Defective Concrete Blocks

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Emergence of the Issue……

- A call to Local Radio Station enquiring about Pyrite
- Responded with general information
- Highland requested a detailed live discussion
- Discussed Pyrite and Exterior Cracks on Houses
- Overwhelming response from listeners who recognised the symptoms discussed – especially the issue of cracked exterior walls
- Awareness was consequently created to this County wide issue
- Local Representatives, Councillors and TD's
- Meeting with Senior Department of Environment Officials
- Visit from Minister Mr. Coffey T.D.
- Ongoing enquiries and new cases.

Not to be confused with Pyrite.

- The issue we seem to be facing is different from the problem in Leinster
- Rather than it affecting the sub-floor fill and causing floors to crack and heave
- The issue seems to be defective concrete blocks causing defects to the super structure blockwork.

Common Symptoms.

- Sporadic web/mapped like cracking to external walls.
- The cracks are on the external leaf of the external walls only with no corresponding cracks internally.
- Affects on internal fabric in advanced cases.
- Vertical cracks close to the corners which extend from the ground to the roof.
- Horizontal cracks on the gables.

Common Symptoms cont'd..

- The elevations most susceptible to the prevailing winds and rain appear to be the worst affected.
- Expansion at dpc level.
- Lateral displacement/outward movement of the external leaf
- Degradation, crumbling
- Open textured

Examples

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Examples

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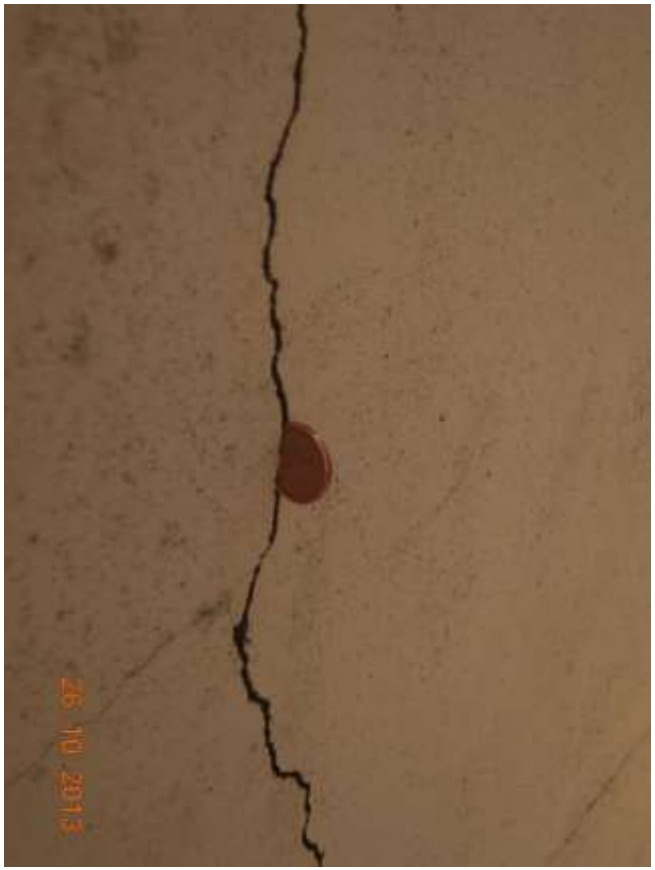
Examples



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Extent of the Problem.

- Over 170 houses surveyed and confirmed to date.
- Considerable number of units in multiple housing schemes not yet reported.
- The main geographical area in Donegal is the North East of the County.
- Some isolated cases in other parts of the Country.
- Mostly affecting buildings constructed in the period 1999 – 2008.
- One prominent supplier with a small number of cases from one other supplier.

Possible Causes…..

- Low cement content
- High water/cement ratio
- Abundance of Mica and or Phyllite
- Open textured
- Low density
- Porous
- Low compressive strength
- Dimensional properties

Investigative process.

- Initial Preliminary Visual Site Inspection
- Intrusive site investigations
- Preliminary determination of characteristics
- Extraction of samples & Laboratory testing.

Laboratory Testing.

- Compressive Strength
- Freeze/thaw
- Petrographic – (microscopic examination)
- XRD (X-Ray Diffraction to ascertain the crstalline components (mineralogy) of materials.
- Long term expansion
- Render

Findings.

- Blocks easily broken
- Low compressive strength
- High water cement ratio
- Low cement content
- Low resistance to freeze/thaw tests.
- High levels of Muscovite Mica

Muscovite Mica.

- Main material within schist. (The coarse aggregate was primarily schist, which is a metamorphic rock)
- Excessive amounts can be problematic in concrete.
- Findings shown quantities in excess of 30% of the fine grained material is mica.
- The presence of mica dust results in increase water demand, lower strength and lower durability.
- Strength can be reduced by 5% when 1% of mica is present in the concrete [Dewar, 1963].
- Lees [1987] suggests that mica should be no more than 1% of the aggregate when the aggregate is used for concrete.

Standards.

1997 Building Regulations.

Part A Structure

Part D Materials & Workmanship.

I.S. 20:1987 Concrete Building Blocks, I.S. 5 Aggregates in concrete products.

2003 - Replaced by EN 771-3 aggregate concrete masonry units (dense and lightweight aggregates.

Regulation (EU) No. 305/2011

European Union (Construction Products) Regulations 2013.

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Remedial Work.

- Complete removal of defective material.
- Interim measures.

Level of remedial work is dependant upon the extent of the defect.
The building owners circumstances are taken into consideration.

Challenges in the Remedial Work.

- High Costs where immediate structural work is required.
- Sub-structures affected leading to consequential underpinning in extreme cases.
- Confining the work to what is visibly defective.
- Difficulties in Certification.

Consideration of redress options.

- Home Insurance?
- Do nothing
- Guarantee Schemes
- Complete the structural work by building owner.
- Negotiation with supplier etc.
- Mediation
- Litigation

Challenges facing building owners.

- Unable to confirm identity of the supplier.
- No direct contractual arrangement with the supplier.
- Developer or Contractor no longer in business.
- Lack of engagement by the Supplier.
- Cost and complexities in laboratory testing.
- Cost of litigation is expensive.
- Some homes require urgent structural remedial works.
- Reduced Market Value.

What Next.

- Investigations are ongoing.
- The numbers of new cases continue to rise.
- Review and monitoring of existing cases.
- Ongoing discussions with the Department of Environment.
- Consideration of Standards.
- To clearly identify how this occurred and prevent it form happening again.
- Homeowner discussions with mortgage providers.

Thank You!

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