

“REPAIR AND REHABILITATION OF A BUILDING”

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Abstract :- information regarding this paper discusses the review of repair and rehabilitation of building. In current scenario of building research, repair and rehabilitation plays vital role as it serves important in building application. The structural examination under sect. 353(B) of the Bombay munciple corporation act, 1888. As per request of managing committee of the building. We have inspected “YASHASHREE C.H.S. LTD,” situated anant nagar, kulgaon badlapur, badlapur (E). Tal Ambernath, Dist thane- 421503.

We have inspected the building and check the building component for the purpose to find out current structural condition. The report is best mainly on visual inspection and NDT Test. The building is RCC Frame structure with Brick walls. The building is consisting of G+2 storied. As compare to the building the intensity and damage and deterioration is indicatively severe and exhibits. As the extended movement corrosion of the steel reinforcement take place. Overall structural condition of the building does not look to satisfactory since the building elements are affected by reinforcement corrosion externally and internally. Some recommendation/conclusion have been given for durable concrete construction and rehabilitation work.

Key words :- spalls, delamination, carbonation, corrosion, non destructive testing, polymers.

1. Introduction :-

The term rehabilitation in broad sense implied restoring the structure to its original condition. Technique developed for rehabilitation may also be used for modifying the structure to meet new functional or other requirements. In general, structure may need rehabilitation for one of the following:

- Normal deterioration due to environmental effect
- New functional or loading requirements and modification to a structure.
- Damage due to accident.

The first task when a structure shows sign of cracking, spalling or any other sign is to determine whether the damage is structural or non structural. The engineer in-charge of rehabilitation should have qualities of investigator,

structural designer, material technologist and awareness of application techniques.

The repair and rehabilitation of structures includes the following:

- inspection method, assessment, monitoring, maintenance of structures.
- concrete durability, testing and analysis.
- general repairs.

1.1 LITERATURE REVIEW:-

The Building we have selected for our project is situated in badlapur name of the building is YASHASHREE C.H.S Ltd. **Bhavan Avani et al(2013)**(structural repair and rehabilitation of 3 No (G+8) multistoreyed residential building at ONGC colony at chandkehda Ahmedabad Gujarat) it states that the structure start showing the signs of distress sometimes less than 10 years of service requiring early repair and rehabilitation of work. **Balamuralikrishnan r et al. (2016)** (repair and rehabilitation of structure It states that the repair and rehabilitation means restoring the damaged structure to make them fit for serviceability condition. The cement concrete reinforced with steel bars is an extremely popular construction material. **Chajlani jeetendra1, kushvaha suresh2, hussain aslam3 et al. (2015)** (analysis of repairs and rehabilitation of RCC structures)states that the Technique Develop for rehabilitation may also be used for modifying a structure to meet new functional and or other requirements.

2. Preliminary investigation :-

Visual inspection of a building indicated corrosion as a result of carbonation due to environmental attack. At certain location of beams, column and slab concrete cover had got spalled and some shear stirrup were totally up by corrosion. The visual inspection necessitated the need for detailed evaluation for design of rehabilitation.



Fig.2.1 Severe corrosion and spalling of beam



Fig. 2.2 de-lamination of concrete cover due to severe corrosion of roof slab

3. Detailed investigation :-

3.1 Rebound hammer test

- Assessing the compressive strength of concrete with the help of suitable correlation between rebound index and compressive strength
- Assessing the uniformity of the concrete
- Assessing the quality of concrete in relation to the standard requirements
- Assessing the quality of one element of concrete in relation to another



Fig. 3.1 rebound hammer test

3.2 ultrasonic pulse velocity

The ultrasonic pulse velocity method is used for non destructive testing of plain reinforced and pre-stressed concrete whether it is precast or cast in-situ.

Object: the main object of ultrasonic pulse velocity method are to established,

- the homogeneity of the concrete
- the presence of cracks, void and other imperfections
- changes in the structure of concrete caused by exposure condition, corrosion, wear etc. Which may occur with time
- the quality of concrete in relation to the specified standard requirements.
- The quality of one element of the concrete in relation to the another
- The values of the dynamic elastic modulus of the concrete

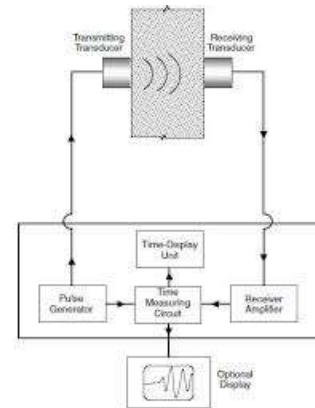


Fig. 3.2 Ultrasonic pulse velocity test

4. Material for crack repair and technique:-

4.2 The various materials are used for repair of crack are:

- cement slurry
- cement mortar
- epoxy resin
- polymer modified cementations product

4.3 Techniques:

- Epoxy injection grouting
- routing and sealing
- providing additional reinforcement
- surfacecoating

5. RESULTS:-

The structural examination of the building "YASHASHREE C.H.S. LTD.", situated at anant nagar, kulgaon badlapur, badlapur (E). Tal ambernath, Dist Thane- 421503.

Sr. no.	Sub	Structural Audit
	Name of consultant	"SAD CONSULTANT"
1.	Name of building	YASHASHREE C.H.S. LTD. BADLAPUR (E).
2.	No. of Storey	G+2 UPPER FLOORS
3.	Year of construction	1999
4.	Mode of construction	RCC framed structure
	I. Foundation	RC footing
	II. Floor	RC slab
	III. Walls	Brick Work
	IV. Beams	RC Floor beams
	V. Columns	R.C.C. Columns
	VI. Roof	R.C.C. Slab
5.	Condition of	
	i. Internal plaster	Cracks & Leakages seen at many places
	ii. External plaster	Crack & Leakages seen at many places
	iii. Plumbing	Leakages are observed
6.	Date of Inspection by Consultant	28/09/2018

TESTING:-

1.	TEST RECOMMENDED	
	• Rebound hammer test	Done
	• Concrete core cutting & compression testing	No
	• Half cell potential test for determining the probability of corrosion in embedded steel	No
	• Carbonation test for carbonation depth measurement for steel	No
	• Ultrasonic pulse velocity test	Done

NDT RESULTS													
Test location						UPV Results		HCP Results	Carbonation Results			Rebound Results	Hammer
Serial no.	Unit	Member ID	Level	Element type	Test location On member	UPV Km/sec	Concrete Quality	Potential (mV)	Depth mm	Performed on core?	Hammer reading	Hammer direction	Eqv. Cube Strength
1		C1	G-1	Column	Mid	4.44	Excellent	-309	20		25	HOR	13
2		C2	G-1	Column	Mid	3.00	Medium		50				
3		C3	G-1	Column	Mid	4.40	Excellent	-319					
4		C4	G-1	Column	Mid	3.04	Medium						
5		C5	G-1	Column	Mid	4.33	Excellent				18	HOR	Below 9
6		C6	G-1	Column	Mid	4.66	Excellent						
7		C7	G-1	Column	Mid			-330	50				
8		S1	1	Slab	Edge	3.18	Medium				24	VUP	Below 9
9		B1	2	Beam	End	3.12	Medium				29	HOR	18
UPV Results Summary						Average			40.0				
criteria		Concrete	No.	of	HCP Results Summary								

	Quality	readings							
Above 4.5 km/s	Excellent	2		Criteria	Probability of corrosion	No. of readings			
3.5 to 4.5 km/s	Good	4		More than -200 mV	10%	0			
3.0 to 3.5 km/s	Medium	4		-200 mV to -350 mV	50%	3			
Below 3.0 km/s	Doubtful	0		Less than -350 mV	90%	0			

6. Conclusions:-

The structure inspected is in dilapidated condition, many RCC member such as column, beam and slab are about to corrode. In brick wall plaster cracks are found. Vegetation on external walls are seen. Columns and beams indicating that moisture is present inside which leads to corrosion of reinforcement of RCC member.

The detail investigation of the building with rebound hammer test, ultrasonic pulse velocity test, carbonation test have indicated that there is a lot of variation in the compressive strength of concrete in beams as well as columns. At certain locations, the strength were found around 10 N/mm² only indicated poor quality of concrete practices adopted in the original construction. Lower value of compressive strength also indicate higher permeability of concrete leading to ingress of harmful agents like carbon dioxide gas, chlorides etc. from the environment resulting in corrosion of steel bars and disintegration of concrete cover.

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