STRUCTURAL AUDIT REPORT

FOR

“VISHAL SAHYADRI CO – OP HSG. SOC. LTD”,

“C12 – WING”

SITUATED AT

SAHYADRI NAGAR, CHARKOP,

KANDIVALI (W) MUMBAI – 400 067

PREPARED BY

LATESH S. SANKLECHA

CONSULTING STRUCTURAL ENGINEERS

Mauli Niwas, First Floor,
Bhusar Aali, Opp Grahak Sahkar Bazar No. 3,
Kalwa, Thane – 400 605. Tel. +912225339113,
9403244399 Email: lateshsanklecha@gmail.com

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INTRODUCTION:

"Vishal Sahyadri Co – Operative Housing Soc. Ltd", C12 – Wing Regi. No. BOM/HSG/5697/1979 Situated at Sahyadri Nagar, Charkop, Kandivali (W) Mumbai – 400 067 had requested to **Latesh S. Sanklecha, Consulting Structural Engineer** to inspect the structures.

WHEN IS CONSIDERED THERE IS WATER SEEPAGE / LEAKAGE?

When one of the following signs or the combination of the following signs in your building which causes water to seep inside the structure:-

- Improper workmanship.
- Deficiencies in construction.
- Cracks in the RCC member.
- Cracks in the Plaster.
- Blistering of external paint.
- Moisture, wetness or signs of capillary dampness on wall.
- Water marks or stains marks on the wall, ceiling. or roof of the building.
- Growth of vegetation on the exteriors roof & walls.

SCOPE OF SURVEY:

In order to analyze the condition of the structure & give a comprehensive report.

The said site visit was mainly to find out the general condition of the structure, nature & extent of the damage. Structural Members & their effect on the stability of the structure.

Assessment of Non – Structural work such as external plaster, plumbing/ Drainage work, waterproofing of R.C.C. cantilever chajjas, Terrace waterproofing, overhead water tanks and assessing the optimal repair required.

Visual inspection of the building & individual units with respect to the stability of structure, the damages noticed in Structural Members.

Following is our detailed report incorporating of our observations and interpretation & photographs of distresses & emerging recommendations.

Specific documentation of the existing structural provision was not available & also architectural drawing of the structure was not available for our reference.

DESCRIPTION OF THE STRUCTURE:

"Vishal Sahyadri Co – Op Housing Society Ltd." Regi. No. BOM/HSG/5697/1979 consists of 63 wings known as "B1 to B17, A1, A2, C1 to C22, D2A to D2L" and D3A to D3L. Total 2,154 flats are in **"Vishal Sahyadri Co – Op Housing Society Ltd."**

C12 building consists of two wings known as "A – WING" & "B – WING"

In C12 building both wings consists of Ground plus Upper Four floors.

In C12 building both wings consists of Eight flats on each floor.

In C12 building each wing consists of Total 40 flats.

The building is provided with regular sufficient opening and in staircase mid landing opening is provided for ventilation.

Building is constructed with beam column frame structure the load of slab is transfer on beam & from beam it is transferred on column.

YEAR OF CONSTRUCTION:

The building was constructed in 1988 as reported.

HISTORY OF THE REPAIRS:

Repair work has been carried out recently.

METHOD OF INVESTIGATION:

The structure was surveyed internally & externally, floor wise & unit wise to assess the condition of structural deterioration due to the following environmental stresses.

i. Effects of corrosion on the structural members due to weather condition.
ii. Faults in construction.
iii. Seepage of water.
iv. Ageing / fatigue of structure.
v. Plumbing line condition.

At the time of detail field survey, we have noticed major distress in the plumbing work and at some portion structural member's i.e. in column, beams & slabs the status surveyed can be summarized.

INTERPRETATION OF NON DESTRUCTIVE TEST RESULTS

Non Destructive evaluation carried out on the selected RCC structural member.

Total 10 locations were tested for NDT.

REBOUND HAMMER TEST

Total 4 locations were selected for Rebound Hammer Test.

Rebound Hammer was tested for compressive strength at surface by Schmidt rebound hammer. Results indicate the compressive strength at surface of the RCC columns & beam in is ranging between 20.30 MPa to 26.50 MPa.

UPV TEST

Total 4 locations were selected for UPV tests, on columns.

The UPV values are ranging between 3.0 Km/Sec to 3.50 Km/Sec.

Out of 4 locations all 4 locations were ranging between 3.0 to 3.75 Km/Sec means concrete quality is doubtful.

This indicates there are progressive internal cracks in the RCC members due to corrosion of reinforced steel. These members are under distress condition.

Overall, condition of concrete is good, but distressed RCC member's needs immediate repair with suitable repair system.

RCC elements indicating UPV values less than 3 Km/sec needs immediate attention.

HALF CELL POTENTIAL TEST

Half Cell Potential tested for corrosion activity by half – cell potential tests. Value is taken on Column. The result on tested column is – 321 mV.

This indicates the probability of corrosion is 50% on tested column steel reinforcement.

CARBONATION TESTS

Carbonation tests are conducted to assess the passivity of concrete cover above the reinforcement bars. If the carbonation depth is reached to the reinforced steel bars, it initiates corrosion activity in the steel.

Carbonation test was conducted to assess carbonation depth. Readings are taken on Column. Result indicates the carbonation penetration depth is 35.00 mm. Carbonation depths have reached to the reinforcement level in all of the RCC elements. It is essential to give a suitable anti-corrosion treatment to all the RCC members to stop further carbonation and corrosion of concrete.

NON –DESTRUCTIVE TEST PHOTO

PROFORMA - B		
	Sub: Structural Audit	
	Name Of The Consultant : **Latesh S. Sanklecha, Consulting Structural Engineer**	
1	Name Of The Structure:	"Vishal Sahyadri Co – Operative Housing Soc. Ltd.", **C12 – Building** Situated at Sahyadri Nagar, Charkop, Kandivali (W) Mumbai – 400 067.
2	CTS No./Ward	-
3	No Of Storey	Ground plus upper four storeys.
4	Year Of Construction	1988
5	User Department	Residential Building.
6	Mode Of Construction Of Existing	
	a) Foundation	Not Shown
	b) Floors	R.C.C. slab
	c) Walls	Brick Masonry
	4) Beams	R.C.C. Beam
	5)Columns	R.C.C. Beam
	6)Roof	R. C. C. Flat Roof.
7	History Of Repairs Done Year Wise	
	a)Slab Recasting	No
	b)Column Jacketing	No
	1)Structural Repair	No
	2)Tenantable Repairs	Yes
	3)Roof/Plumbing	No
	4)Addition/Alteration If Any	
8	Date Of Inspection By Consultant	May 15, 2021
9	Condition Of :-	
	1)Internal Plaster	Major cracks and leakage marks observed.
	2)External Plaster	Major crack observed.
	3)Plumbing	Leakage found.
	4)Drains/Chambers	Not shown
10	Observation:-	
	a) Doors And Windows Don't Close	None

	b) Columns And steel Exposed	Ceiling concrete get damaged & Steel exposed & corroded observed at a few locations internally.
	c) Settlement uneven flooring gaps between and skirting & floor	None
	d) Foundation settlement	Foundation not shown.
	e) Deflections of slab at some places.	Deflection not found but plaster debonded
	f) Major cracks in column / beams	Cracks of varying depth and lengths are observed in column and beam at different location.
	g) Seepages / Leakages s	Marks of seepage from external face area observed on inside of walls at various locations.
	h) Staircase area / column condition	Leakage marks and major cracks observed at several places.
	i) Lift walls	None
	j) U. G. Tank	Not seen.
	k) Deflection / Sagging OHT / Column condition	Algae observed on OHT.
	l) Parapet at terrace	Algae observed.
	m) Chajjas	Damaged Concrete observed & steel was corroded.
	n) Common areas	Distress found and marked in report.
	o) Toilet blocks	Cracks & leakage marks observed.
	p) Terrace / Water proofing	At few locations hollow sound & cracks observed on terrace surface.
11	Test carried out on structural / observations Findings Range as per IS Code therefore: Non Destructive Test (NDT)	
	a) Ultrasonic pulse velocity Test	The UPV values are ranging between 3.0Km/Sec to 3.50 Km/Sec.
	b) Rebound Hammer Test	Results indicate the compressive strength at surface of the entire RCC member in is ranging between 20.30 MPa to 26.50 MPa.

	c) Half Cell Potential Test	The result is on column is more than – 321 mV.	
	d) Carbonation Depth Test	Result indicates the carbonation penetration depth on column is 35.00 mm.	
12	Distress Mapping Plan & photographs with caption below about description of structural members and its location	Mention in report	
13	Brief Description of repairs to be done		
	a) Water Proofing	Please Refer Report	
	b) External Plaster	Please Refer Report	
	c) Structural Repairs		
	i. Column Jacketing	Please Refer Report	
	ii. Slab recasting	Please Refer Report	
	iii. RCC cover to be replaced	Please Refer Report	
	iv. Beam recasting	Please Refer Report	
	d) Partial Evacuation during repairs needed	No	
	e) Propping	No	
14	**CONCLUSIONS OF CONSULTANTS**	**OBSERVATIONS**	**KEY REASON**
i	Whether structure is livable / or whether it is to be evacuated / pulled down	Yes / No / No	-
ii	Whether structure requires tenantable Repairs / Major structural repairs & its time Frame.	Structural Repairs required.	-
iii	Whether structure can be allowed to occupy during course of repairs	Yes	-
iv	Nature / Methodology of repairs	Refer Report	-
v	Whether structure requires immediate propping. If so, its propping plan Methodology given	No	-
vi	Whether other immediate safety Measures required – what is specific recommendation?	-	
vii	Enhancement in life of structure after repairs / frequency of repairs required in extended life period.	Repairs will stop further deterioration but could not give additional strength to the structure.	-

viii	Projected repair cost / sq. ft. Rs 140 – Rs 180		-	-
ix	Projected reconstruction cost / sq. ft. Rs 2500 - Rs 3000		-	
x	Specific remarks whether building needs to be vacated / demolished / repairable		Nothing.	
xi	Whether structure in extremely critical condition		No	
15	**CRITICAL OBSERVATION –** Repair & strengthening of structural member required externally as well as internally on immediate basis so to maintain the health of structure, so distress could not increase in the structural & Non – structural member of the building		None	
16	**CLASSIFICATION OF BLDG**	**CATEGORY**	**AUDITORS FINAL CONCLUSIONS**	
	Comes Under this Category	C1	To be evacuated Demolition immediately	
		C2 – A	To be evacuated and or Partial demolition Requiring major Structural Repairs	
		C2 – B	No eviction only structural repairs	
		C3	No eviction needs minor Repairs only	

CONCLUSION

On the basis of above reports, it shows that over all condition of the structure from internal portion is not good and several cracks and leakage issues are present in most of the internal non – structural members. (Refer Report & Photographs).

Considering the internal part of the structure, there are several damages observed on many places in the flat. Most of the flats having leakage issue mostly during monsoon season this leakage leading to corrosion of reinforcement deteriorating their strength (Refer Reports and Photographs) and damaged concrete of structural member also noted with exposed & corroded steel with hollowness has also been noted in some non – structural member and damaged concrete of structural member also noted with exposed & corroded steel.

Externally work has been done but the condition of the structure is not good.

Externally – We extract ultra – sonic pulse velocity test result was also not satisfactory result is doubtful quality.

Periodic repair & maintenance were not done to maintain the health of the structure internally and externally, so distressed increased in the Structural & Non – Structural member of the building. Major leakage marks and colour peelings are noted at several places in flats and have started the corrosion in reinforcement. The corrosion damaged is in accelerated stages & it would continue to accelerate.

Since the Structure is almost 33 years old, structural & non – structural member loses its strength and also even after carrying out the structural repairs, the life anticipation of the structure will not be guaranteed.

On the basis of N.D.T results and visual inspection, Building comes under **C1 category**; stating to be evacuated Demolition immediately.

JUNE 21, 2021

CERTIFICATE

In Accordance with Section 28(6) of the Building Control Act (the "Act") and Regulations 4 and 5 of the Building Control (Inspection of Buildings) Regulations (the "Regulations"), I **Mr. Latesh S. Sanklecha,** Consulting Structural Engineer appointed by the Buildings under section 28(3) of the Act have personally visited and inspected the condition of the structure of the building and hereby submit the report of results of our Inspection. I, **Mr. Latesh S. Sanklecha,** certify that the inspection was carried out and report was checked by me and is valid till next six months.

LATESH S. SANKLECHA

B.E. (Civil), M.E. (Stru.), A.M.I.E., C Eng. (I)

CONSULTING STRUCTURAL ENGINEER

REGISTRATION NO.

MCGM – STR/S/272, TMC – 1012, NMMC – NMMC/TPO/S.E./126

POINTS TO BE NOTED DURING REPAIR

We would like to bring kind attention a few very important points pertaining g to the civil & plumbing repairs.

I. It is not possible to remove all the construction faults during rehabilitation because the building can't be vacated. Members find it difficult to adjust to the hazards of cement & dust.

II. The scaffolding support & ties will be required to be anchored on balconies, windows, jambs, Pipes etc. do not loosen or untie any support since this weaken the supports to the scaffolding and in turn endangers the live s of the men working on the scaffolding.

III. The work will involve a lot of dust and noise during hammering, chiseling & removing the old plaster & concrete. Also there will be a lot of noise & dust during plastering & structural steel strengthening.

IV. Due to chiseling of plaster, cracks may appear in the inner walls, lintels etc. of the premises adjacent to where work is being carried out & also loose plaster may fall off.

V. During braking of external plaster & replacement of it with new plaster, the windows & door openings have to be covered by ply boards. The inmates feel suffocated & dark inside, but the window panels have to be protected as it is very expensive to replace them, Moreover it is essential to protect the inmates themselves from falling debris & dust.

VI. Aluminum window which are fixed on the edge of the plaster are liable to get misaligned / jammed as the plaster on which it is supported is to be replaced.

VII. If the bottom of beam has to be restored / strengthen or plastered, windows will have to be removed & re fixed. On the re – fixing the size of the opening might be reduced by few inches.

SALIENT FEATURES FOR REGULAR MAINTENANCE –

Every building / Structure must have specific maintenance with proper rules for alterations & renovations.

The following steps would help in proper maintenance of the structure.

- Attend to seepage / leakage problems immediately i.e. proper filling the flooring joints, window sill joints & all internal leakages problem etc.
- Vegetation growth, seepage propagation area & visible cracks should be investigated & attended according to the diagnosis of the technical expertise.
- Periodic checking of entire plumbing system & drainage line should be conducted.
- During interiors a technical advice should be taken in the benefit of the common structure.
- Cleaning, Supervising & checking of common areas like water tanks, staircase, and pump room should be conducted.
- External inspection & painting to be done as it not adds to the aesthetic appearance of the building but it also function as protective coating to concrete & plaster.

OBSERVATION: **–**

During the said detailed visual inspection; following critical observations noted.

INTERNAL OBSERVATION

A – WING

GROUND FLOOR

FLAT NO – 03

- **HALL** – O.K.
- **KITCHEN** – Leakage mark observed on ceiling.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 05

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 08

- **HALL** – Structural crack observed on beam.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FIRST FLOOR

- All Flats was closed.

SECOND FLOOR

FLAT NO – 17

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 20

- **HALL** – Leakage mark observed on wall.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 24

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

THIRD FLOOR

FLAT NO – 25

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 26

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 28

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 30

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 31

- **HALL** – Leakage mark observed on wall & ceiling.
  - Structural damage observed on ceiling.
- **KITCHEN** – Leakage mark observed on ceiling.
  - Ceiling plaster get damaged & steel get exposed & corroded.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.




FOURTH FLOOR

FLAT NO – 34

- **HALL** – Structural damage observed on ceiling.
- **KITCHEN** – Structural damage observed on ceiling.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 35

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 37

- **HALL** – Leakage mark observed on wall.
- **KITCHEN** – Leakage mark observed on wall.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.


FLAT NO – 38

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 39

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** Leakage mark observed on ceiling.

B – WING

GROUND FLOOR

FLAT NO – 42

- **HALL** – Structural crack observed on column.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 44

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 47

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FIRST FLOOR

FLAT NO – 50

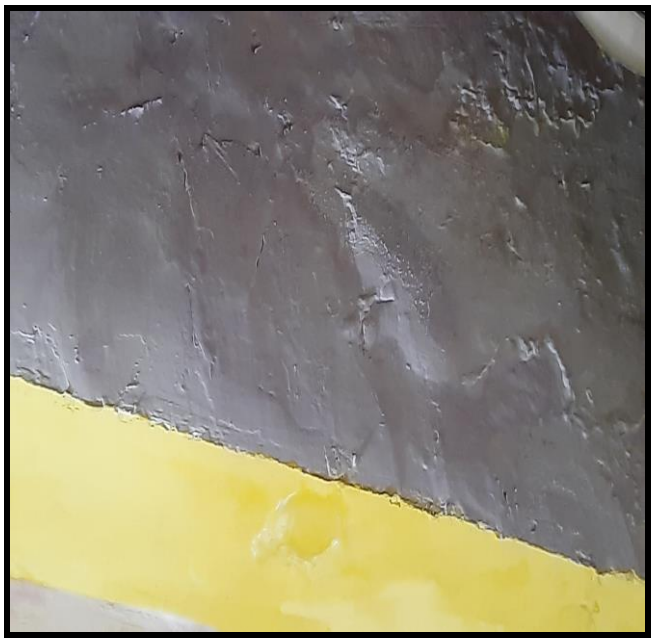
- **HALL** – Structural crack observed on column & beam.
- **KITCHEN** – Leakage mark observed on ceiling.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 52

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 54

- **HALL** – O.K.
- **KITCHEN** – Leakage mark observed on ceiling & wall.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.



FLAT NO – 56

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

SECOND FLOOR

FLAT NO – 58

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 59

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 62

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 63

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

THIRD FLOOR

FLAT NO – 67

- **HALL** – O.K.
- **KITCHEN** – Leakage mark observed on ceiling.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 68

- **HALL** – Dampness observed on wall.
- **KITCHEN** – Leakage mark observed on ceiling.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 70

- **HALL** – O.K.
- **KITCHEN** – Leakage mark observed on ceiling.
  - Beam plaster get damaged & steel get exposed & corroded.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** Leakage mark observed on ceiling.


FLAT NO – 71

- **HALL** – O.K.
- **KITCHEN** – Leakage mark observed on ceiling.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FOURTH FLOOR

FLAT NO – 74

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 75

- **HALL** – O.K.
- **KITCHEN** – Structural crack observed on beam.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 76

- **HALL** – O.K.
- **KITCHEN** – O.K.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

FLAT NO – 78

- **HALL** – O.K.
- **KITCHEN** – Structural damage observed on beam.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** ceiling plaster get damaged & steel get exposed & corroded.


FLAT NO – 80

- **HALL** – Structural crack observed on ceiling.
- **KITCHEN** – Structural crack observed on beam.
- **PASSAGE –** O.K.
- **TOILET & BATH ROOM –** O.K.

EXTERNAL OBSERVATION

A – WING & B – WING

FRONT SIDE

- O.K.

BACK SIDE

- O.K.

NORTH SIDE

- O.K.

SOUTH SIDE

- O.K.

SUMMARY OF DEFECTS

STRUCTURAL DAMAGES

The structural component of a R.C.C. building consists of the beams, Columns & the Slabs.

Please note that the Chajja & stair case though structural items, independently have been considered as "Non – Structural Items" in the context of their direct impact on the overall structural health of the building.

We would like to mention here that at some locations there are 'False Ceiling" presents, such provisions conceal the structural elements & do not permit the required inspection. However in many places distresses / leakages have been observed in ceiling, which indicates probability of having leakage & also the possibility of cracks in the slab above these 'False ceilings'.

During the survey, some of the R.C.C. Slabs, beams & Columns have been found damages / cracked. These distresses clearly indicate that some amount of corrosion to reinforcement bars has taken place inside the concrete. It may further damage the structure if not controlled at this stage.

The continuous corrosion of reinforcing bars, after reaching a certain stage, loosens the bond with concrete ultimately causing cracks in the concrete cover. As the concrete cover cracks, more corrosion results. Corrosion of reinforcement bar causes reduction in effective diameter of bar & subsequently the bars / the structural members loses strength to a great extent. This produces further cracking in structural members. As seen, concrete cover has given away & exposing the main reinforcement of the structural members. The corrosion process is basically an Electro Chemical Phenomenon.

In reinforced concrete, corrosion produces the rust several times in volume over the original metal causing the reinforcement bar to expand. Due to this they push the concrete from inside subjecting it to tension. Concrete being weak in tension cracks, subsequently the cover concrete cracks. This reduces the effective cross –

Section of the reinforcement & concrete, thereby reduces its load carrying capacity. Due to such cracking of concrete, more quantity of water & salts penetrate into the

concrete section expediting the corrosion phenomenon. Hence once the corrosion process initiates, it accelerates progressively till that element of the structure collapses. Hence this damage cycle should be immediately controlled by repairs to avoid accelerated damage to the structure.

This corrosion damages indicates reduction in the strength & load carrying capacity of the structure. These damages are medium to major & noted in the survey details. However, these structural damages need to be attended urgently internally & coated with external surface protection treatment to avoid sudden falling of deteriorated portion & resultant possible damages to life & property.

Further, for foundation of the structure are not available for inspection as the ground floor is occupied, hence we cannot comment on their stability, however, visual inspection of superstructure did not reveal any symptoms regarding foundation related damages.

NON – STRUCTURAL DAMAGES

The non – structural components of a R.C.C. building consists of items such as partition wall, external wall, plastering, painting, plumbing / drainage line & terrace water proofing. The non-structural cracks are mainly separation cracks are mainly on brick masonry walls.

Our observation for these items is as follows –

1. **Walls –**

The walls shows cracks that in the internal plaster in the form of cracking at few places & walls shows sign of dampness at some places.

2. **Leakage Through Pipe Connections –**

The water supply line & the drainage pipe are comparatively in fair condition.

3. **Bath Room & Toilets –**

We identified leakage patches & peeling of paint on some walls & ceilings of Bath Room & Toilets.

4. **Stair Case –**

We identified some minor cracks and colour peeling on stair case.

ROCEDURE FOR THE STRUCTURAL REPAIRS IN GENERAL (REMEDIAL MEASURES)

- Remove old & crack loose concrete.
- Clean the exposed reinforcement.
- Apply Anti-rusting coat to the reinforcement
- Apply bonding coat to the old concrete.
- Replace the removed concrete with polymer base mortar under the strict supervision of a Consulting Engineer.

STEPS FOR REPAIR/ STRENGTHENING METHODOLOGY FOR COLUMNS, BEAMS ON STILT FLOOR

- **CHIPPING**

Chip off loose and carbonated concrete from surface of existing structural elements with help of chisel and hammer till sound concrete is encountered. De-scale the surface of exposed reinforcement with help of brush to remove the rust scales. Carbonated concrete if left in structure shall initiate deterioration process.

- **MAKING UP OF LOST STEEL AREA**

Connect the buckled steel bars by welding additional steel rebar's or by inserting new bars by Hilti to make up for the lost area of steel and providing adequate lap length in the column. The new bars inserted shall be grouted properly by chemical grouting and shall be taken from the footing if required. Also tie the new bars with the old one by providing column links at spacing given in the respective drawing. As far as possible bend the buckled portion flush to the additional reinforcement and avoid cutting of steel in buckled area.

- **CORROSION TREATMENT**

Carry out application of alkaline rust converting primer FEOVERT on corroded steel surface. It has property to attack anode as well as cathode, which is purely alkaline in nature (pH-9.5), so it has no carcinogen activity with concrete.

Follow with application of two coats of **IPNet- RB** anticorrosive epoxy coating for bar protection against future corrosion. Coating is for old a well as newly provided steel. This system (Interpenetrating polymer network system for rebars : IPNet-

RB) once applied on steel shall provide extended protection against future carbonation and chloride attack.

- **BONDING COAT**

Bond between new and old concrete is important aspect for effective participation of total cross sectional area of concrete. Selection of type of bond coat is based on, type of stresses bond strata is expected to go and prevailing area where application is to be carried.

Here application of high pot life epoxy bond coat of EPIBOND 21 is suitable. This bond coat is effective in transferring stresses from old to new concrete surface and has the setting time of two which offers sufficient time for fixing of form work and casting of new concrete.

MAKING UP LOST STRENGTH OF CORE OF CONCRETE BY JACKETING THE DAMAGED PORTION BY MICRO-CONCRETE.

Micro-concrete is supplied as a ready to use dry powder. Only specified amount of water is to be added to produce a free – flow non-shrink concrete. The material is a blend of specially processed cement, pre – graded fillers and additives which impart:

- Good early and final strengths due to very low water requirement.
- Controlled expansion to retain the original volume filled even after setting.
- Free flow characteristics without any segregation and bleeding.

After carry out the required form work in damaged areas the micro concrete can be simply pour in the form work. It is fast setting material and offers very good early strength. The form can be removed within the 24 hours.

STEPS FOR EXTERNAL PLASTER

Remove complete external plaster & redo the same with bonding coat & 2 coats of sand faced plaster along with a water proofing chemicals. It is advisable to put a fiber mesh along the junction of RCC beam & bricks work also along the junction of RCC columns & brick work.

STEPS FOR WATER PROOFING

Remove the complete existing brick bat coba. Clean the surface of chajja /slab. Apply one coat of waterproofing chemical. Put the brick bat with proper slope. Finish the surface with waterproofing chemicals.

91 84258 09543
91 77770 80471
91 77770 80472
strencreteslaboratory@gmail.com
Shop no. 2, Louis Wadi, Sumitra Farro Nagar Co-Op HSG. Society,
Near Maitri Darshan Building, Thane West - 400 604

STRENCRETE SOLUTION LABORATORY PRIVATE LIMITED

CONSOLIDATED NDT TEST RESULTS (UPV / Rebound Hammer / HCP / Carbonation)

Customer	Latesh Sanklecha	Building Name	Vishal Sahyadri CHSl, Bldg. No.C12
Site Address	Vishal Sahyadri CHSl, Sahyadri Nagar, Charkop, Kandivali , Mumbai	Report Date	17-May-21
Project No.		Building Age	

NDT Results

UPV Test Results

Sr. No.	Id Mark		Corrected Velocity as per probing mode, (km/s)	Remark
	Floor	Member		
1	Ground	C1	3	Doubtful
2	Ground	C2	3.1	Doubtful
3	Ground	C3	3.2	Doubtful
4	Ground	C4	3.5	Doubtful

RH Test Results

Id Mark		Direction	Average Rebound Number	Equiv Cube Strength N/mm²
Floor	Member			
Ground	C1	→	28	20.3
Ground	C2	→	29	21.8
Ground	C3	→	31	24.9
Ground	C4	→	32	26.5
		Average	**30**	**23**

Half-cell Potential Results

Sr. No.	ID Mark		Half-cell Potential (mV)
	Floor	Member	
1	Ground	C1	-321

Carbonation Test Results

Change in Colour (Y/N)	Carbonated	Carbonation Depth (mm)
Y	No	35

UPV READING MAX =3.5, MIN =3

UPV Results Summary

Criteria	Concrete Quality	No. of readings
Above 4.40km/s	Excellent	0
3.75 to 4.40 km/s	Good	0
3.0 to 3.75 km/s	Doubtful	4
Below 3.0 km/s	Poor	0

HCP Results Summary

Criteria	Probability of corrosion	No. of Readings
Less than -200 mV	10%	0
-200 mV to -350 mV	50%	1
More than -350 mV	90%	0