

**REPORT ON STRUCTURAL HEALTH MONITORING, REPAIR
METHODOLOGY FOR LEAKAGES AND CRACKS REPAIRS
FOR
HOSTEL BUILDINGS A-F BLOCK AT DIIACT, GANDHINAGAR**



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HOSTEL BUILDINGS A-F Blocks

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1) INTRODUCTION

- The Hostel Buildings are located at DIIACT at Gandhinagar. The existing Buildings are RCC frame structure, with G.FL +F.FL. + S.FL. Building was constructed in the year 2003. The building is used as Hostel rooms.
- The DIIACT decided to carry out the health assessment of damages and check the stability & structural inspection.
- DAU has entrusted the job of structural inspection to ascertain the safety and serviceability of the building for inhabitation purpose and to make aware the Client about the prevailing condition of the building. Also, purpose of this study is to check the hostel Buildings and methodology of repairs at various places due to structural or non-structural defects.

2) OBJECTIVES

- The stimulus of this report is the health assessment of the existing Hostel Buildings to know the effect of any disastrous phenomena.
- The report covers the finding after the Visual inspection & subsequent NDT tests.
- Performing preliminary inspection of the building & Study of available drawings.
- Visual inspection to highlight critical area of Damages & NDT test locations.
- Performance of NDT tests.
- Finding actual present strength of the building.
- To find out the residual strength of the existing structure and possibility of the retrofitting and restoration of structures with respect to present Indian codes for safety with respect to Natural Hazards, like Earth Quake & Wind Cyclone.
- To inspect the building thoroughly and check the cracks, settlements and leakages issues and identify the causes and finding the remedies.
- Conclusions and Recommendations on the possibilities of repair/ restore them to facilitate the use of Hostel Buildings after achieving necessary safety standards of the occupants.

3) Methodology of Assessment

- Detailed visual survey of all accessible structural members across all floors
Photographic documentation of distress, spalling, cracking, exposed reinforcement
Assessment of the exterior facade, columns, beams, slabs, staircase, corridors, utility areas and vegetation.
- NDT Testing methods such as rebound hammer test, Ultrasonic Pulse Velocity (UPV), Carbonation depth test, Half –cell potential meter to estimate structural strength, durability, corrosion, carbonation depth, and honey combining.
- Evaluation of Test Result are analyzed against standard benchmarks to determine the structural health.
- Conclusion over all conclusion form visual inspections and NDT tests over all summery whether the building is structurally “sound”, “Repairable” or “distressed” and root cause identification

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- Recommendation contains immediate measures for repair and rehabilitation and structural strengthening if required.

4) Visual Inspection

In order to carry out structural audit RCC building is checked with following Steps.

Step 1: - Study the available drawings of Building. There are no Structural drawings available at the time of investigation. Building's geometry has been checked with available local government authority passing drawing's plan, section & elevations.

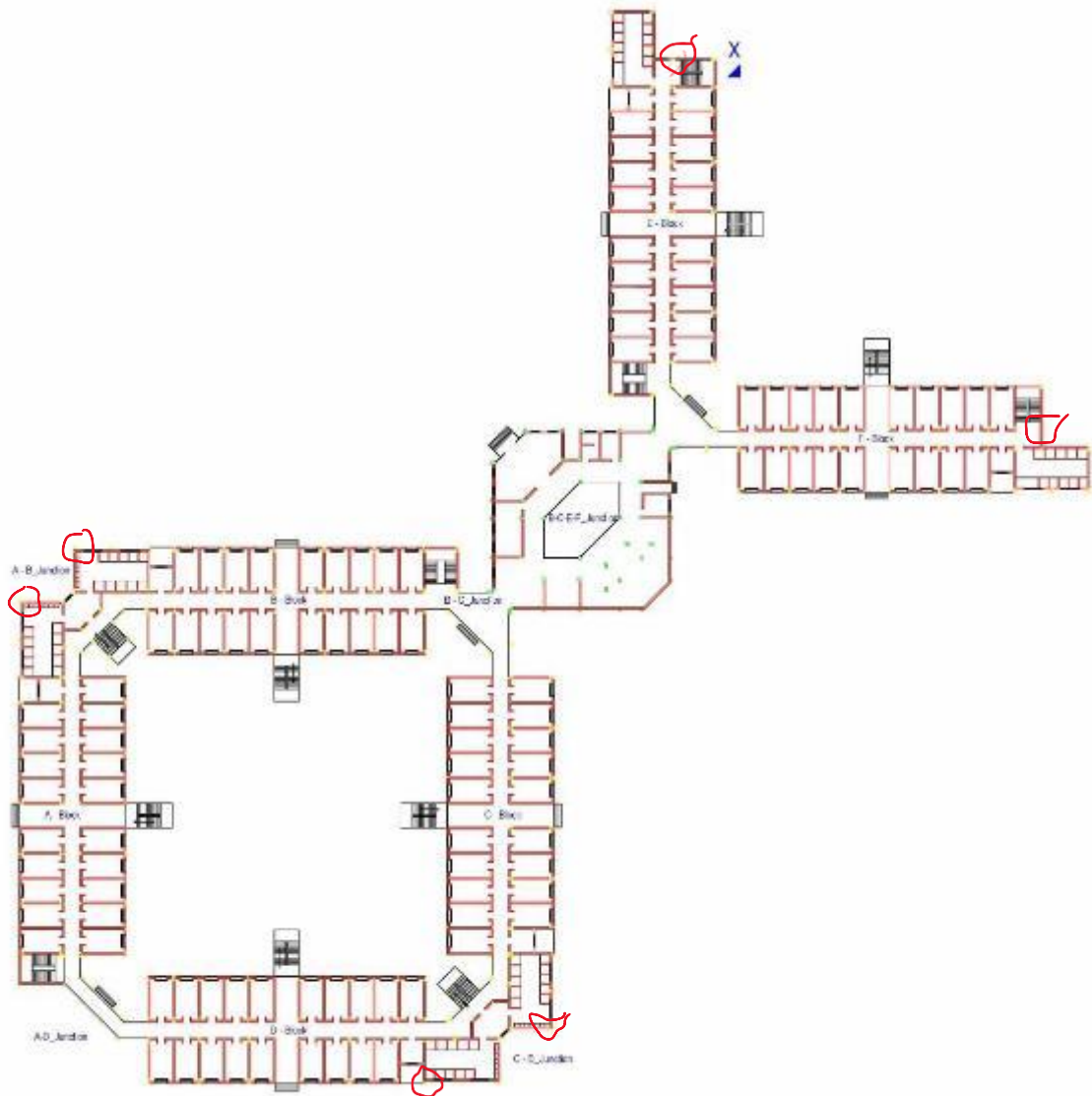
Step 2: - Visual inspection to be carry out with available drawings.

This building is thoroughly inspected from ground floor to terrace for noting cracks, spalls, crazing, seepage etc. Highlighting critical area of investigation & NDT test location is marked on site.

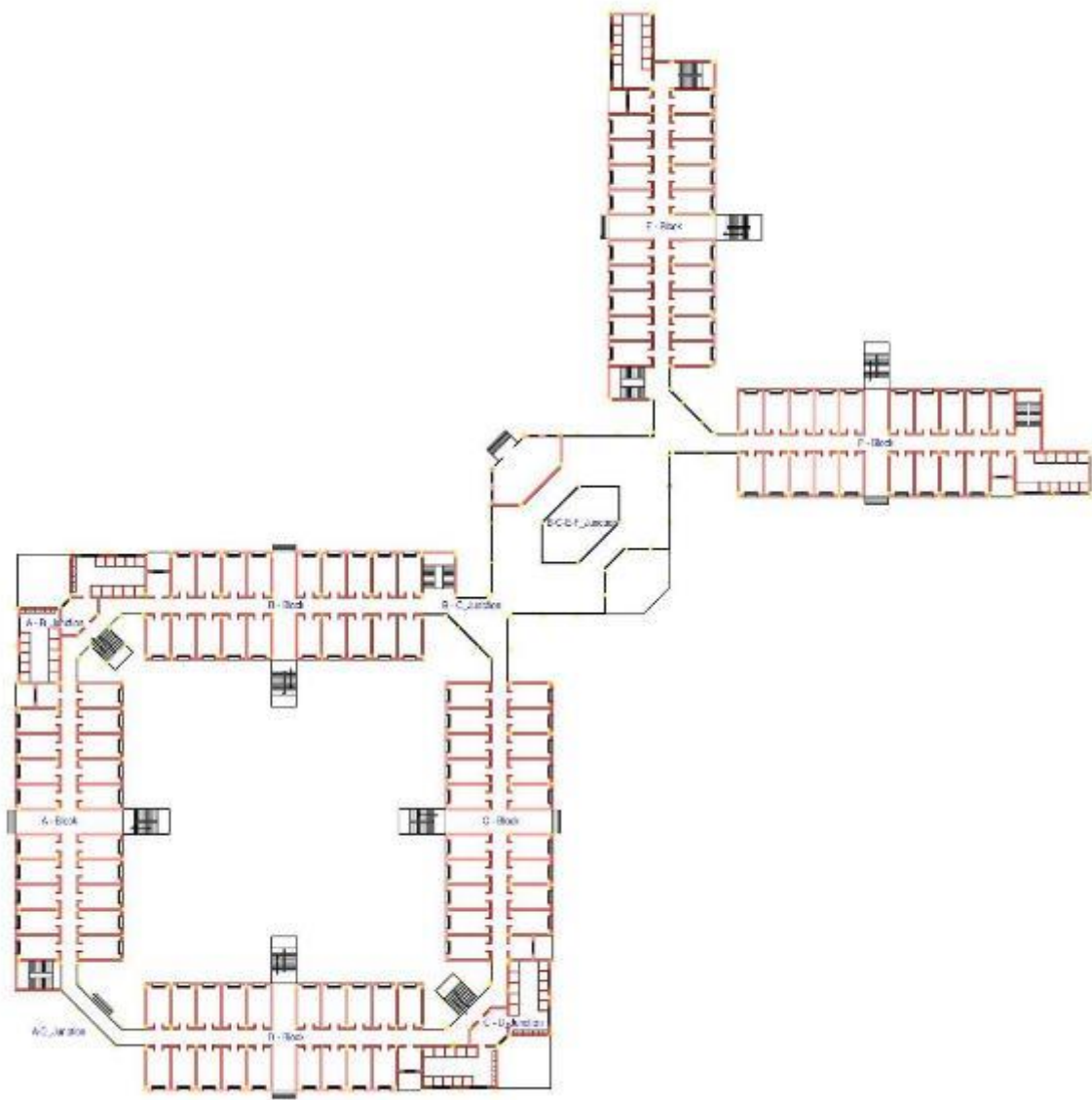
- This building has shown some non-structural as well as some structural distress. Some cracks have been seen in structural elements. Cover Concrete has spilled in few slabs bottom.
- Water seepages have been observed in hostel Washrooms walls, outer walls, ceiling at top floors, expansion joints and below overhead water tank area. Water leakages from water tank pipe are found.
- NO FLOOR SETTLEMENT IS SEEN ANYWHERE IN THE PLINTH AREA.
- Plinth protection seems settled in few areas of outer walls.
- No Vegetation growth is seen on terrace or any walls in periphery of building
- More Non-structural cracks were seen in Masonry and plaster at top floors. Many places plaster (pill off) damage and vertical and horizontal cracks at col and beams with partition wall junctions.
- Leakages in slab area of Washrooms is observed at some places.
- There are big honey combs between beams bottom and wall joints are observed.
- There is open crack at expansion joint on terrace and different floors at flooring level which require repairs to stop water leakage.

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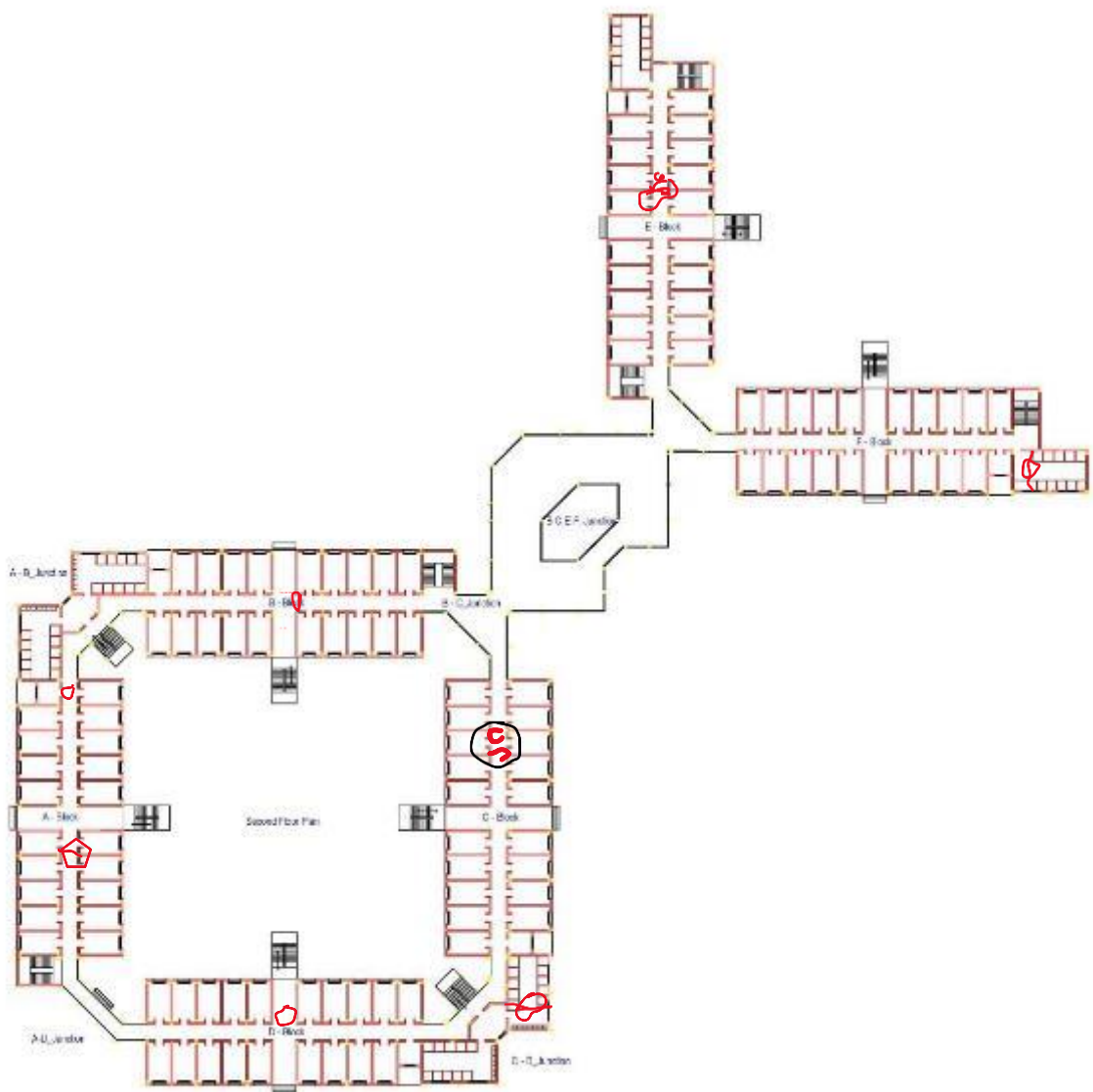
- At one place minor settlement crack has been seen.



Ground Floor Plan



First Floor Plan



Second Floor Plan



Cracks at beam Bottom Level



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Cracks at beam and masonry junction Level



Slab concrete spalling off due to corrosion of steel and wall cracks at wall Beam junction.



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Past Dampness in Ceiling outside Washroom of Hostel Buildings



Dampness outside Washroom of Hostel Buildings.



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Non-structural Cracks at top floor of Hostel Buildings.



Slab concrete spalling off due to corrosion of steel and wall cracks at wall Beam junction.



Slab concrete spalling off due to corrosion of steel and wall cracks at wall Beam junction.



Non-structural Cracks at top floor of Hostel Buildings.



Non-structural Cracks at top floor of Hostel Buildings.



Previously repaired of wall plaster and structure.



Slab Concrete spilling off due to corrosion of steel



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Non-structural Cracks at top floor of Hostel Buildings.



Slab Concrete pill off due to corrosion of steel



Leakage near Toilet block





Dampness and corrosion in Slab & Crack below Beam.



Dampness and Leakage in Washroom area.



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Non-structural Cracks in open chowk and outer walls of rooms

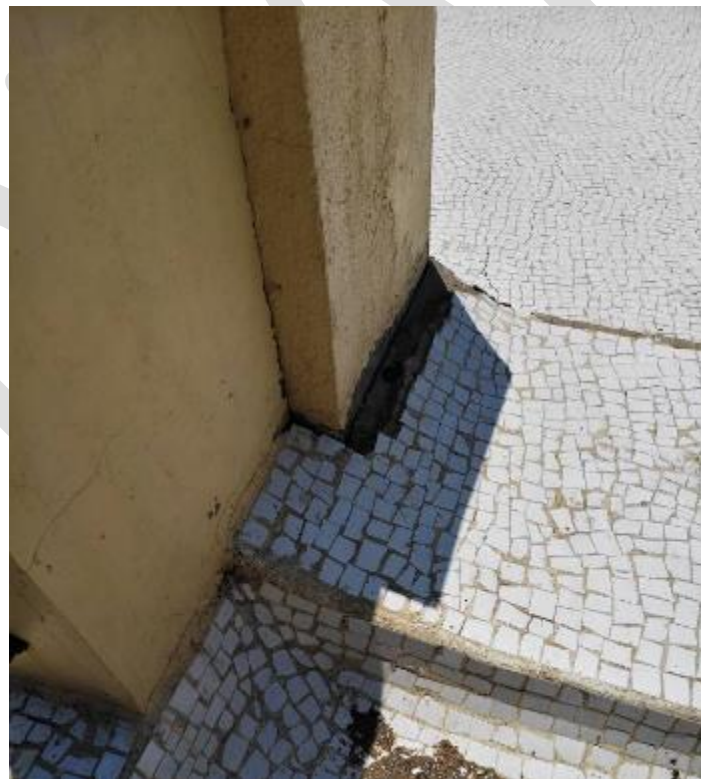


Damages and cracks in Expansion joint water proofing.

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Damages and cracks in Roof water proofing & Expansion joint



Damages and cracks in Roof water proofing



Damages and cracks in Roof water proofing & Expansion joint



Damages and cracks in water proofing & Expansion joint

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Accumulation of Water and dust near OHWT





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Expansion Joint damage



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Plinth protection settlement



5) Non-Destructive Tests for Concrete

After doing the Visual inspection following NDT test to be performed on site to know the present strength of concrete. Location of test is selected in such a way that, it can cover the whole building from Ground floor, First floor, Second floor and staircase. Also, all the elements of building like beam & column are considered in such a way that, it can cover maximum load for expansion of one floor above.

- a) REBOUND HAMMER TEST
 - b) ULTRASONIC -PULSE VELOCITY TEST
 - c) CORE CUTTING
 - d) CARBONATION TEST
 - e) HALF CELL POTENTIAL TEST
-
- Non-destructive Tests are the method of testing in which properties of material or condition of the material is determined without damaging or making changes in the object. This method of testing allows to test the material or component without losing its usefulness & strength.
 - NDT method helps in testing integrity of concrete or structural members throughout its life span.



HOSTEL BUILDINGS A-F Blocks
A:- Rebound Hammer Test



Rebound Hammer Test

TEST REPORT FOR REBOUND HAMMER TEST												
Report No		SMC/SC/147/1/2026					Report Date		17-Jun-26			
Testing Date		15-Jun-26					Description of Test		Rebound Hammer Test			
Completion of Testing		15-Jun-26					Angle Direction:		0°			
Client Name		Bhoomi Consultants										
Location		Sector-16, Gandhinagar, DAU, HCR Men Building										
Tested As per IS:		IS-516 :2020 (Part-5, Sec.4)										
TEST RESULTS												
Sr No	Identification of location	REBOUND VALUE									Average Rebound	Compressive Strength
		Rebound Stroke Reading										
		Top of Column			Center of column			Bottom of column				N/mm ²
		1	2	3	4	5	6	7	8	9		
1	E Block C1 GF	28	26	26	34	28	26	33	32	36	30.1	26.0
2	F Block C2 GF	33	34	35	32	35	29	28	35	31	32.4	28.0
3	A Block C3 GF	28	26	26	35	40	39	28	30	32	31.6	27.0
4	B Block C4 GF	35	39	35	37	39	26	26	32	28	33.0	30.0
5	C Block C5 GF	32	31	30	34	32	42	Reading not possible			33.5	30.0
6	D Block C6 GF	42	31	38	36	33	40	33	34	31	35.3	33.0

Note: The estimation of strength of concrete by rebound hammer method cannot be held to be very accurate and probable accuracy of prediction of concrete strength in a structure is $\pm 25\%$.

Conditions:

- 1 Results given above refer only to the sample supplied by the Customer.
- 2 The Report is being issued on the specific understanding that SMC will not in any way be involved in any action following interpretation of the above results.
- 3 This report shall not be reproduced in full without written approval of the Lab SMC.
- 4 Corresponding requirement in accordance with recognized standards are available from SMC at specific result.
- 5 The Balance quantity of the tested sample wherever possible shall be returned only for a period of 07 days from the date of issue of the Test Certificate.
- 6 The Reported results are valid at the time of Performance of test under Specific Conditions Only.

TEST REPORT FOR REBOUND HAMMER TEST			
Report No	SMLC/SO/147/2/2026	Report Date:	17-Jun-26
Testing Date	15-Jun-26	Description of Test:	Rebound Hammer Test
Completion of Testing	15-Jun-26	Angle Direction:	0°
Client Name	Bhoomi Consultants		
Location	Sector-16, Gandhinagar, DAU, HOR Men Building-2nd floor		
Tested As per IS:	IS-516 :2020 (Part-5, Sec.4)		

TEST RESULTS

Sr No	Identification of location	REBOUND VALUE						Average Rebound	Compressive Strength
		Rebound Stroke Reading							
		LHS OF Beam			RHS of Beam				
		1	2	3	4	5	6		N/mm ²
1	A Block 2nd-floor Beam Toilet Side	40	32	27	37	39	22	32.8	30.00
2	B Block 2nd-floor Beam Room No: 304/305	35	24	32	25	23	29	28.0	22.00
3	C-D Junction 2nd-floor Beam Toilet Room	26	34	31	32	33	30	31.0	26.00
4	D Block 2nd-floor Beam Room No: D315/D316	16	16	25	22	16	20	19.2	10.00
5	E Block 2nd-floor Beam Room No: E314/E315	25	26	32	26	26	22	26.2	19.00
6	F Block 2nd-floor Beam Toilet Room	23	22	28	22	28	26	24.8	17.00

Note: The estimation of strength of concrete by rebound hammer method cannot be held to be very accurate and probable accuracy of prediction of concrete strength in a structure is $\pm 25\%$.

Conditions:

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- 4 Corresponding requirement in accordance with recognized standards are available from SMLC on specific result.
- 5 The Balance quantity of the tested sample wherever possible shall be retained only for a period of ONE month from the date of issue of the Test Certificate.
- 6 The Reported results are valid at the time of Performance of test under Specific Conditions Only.

TEST REPORT FOR REBOUND HAMMER TEST						
Report No		SMLC/SO/147/3/2026			Report Date: 17-Jun-26	
Testing Date		15-Jun-26			Description of Test: Rebound Hammer Test	
Completion of Testing		15-Jun-26			Angle Direction : -90 ⁰	
Client Name		Bhoomi Consultants				
Location		Sector-16, Gandhinagar, DAU, HOK Men Building-2nd floor				
Tested As per IS:		IS-516 :2020 (Part-5, Sec.4)				
TEST RESULTS						
Sr No	Identification of location	REBOUND VALUE			Average Rebound	Compressive Strength
		Rebound Stroke Reading				
		Slab				
		1	2	3		N/mm ²
1	A Block 2nd-floor Slab	32	33	30	31.7	33.00
2	B Block 2nd-floor Slab	15	24	23	20.7	16.00
3	C Block 2nd-floor Ceiling	10	15	17	14.0	10.00
4	D Block 2nd-floor Slab	17	14	18	16.3	10.00
5	E Block 2nd-floor slab	22	26	23	23.7	20.00
6	F Block 2nd-floor slab	19	24	22	18.3	10.00

Note: The estimation of strength of concrete by rebound hammer method cannot be held to be very accurate and probable accuracy of prediction of concrete strength in a structure is $\pm 25\%$.

Conditions:

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B:- Ultrasonic Pulse Velocity Test



UPV Test

TEST REPORT

Test Name: Ultrasonic Pulse Velocity Test on Concrete
Sample received from : Bhoomi Consultants
Project Name: NDT Testing at Dhruvhai Ambani University, Gandhinagar.
Ltr. Ref. No. As per request Dated: 15.06.2026
Condition of Sample: ok
Date Of Starting: 15/06/2026
Tested As per As Per IS-516 Part-5, Sec.1: 2018

Report No.: SMLC/SO/147/4/2026

Report Date: 17/06/2026

Sampling Method: Not Applicable

Date Of Completion: 15/06/2026

Identity		Path Length (mm)	Time (microsecond)	Pulse Velocity (Km/Sec)	Concrete Quality Grading As Per IS 516 Part-5, Sec.1	Test Method of UPV
E-1 Beam(1)	Centre	230	68.50	3.36	Poor	Cross Probing
E-1 Beam(2)	Bottom	230	76.00	3.03	Poor	Cross Probing
F Block Toler Beam(1)	Centre	230	82.50	2.79	Doubtful	Cross Probing
F Block Toler Beam(2)	Bottom	230	63.50	3.61	Poor	Cross Probing
G Block Beam(1)	25% Clear zone	230	62.50	3.69	Poor	Cross Probing
H Block Beam(1)	Centre	230	71.00	3.24	Poor	Cross Probing
A Block Beam(1)	Bottom	230	102.00	2.25	Doubtful	Cross Probing
A Block Beam(2)	Top	230	70.50	3.25	Poor	Cross Probing
D Block Beam(1)	Centre	230	66.50	3.47	Poor	Cross Probing
D Block Beam(2)	Bottom	230	63.20	3.64	Poor	Cross Probing
CD Junction Toler Beam(1)	Top	230	67.00	3.43	Poor	Cross Probing
CD Junction Toler Beam(2)	Centre	230	77.00	2.99	Doubtful	Cross Probing

Conditions:

1. Results given above refer only to the sample supplied by the Customer.
2. This Report is being issued on the specific understanding that SMLC will not in any way be involved in any action following interpretation of the above results.
3. This report shall not be reproduced in full without written approval of the lab SMLC.
4. Corresponding requirements in accordance with recognized standards are available from SMLC on request via JIL.
5. The Balance quantity of the tested sample where very possible shall be retained only for a period of ONE month from the date of issue of the Test Certificate.
6. The Reported results are valid at the time of performance of test under Specific Conditions Only.



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C: - Core Extraction

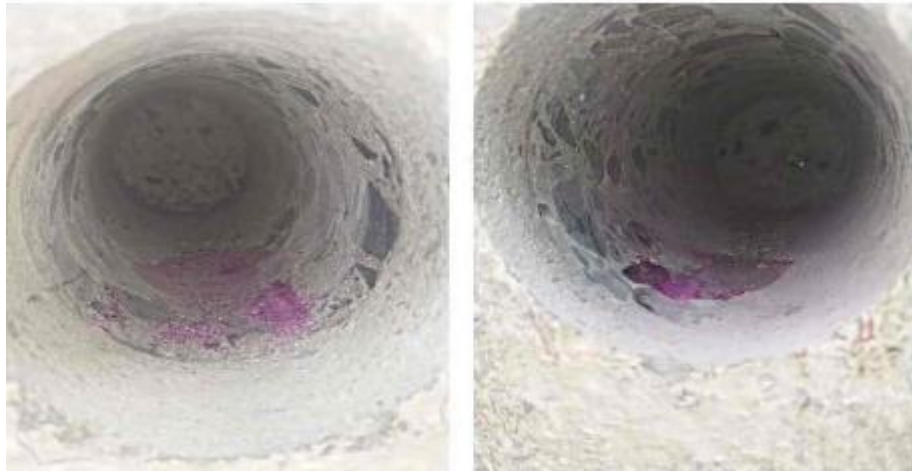


Bar Locator



Core Cutting





Carbonation Test inside Core

TEST REPORT

Report No: SMLC/SO/146/1/2026

Report Date : 16/06/2026

Sample : Concrete Core

Test Performed: Carbonation on Site

Sample Received From: Bhoomi Consultants

Project: NDT Testing at Dhurubhai Ambani University, Gandhinagar.

Letter ref. No: As per client request dated:15.06.2026

Condition of Sample:- ok

Sampling Method: Not Applicable

Date Of Starting: 15/06/2026

Date Of Completion: 16/06/2026

Tested As per : IS 516 (Part-5) Sec.3 (2021)

Sr. No.	DESCRIPTION	RESULTS
1	C-2 F Block	Carbonation not Observed
2	C-1 E Block	Carbonation not Observed
3	C-4 B Block	Carbonation not Observed
4	C-3A Block	Carbonation not Observed
5	C-5 C Block	Carbonation not Observed
6	OPPOSITE D 304 SLAB	Carbonation Observed

Conditions:

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Carbonation at slab Level





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D: - Carbonation Test



Carbonation Test on Core

TEST REPORT

Sample :	Concrete Core	Report No: SMLC/SO/134/2/2026
Test Performed:	Carbonation	Report Date : 02/06/2026
Sample Received From:	Bhoomi Consultants	
Project:	NDT Testing at Dhirubhai Ambani University, Gandhinagar.	
Letter ref. No:	As per client request dated:01.06.2026	
Condition of Sample:-	ok	Sampling Method: Not Applicable
Date Of Starting:	01/06/2026	Date Of Completion: 02/06/2026
Tested As per :	IS 516 (Part-5) Sec.3 (2021)	

Sr. No.	DESCRIPTION	RESULTS
1	C-1 E- Block HOR Men (01.06.2026)	Carbonation not Observed
2	C-2 F-3 Block (01.06.2026)	Carbonation not Observed
3	C-3 A block (01.06.2026)	Carbonation not Observed
4	C-4 B-Block HOR Men (01.06.2026)	Carbonation not Observed
5	C-5 C-Block	Carbonation not Observed

Conditions:

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- 3 This report shall not be reproduced in full without written approval of the lab SMLC .
- 4 Corresponding requirement in accordance with recognized standards are available from SMLC on specific results.
- 5 The Balance quantity of the tested sample wherever possible shall be retained only for a period of ONE month from the date of issue of the Test Certificate.
- 6 The Reported results are valid at the time of Performance of test under Specific Conditions Only.



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E: - Half Cell Potential test



Half Cell Potential Test

TEST REPORT

Sample : Concrete
Test Performed: Half Cell Potential
Sample Received From: Bhoomi Consultants
Project: NDT Testing at Dhirubhai Ambani University, Gandhinagar.
Letter ref. No: As per client request dated:15.06.2026
Condition of Sample:- ok
Date Of Starting: 15/06/2026
Tested As per : IS 516 (Part-5) Sec.2 (2021)

Report No: SMLC/SO/146/2/2026
Report Date : 16/06/2026

Sampling Method: Not Applicable
Date Of Completion: 16/06/2026

Sr. No.	ID	Results Obtained			Test Method	Corrosion Condition
1	E Block Column C1	-154	-221	-209	IS-516 Part-5 Sec_2	Low (there is a greater than 90 percent probability that no reinforcing steel corrosion is occurring in that area at the time of measurement)
2	C Block Column C5	-175	-136	-112	IS-516 Part-5 Sec_2	Low (there is a greater than 90 percent probability that no reinforcing steel corrosion is occurring in that area at the time of measurement)

Conditions:

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6) Evaluation of NDT Result

Detail reports for NDT Tests are issued by Soilmate Laboratories & Consultancy LLP, Ahmedabad vide Report Nos. SMLC/SO/147/1, 147/2, 147/3, 147/4, 134/2 & 146/1, 146/2 of 2026, and are to be referred along with this report.

- A)** Rebound Hammer Test was carried out on GF columns (E, F, A, B, C, D Blocks), 2nd floor beams, and 2nd floor slabs/ceiling as per IS 516:2020 (Part-5, Sec.4). GF columns show rebound values of 30.1 to 35.3, corresponding to a compressive strength of 26 to 33 N/mm², indicating reasonably good concrete quality at ground floor level. However, 2nd floor beams and slabs show a much wider and lower range — rebound 14.0 to 32.8, with corresponding strength as low as 10 N/mm² in D Block (beam and slab) and C Block ceiling, and B and F Block slabs. This indicates that distress and strength loss are concentrated at the 2nd floor level rather than at the ground floor columns.
- B)** Ultrasonic Pulse Velocity (UPV) Test was carried out on beams of A, B, D, E, F Blocks and toilet/junction areas as per IS 516 Part-5, Sec.1: 2018 (Report 147/4). Pulse velocity readings range from 2.25 to 3.69 km/s. Of the 12 readings taken, 9 fall in the Poor category and 3 in the Doubtful category, with no Good or Excellent readings recorded. This is consistent with the visual inspection finding of large honeycombs between beam bottoms and wall joints, and confirms widespread presence of voids, micro-cracks or poor compaction in the beam elements tested.
- C)** Carbonation Test was carried out on core and site samples from E, F, A, B, C Blocks as per IS 516 (Part-5) Sec.3: 2021 (Reports 134/2 & 146/1). Carbonation was NOT observed in 10 of the 11 locations tested. However, carbonation WAS observed at the location opposite D-304 Slab. This isolated finding correlates with the notably lower rebound hammer strength recorded at D Block's beam (10 N/mm²) and slab (10 N/mm²), indicating that the D Block 2nd floor area is the most distressed zone in the building and warrants priority repair and further investigation,
- D)** Half Cell Potential Test was carried out at two locations — E Block Column C1 and C Block Column C5 — as per IS 516 (Part-5) Sec.2: 2021 (Report 146/2). Both locations recorded potential values in the Low Corrosion Condition range (-112 to -221 mV), indicating a greater than 90% probability of no active reinforcement corrosion at the time of testing. Note that this test covered only 2 of the 6 blocks; given the carbonation finding at D Block, it is recommended that Half Cell Potential testing be extended to D Block and the remaining blocks to confirm reinforcement condition building-wide.

7) Conclusion

- A)** The Hostel Building (A-F Blocks) at DIIACT, Gandhinagar is a G+F+S RCC framed structure constructed in 2003, now approximately 23 years in service and currently used as hostel accommodation. The building was inspected to assess its present structural health and to evaluate the feasibility of adding one additional floor.
- B)** Visual inspection has revealed a combination of structural and non-structural distress. Non-structural cracks in masonry and plaster are widespread at the top floor, with plaster pill-off and cracks at column-beam-partition wall junctions. Cover concrete spalling with visibly corroded reinforcement has been observed in several slab soffits and ceiling areas across multiple blocks. Water seepage is present in washroom walls, outer walls, top-floor ceilings, expansion joints, and below the overhead water tank, with leakage also observed from the water tank pipe itself. Large honeycombing has been observed at several beam-wall junctions. Damaged and cracked expansion joints are present on the terrace and at flooring level across different floors. Plinth protection has settled in a few areas of the outer walls, and one isolated minor foundation settlement crack was noted. Importantly, no floor settlement has been observed anywhere in the plinth area, and no vegetation growth was found on the terrace or building periphery.
- C)** NDT results confirm that the distress observed visually is concentrated at the 2nd floor level rather than at the ground floor. Rebound Hammer Test results show GF columns in reasonably good condition, with compressive strength in the range of 26 to 33 N/mm². However, 2nd floor beams and slabs show a much wider and weaker range, with strength as low as 10 N/mm² in D Block (beam and slab), C Block ceiling, and B and F Block slabs. UPV results corroborate this, with the majority of beam readings falling in the Poor category (2.25 to 3.69 km/s), confirming the presence of voids, micro-cracks, and poor compaction consistent with the honeycombing observed visually.
- D)** Carbonation testing returned a NOT OBSERVED result at 10 of 11 tested locations, which is a positive durability indicator for the majority of the building. However, carbonation WAS observed at the location opposite D-304 Slab. This finding aligns directly with the weakest rebound hammer readings recorded in that same D Block area, confirming D Block 2nd floor as the single most distressed and highest-priority zone in the building requiring repair before any further assessment of additional loading.

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- E)** Half Cell Potential testing, carried out at E Block Column C1 and C Block Column C5, confirmed Low Corrosion Condition (greater than 90% probability of no active corrosion) at both tested locations. As this test covered only 2 of the 6 blocks, this favourable result should not be extended to the building as a whole, particularly D Block, where the carbonation finding raises specific concern regarding reinforcement condition.
- F)** Taking the visual inspection and NDT findings together, the building is assessed as structurally REPAIRABLE. The core load-bearing framework of the building, particularly at ground floor level, retains adequate residual strength for its present use as hostel accommodation. The distress identified is predominantly non-structural and superficial in nature at most locations, with the exception of D Block 2nd floor, which shows a genuine combination of low strength, carbonation, and corrosion that requires structural-level repair rather than cosmetic treatment alone.
- G)** With timely and complete repair of the distressed elements particularly D Block 2nd floor beams and slabs, expansion joints, roof waterproofing, washroom seepage points, and plinth protection the building is expected to achieve a satisfactory residual serviceable life, provided regular periodic maintenance is subsequently followed to prevent recurrence of water ingress-related deterioration.
- H)** Performance of the building under Natural Hazards (Earthquake & Wind Cyclone) cannot be conclusively certified in the absence of original structural drawings. Based on field-observed column geometry and the generally adequate ground floor strength, the building's lateral load resisting system appears reasonably distributed; however, this assessment should be read together with the repair recommendations above, as the weakened 2nd floor elements would benefit from restoration before the building's seismic performance is considered fully satisfactory

8) Recommendation and Repair Methodology

1. Injection Grouting for Masonry Cracks

For cracks observed in brick masonry walls, the following systematic technical procedure shall be strictly adopted:

- **Plaster Removal:** Remove the plaster in the immediate vicinity of the crack, fully exposing the cracked bare masonry structure.
- **V-Groove Preparation:** Shape the crack into a clean V-groove profile by careful manual chiselling.
- **Nipple Fixing:** Fix 6 mm to 10 mm diameter PVC or brass grouting multi-perforated nipples at predetermined locations to a depth of 30 mm to 40 mm, spaced uniformly at 150 mm to 200 mm centre-to-centre along the entire length of the crack.
- **Air Cleaning:** Thoroughly clean the crack with oil-free compressed air blown through the installed nipples to ensure that all fine dust, loose debris, and material inside the cracked masonry are fully evacuated.
- **Surface Sealing:** Seal the crack securely on both faces of the wall using a 1:3 cement mortar mix incorporating an approved non-shrink additive, as per the manufacturer's specified proportions.
- **Water Flushing & Saturation:** Inject clean water starting from the nipple fixed at the highest level and progressively moving downward, ensuring internal dust is flushed out and the surrounding masonry is fully saturated with water.
- **Grout Injection:** Prepare a homogeneous cement slurry in a 1:1 proportion by weight (using non-shrink polymer-modified cementitious compound such as Conbex-100 or an approved equivalent and clean water). Inject the slurry using a calibrated pressure pump starting from the lowermost nipple. Continue pumping until the slurry cleanly emerges from the next higher nipple, then seal the current nipple and move progressively upward.
- **Surface Finishing:** After injection grouting through all nipples is completed and the grout has achieved initial set, remove the nipples, seal the cavities, re-plaster the surface, and finish it to precisely match the texture and profile of the existing wall finish.

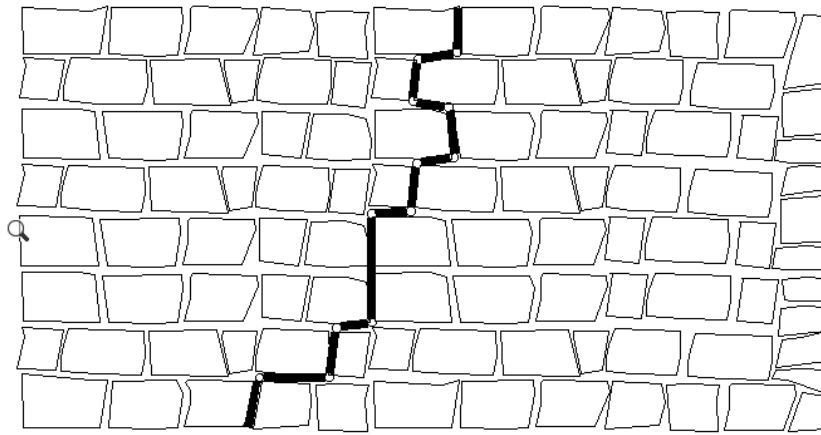


**FIG.1 TREATMENT FOR FINE CRACKS
 $\geq 1.5\text{mm}$ WIDE IN MASONRY BY
 MICRO CRETE GROUTING.**

2. Repair of Cracks in RCC Members (1 mm to 5 mm Width)

For fine structural cracks observed in reinforced concrete (RCC) slabs, beams, and columns, epoxy injection grouting shall be executed as follows:

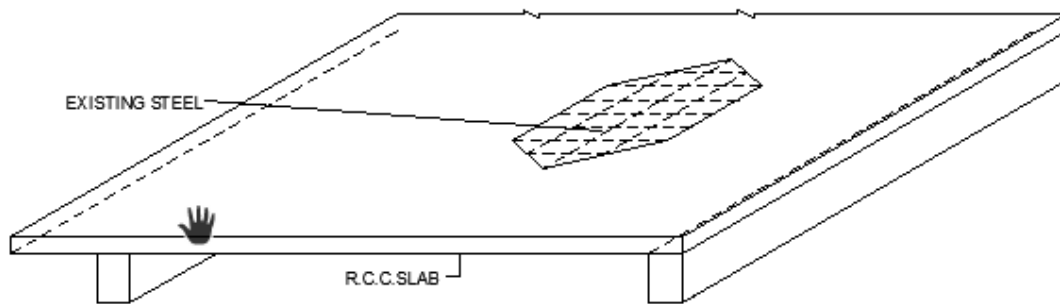
- **Surface Preparation:** Remove all surface plaster and loose materials in the vicinity of the concrete crack to expose the bare, structural cracked concrete.
- **V-Groove Chiselling:** Shape the crack path into a clean V-groove by chiselling out the concrete along the crack line.
- **Air Blasting:** Clean the chiselled crack thoroughly using high-pressure compressed air to remove all micro-particles.
- **Drilling Grout Ports:** Drill 75 mm deep injection holes directly along the crack line spaced at a strict grid of 400 mm centre-to-centre spacing.
- **Nipple Installation:** Fix 6 mm to 10 mm diameter multi-perforated PVC or brass grouting nipples (30 mm to 40 mm in length) into the drilled holes, securing them firmly in place using an epoxy-based M-Seal compound or approved epoxy putty.
- **Crack Sealing:** Seal the surface of the crack tightly on both accessible faces of the structural concrete member using a high-strength polymer-modified cementitious mortar.
- **Epoxy Chemical Grouting:** Carry out low-viscosity epoxy chemical resin injection through the lowest nozzle using a specialized grout pressure pump operating at a stable pressure of 6.0 to 7.0 kg/cm². Maintain pressure until the epoxy resin visibly emerges from the next upper nozzle hole, then seal and move progressively upward through all installed nipples.
- **Re-Plastering:** Upon full curing of the injected epoxy resin, cut or remove the extended nipples, patch the port holes, re-plaster the treated concrete surface, and finish to match the original surrounding profile.



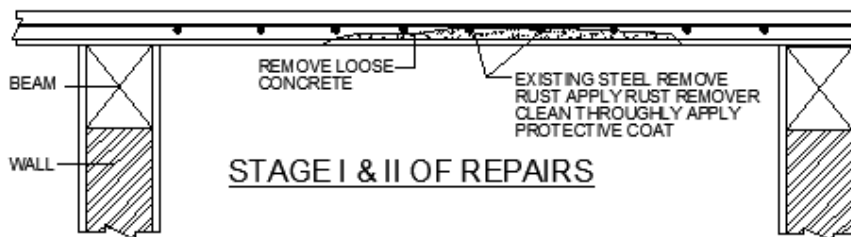
3. Repair of RCC Slab/Beam Affected by Corrosion

Where reinforcement oxidation, concrete cover spalling, or heavy corrosion cracking is observed in structural slabs or beams, the following remediation sequence shall be strictly enforced:

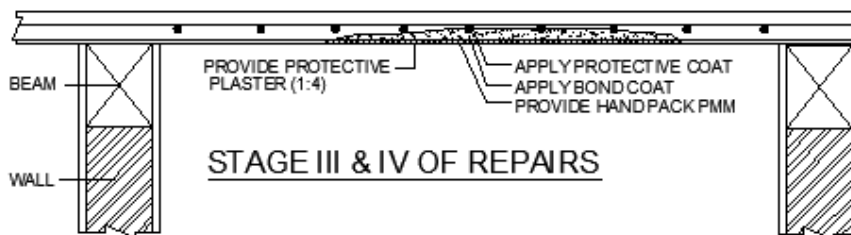
- **Concrete Chipping:** Chip away all loose, delaminated, damaged, and carbonated concrete cover. Fully expose the corroded reinforcement steel bars, extending the excavation up to 20 mm completely beyond the main reinforcing bars to provide clear all-around working clearance.
- **Reinforcement Cleaning:** Thoroughly clean the exposed rusted steel reinforcement bars using a heavy-duty wire brush, followed by high-velocity air-blowing to eliminate loose rust scales.
- **Chemical Rust Removal:** Apply an approved structural rust remover solution (such as Resiticide, Rustoline, or equivalent) thoroughly over the steel surface using a cotton waste swab or specialized brush, followed by compressed air clearing.
- **Anti-Corrosion Priming:** Apply a protective rust-preventive coating layer using a mix of Polyalk Fixoprime and fresh cement slurry blended in a 1:1.5 proportion by weight (1 kg Polyalk Fixoprime to 1.5 kg fresh cement) using a soft brush. Allow it to dry for 24 hours, then apply a second specialized coat of pure rust preventer without cement slurry.
- **Interfacial Bonding Coat:** Provide and apply a high-performance priming-cum-bonding coat of Polyalk Fixoprime (or approved equivalent) and fresh cement slurry mixed in a 1:1 proportion by weight. Apply evenly over the prepared concrete surface using a stiff brush.
- **Polymer Mortar Application:** While the structural bonding coat remains in a tacky condition, build up the concrete section by applying high-strength polymer mortar to a total thickness of 20 mm, executed in two distinct sequential layers of 10 mm each. The mortar mix proportion shall strictly follow a 1:5:15 ratio by weight (1 kg Polyalk E.P. compound: 5 kg fresh cement: 15 kg graded quartz sand) mixed with the optimum water-cement ratio for design consistency. Pack tight and finish using a wooden float or steel trowel.
- **Curing Process:** Continuously cure the repaired polymer mortar surface for a minimum duration of 48 hours.
- **Secondary Cementitious Grouting:** Following polymer mortar treatment, drill 3 nos. of 30 mm to 40 mm deep injection holes per 2 square meters of repaired surface area. Fix 6 mm to 10 mm diameter PVC multi-perforated grouting nipples using an epoxy putty collar. Inject an approved non-shrink cementitious structural grout using a pressure pump at a continuous pressure of 3 kg/cm². Tightly seal the nipples with epoxy putty upon completion.
- **Structural Reinforcement Replacement:** Where the active cross-sectional area or bar tie diameter of an existing reinforcement bar is found to be reduced by 80% or more due to advanced corrosion pitting, the degraded bar section must be structurally cut out and replaced. Provide a new reinforcing steel bar of matching grade and diameter, and secure it by lap-welding to the sound ends of the existing reinforcement as per design structural specifications.



PRESPECTIVE VIEW OF SLAB FOR REPAIRS



STAGE I & II OF REPAIRS



STAGE III & IV OF REPAIRS

SKETCH.NO.-1 METHOD OF SURFACE REPAIRS
TO R.C.C SLAB (FOR MODERATE CORROSION)

4. Parapet Wall Repair and Terrace Waterproofing Replacement

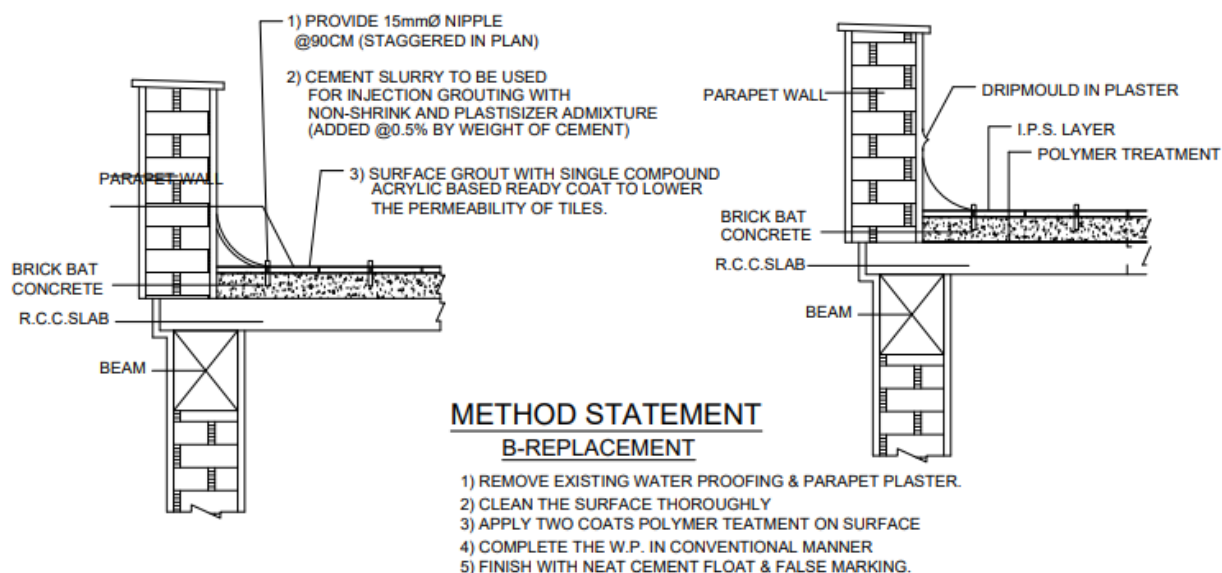
Where parapet walls exhibit structural separation cracks at the deck slab junction, or where the existing terrace waterproofing system has failed, the following procedure applies:

- **Dismantling & Surface Clearance:** Completely strip and remove the failed existing waterproofing layers (such as damaged brick-bat coba or tile layers) and old parapet wall plaster. Scrape and clean the exposed bare concrete structural surface thoroughly.
- **Separation Crack Repair:** Seal the longitudinal separation cracks between the parapet wall and the floor slab using a specialized modified cement mortar. Drill and fix 15 mm diameter grouting nipples spaced at a regular grid of 60 cm centre-to-centre. Grout the interface under low pressure using a neat cement slurry enhanced with an approved structural grouting aid compound.
- **Polymer Base Treatment:** Apply two continuous, uniform coats of an advanced polymer waterproofing treatment over the entire cleaned concrete deck surface.

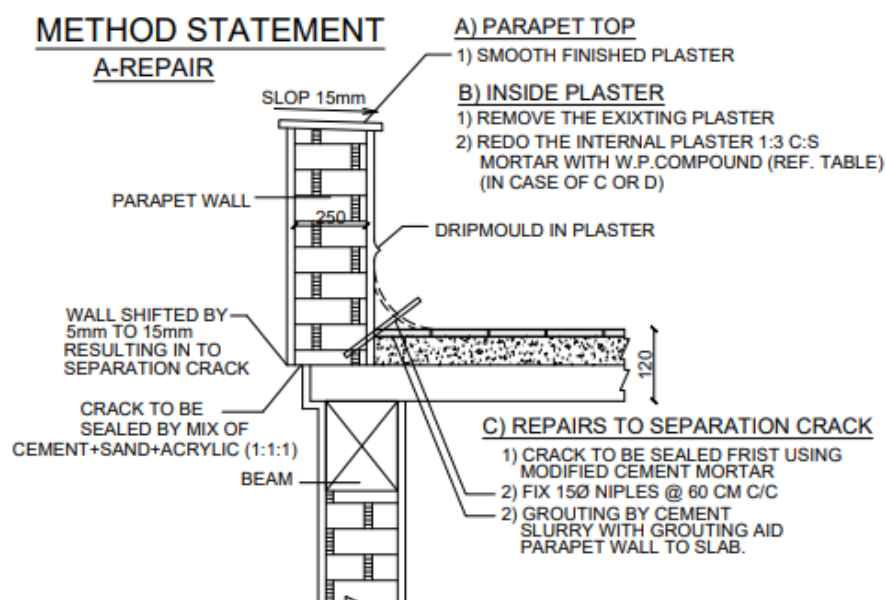


HOSTEL BUILDINGS A-F Blocks

- **Waterproofing Reinstallation:** Reconstruct the fresh waterproofing layer system in a conventional manner (brick-bat coba or an Ironite/IPS layer as specified by design), maintaining a strict, uniform slope of 15 mm or as engineered to ensure rapid, and efficient water drainage toward roof spouts.
- **Final Finishing:** Finish the terrace surface cleanly with a neat cement float and clear false markings (or install new weather-resistant floor tiles if explicitly specified in the contract schedule).



SKETCH.NO.-1 METHOD OF REPAIR/REPLACEMENT OF WATER PROOFING OF TERRACE SLAB



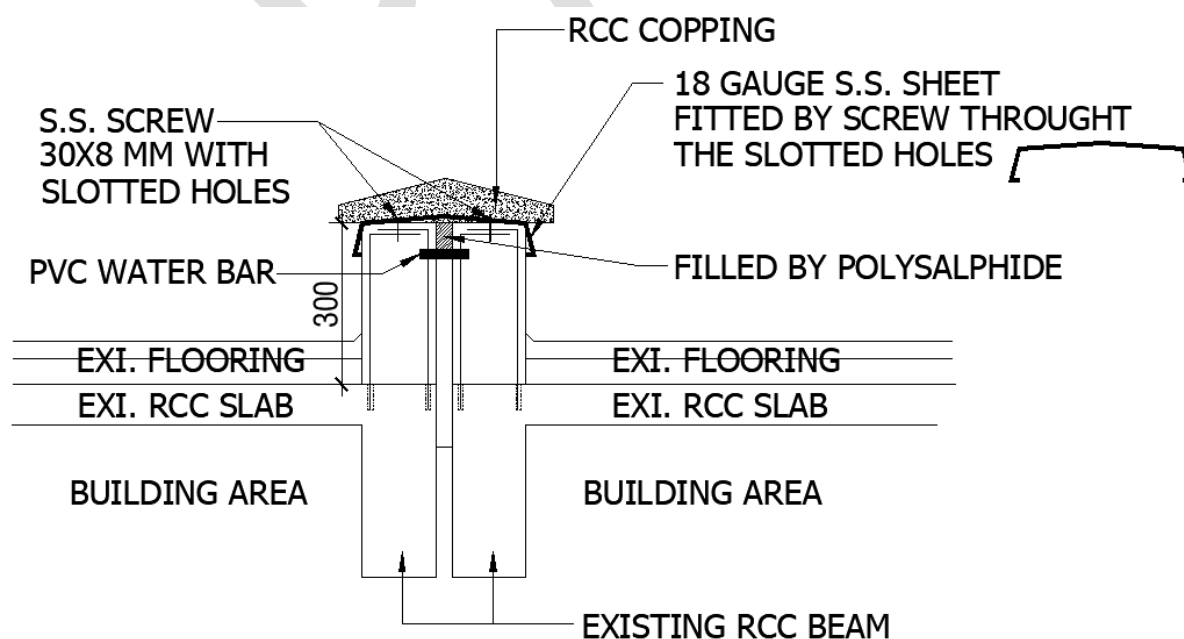
SKETCH.NO.-2 METHOD OF REPAIR TO PARAPET WALL



5. Expansion Joint Repair Methodology

For deteriorated, damaged, or leaking expansion joints across floor slabs, columns, flooring finishes, and plaster-ceiling junctions, restoration shall be precisely executed as follows:

- **Joints in Floor Slabs:** Clear out all structural debris from the existing gap between the twin RCC beams and roof slabs to insure uninhibited movement. Install a continuous PVC water bar across the joint to create a watertight core barrier against fluid migration. Fill the upper section of the joint gap with a high performance polysulfide sealant to allow structural moment while keeping the interface sealed. Finally, overly the flashing sheet with an 18-gauge Stainless Steel (S.S.) sheet, anchoring it with 30 x 8 mm S.S. screws using explicitly engineered slotted/oblong holes to permit unrestricted structural thermal movement. Additionally, construct a casting in place RCC COPPING (Cap) over the vertical wall extension of the joint line, flashing it with an extra S.S. sheet top fixed with slotted screws to completely shield the core assembly from direct vertical rainwater ingress.
- **Joints in Building and Passage:** Clear out all structural debris from the existing gap between the twin RCC beams and slabs. Install a continuous PVC water bar across the joint to create a watertight core barrier against fluid migration. Fill the upper section of the joint gap with a high performance polysulfide sealant to allow structural moment while keeping the interface sealed. Finally, overly the sloping joint line with an 18-gauge Stainless Steel (S.S.) sheet, anchoring it with S.S. screws through slotted holes on one side to facilitate uninhibited horizontal expansion and contraction. Additionally, construct a concrete weather shed at the top of the building directly over this vertical joint line to shield the entire expansion assembly from direct rainwater ingress.

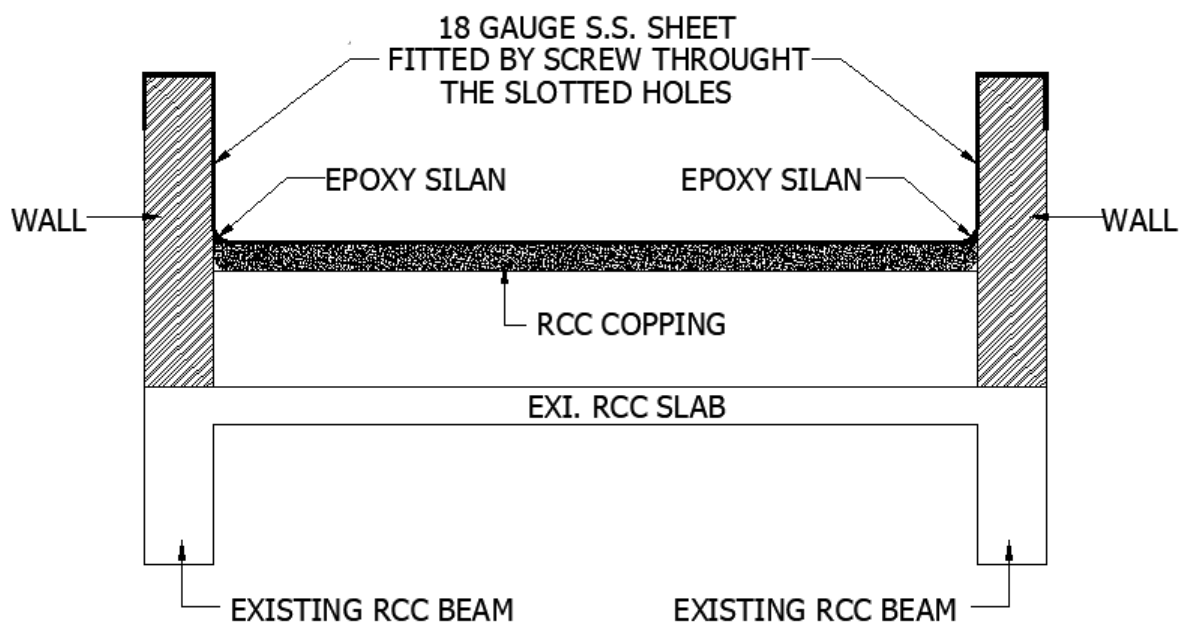
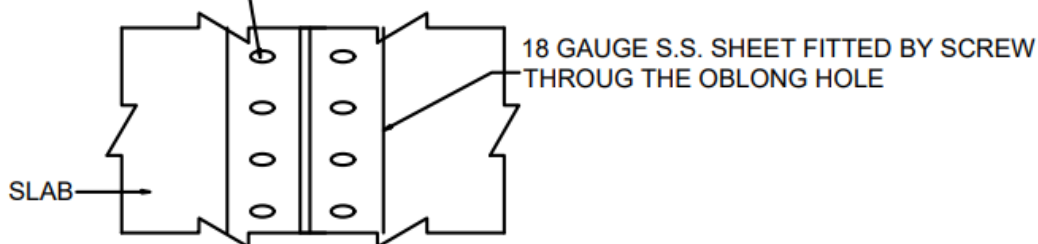


EXPANSION JOINT IN ROOF WITH BEAM

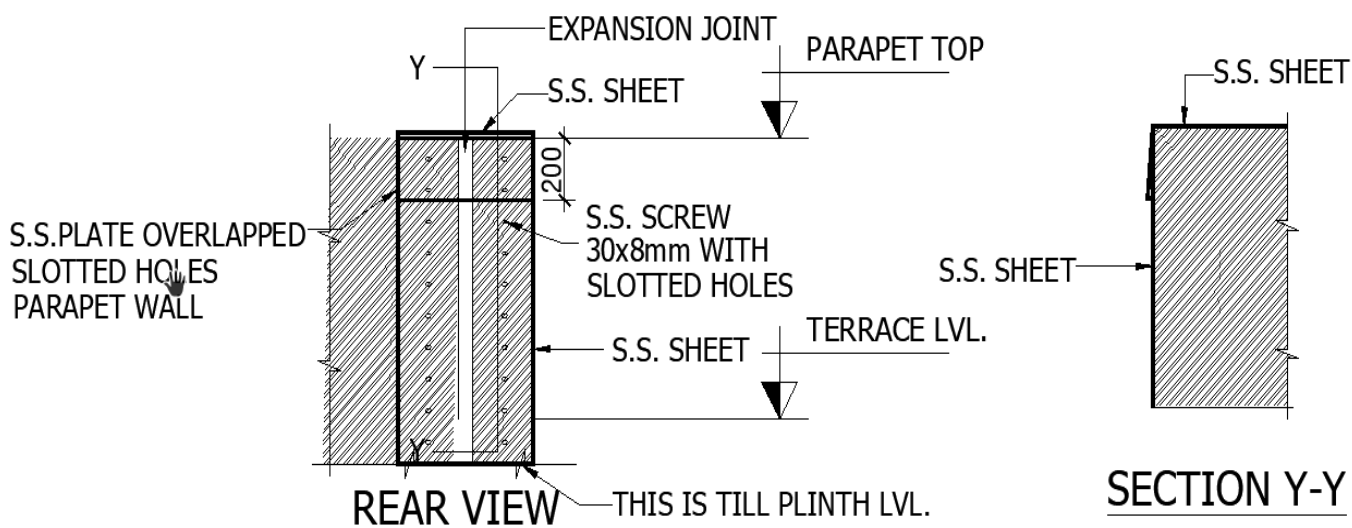


HOSTEL BUILDINGS A-F Blocks

S.S. SCREW 30 X 8 mm
THROUGHT ABLONG HOLE

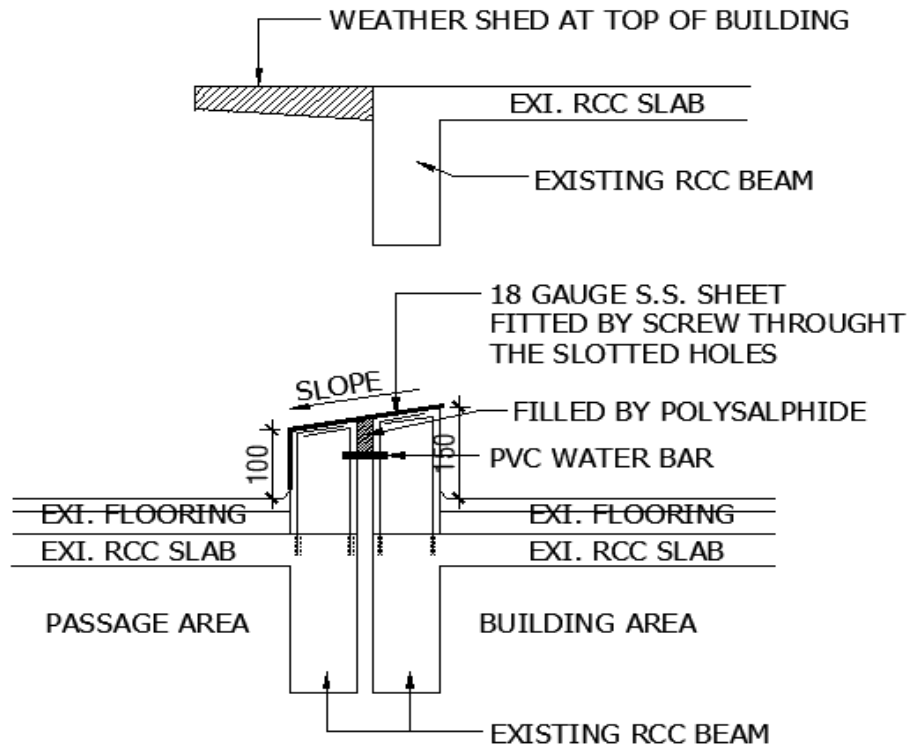


EXPANSION JOINT IN ROOF PARAPET SECTION

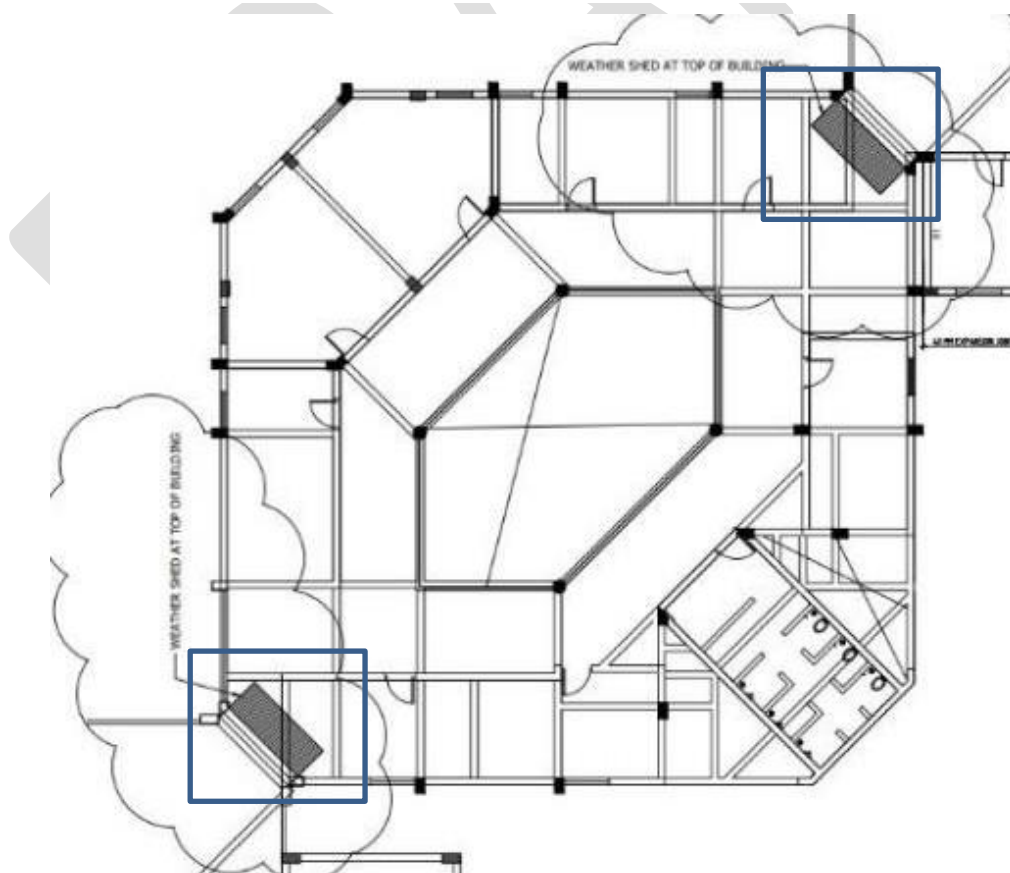




HOSTEL BUILDINGS A-F Blocks



EXPANSION JOINT AT PASSAGE & BUILDING SIDE

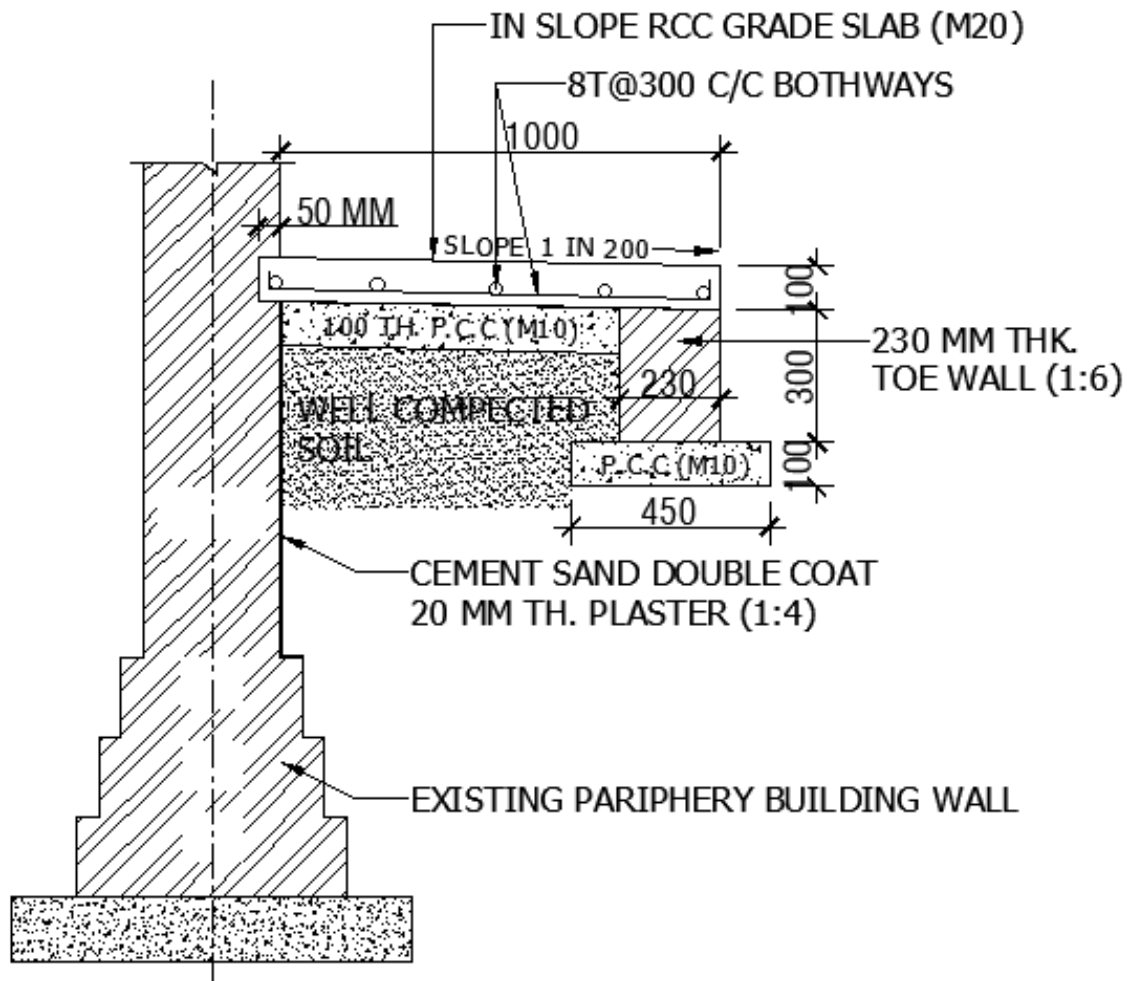


Water Shed at Passage and Block Junction

6. Plinth Protection Methodology

Plinth protection observed to be settled and damaged at several locations around the hostel building periphery. The following methodology shall be adopted for repair/replacement:

- **Surface Clearance:** Clear the ground surface along the external perimeter walls up to a minimum width of 900 to 1000 mm, removing all loose soil, organic matter, debris, and roots.
- **Perimeter Excavation:** Excavate the perimeter earth to a nominal depth of 400 to 450 mm below the finished ground level, establishing an initial slope grading away from the building line.
- **Subgrade Compaction:** Well-compact the excavated subgrade earth mechanically using an iron rammer or plate compactor to achieve optimum dry density.
- **Anti-Termite Treatment:** Apply chemical anti-termite treatment solution at the critical junction of the structural wall and the compacted earth.
- **Soling Base Course:** Lay a structural base layer of 100 to 230 mm thick hard boulders, broken stone aggregates, or over-burnt brickbats over the compacted subgrade. Interstices must be filled with dry local murrum or fine sand, watered, and rammed thoroughly.
- **PCC Apron Bedding:** Provide and lay a 100 mm thick layer of Plain Cement Concrete (PCC) of minimum M10 grade over the consolidated soling base.
- **Gradient Formation:** Finish the top surface of the concrete with a strict outward slope/gradient of 1 in 150 to 1 in 200 away from the structural wall to ensure immediate drainage.
- **Expansion Joint Layout:** Cast the PCC apron in alternate panels (not exceeding 2.0 m x 2.0 m) separated by 10–12 mm wide expansion joints filled with bitumastic filler to safely accommodate thermal expansion.
- **Toe Protection & Drainage:** Construct a perimeter brick masonry toe wall along the outer edge of the apron. Connect the lowest edge of the plinth protection directly to the peripheral open storm drain network.

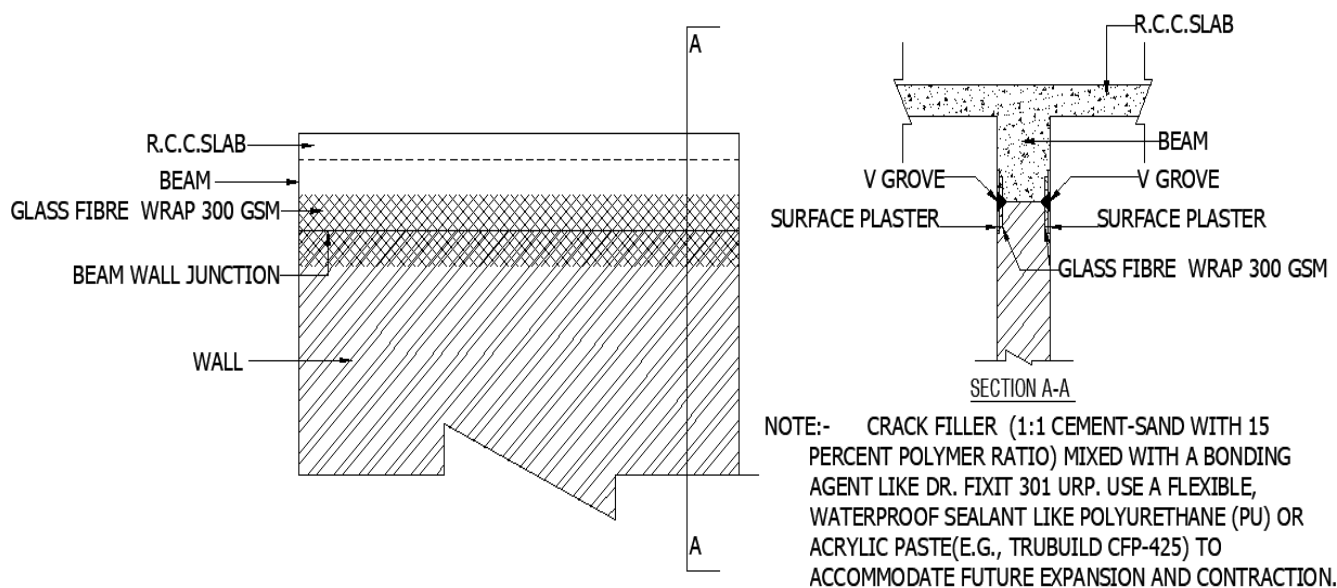


TYPICAL SECTION FOR PLINTH PROTECTION
ALL AROUND THE PERIPHERY OF HOSTEL BUILDING



7. Repair of Cracks in Beam Bottom and Wall Junction

- **Expose the Joint:** Use a chisel or power tool to remove the loose, cracked plaster. Create a clean, V-shaped groove along the junction of the beam bottom and the top of the brickwork.
- **Clean the Area:** Thoroughly brush away all dust, loose mortar, and debris from the channel. Fill and Seal:
- **For minor cracks:** Pack the gap tightly using a polymer-modified crack filler (1:1 cement-sand with 15 percent polymer ratio) mixed with a bonding agent like Dr. Fixit 301 URP. Use a flexible, waterproof sealant like polyurethane (PU) or acrylic paste (e.g., Trubuild CFP-425) to accommodate future expansion and contraction.
- **Apply a Reinforcing Mesh:** To prevent the crack from returning, fix a strip of fiberglass or chicken wire mesh (about 300 mm wide) over the joint. Secure it with nails or embed it directly into a base layer of plaster.
- **Replaster and Finish:** Apply standard wall plaster over the mesh, level it flush with the surrounding wall, and finish with putty and paint.



REPAIR METHODOLOGY OF BEAM AND WALL JUNCTION

8. Dampness for walls of bathrooms and rooms

There are three type of the physical cause of the water ingress or dampness on wall

- **Rising Damp (Groundwater):** Occurs when moisture climbs up from the earth due to a broken or missing damp-proof course (DPC). Generally it appears at the bottom 1.2 meter on Gf
- **Penetrating Damp (Rainwater):** Caused by driving rain soaking through porous bricks, failed mortar joints, leaking gutters, or blocked drainage.
- **Leaks & Condensation:** Check for damaged plumbing pipes inside the wall, overflowing water butts, or high internal humidity from unventilated bathrooms.

Methodology for repair

A. Treating the Brickwork For Rising Dampness

- **Remove Damaged Layers:** Chip away all salt-contaminated internal plaster or render down to the bare brickwork, extending at least 30 cm above the highest visible line of dampness.
- **Drill Injection Holes:** Use a rotary hammer drill to make a horizontal line of holes along the lowest continuous mortar joint (roughly 150 mm above ground level). Space the holes roughly 12 cm apart.
- **Inject Damp-Proof Cream:** Clear the holes of dust. Use a caulking gun to fill the cavities with a specialized silicone cream like Sikamur Injection Cream 100 or Perma SEAL PRO DPC Injection Creams.

B. For Penetrating Dampness from Exterior wall

- **Repoint Failed Mortar:** Rake out old, crumbly mortar joints and fill them with fresh sand-and-cement mortar mixed with an integral waterproofing compound.
- **Apply Masonry Protection Cream:** Ensure the exterior wall is fully clean and dry. Use a roller, thick brush, or paint sprayer to coat the outer face of the bricks with a breathable, water-resistant cream like 3C Micro Shield Ultra or equivalent paste. These creams dry completely transparent, preventing rain absorption while allowing trapped vapor to escape.
- **Once the source is sealed and the brickwork has dried out, you can finish the internal side of the wall: [1, 2] • Waterproof Slurry Coat:** Apply two layers of a polymer-modified cementitious coating, such as Safeguard TS Plus or an SBR latex cement slurry, directly to the bare bricks. This keeps back residual ground salts and moisture. Paint the wall using ANY OF highly breathable paints