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Dated: 25.07.2016
Job No. C/HKS/16-17/ 66
No. C / HKS / 66

Director/Principal
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Airport Road, Subri,
Karnal 132 001

Subject: Report of Inspection and Non destructive Testing of Academic Block Building of Montfort World School, Subri, Karnal for Structural Safety Purpose.

Reference: Your letter Dated 15.07.2016

Please find enclosed herewith report of inspection and non destructive testing of academic block building for structural safety, for further necessary action.

(Dr H K Sharma)

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Encl:
1. Report
2. Annex-1 (9,6&7)
3. Annex -2 (9&6)
4. Annex - 3.

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REPORT OF INSPECTION AND NON- DESTRUCTIVE TESTING OF ACADEMIC BLOCK BUILDING OF MONTFORT WORLD SCHOOL, AIRPORT ROAD, SUBRI, KARNAL (HARYANA) FOR STRUCTURAL SAFETY OF BUILDING

The inspection and non-destructive testing of Academic Block Building of Montfort World School, Airport Road, Subri, Karnal (Haryana) was conducted in presence of Mr Tanvir Singh , Managing Director and Principal of the School and His Site Engineer .

The inspection and testing were conducted in response to letter Dated 15.07.2016 from the Director and Principal of the School.

The non-destructive testing using Rebound Hammer was conducted as per procedure laid down in IS : 13311 (Part-II) :1992 for assessing likely compressive strength of concrete using suitable correlation between rebound index and compressive strength , uniformity of concrete, quality of concrete in relation to standard requirements and quality of one element of concrete in relation to another. Ultrasonic pulse velocity test was also conducted as per procedure laid down in IS: 13311 (Part - I) to ascertain homogeneity of concrete, presence of cracks , voids and other imperfections, quality of concrete in relation to standard requirements, possible changes in the structure of concrete which may occur with time , quality of concrete in relation to standard requirements , etc .Destructive testing in the form of core cutting from RC structural components like beam and slab for assessing residual compressive strength of concrete and evaluation of local damages , was not carried out in view of already severe damages in these components of buildings.

The Academic Block which is a three storey has been in use for academic studies purpose having class rooms , labs and other academic aminities.

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REBOUND HAMMER TEST

Basic Principle

When the plunger of rebound hammer is pressed against the surface of the structure of the concrete , the spring controlled mass rebounds and the extent of such rebound depends upon the surface hardness of concrete. The surface hardness and therefore the rebound is taken to be related to the compressive strength of concrete. The rebound is read off along a graduated scale and is designated as the rebound number or rebound index.

Procedure

Rebound hammer test was conducted around all the points of observations on all accessible faces of the structural elements .Concrete surfaces were cleaned thoroughly before taking any measurements. Rebound hammer tests were conducted either at right angle to the surface of concrete member or at some angle as situation demands. Six readings of rebound indices were taken around each point of observation and average of these readings after deleting outliners as per IS 8900: 1978 becomes rebound index for the point of observation.

Interpretation of Results

The rebound hammer method provides a convenient and rapid indication of the compressive strength by means of establishing a suitable correlation between rebound index and compressive strength of concrete.

ULTRASONIC PULSE VELOCITY TEST

Basic Principle

The ultrasonic pulse is generated by an electro acoustical transducer which is induced into the concrete. A complex system of stress waves is developed which induces longitudinal, shear and surface waves . The receiving transducer detects the onset of longitudinal waves , which is the fastest.

Since , velocity of the pulse is almost independent of the geometry of the material through which they pass and depends only on its elastic modulus, pulse velocity method is a convenient technique for investigating structural concrete.

The underlying principal of assessing quality of concrete is that comparatively higher velocities are obtained when quality of concrete in terms of density, homogeneity and uniformity is good. The actual pulse velocity obtained depends primarily upon

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the materials and mix proportions of concrete. Density and Elastic modulus of aggregate also significantly affect the pulse velocity.

Procedure

The test was conducted as per procedure laid down in IS 13311(Part I) Ultrasonic pulse is produced by the transducer which is held in contact with one surface of concrete member under test.. The pulse of vibration is converted into an electrical signal by the second transducer held in contact with other surface of the concrete member, and an electronic timing circuit enables transmit time of the pulse to be measured. In order to ensure adequate acoustical coupling between concrete and face of the each transducer, typical couplants like petroleum jelly, grease, liquid soap, and kaolin glycerol paste may be used.

Interpretation of Results

The ultrasonic pulse velocity of concrete is mainly related to its density and modulus of elasticity which in turn depends upon the materials and mix proportions used in making concrete as well as method of placing , compaction and curing of concrete. During inspection and testing, recording of information was done starting from ground floor of the building to first floor and then to second floor , to ascertain extent of damage of various structural components and to estimate strength of various structural components. During inspection and testing, following points were observed.

Ground Floor

(i) The ground floor has been found to be in use for academic studies purpose having class rooms , labs and other academic amenities

(ii) No visible crack was found any where in this portion of the building.

(iii) The average compressive strength of concrete used in columns of the building was obtained as 25.50 N/mm^2 using Rebound Hammer Apparatus whereas average compressive strength values of concrete used in beams and slab of the building were obtained as 26.30 N/mm^2 and 24.00 N/mm^2 resp. using Rebound Hammer Test.

(iv) The quality of concrete in terms of uniformity, incidence or absence of internal flaws, cracks and segregation, etc indicative of level of workmanship employed , has been assessed as 'Medium' in beams and Columns using Ultrasonic Pulse Velocity Test .

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First Floor

(i) The first floor has also been found to be in use for academic studies purpose having class rooms , labs and other academic amenities.

(ii) No visible crack was found any where in this portion of the building.

(iii) The average compressive strength of concrete used in columns of the building was obtained as 23.10 N/mm^2 using Rebound Hammer Apparatus whereas average compressive strength values of concrete used in beams and slab of the building were obtained as 25.30 N/mm^2 and 24 N/mm^2 resp. using Rebound Hammer Test.

(iv) The quality of concrete in terms of uniformity, incidence or absence of internal flaws, cracks and segregation, etc. indicative of level of workmanship employed , has been assessed as 'Medium' in beams and Columns using Ultrasonic Pulse Velocity Test .

Second Floor

(i) The second floor has also been found to be in use for academic studies purpose having class rooms , labs and other academic amenities.

(ii) No visible crack was found any where in this portion of the building.

(iii) The average compressive strength of concrete used in columns of the building was obtained as 23.70 N/mm^2 using Rebound Hammer Apparatus whereas average compressive strength values of concrete used in beams and slab of the building were obtained as 24.10 N/mm^2 and 25 N/mm^2 using Rebound Hammer Test.

(iv) The quality of concrete in terms of uniformity, incidence or absence of internal flaws, cracks and segregation, etc. indicative of level of workmanship employed , has been assessed as 'Medium' in beams and Columns using Ultrasonic Pulse Velocity Test .

In addition , it was however observed that some visible hairline cracks have developed in the non structural components like sun sheds and projections at roof level , etc. which need to be retrofitted / repaired /strengthened in view of the importance of the building.

The Architectural Drawings prepared by Ar Varun Dutt , CA/2011/53051 , #258, Mugal Canal , Karnal have illustrated that Academic Block has been constructed on land having Khasra No. 201, Killa No. 4 and 7 situated at Village Kunjpura, Teh and

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Distt. Karnal having total covered area 25815 square ft provided at three floors, as per Annex - 1. Photographs of the Academic Block are enclosed as per Annex-2. The structural safety certificate issued by Er ShashiKant , Structural Engineer, Karnal has certified that structural design has been carried out by following relevant IS Codal provisions and construction has also been done as per procedure laid down in various IS Codes .It has also been certified by Structural Engineer that the building has been found structurally safe and stable . Annex - 3

On the basis of inspection and non destructive testing of various structural components like columns, beams and slabs, etc., and the structural safety and stability certificate provided by Mr ShashiKant , HUDA Approved Structural Engineer,(Licence No. 2) , the Academic Block Building housing Academic amenities may therefore be considered structurally safe .

IMPORTANT:

The responsibility of National Institute of Technology, Kurukshetra and the Principal Investigator is limited only to providing technical advice on the above subject matter referred by the sponsoring agency i . e. Director/ Principal, Montfort World School, Airport Road, Subri, Karnal . All procedural / legal/ operational matters will be the sole responsibility of the sponsoring agency i. e. Director/ Principal, Montfort World School, Airport Road, Subri, Karnal and executing agency, National Institute of Technology, Kurukshetra and Principal Investigator, in any way, will not be involved in any Techno-legal proceedings.

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