Vulnerability Assessment – Rapid Visual Screening

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LEVELS OF EVALUATION

LEVEL-1
Rapid Visual Screening (RVS)

LEVEL-2
Simplified Vulnerability Assessment (SVA)

LEVEL-3
Detailed Vulnerability Assessment (DVA)

Rapid Visual Screening (RVS) Procedure

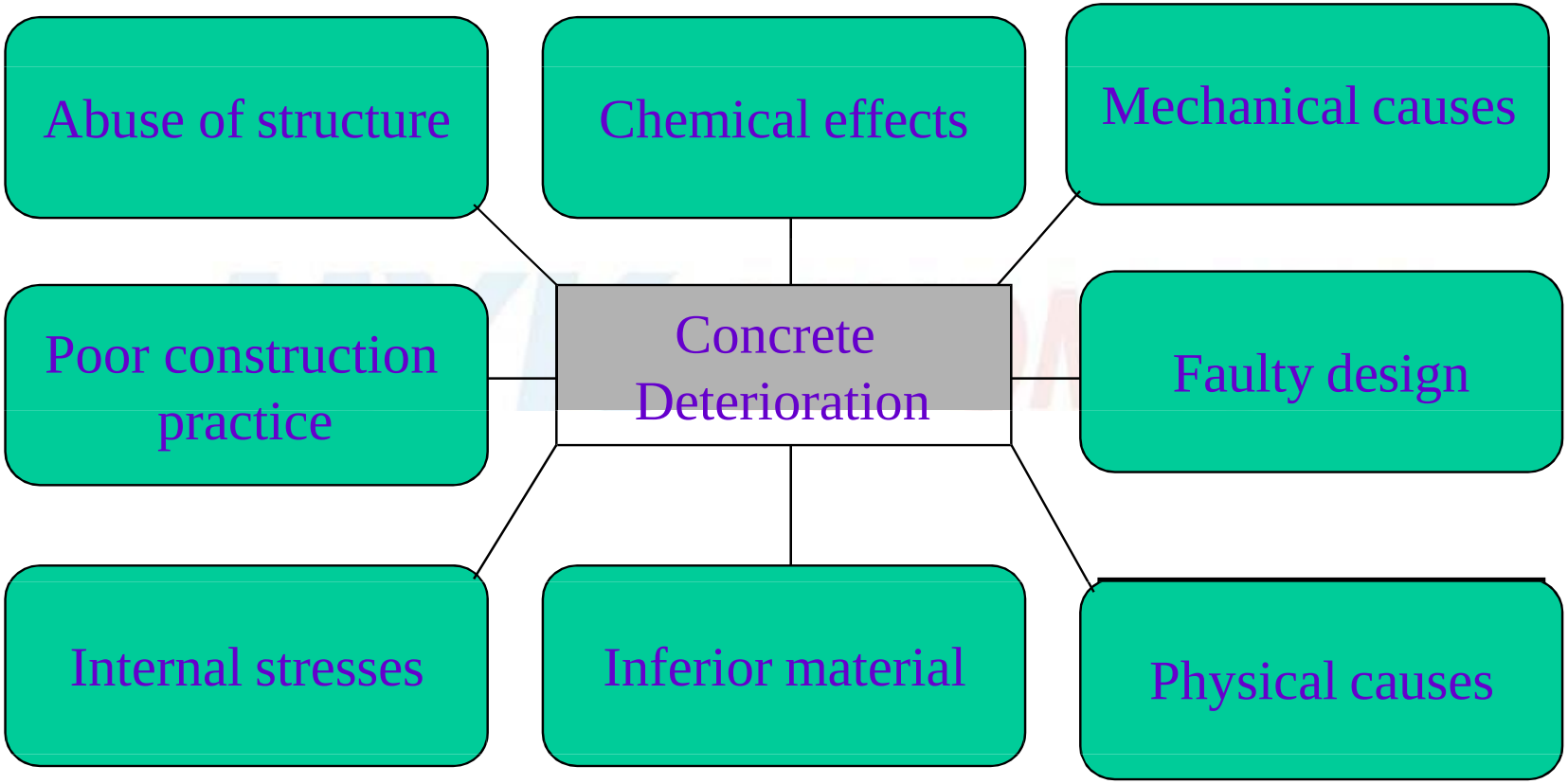
- For mass scale screening of existing buildings
- Limited to visual inspection and identification of potential seismic defects/deficiencies
- Use of checklists
- For post-earthquake vulnerability survey

Simplified Vulnerability Assessment (SVA) Procedure

- For buildings identified during Rapid Visual Screening
- More detailed visual survey, preliminary measurements and study of available design documents, drawings and repair documents, if any.
- Simplified calculation for forces in members

Detailed Vulnerability Assessment (DVA) Procedure

- For vulnerability of assessment of individual buildings
- Detailed in-situ investigation of material strength, defects and deterioration
- Detailed analysis


Abuse of structure
Chemical effects
Mechanical causes
Poor construction practice
Concrete Deterioration
Faulty design
Internal stresses
Inferior material
Physical causes

SOURCES OF DEFICIENCIES

Defects in the original design

1. **Under estimation of loads**
2. **Old standards**
3. **Improper detailing**

SOURCES OF DEFICIENCIES

Defects during construction

1. **Under strength concrete**
2. **Poor compaction**
3. **Poor construction joints**
4. **Improper placing of reinforcement**
5. **Honey-combing**

SOURCES OF DEFICIENCIES

Deterioration due to improper maintenance

1. **Reinforcement corrosion**
2. **Alkali-aggregate reaction**

VISUAL INSPECTION AND STUDY OF BUILDING CONFIGURATION

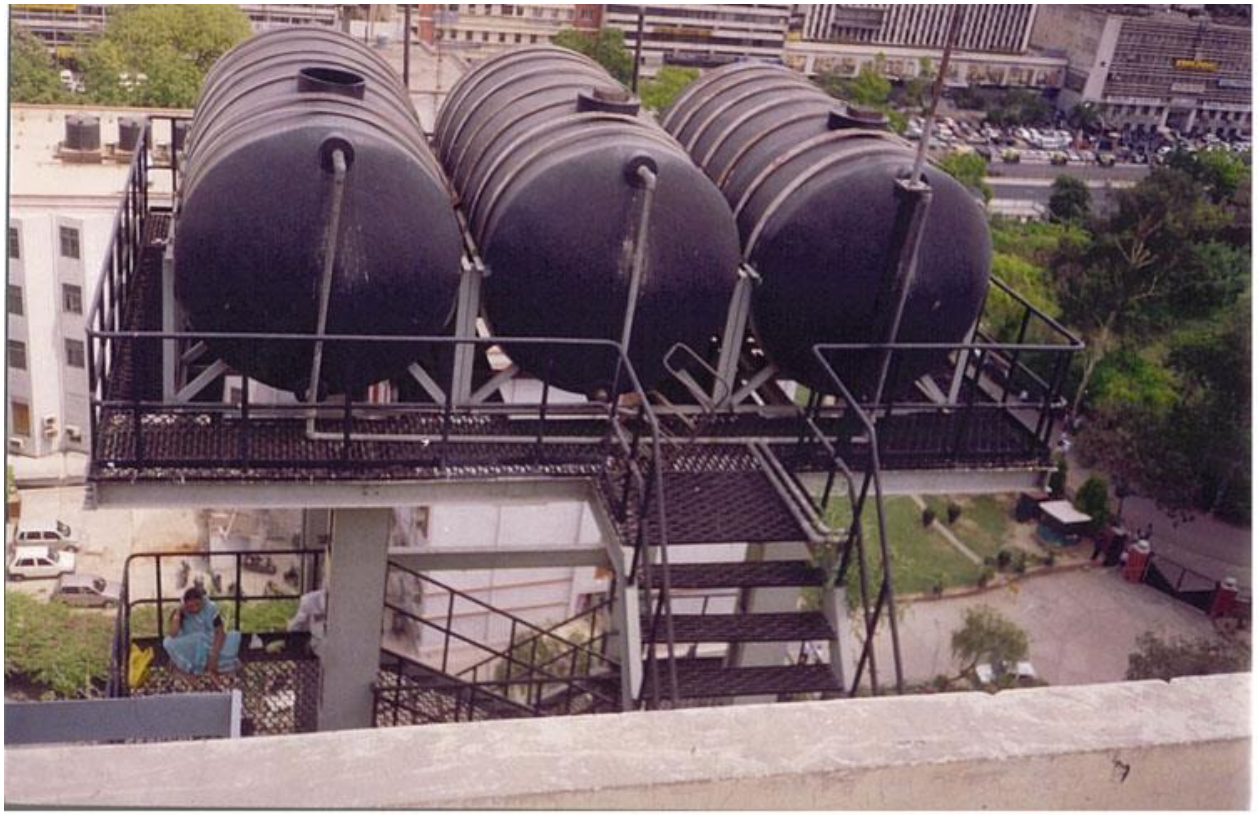
1. Asymmetry of configuration
2. Irregularity in stiffness
3. Location of shear wall, stair case, service core
4. Location and condition of separation joints
5. Distress shown by structure, e.g cracks, spalling
6. Year of construction and IS Codes followed
7. Seismic zone
8. Extension and past repairs

SOFT FIRST STOREY

DAMAGE TO SOFT FIRST STOREY BUILDING DURING EARTHQUAKE

DISSIMILAR ADJACENT BUILDING

HEAVY MASS AT TOP



STIFFNESS AND PLAN IRREGULARITY

BEAM COLUMN OFFSET

NON-FUNCTIONAL SEPARATION JOINT

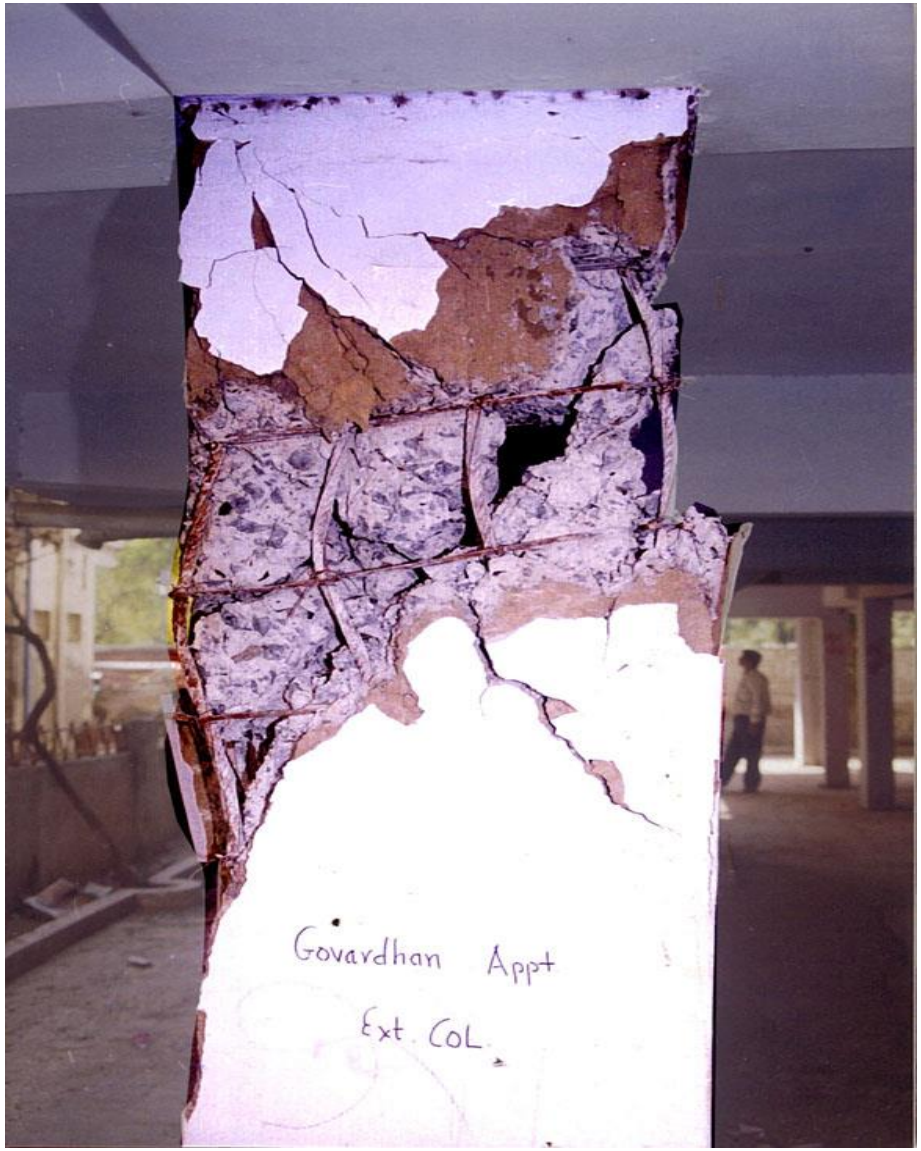
MONOLITHIC STAIRCASE

SHORT COLUMN EFFECT

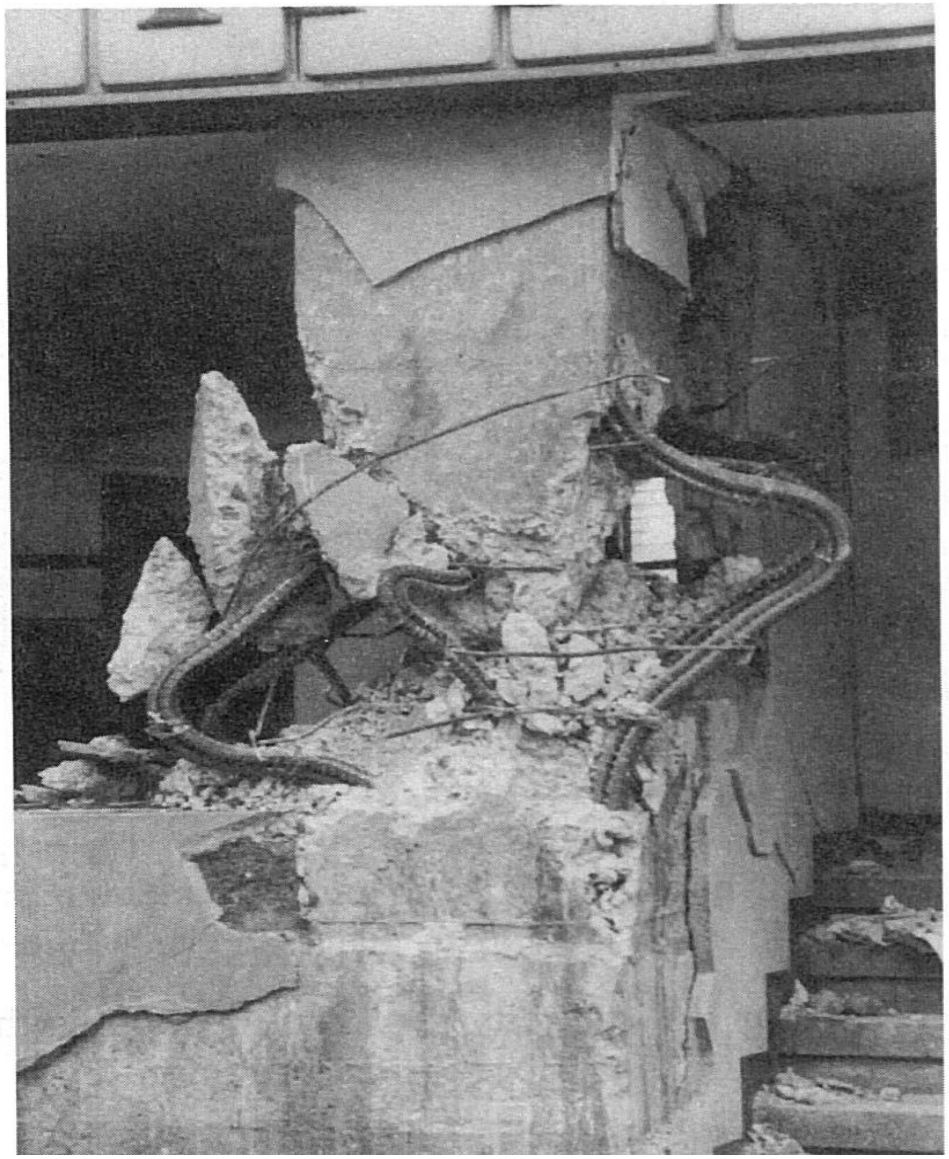
STUDY OF DRAWINGS

1. Symmetry and grid pattern
2. Ductile detailing and confining reinforcement
3. Anchorage of beam reinforcement into column
4. Splicing of reinforcement
5. Anchorage of shear wall reinforcement in to beam, slab and column
6. Confining reinforcement in shear walls

LACK OF SHEAR REINFORCEMENT



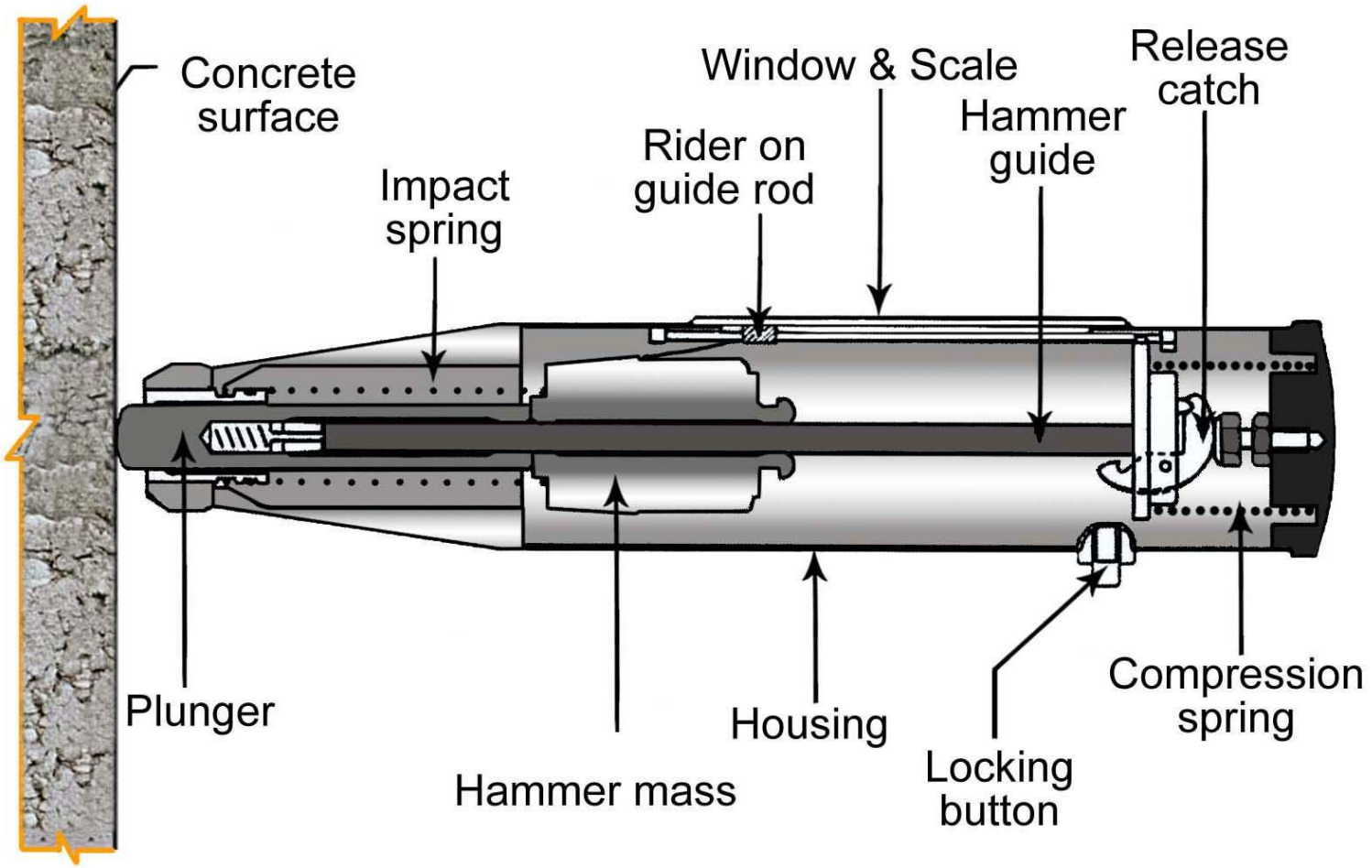
LACK OF CONFINING



LACK OF ANCHORAGE

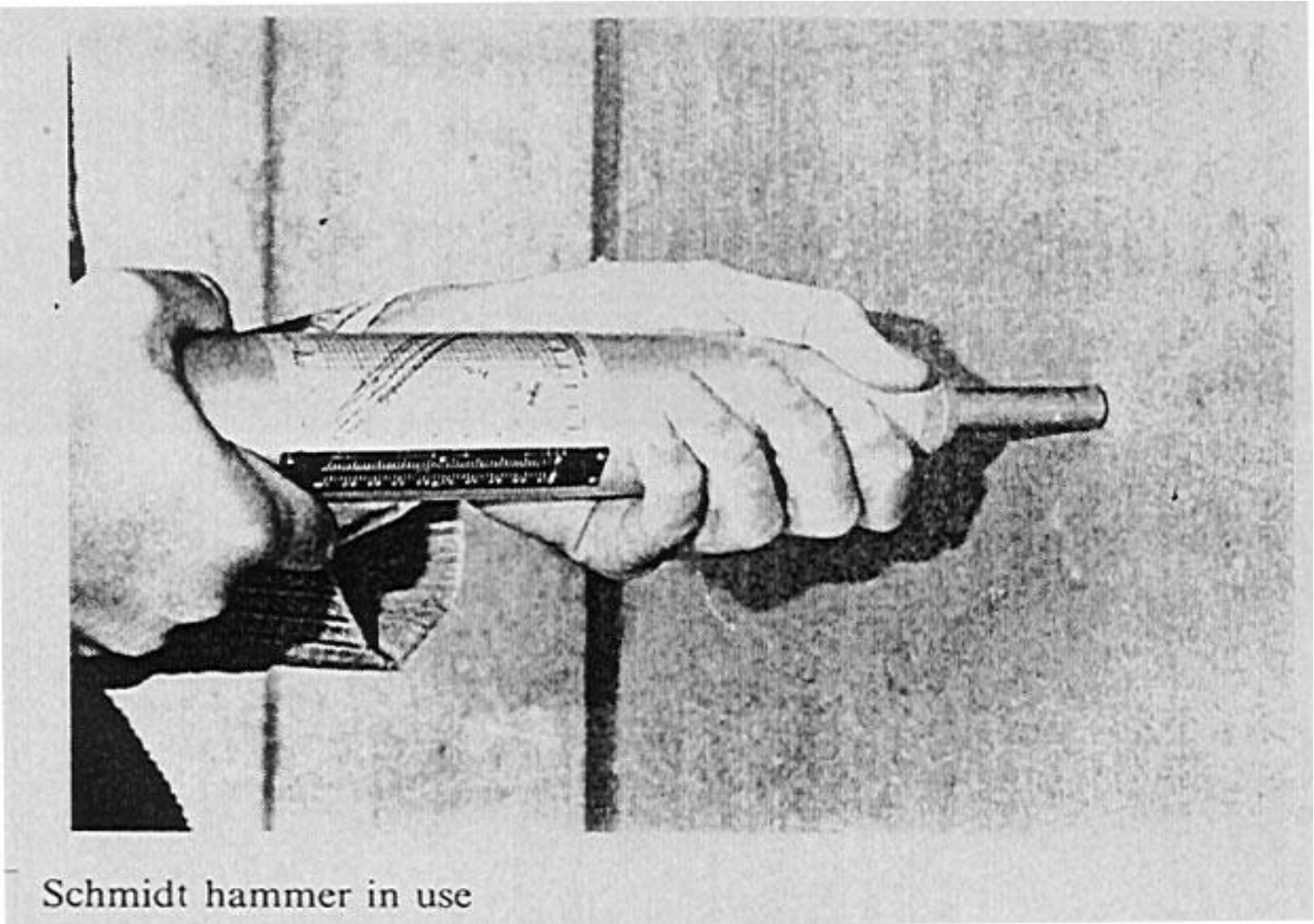
IMPROPER SPLICING

IN-SITU EVALUATION TOOLS



REBOUND HAMMER

SURFACE HARDNESS TEST

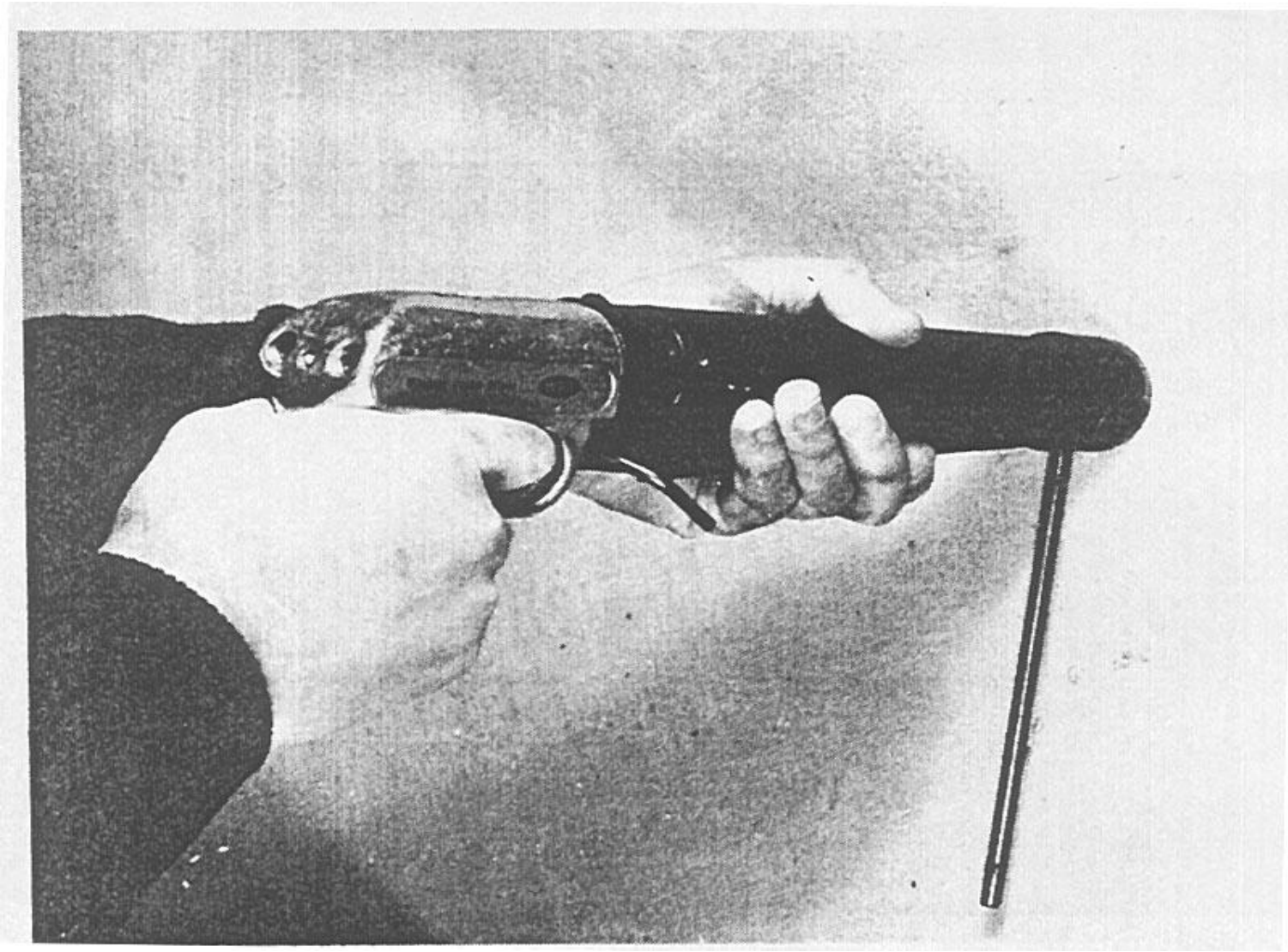


Schmidt hammer in use

IN-SITU EVALUATION TOOLS

USPV TESTER

PENETRATION RESISTANCE TEST



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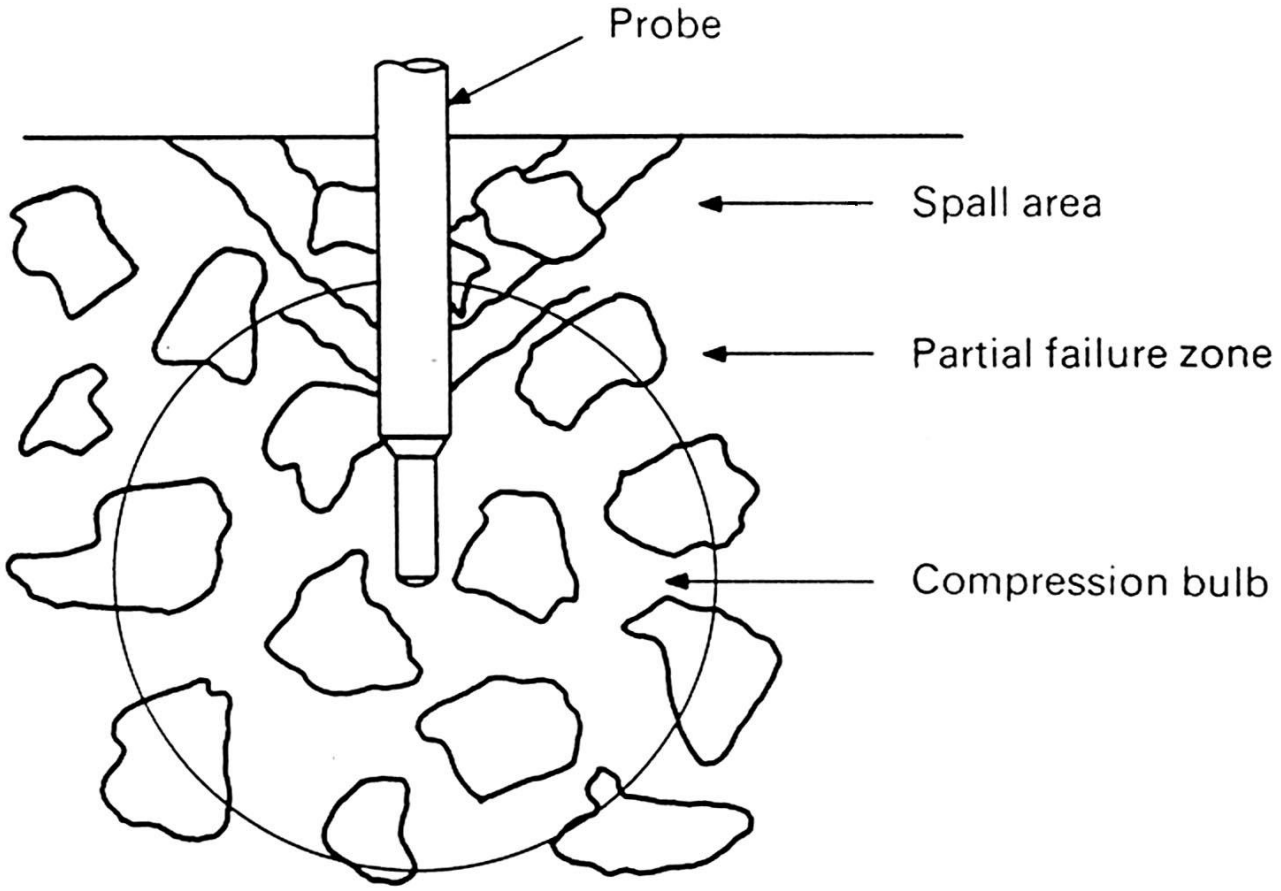
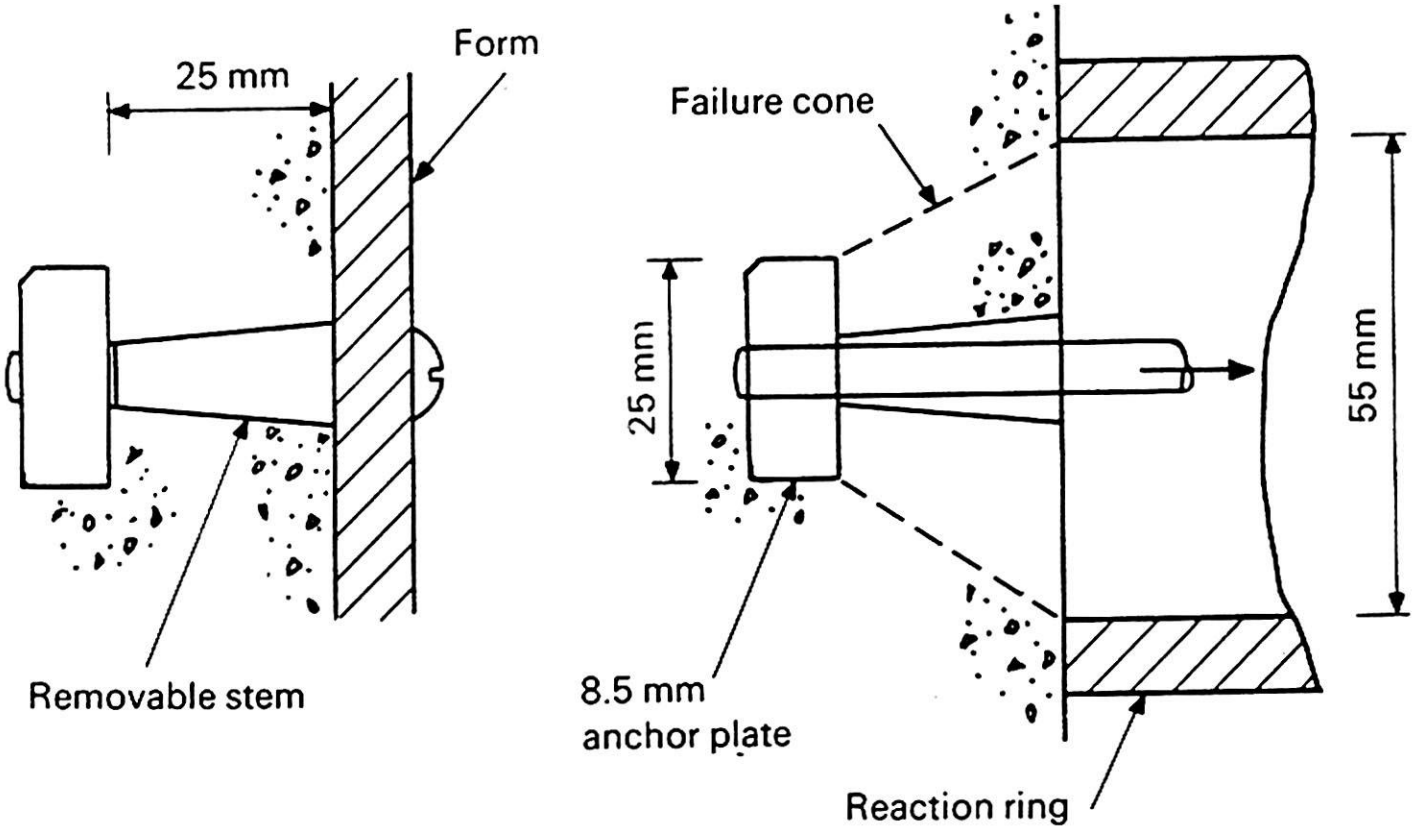


PULL OUT TEST



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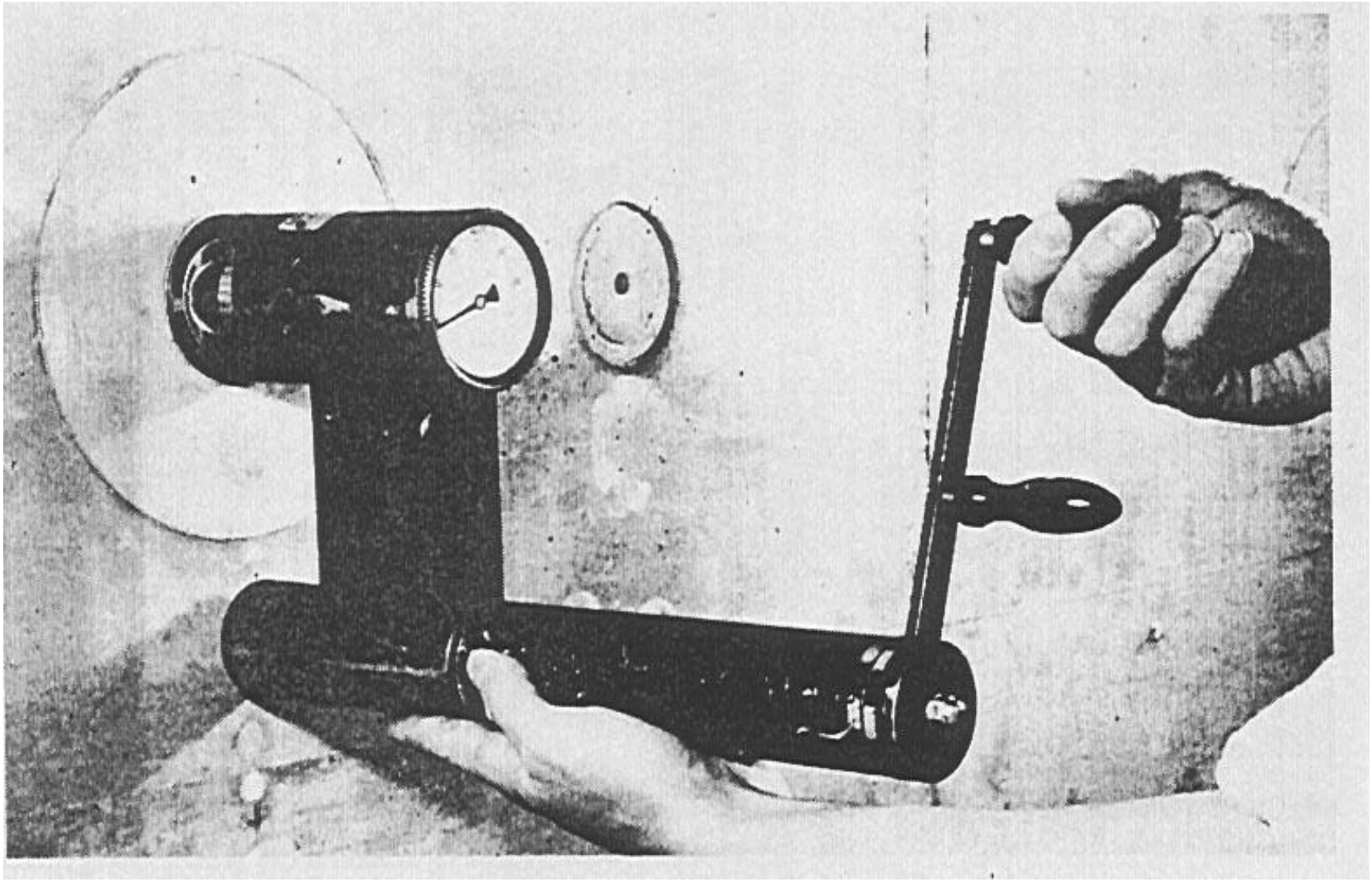

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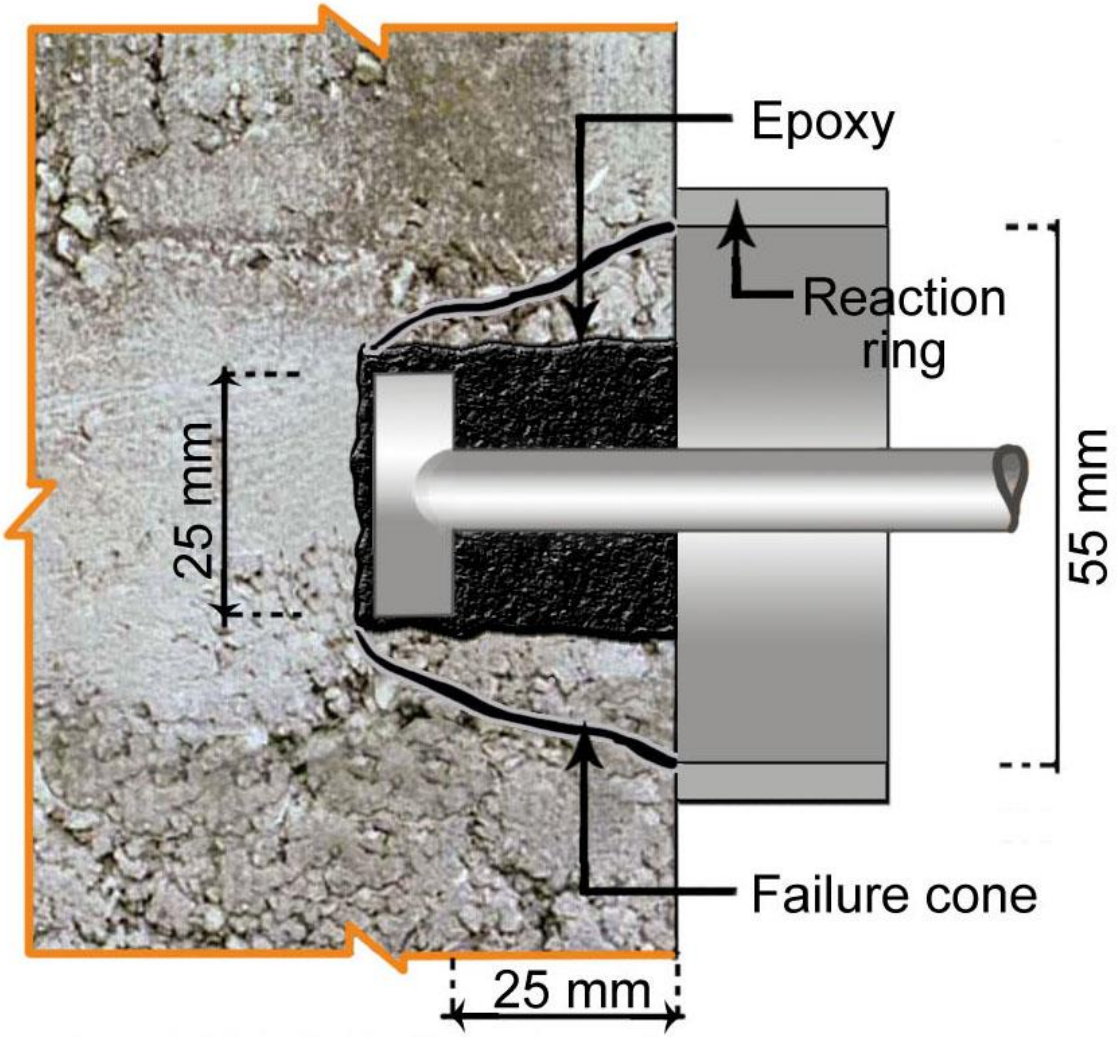
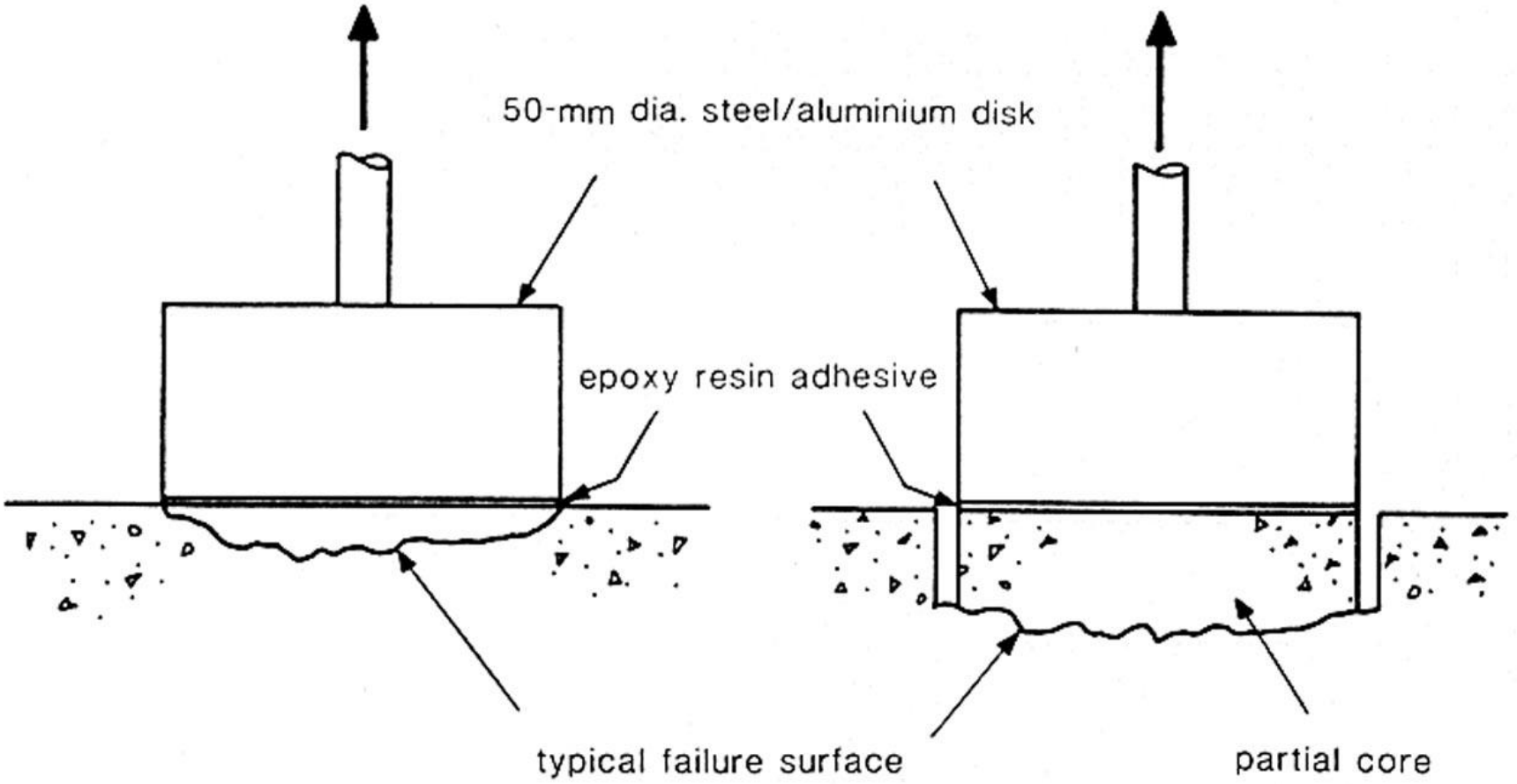


PULL–OUT TEST

PULL-OFF TEST



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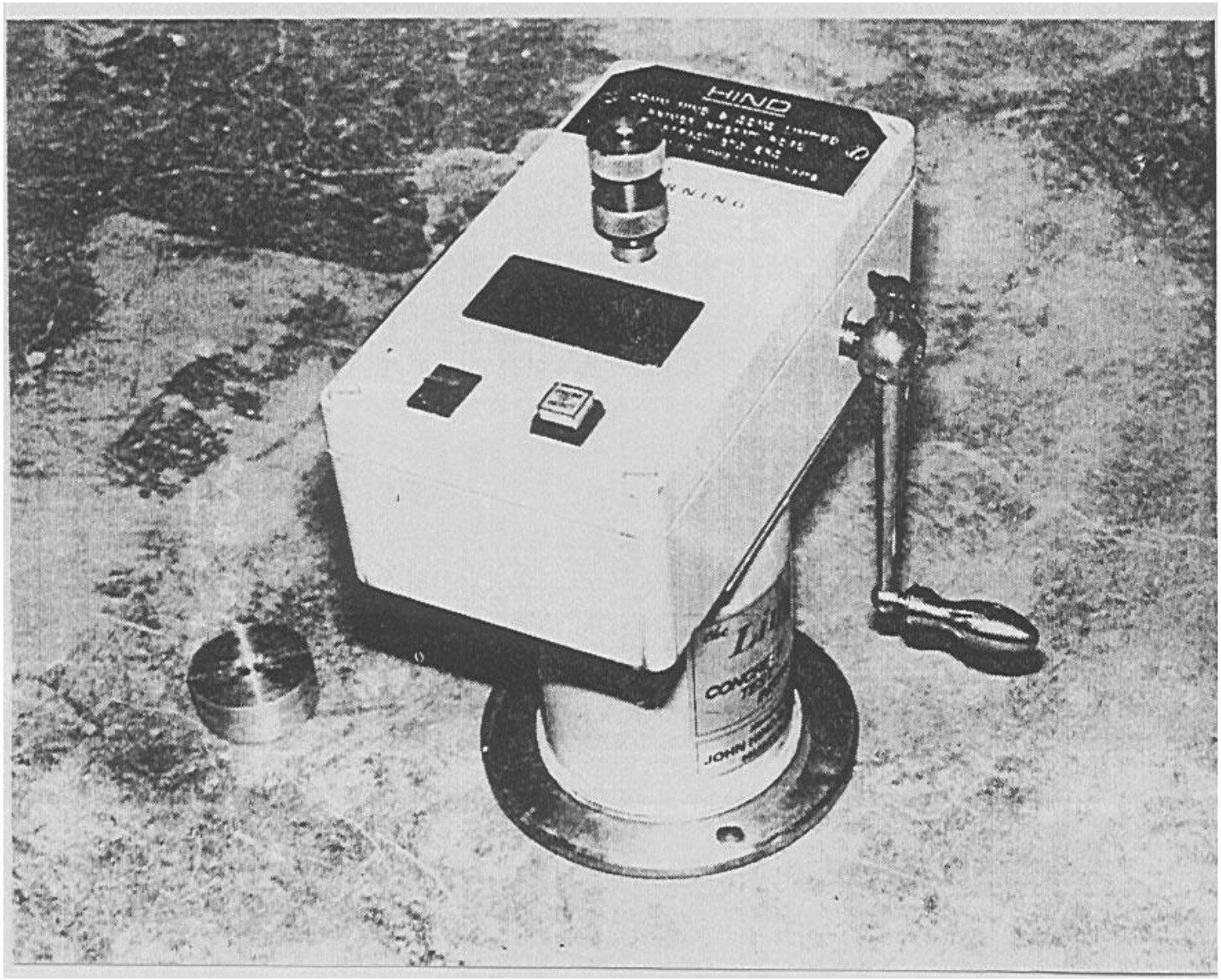

Thank You