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STRUCTURAL STABILITY AND FEASIBILITY ANALYSIS OF MOTHER SLAB (RCC) AT HERITAGE HOTEL

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Abstract- *For exploring the current state of strength and possibility of water proofing tiles and effect of such additional load stress of mother slab made of RCC at heritage hotel located at Riktiya Bharuji Chouraha fly over using detailed visual and Non Destructive observations as deed fit. Applications of NDT methods in constructions become more accurate since these have to assist for more consistent solutions for repairing and retrofitting study. Several visual and NDT methods are available to achieve the task of reuse of the structures within agreed safe limits. Being indirect in nature in depth study of these methods is condition for both qualitative and quantitative exploration.*

Keywords- *Structural Strength, Stress Loading Calculation, NDT, Rebound Hammer, Ultra sonic Pulse Velocity, Heritage Hotel*

I. INTRODUCTION

1.1 Problems in structures:

The Heritage Hotel site located at Riktiya Bharuji Chouraha fly over needs to be checked for mother slab (RCC) strength using NDT methods. Water proofing work was in progress at the time of first site visit by NDT expert team and work is carred out by field contractor with under guidance of engineer expert appointed by the management. Initially it was planned to check the permeability and other NDT tests for water proofing, but finally it was planned to conduct NDT for RCC mother slab.

1.2 Visual observations:

Visual inspection is mainly required to plan NDT evaluation of the concrete structure. The various components of the structure are almost in good condition and decorative in presence. The mother slab (RCC) was constructed as a roof top with brick koba on it varying in thickness from 3" to 9". The brick koba was removed at the time of visit. The surface of mother slab (RCC) was smoothened for UPC tests using stone provided with the equipment. Structural health demonstration condition valuations can be made using NDT methods.

1.3 User Requirement:

Agency required some assurance from experts regarding stability and feasibility. Although NDT have certain queries namely- Leakage issue in some part of the structure and dampness in the roof, difficulties in maintaining look during rainy season, distortion in residual strength/ remaining life of the slab, possibility of repair and retrofitting/ remedial measures etc. Before visiting and start the investigation at site some significant data is required to found from the source if possible, which may help in plan of examination and interpolation of the results i.e. Age of the structure, reasons for its valuation, geo technical study report, Ambient Environment and its effect, Design and detailing of the structure, Use of the structure and its repair history etc. This provides certain status to consider appropriate NDT techniques for investigation. The visiting team interacted with the persons present at the site and briefed about the tests and gets some data related to structure which are essential for interpretation. The mix design report and test data are not available.

1.4 Techniques Used for Assessment:

Techniques used are: Schmidt Rebound Hammer Digital model of Proceq (Swiss company), TICO Ultra sonic Pulse Velocity and other instruments were used as deemed fit. Non Destructive Testing techniques available are:

1. Visual Inspection.
2. Hardness based technique: Rebound hammer etc.
3. Ultra sound wave transmission technique: Ultra Sonic Pulse Velocity.

In reply to client's demand above desired information was desired. Except two planning drawing nothing could be provided by client for reference purposes. It was decided to inspect the site and carry out NDT with techniques deemed fit.

II. PROBLEM STATEMENT

2.1 Work Strategy & Observations:

On the basis of initial site visit it was decided that NDT will be carried out using appropriate apparatuses available in the institution. Boundaries of the study were also reflected. Schmidt Rebound hammer interpretations are related to surface hardness of the concrete and its strength is related using inbuilt calibration curve in the tool. The strength with rebound

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hammer number not basically is truly indicative of its compressive strength to the extent shown, these have to be corrected for dissimilar factors but it does give comparison of surface hardness for quality of concrete, Refer IS 13311 pt II

Ultrasonic pulse velocity test specify travel time through concrete continuous media. In Indirect method probes are kept on same side of the surface where velocity may be higher (to the tune of 1000 m/s) if experimental with semi direct or direct observations. Higher pulse velocity indicates better quality of concrete. Difference in velocities obtained by different methods should be compared with corrections as given in IS 13311 pt I.

III. NDT TEST RESULTS

3.1 Schmidt Rebound Hammer Test Results:

SN	*Average Rebound no (6 readings)*	*Maximum Reading*	*Minimum Reading*	*Standard Deviation*	*Related Compressive Strength N /sq mm*	*Remarks*
1.	31	44	4.9	38.8	40.3	
2.	37	46	3.2	39.7	41.9	
3.	41	50	3.1	45.3	52.7	
4.	34	44	3.7	36.8	36.7	
5.	35	47	4.4	41.2	44.6	
6.	36	42	1.3	37.7	38.2	
7.	30	42	4.5	36.3	35.8	
8.	32	41	3.6	37.0	37.0	
9.	38	48	3.3	42.3	46.9	
10.	31	39	2.9	34.3	32.3	
11.	34	48	5.4	42.0	46.2	
12.	35	46	3.2	41.5	45.5	
13.	32	46	4.3	40.0	42.5	
14.	33	49	3.2	40.8	44.0	
15.	35	49	4.5	42.3	46.9	
16.	35	46	4.2	39.8	42.2	
17.	35	48	4.8	40.3	43.1	Wet
All Reading of RH taken in Vertical Position only.						

3.2 Ultrasonic Pulse Velocity Test Results:

S N	*Column/Beam No.*	*Path length mm*	*Travel time µ sec*	*Velocity m/sec*	*Remarks/ Method*
1.	200	101.0	1980	-	40
2.	200	64.7	3090	-	45
3.	200	65.8	3040	-	38
4.	200	70.4	2840	-	36
5.	200	97.1	2060	-	37
6.	200	75.7	2640	-	34
7.	200	100.8	1980	-	41
8.	200	70.6	2830	-	40
9.	200	66.7	3060	-	41
10.	200	69.7	2870	-	40

D- Direct, SD-Semi Direct & ID- Indirect Transmission of Ultra Sonic Pulse Wave

IV. RECOMMENDATIONS/CONCLUSION

4.1 Compressive Strength

The concrete shall be deemed to fulfill with the strength necessities when both the following circumstances are met:-

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- The mean strength strong-minded from any group of four successive test results complies with the appropriate limits in column 2 of table 11.
- Any individual test results complies with the appropriate limits in column 3 of table 11
- Clause 16.3. Quantity of Concrete Characterized by Strength Test Results
- Clause 16.3. The quantity signified by a group of four consecutive test results shall include the batches from which the first and last were taken together with all intervening results.
- 16.6 Concrete is accountable to be disallowed if it porous or honey searched, its placing has been intermittent without providing a proper structure joint, the reinforcement has been displaced beyond the acceptances specified, or construction tolerances have been met, However, the hardened concrete may be accepted after carrying out suitable remedial measures to the satisfaction of the Engineer In charge.

4.2 Testing

Concrete in the member signified by a core test shall be considered acceptable if the average corresponding cube strength of cores is equal to at least 85 percent of the cube strength of the grade of concrete specified for the consistent age and no individual core has strength less than 75 percent.

4.3 The Purpose of the Inspection-

The purpose of the review is to provide advice to a potential or other absorbed party concerning the condition of the structure at the time of the inspection. The advice is limited to the reporting of the condition of the structure in consensus with IS 456. This report is restricted to (unless otherwise noted) the main structure on the site. This report is not intended as a certificate of acquiescence of the structure within the requirements of any act, regulation, and order or by law, or, as a warranty or an cover policy against problems emerging with the building in the future.

4.4 Assumptions & Limitations-

- Any person who relies upon the contents of this report does so recognizing that the following clauses, which define the Scope and Limitations of the examination, form an essential part of the report.
- This NDT inspection is limited to those areas and sections of the structure fully accessible and visible to the Superintendent at the time and on the date of Inspection.
- The inspection did not include contravention apart, dismantling, removing or moving objects including, but not limited to, foliage, moldings, sparking membrane, appliances or personal possessions.
- Requirements of IS 13311 part I and part II 1992 applies in totaling to provisions of IS 516 latest version applies. So far as mix design is concerns requirements of IS 10262 and SP 23 latest versions shall comply. Useless to say that Requirements of IS 456-2000 also applies.
- Nothing limited in the Report implies that any unreachable or partly unreachable area(s) or section(s) of the structure being inspected by the Inspector on the date of the inspection were free from defects latent or otherwise.
- No responsibility can be accepted for defects which are latent or otherwise not sensibly detected on limited requirement.
- Durability of visible finishes.
- Photographic evidence taken on the day of inspection is given as an example of the NDTs found to the structure for journalism purposes only. These photos inside the report are to contribution, and May not show all the tests and/or the areas renowned on the day of inspection.
- Any person who relies upon the contents of this report does so acknowledging that the above clauses, definitions and disclaimers that follow define the Possibility and Boundaries of the inspection and form an essential part of the report.
- Disclaimer of answerability: No answerability shall be accepted on account of failure of the report to notify any problems in any area(s) or section(s) of the subject structure physically inaccessible for testing purpose, or to which access for testing is denied by or to the visiting team (including but not limited to any area(s) or section(s) so stated by the Report.
- Disclaimer of Accountability to Third Parties: This report is made solely for the use and advantage of the Customer named on the front of this report. No accountability whatsoever, in contract or tort, is accepted to any third party who may rely on the Report wholly or in part.

4.5 Recommendations: - All procedure should be including testing, witnessed by either the contractor or the activity possessing the construction. The matter may be referred to a competent authority as per norms of NDMA sighted requirement and knowledge of the skilled concerned.

4.6 Conclusions: The NDT readings got using rebound hammer technique and Ultra-Sonic Pulse Velocity technique indicates good structural strength of RCC of mother slab. The combined technique did not indicate any reading of (σ) compressive strength.

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Photo-1 Mother Slab Top View at Point No 03

Photo-2 Equipment's on Mother Slab

Photo- Equipment & Ducts on Mother Slab at Point No 12

Photo-4 Piping Arrangements on Mother Slab Rear View

Photo-5 View of Mother Slab at Point No 04

Photo-6 Another View of on Mother Slab at Point No 05

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Photo-7 Rebound Hammer Testing at Mother Slab

Photo-9 UPV Testing at Mother Slab

Photo-11 Location on Google Map

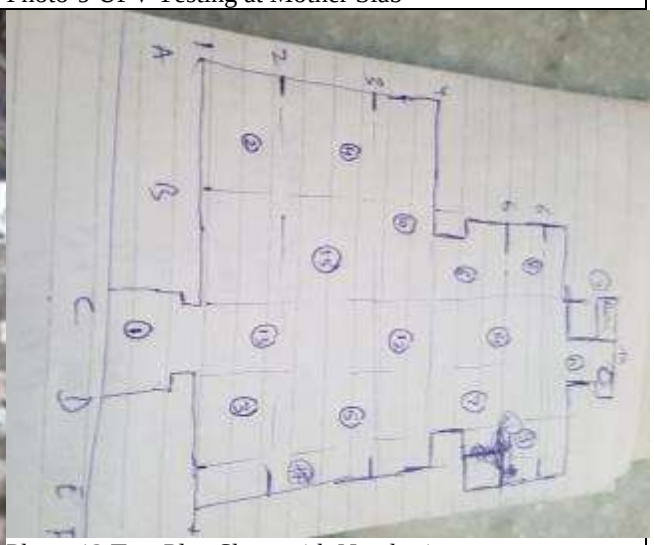

Photo-12 Test Plan Sheet with Numbering

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