UNIT - IV

MAINTENANCE AND REPAIR METHODS FOR MASONRY
Masonry – Types

Types of Masonry

• Load bearing
• Non load bearing
Masonry – Material

- Bricks
- Blocks
- Stone
  - Random rubble
  - Coursed rubble
  - Ashlar
Explain the various causes of wall cracks & their probable locations

Cracking in masonry :-

- Leaching
- Rising dampness
- Hollows/Voids in masonry
- Leakage /Salt
- Masonry joints
- Poor quality stones/ abrasion
- Corrosion of embedded portion of steel girders / joist
- Corner dislocation
Explain the various causes of wall cracks & their probable locations

- Non provision of RC sill
- Improper lintel
- Settlement cracking
- Load transfer from RCC beam
- Earth quake cracks
- Separation cracks
Explain the various causes of wall cracks & their probable locations

Non provision of RC sill
Explain the various causes of wall cracks & their probable locations

Improper lintel
Explain the various causes of wall cracks & their probable locations

Settlement cracking
Explain the various causes of wall cracks & their probable locations

Load transfer from RCC beam

[Image: Image of a cracked wall]
Earth quake cracks
Explain the various causes of wall cracks & their probable locations

Separation cracks
Select the relevant repair techniques for the damages in the given civil structures with justification.

<table>
<thead>
<tr>
<th>TECHNIQUES OF REPAIRS</th>
<th>MATERIAL STRENGTHENING</th>
<th>MEMBER STRENGTHENING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>→ <strong>Re- Waterproofing</strong></td>
<td>→ Fibre wrap</td>
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<tr>
<td></td>
<td>→ <strong>Re – Plastering</strong></td>
<td>→ Helifix bar</td>
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<td></td>
<td>→ Grouting</td>
<td>→ Retrofitting of stone masonry wall</td>
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<tr>
<td></td>
<td>▪ <strong>Micro grouting</strong></td>
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<tr>
<td></td>
<td>▪ Cement</td>
<td>→ Stitching</td>
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<td></td>
<td>▪ <strong>Polymer / Epoxy</strong></td>
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<td></td>
<td>→ Guniting &amp; Shotcreting</td>
<td>→ Sill bands</td>
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<tr>
<td></td>
<td>→ Raking</td>
<td>→ Lintel bands</td>
</tr>
<tr>
<td></td>
<td>→ Pointing</td>
<td>→ Corner bands</td>
</tr>
</tbody>
</table>

Go to the next point
Select the relevant repair techniques for the damages in the given civil structures with justification.

Re-Waterproofing
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Select the relevant repair techniques for the damages in the given civil structures with justification.

**Re-Waterproofing**

<table>
<thead>
<tr>
<th>Do's</th>
<th>Don’ts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Check corrosion damage to top &amp; bottom reinforcement of the slab</td>
<td>• Use crowbars / Pick axe / Sledge hammer /Jack hammer (High impact demolition tools)</td>
</tr>
<tr>
<td>• Treat slab for corrosion</td>
<td>• Stack the material in one corner of the terrace slab. Spread it out</td>
</tr>
<tr>
<td>• Observe cracks in slab and grout prior to brick bat</td>
<td>• Use high strength cement</td>
</tr>
<tr>
<td>• Check slab thickness &amp; adequacy</td>
<td></td>
</tr>
<tr>
<td>• False mark /Ample curing by ponding method</td>
<td></td>
</tr>
</tbody>
</table>
Select the relevant repair techniques for the damages in the given civil structures with justification.

Re-Plastering
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**Re-Plastering**

<table>
<thead>
<tr>
<th>Do’s</th>
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<tbody>
<tr>
<td>• Check &amp; remove only de-bonded /poor quality plaster</td>
<td>• Remove good plaster</td>
</tr>
<tr>
<td>• Rake out the joints</td>
<td>• Use heavy hammers</td>
</tr>
<tr>
<td>• Check joint strength</td>
<td>• Damage brickwork</td>
</tr>
<tr>
<td>• Wet brickwork</td>
<td>• Increase the thickness</td>
</tr>
<tr>
<td>• Use cutters for cutting part brickwork</td>
<td></td>
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Select the relevant repair techniques for the damages in the given civil structures with justification.

**Microgrouting**

Cracks to be filled with epoxy / polymer
Select the relevant repair techniques for the damages in the given civil structures with justification.

Grouting

Nipple
Select the relevant repair techniques for the damages in the given civil structures with justification.

Grouting
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**Grouting**

<table>
<thead>
<tr>
<th>Do’s</th>
<th>Don’ts</th>
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<tr>
<td>• Identify the purpose of grouting</td>
<td>• Grout active cracks</td>
</tr>
<tr>
<td>• Identify cracks active/passive</td>
<td>• Excessive grouting</td>
</tr>
<tr>
<td>• Extent of damage to be studied &amp; marked</td>
<td>• Excessive pressure</td>
</tr>
<tr>
<td>• Select appropriate grouting material /technique.</td>
<td></td>
</tr>
<tr>
<td>• Refusal of grout shall be clearly understood</td>
<td></td>
</tr>
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Select the relevant repair techniques for the damages in the given civil structures with justification.

Guniting & shotcreting
Select the relevant repair techniques for the damages in the given civil structures with justification.

**Guniting & shotcreting**

<table>
<thead>
<tr>
<th>Do’s</th>
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<tr>
<td>• Surface must be firm &amp; clean</td>
<td>• Gunite at an angle</td>
</tr>
<tr>
<td>• Use of jet pressure /air blast</td>
<td>• Use refuse material with out treatment</td>
</tr>
<tr>
<td>• If the surface of treatment has high adsorption, then it must be kept wet for a time period of 6 hours before undergoing guniting.</td>
<td></td>
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Select the relevant repair techniques for the damages in the given civil structures with justification.

Raking
Select the relevant repair techniques for the damages in the given civil structures with justification.

Pointing
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**Raking & Pointing**

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<th>Do’s</th>
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<tr>
<td>• Use of brush /scraper</td>
<td>• Use mechanical cutter</td>
</tr>
<tr>
<td>• Pointing shall be at joint only</td>
<td>• Remove firm /strong pointing material</td>
</tr>
</tbody>
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Select the relevant repair techniques for the damages in the given civil structures with justification.

Fibre wrap
Select the relevant repair techniques for the damages in the given civil structures with justification.

Helifix bar
Select the relevant repair techniques for the damages in the given civil structures with justification.

- Helifix bar
- Strengthening Based on CEM TIES
- Strengthening Based on DRYFIX
Select the relevant repair techniques for the damages in the given civil structures with justification.

Retrofitting of stone masonry wall

Vertical reinforcement

Drill in the wall

Stabilization of Wall
Select the relevant repair techniques for the damages in the given civil structures with justification.

Retrofitting of stone masonry wall

Vertical and Horizontal drilling
Select the relevant repair techniques for the damages in the given civil structures with justification.

Retrofitting of stone masonry wall

Insertion of reinforcement …followed by Grouting
Select the relevant repair techniques for the damages in the given civil structures with justification.

Retrofitting of stone masonry wall

Lime and cement grouting for masonry joints

Grouting in vertical drilled hole, grouted hole inside.
Select the relevant repair techniques for the damages in the given civil structures with justification.

**Stitching**
Select the relevant repair techniques for the damages in the given civil structures with justification.

Sill band
Select the relevant repair techniques for the damages in the given civil structures with justification.

Lintel bands
Select the relevant repair techniques for the damages in the given civil structures with justification.

**Execution Notes**

1. Remove existing plaster including cracking cut joints.
2. Apply 1st coat of cement plaster 15mm thick in 1:3 C.M.
3. Fix weld mesh jail 50x50mm x 3mm (10 gauge) after Drilling holes and fixing 6mm dia. G.I. Pins at 450 mm o/c.
   Staggered with ends dipped in epoxy and U nailing.
4. Apply bonding coat of polymar.
5. Provide second coat of sand faced plaster 20mm thick in single coat in 1:3 C.M.

**Corner bands**
Explain the repairing methods for the different crack types for the given structure

Covered in slide no. 12 -40
Explain the dampness in wall and its repair techniques

- External Leakage
- External seepage
- Rising dampness
Explain the dampness in wall and its repair techniques
Explain the various methods of improving bearing capacity of foundation

- Black Cotton Soil
- Chemical grouting
- Confinement of BC soil
- Mixing about 5% of lime
THANK YOU