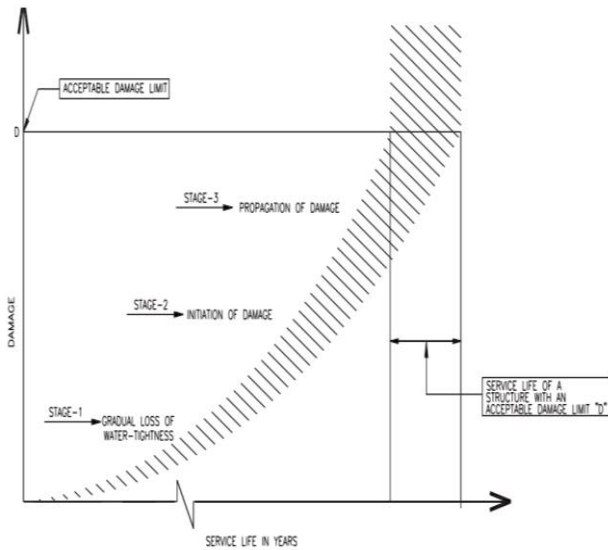


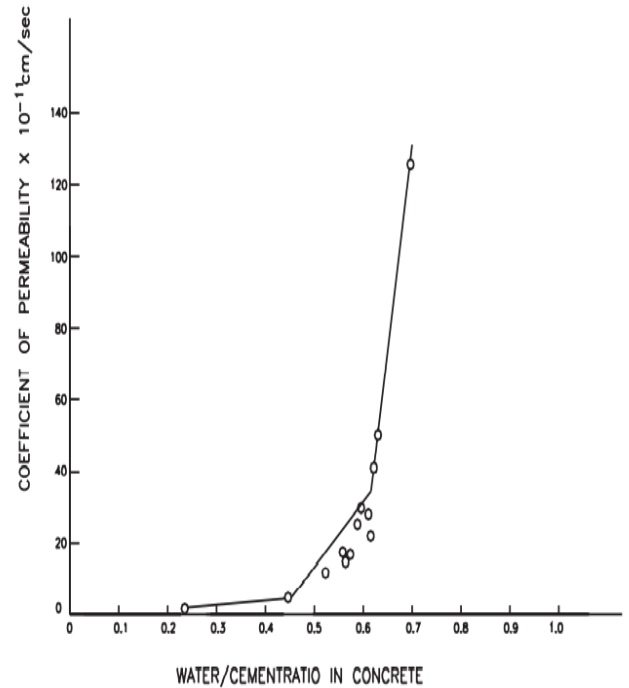


### III. METHODOLOGY

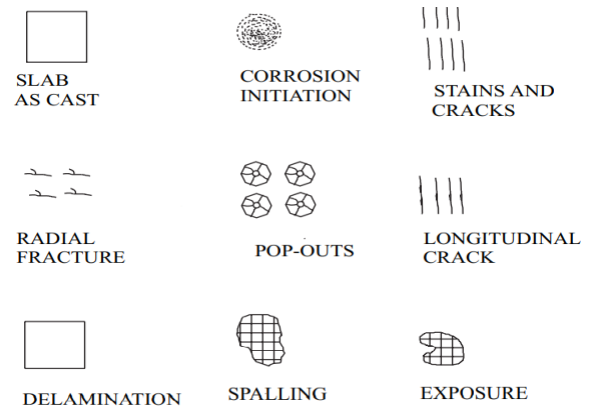
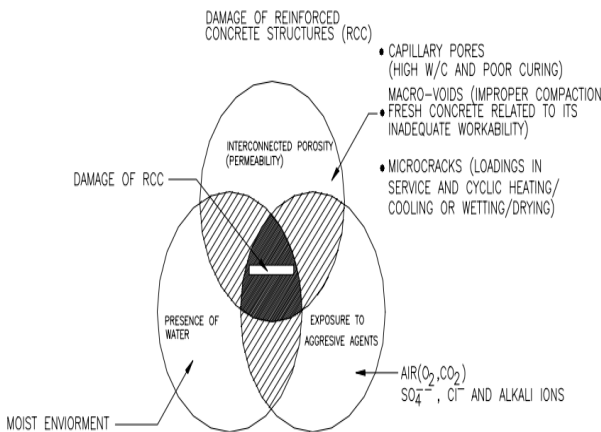


In the above figure we can understand about damages to the concrete structures with respect to the service life in years. In this there are three important zones with respect to damages. These are three zones which are mostly used for analysis. In the first stage the structure is subjected to damage due to water. By passing of water into the concrete structures it may leads to formation of corrosion in the concrete structures. in the second stage damages are started and subjected to problems in the reinforced concrete structures. in the stage three the damages are increased rapidly and finally structure is subjected to major damages and repairs. In order to prevent this type of damages in concrete structures we can identify the problem in early stage and solve it by using suitable repair materials. If we are not identifying the damages in early stage which results increasing of damages in each zone with respect to the service life of the reinforced concrete structures.

- Improper compaction
- Over loading
- Over stresses
- Poor quality works
- Improper design



From the above figure we can understand that coefficient of permeability of concrete with respect to water cement ratio in the concrete. If the amount of water cement ratio increases which results in increasing in coefficient of permeability in the concrete structures and then decreases the strength of the concrete as well. If amount of moisture increases in concrete surface which results concrete become loose and lost its strength and durability and it can be weak compared to normal strength of the concrete.



### IV. REASONS FOR REPAIRS

- Permeability
- Curing
- Hydration
- Water cement ratio
- Air voids

### V. TESTS USED

There are number of tests are available for repairing the reinforced cement concrete structures. in this we have mainly discuss on NDT tests. By using these tests, we can clearly identify damages and location of damage surfaces in the structure and also examined type of damage and severity of the damages in the reinforced concrete structures. most of tests are gives acceptable and good results. By following

details gives an idea about tests and its uses and details as well.

S.No.	Tests	Details
1.	Rebound Hammer	A Qualitative field test to measure surface hardness of concrete
2.	Ultrasonic Pulse Velocity	A Qualitative field test to measure surface integrity and homogeneity of concrete structures
3.	Windsor Probe	Field test to measure strength of concrete
4.	Pull out	To Determine the compressive strength of concrete
5.	Pull off	To Determine the tensile strength of concrete

In the above figure we can understand about damage of reinforced concrete structures with respect to water content and environmental exposure conditions etc. due to permeability and moisture content and environmental agents are leads to formation of damages in the reinforced concrete structures. the chemical reactions are playing an important role in leading damages in concrete structures.

### VI. RETROFITTING METHODS

These are the important methods and it can be used to improve the structural capacity and structural strength and as well as increase the structural durability. The main aim of this is to reduce the damages and to make an impervious or non-absorbing layer or surface to the concrete structures. in this paper we can discuss some of the important techniques and uses in the concrete structures.



Fig. Resin Injection



Fig. Stitching



Fig. Routing

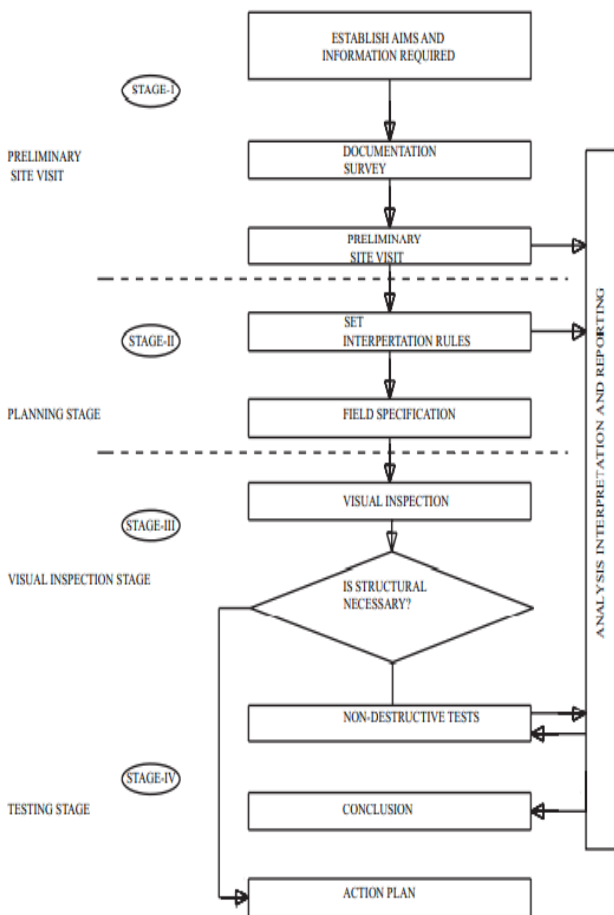


Fig. Visual Inspection



Fig. Damaged structure



Fig. Guniting

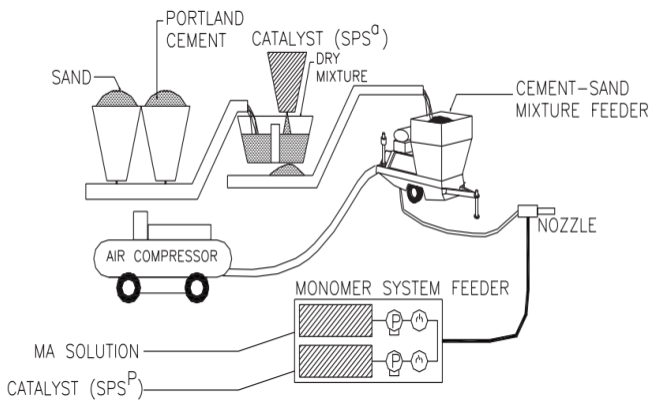
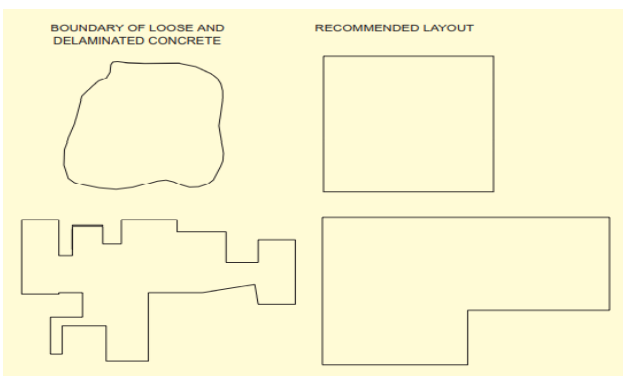


Fig. Polymer Modified Concrete

VII. RECOMMENDED AREA OUTLET



For proper repairing of any damages area outlet also plays an important role to repair the damages. If the area of layout is in regular or linear manner then the repairing of reinforced concrete structure is easy. if the area of layout is irregular and non-uniform then the repairing of damages is complex compared to uniform structures. so, it is indirectly placing an important role for concrete structures.

VIII. CONCLUSION

To ensure a structure in safely and in order to prevent damages repair and rehabilitation of concrete structures are necessary. There are lot of researches is going on repairing methodologies and development of strength in the concrete structure. It can be used to reduce the risks and with stand the environmental effects to the reinforced concrete structures. the study of repair and rehabilitation is most useful to gain knowledge on concrete structures and its repairs.

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REFERENCES

- [1] Concrete properties and materials by Paulo
- [2] Properties of concrete by Neville
- [3] Materials for construction by James
- [4] Structural condition assessment by Robert
- [5] Repair and Rehabilitation of Structures by Govt. of India.
- [6] Structural rehabilitation and retrofitting by Mohee
- [7] Retrofitting of structures by waghmare
- [8] Structural rehabilitation and retrofitting by Kumar
- [9] Retrofitting of concrete structures by Hassan
- [10] Repair of reinforced concrete structures by Austin
- [11] Repair and rehabilitation and retrofitting structures by Bhattacharjee.