and prevent recurrence.
4. Conduct a comprehensive review of the exterior site drainage around the entire building, especially near R1, to ensure proper grading, functioning gutters, and downspout extensions that direct water away from the foundation. Address any deficiencies to mitigate future soil movement and water intrusion.

