Building Defect Analysis Report

Root Cause Analysis

Report Generated: 1/28/2026, 8:50:56 AM
Property ID: P6
Historical Data Analyzed: 3 records

Ø<ß¯ Identified Root Causes

1. Differential Foundation Settlement exacerbated by Expansive Soils

Confidence: HIGH

Reasoning: The large diagonal crack (3mm wide) running from the ceiling corner to the window frame, coupled with 'signs of recent structural movement,' is a classic indicator of differential foundation settlement. This is a root cause because it signifies a fundamental failure of the ground and foundation system to provide stable, uniform support to the structure. In the 'South' region, expansive clay soils are a common environmental factor that can cause significant cyclic swelling (when wet) and shrinking (when dry), leading to uneven foundation movement if not properly accounted for in the original design and construction. The crack is a direct symptom of the resulting stress and strain on the building's structural frame.

Affected Systems:

- Foundation
- Geotechnical/Site
- Structural Frame

2. Plumbing System Leakage OR Failed Bathroom Waterproofing

Confidence: HIGH

Reasoning: The 'significant water staining on ceiling near bathroom area,' 'discoloration and paint peeling,' and subsequent 'black mold growth' strongly indicate an active or persistent water leak originating from the bathroom directly above. This is a root cause because it represents a failure within the building's internal water containment systems. This could be due to a leak in the supply or drain plumbing lines (e.g., pipes, connections, fixtures like toilets or showers), or a failure in the waterproofing system of the shower, tub, or floor (e.g., deteriorated grout, failed caulk/sealants, or a compromised shower pan/liner). The observation of 'moisture accumulation over extended period' for the mold growth further confirms a persistent source of water, not just a one-time event.

Affected Systems:

- Plumbing
- Waterproofing
- Interior Finishes
- Indoor Air Quality

3. Inadequate Bathroom Ventilation

Confidence: MEDIUM

Reasoning: While not the primary source of the initial water damage, inadequate ventilation in the bathroom is a significant contributing root cause to the 'black mold growth' and the 'moisture accumulation over extended period.' In the 'South' region, which typically experiences high humidity, poor exhaust ventilation allows moisture from showers and baths to linger in the air and on surfaces. This creates an ideal environment for mold proliferation once a primary water source (like the identified leak) introduces initial saturation. This represents a design flaw or inadequate maintenance procedure for the HVAC/ventilation system, failing to manage indoor air quality and moisture effectively.

Affected Systems:

- HVAC/Ventilation
- Indoor Air Quality

Ø=Ü¡ Immediate Action Recommendations

1. For R1 (Crack): Immediately engage a qualified structural engineer and geotechnical engineer to perform a comprehensive foundation and soil analysis. Implement temporary shoring if structural integrity is deemed critical. Begin monitoring crack progression with crack gauges to track movement. Review and improve site drainage and landscaping around the foundation to manage soil moisture and mitigate further expansive soil effects.

2. For R2 (Water Damage & Mold): Immediately identify and stop the source of the water leak in the bathroom above (e.g., shut off water to the bathroom, inspect all fixtures, supply lines, and drain connections). Contain the affected area to prevent further mold spread. Engage a qualified mold remediation specialist to safely remove all mold and replace affected building materials. Engage a licensed plumber to repair the identified leak. Assess and improve bathroom ventilation (e.g., install or upgrade exhaust fan) to prevent future moisture accumulation and mold growth, especially given the high humidity in the 'South' region.