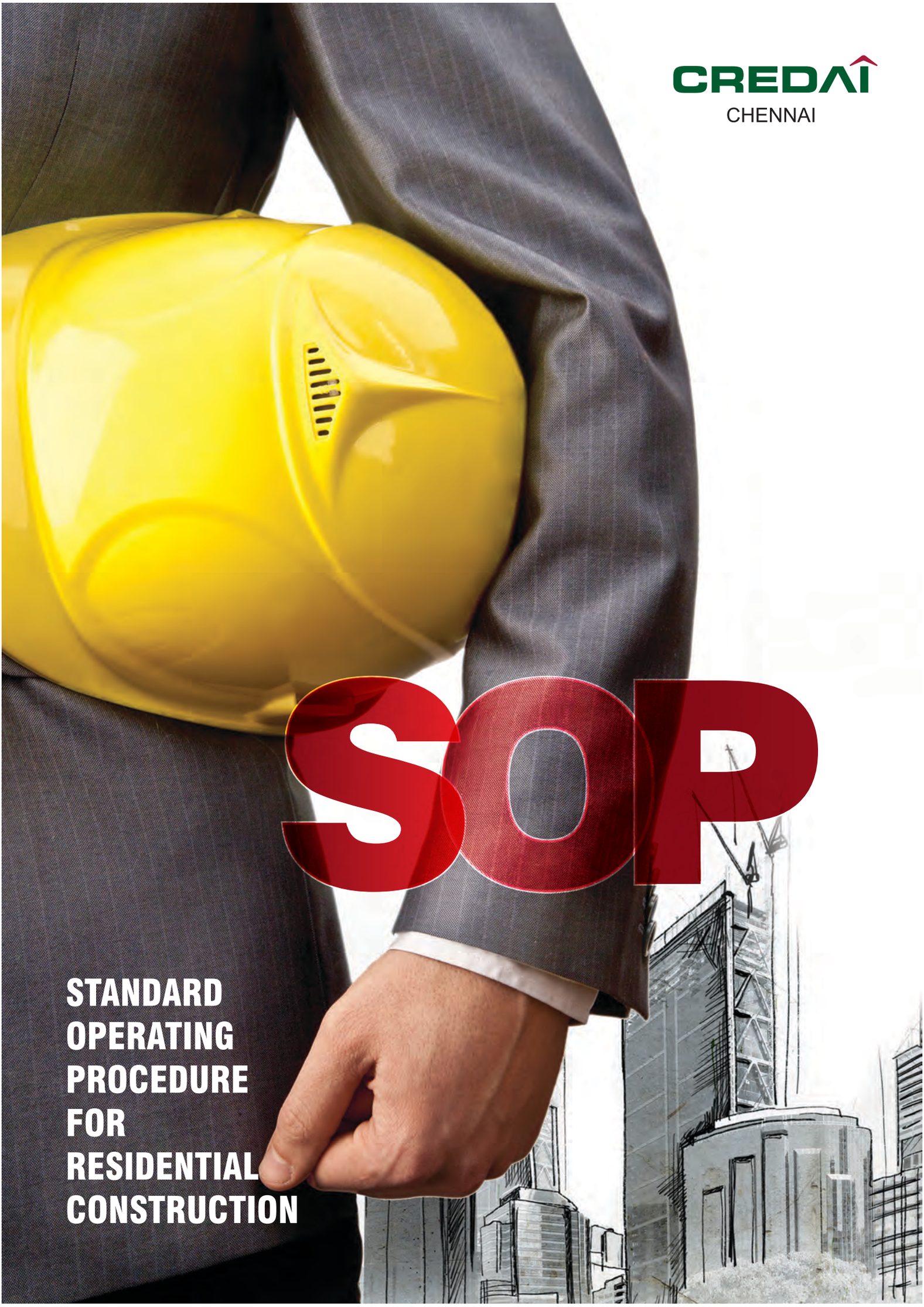
CREDAI
CHENNAI



SOP

STANDARD OPERATING PROCEDURE FOR RESIDENTIAL CONSTRUCTION

CREDAI

CHENNAI

Confederation of Real Estate Developers Associations of India

SOP for RESIDENTIAL CONSTRUCTION

A guideline to CREDAI CHENNAI Members

By

BUREAU VERITAS

INDEX

INDEX

SOP ANNEXURES

About CREDAI

Established in 1999, The Confederation of Real Estate Developers' Association of India better known as CREDAI is the apex body for the private real estate developers in India, representing over 9000 developers through 23 states and 156 city level member associations across the country. CREDAI has worked hard to make the industry more organized and progressive by net working closely with government representatives, policy makers, investors, financial institutions, consumers and real estate professionals.

Acting as the voice of India's Real Estate Industry, CREDAI has been the guiding force for the growing Real Estate sector in India, bringing more transparency.

CREDAI's success in bringing the majority of organized private real estate developers under a single umbrella is a potent force that promises the rapid development of the realty sector, one that knows itself as a major driver of India's economic growth.

CREDAI's code of conduct is adopted proactively by all its members and promotes ethical practices. CREDAI also updates its members about the latest industry data, technological advancements, industry benchmarks and international situations from time to time.

Apart from various activities, CREDAI has been organizing conventions and exhibitions every year on subjects relating to housing and real estate sectors, to foster relationship between builders, government and the people.

ACKNOWLEDGEMENTS

We are grateful to have an extraordinary group of people dedicated to this project, and who have made significant contribution in bringing out this handbook. The standard they set for themselves in the quality of their work has set a high standard for the Standard Operating Procedure (SOP) to live upto.

We acknowledge the contribution made by the following members:

Prof. **A.R.Santha Kumar** (Retd.) – IIT
Dr. **K.P.Jaya** - Anna University - Structural Engineering Dept.
Prof. **A. Sridharan** - IISC Bangalore
Dr. **K.L. Pujar,** Soil Expert
Mr. **R. Jeyakumar** MD, Rajparis Civil Constructions Ltd.,
Mr. **S. Senthilkumar** MD, Ganga Foundations Pvt. Ltd.,
Dr. **T. Arul** Head Operations, Vasanth Builders
Mr. **R. Damodaran,** ED, Real Value Promoters Pvt. Ltd.,
Mr. **C. Harish**, Director, Malles Construction (P) Ltd.,

PREFACE

This book fills an important gap in the Construction literature and makes a positive contribution to improve the Safety, Security and Structural stability of buildings which are of paramount importance to the Building and Construction Industry. SOP (Standard Operating Procedure) is a practical guide based on extensive experiences drawn from construction projects and will be invaluable for all those seeking to improve efficiency of their practice.

CREDAI CHENNAI is committed to seeking continuous improvement in all aspects of construction industry. To achieve this aim, CREDAI CHENNAI constituted the Skill development Committee and a task force to review specific areas of work with the intention of framing guidelines, codes of practice, Codes of Conduct to assist the participants in the industry to strive for excellence.

The SOP provides a definitive, comprehensive step by-step-best practice process to manage any type of project from start to finish.

This is a practical project management book that provides working standards and practices in project management knowledge areas and will be of significant guidance and assistance to all those engaged in project management.

Suresh Krishn
Vice President
CREDAI CHENNAI

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COMMITTEE MEMBERS OF CREDAI CHENNAI

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Mr. **S. Senthilkumar,** Convenor

Dr. **T. Arul,** Co-Convenor

Mr. **R. Damodaran,** Member

Mr. **C. Harish,** Member

PART - I

1.0 INTRODUCTION

1.1 Scope and Purpose

The CREDAI CHENNAI SOP for Construction was developed by Subject Matter Experts of the industry, keeping in mind the best practices applicable.

This hand book is developed with the intent to create a culture of Safety, Quality & Reliability, thereby standardizing the approach by developers in Construction practices.

The aim of this handbook is also to build the competence of people working in the construction industry, thereby achieving consistency in the construction methodologies adopted by the industry.

The requirements in this handbook is mandatory for members of the CREDAI Chennai chapter.

1.2 Member Compliance statements

Each CREDAI CHENNAI member, on adoption of this handbook requirement, shall submit a compliance statement to CREDAI CHENNAI.

1.3 Competent person

Person regarded as competent having sufficient training and experience or knowledge and other qualities to properly assist the employer to meet his obligation.

1.4 Member Representative (MR)

A Member Representative shall be nominated by the CREDAI CHENNAI member organization who apart from his other responsibilities, will oversee implementation of the requirements in this hand book within their organization, and will also plan and initiate technical skill development for the organization.

The Member Representative will also communicate the details of bulletins and amendments to the organization and shall be responsible to submit various reports to CREDAI CHENNAI on behalf of the organization.

1.5 Third party vetting consultant

The third party vetting consultant will be shortlisted by CREDAI CHENNAI based on their experience and competency in the relevant field.

1.6 Statutory Compliance

The promoter will be getting approval & clearances from the relevant government authorities prior to starting work.

1.7 Implementation

The implementation of this handbook shall be initiated by the members and overseen by CREDAI CHENNAI through :

a) Compliance reports

b) Audits and periodic reviews

Periodic communications in this regard, shall be sent to CREDAI CHENNAI members in the form of bulletins, amendments to this hand book or by convening meetings.

1.8 Certification

The organization adopting this handbook shall adopt the requirements to international practices and shall govern themselves through formal certifications. Details of such certifications shall be submitted to CREDAI CHENNAI.

1.9 Approval and Copyrights

This handbook is registered by CREDAI CHENNAI under the provisions of the Copyright act. Procedures to meet the requirements of this act are evolved by the legal advisors of CREDAI CHENNAI. Except where the Copyright Act allows no part of this publication may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from CREDAI CHENNAI.

1.10 Distribution

This handbook is available in the form of printed booklets and compact discs. In addition, the availability is also made through the CREDAI CHENNAI website.

1.11 Disclaimer

Information contained in this publication may vary according to circumstances and for individual cases. CREDAI CHENNAI, not being the author of this publication, does not assure, represent or guarantee the accuracy of the information contained in it.

CREDAI CHENNAI advises the users of this handbook to make their own assessment of the information and are advised to verify the correctness of the contents with the relevant agencies / bodies.

CREDAI CHENNAI shall not be held responsible, either directly or indirectly, for any loss or damage which may be suffered by any user by acting upon or placing reliance on the contents of this publication.

2.0 Control Requirements

2.1 Compliance Manual

A compliance manual, addressing all requirements of CREDAI CHENNAI SOP shall be prepared by the member representative and approved by top authorities of the member organization.

2.2 Organization Reviews

Each member organization shall have a program to conduct periodic internal reviews within a project, across project and where required, peer reviews across member organization.

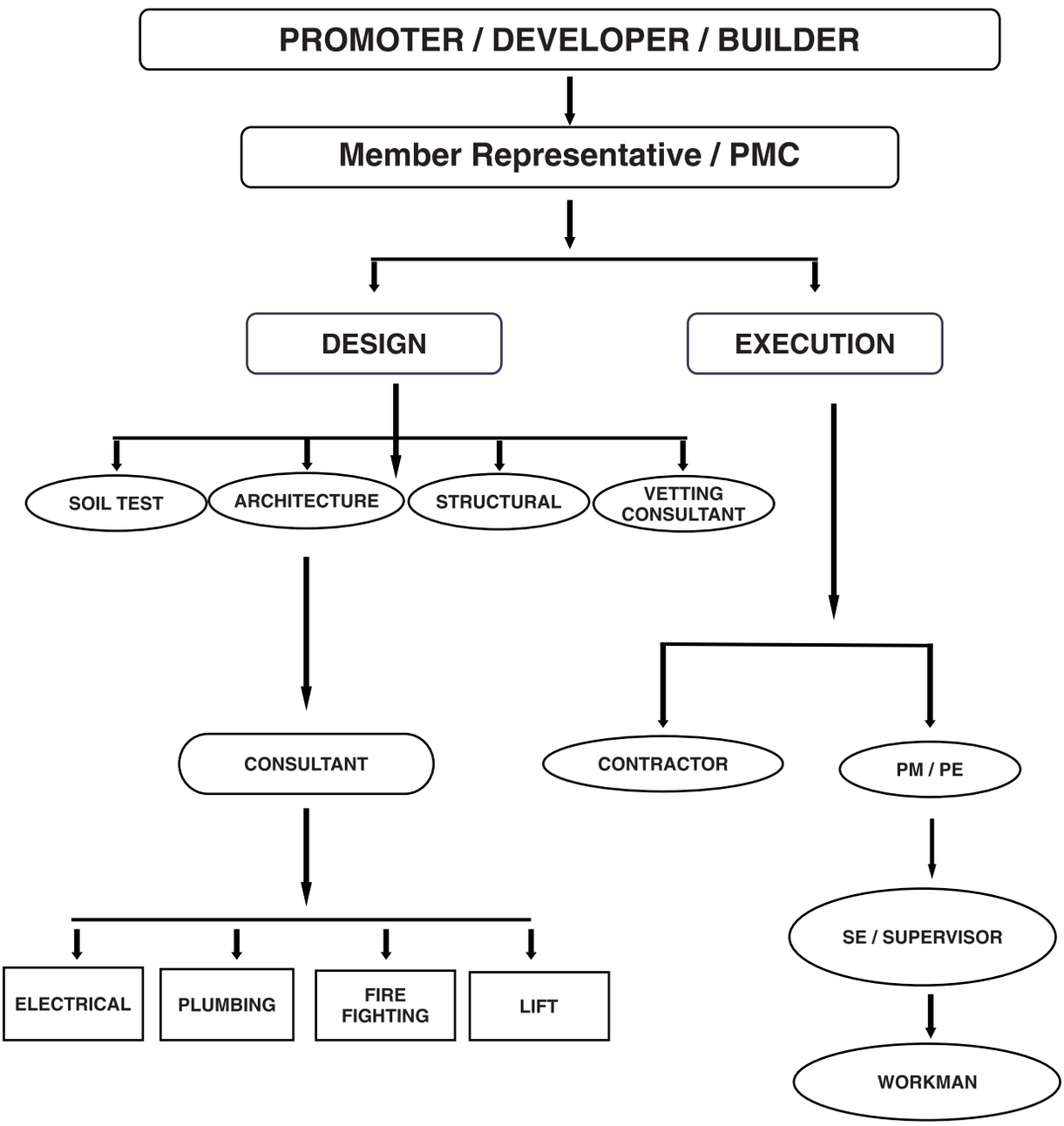
2.3 CREDAI CHENNAI Audits

After submission of compliance statement and compliance manual, CREDAI CHENNAI shall duly review the documents and schedule an audit using competent organizations. Thereafter, need based periodic audits shall be planned.

2.4 CREDAI CHENNAI Code of conduct

This Handbook supplements all requirements of CREDAI CHENNAI code of conduct. If there are any contradiction in this book, CREDAI CHENNAI will take all initiatives to resolve them.

3.0. RESPONSIBILITY CHART



3.1 Developer Responsibility

3.1.1 Engagement Letter

Engagement letter is a written document to be maintained by the member, mentioning various consultants employed in the project as per attached **SOP Annexure - 1**.

3.1.2 Promoter's Certificate

Promoter certificate is the declaration by a developer to an end user (customer) that the constructed property has gone through a structured, progressive and dedicated set of Good Construction Engineering Practices, thereby assuring safety and stability of the premises to the users.

The format is attached in **SOP Annexure - 2**.

3.1.3. Architect Certificate

Architect should give the certificate as per the **SOP Annexure - 3**.

3.2. Structural Stability Certificate

The structural Engineer should give structural stability certificate as per the format given in SOP **Annexure No - 4.**

3.3 Vetting Consultant Responsibility & Certification

It is an Independent review and approval by a competent engineer from an accredited third party agency, who shall advice and approve whether all input requirements were considered in the design aspects including the final design and drawings. Third party vetting involves an endorsement of the **"Good For Construction"** drawings. The format is given in **SOP Annexure No - 5.**

3.4 MR/PMC Certificate

3.4.1 Building Stability Certificate & Constructability Certificate

MR / PMC should submit the constructabilty certificate before starting work. The format should be as per the SOP **Annexure No-6.**

MR / PMC should submit the building stability certificate after completion of the project. The format is given in **SOP Annexure No - 7.**

3.5 PM/PE Responsibility

PM / PE should execute the work as per the architectural and structural drawings.

3.5.1 Execution CERTIFICATE

PM/PE should give the Execution Certificate as per format in **SOP Annexure No - 8.**

3.6 Plumbing Contractor Responsibility

The plumbing contractor should submit no-cut certificate before starting work as per the **SOP Annexure No - 9.**

4.0 Preliminary Works

4.1. Site Analysis Report

4.1.1 Location History

MR should visit the location and collect the history about the site, through verbal enquiry, and record it in the standard format. The MR should use technology like Google earth to understand the history of the location.
(Historical usage of the Site and Location)

i) A brief history of existing buildings, its foundation, nature of the existing soil at site, and in the adjoining area.

ii) Location of major trees on site, on adjacent properties and on streets.

iii) Location of utility services, including electricity poles, storm water drainage line, natural drainage, cables crossing within the site etc.

iv) Location of any infrastructure easement in the site.

4.1.2 Topography

i) Existing site levels, contours, if any.

ii) Site level with respect to adjacent road.

iii) Site drain, flood level (maximum flood level during floods).

iv) Factors that affect architectural drawings.

4.1.3 Water Quality Test

Task

Appoint a reputed water testing consultant and get the report. For water testing, take samples and give it to two different agencies at same time, for cross checking the results.

Need

To know about the water quality.

Requirement

Water divining should be done in the setback area.

After getting the water divining report, the number of open / bore well required area to be planned based on the requirement.

Water sample to be collected from open / bore wells and sent for testing.

INPUTS FROM WATER TESTING CONSULTANT

SAMPLE TABLE OF WATER ANALYSIS FOR CONSTRUCTION WORK

S.No.	Particulars	Results	Requirement (Desirable limit) As per IS 456:2000 (RA: 2005)
1	Organic Solids	**52 mg/l**	200 mg/l max
2	Inorganic Solids	**822 mg/l**	300 mg/l max
3	Sulphate as SO3	**87 mg/l**	400 mg/l max
4	Chloride as Cl	**254 mg/l**	500 mg/l max. for RCC 2000 mg/l max. for PCC
5	Suspended Matter	**4 mg/l**	2000 mg/l max.
6	pH Value	**7.41**	Shall not be less than 6
7	Quantity of 0.02N NaOH Required to neutralise 100ml of water sample using phenalphthalein as an indicator	**2.4 ml**	Shall not be more than 5 ml
8	Quantity of 0.02N H_2SO_4 required to neutralise 100ml of water sample using mixed indicator	**11.3 ml**	Shall not be more than 25 ml

Result: The given water sample must comply with construction purpose water requirements,as per IS: 456 - 2000 (R.A:2005) with respect to the above factor tested.

4.1.4 Neighbouring Building

Building surrounding the site and their usage, height, overall view of any factors which may affect the design aspects like entry / exit, etc.

4.1.5 Geo technical Investigation

MR should go to site and dig a sample pit (1.5 x 1.5 x 2 Mtr) to understand the sub soil profile & to know about basic soil characteristics. (Preferably where a sump / STP / is located), at the time of testing MR / Competent person should be present at site.

Task :

Appoint a reputed consultant and get the report, and it should be vetted by the third party consultant.

If the land area is more than 1 acre for special buildings (Stilt + 4 floors) the soil test report should be vetted by third party soil consultant. If the building is a Multi Storeyed Building (MSB), irrespective of the area, the soil test should be vetted by the third party soil consultant.

Requirement :

By using soil testing machine.

Bore hole points for soil samples at every one meter depth.

Enough bore hole points to be selected on the building foot print.

The check list for soil investigation is given in **SOP Annexure No - 10.**

Need :

To understand the sub soil profile.

Depth of hard strata and water table level.

To know about the type of foundation.

Inputs from MR :

Type of building

Numbers of floors

Site layout along with building foot print

Inputs from Soil Consultant :

Soil strata

Water table level

SBC of soil

Type of foundation

Suggestions &Recommendations

Basic requirement / Guideline

The bore hole should be within the building line.

Minimum two bore holes are required, if site is more than 1 acre then additional two bore holes per acre.

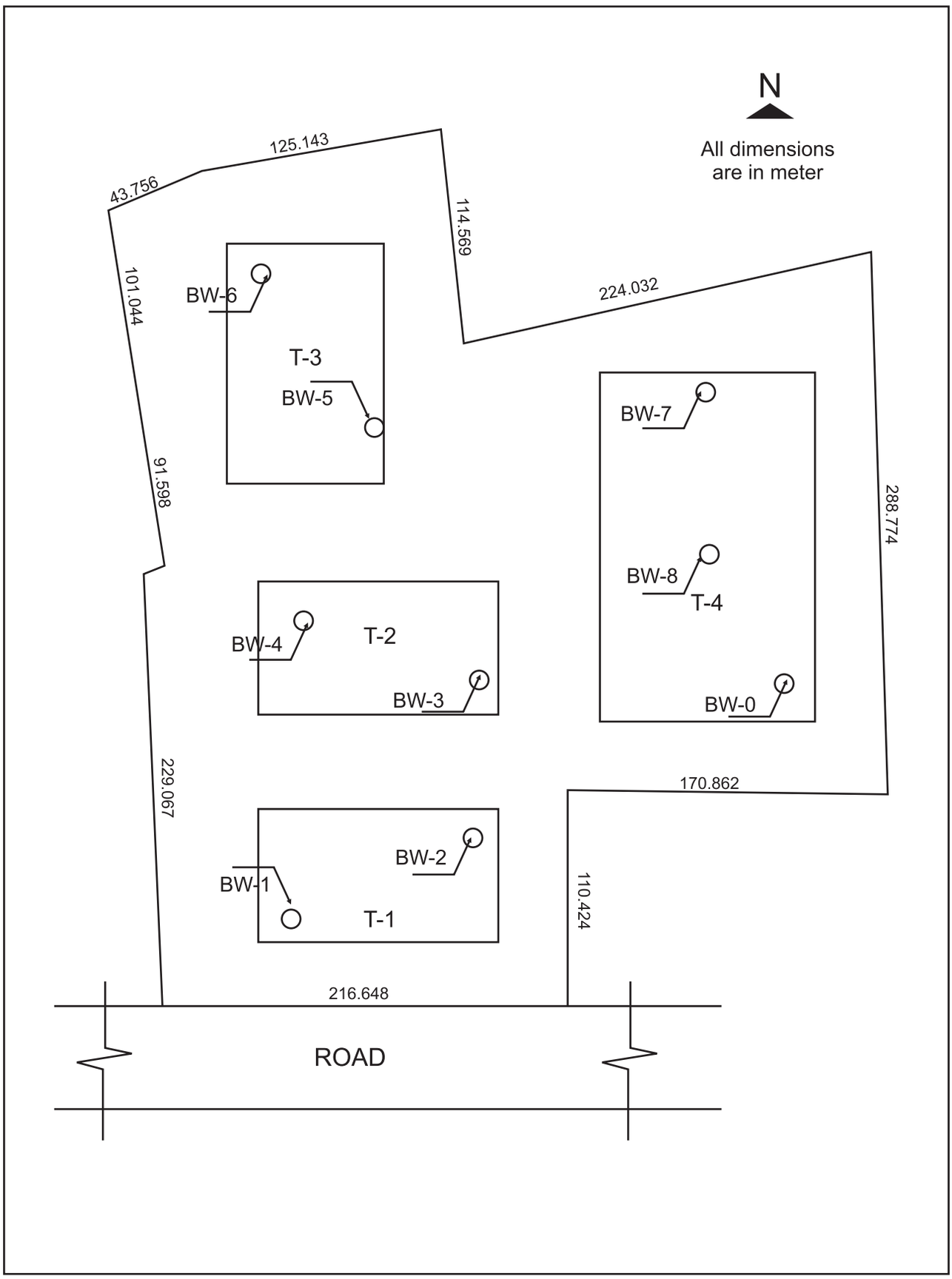
For SPT, testing should be done up to the depth of 10 Mtrs and test shall be continued till, when the N value of 50 is achieved.

Soil samples should be collected at the time of boring.

Soil consultant should visit the site after completion of Earth work and before starting the foundation PCC.

Minimum 2% of the pile should be load tested.

SOIL TEST BORE HOLE DRAWING



4.1.6 Survey

Task

MR should appoint a reputed survey consultant and ensure at the time of earth work the bench mark is preserved.

Requirement

After getting the survey drawing, super impose the FMB layout with survey drawing & cross check the true North point.

Checklist given in **SOP Annexure No - 11.**

Need

To understand the existing site level, road level, structure, boundary, trees, wells, electrical lines, drain, canals, etc.

Inputs from MR

Site layout, FMB

Inputs from Surveyor

Contour layout, Clear boundary measurement, True North point, Bench mark etc. Bench mark has to be in a solid structure for future reference.

5. Architectural Drawing:

Task :

Appoint a registered / Licensed architect who has experience in the respective building types (Special Buildings, Multi storeyed buildings, Commercial / Office Building.

Need :

To get the correct design

Requirement :

Design should be based on the local regulatory norms.

Provision to be incorporated for utility services.

OSR to be considered

Architectural Drawing Checklist given in **SOP Annexure no - 12.**

Inputs from MR :

Survey drawing with north point

Site surroundings

Location map

Land extent

Inputs from Architect :

FSI calculation as per the DR norms

Area statement

Number of flats

Type of flats

Type of design

Number of floors

Floor plans

Elevation & section details.

Co-ordination with structural consultant

Co-ordination with various consultants (Lift, Fire fighting, Piped gas, Electrical, Plumbing & Landscaping, etc.)

Co-ordination with third party vetting team.

6. Structural Design - 3 Stages

6.1 Stage - 01

Task :

Appoint a reputed structural consultant who has experience in the respective building type (Special Buildings, Multi storeyed Buildings, Commercial / Office Buildings).

Need :

To get the proper structural design with respect to the site condition and requirements as per the approval plan / architectural plan.

The consultant should be given full freedom to work and without restricting the quantity of steel required per sft.

Requirement :

Design based on the approval plan\architectural plan

(Type of building, floor plan, height, and number of floors),

Soil & water test report.

Inputs from company :

Soil test report.

Water test report.

Architectural Drawing.

Inputs required from consultant :

Column & beam layout and size.

Type of foundation

6.2 Stage - 02

Analysis by the MR on the preliminary structural design

Task :

Depth of foundation

Type of foundation

Loads considered per floor

Number of floors

Need :

To ensure the foundation rests on the hard strata

Cross verification with soil test report

Cross verification with architectural drawings and approval drawings.

Type of foundation:

Spread Isolated footing

Pile Foundation

Raft Foundation

Requirement :

Compare the soil test report and the structural design as per the attached

SOP Annexure No - 13.

To be checked by the Design team, Project Manager and site engineers.

6.3 Stage - 03

Final Structural design / good for construction

Task :

Final structural design should come after getting clearance (sign off) from Architect /Service consultant / builder.

Compare with - Approved drawing\Architectural drawing & Car Parking Layout

Service consultant drawings (Details for Fire Fighting ,Electrical, Plumbing elevation, piped gas)

Services coming on the setbacks like sumps, STP, pump room

Neighbouring buildings (structure type and age)

Structural Drawing Checklist given in **SOP Annexure no - 14.**

Details of Requirement :

Structural stability certificate

Structural analysis report

Detailed GFC drawing for foundation & Super structure (Which includes Plan & section details, Grade of steel & concrete , Cover, lapping, Column curtailment details, Expansion joint, Column anchorage for seismic)

Need :

To ensure the structural members to carry the design load.

Core cuttings can be planned without disturbing the structural members

To ensure proper alignment with walls, elevation details and other architectural features

To ensure effective usage of space for other services (Duct)

Basis for design calculation for this drawing, The structural drawing should reflect :

Zone type

SBC as per soil test report

Type of building

Number of floors

STAAD Pro / E tab models built on the software should be shared with the builder for vetting purpose.

Structural consultant should visit the site after completion of earth work stage & Periodical site visit should be done at structural work stages.

It is recommended that structural design of the following category of projects be vetted by a third party consultant.

a. If the project is a special building (stilt + 4) measuring more than 1 lakh Sq.ft. of built up area

b. If the project is a MSB irrespective of the area of the building.

ENGAGEMENT LETTER

(Photo copy of this letter should be displayed on site for quick reference.)

Company Name	
Project name	
Survey Number	
Address	
Type of Building	
No. of Blocks	
No. of Floors	

I hereby convey that I have engaged technically competent professionals for design, Execution and Vetting works for the project at.....
Planning Permit No. ....., Building Permit No.....

Management Representative Name:
Address:
Contact No:
Email:
Signature:

PHOTO

Architect Name:
Address:
Contact No:
Email:
Signature:

PHOTO

Structural Engineer Name:
Address:
Contact No:
Email:
Signature:

PHOTO

Vetting Consultant Name :
Address:
Contact No:
Email:
Signature:

PHOTO

PROMOTER'S CERTIFICATE

I hereby confirm that the building with Planning Permit No..... and Building Permit No....., Constructed at.....

is designed and vetted, by qualified professionals and *e*xecuted as per the NBC Code.

I hereby certify that the above building is stable and safe.

Enclosures:-

1. Structure Stability Certificate obtained from Structural Engineer.
2. Building Stability Certificate obtained from MR.
3. Certificate obtained from Vetting consultant.

Date:

Place: Promoter Signature & Seal

ARCHITECT CERTIFICATE

Company Name	
Project name	
Survey Number	
Address	
Type of Building	
No. of Blocks	
No. of Floors	

This is to certify that the architectural design for the Proposed building ..... at Survey / Door No ..... with Building Permit No..... Planning Permit No.....…… Is designed by me considering all government regulations and Architectural design parameters as per the NBC standards.

Architect Signature with date

Name:

Seal:

STRUCTURAL STABILITY CERTIFICATE

Company Name	
Project name	
Survey Number	
Address	
Type of Building	
No. of Blocks	
No. of Floors	

This is to certify that the structural design for the Proposed building ..... at Door No.....with Building Permit No..... Planning Permit No..... Is designed by me, considering all design parameters as per the NBC Codes. The design of this structure is checked and found to be safe and stable.

The Following parameters are considered

1. The loading is taken as per requirements of code of practice for Loading IS-875 (all parts) and Seismic forces as per latest code IS-1893.

2. The design of the structure is done as per the latest code IS 456.

Structural Engineer

Signature with date

Name:

Seal:

VETTING CONSULTANT CERTIFICATE

Company Name	
Project name	
Survey Number	
Address	
Type of Building	
No. of Blocks	
No. of Floors	

This is to certify that the design of the proposed..... residential / Commercial building .....Builders at..... Structurally designed by..... Consultant has been vetted by ..... and the design is found to be safe and stable as per the NBC codes.

Vetting Consultant

Signature with date

Name:

Seal:

BUILDING STABILITY CERTIFICATE

Company Name	
Project name	
Survey Number	
Address	
Type of Building	
No. of Blocks	
No. of Floors	

I hereby certify that the building constructed at..... With Planning Permit No.....and Building Permit No..... designed by Mr....., Vetted by Mr..... and executed by me is Stable and Safe.

I hereby confirm that I have strictly followed the Design and Architecture drawings & executed all the construction works as per NBC codes.

MR Signature with date

Name:

Seal:

CONSTRUCTABILITY CERTIFICATE

Company Name	
Project name	
Survey Number	
Address	
Type of Building	
No. of Blocks	
No. of Floors	

This is to certify that I, Mr..... is the Management Representative for the Proposed Project at S/No..... address..... Architecturally Designed by..... , Structurally designed by ....., Vetted by .....with Planning Permit no..... and Building Permit No..... .

I have verified the architectural and structural design and I hereby assure to construct this building as per the architectural and structural designs and drawings provided to me, and execute the construction as per the NBC codes.

Management Representative

Signature with date

Name:

Seal

EXECUTION CERTIFICATE FROM PM/PE

Company Name	
Project name	
Survey Number	
Address	
Type of Building	
No. of Blocks	
No. of Floors	

I hereby Certify that I have Executed the following Stage of Work..... as Per Structural Drawing and Architectural Drawings adhering to NBC Codes.

PM/PE

Signature with date

Name:

Seal

NO CUT CERTIFICATE

Company Name	
Project name	
Survey Number	
Address	
Type of Building	
No. of Blocks	
No. of Floors	

I hereby assure that I will not cut any of the reinforcement in any of the Structural Members, Column, Beam during my work in this building.

Plumbing Contractor

Signature with date

Name

SOIL TESTING - Checklist

S.No.	Description	Check	Remarks
Details provided to consultant			
1	Site boundary along with building foot print		
2	Building type		
3	Number of blocks / floors		
4	Existing structure, if any		
Inputs from Consultant			
5	Boring location		
6	Soil test report		
7	Suggestions & Recommendations		
8	Actual soil samples		
Check Points			
9	Check if borehole location is inside the building foot print area		
10	Study the report for the following points		
	Conclusions & Recommendations		
	Type of foundation		
	Foundation depth		
	Safe bearing capacity		
	'N' Value		
	Soil profile comparison		
11	Soil strata comparison with other bore holes		

CHECKLIST FOR SURVEYING

Project Name :		**Date :**		
Block No :		**Dwg / Rev No:**		
Sl.No.	**Description**	**Yes**	**No**	**Remarks**
1	Identification Of Reference Base Lines & Permanent Benchmarks			
2	Establishment Of Main Grid Lines In Both Directions. Is It As Per Drawings?			
3	Establishment Of Sub-base Lines And Benchmarks. Is It As Per Drawings?			
4	Location Of Individual Structural Elements. Is It As Per Drawings?			
5	Check for Marking Of BMs, CLs & Gridlines on survey pillars. Is it as per specifications?			
6	Check For Protection Of Survey Pillar. Is It Ok?			
7	Establishment Of Block Levels (10m X 10m Grid). Is It Ok?			
8	Preparation of EGL Map.			
9	Check for control of survey work in the vertical direction.			
Checked By:		**Approved by :**		

CHECKLIST FOR ARCHITECTURAL DRAWING

Project Name:		**Date :**		
Flat Name:		**Revision No:**		
Sl.No.	**Points to be Checked**	**Yes**	**No**	**Remarks**
1	The good for construction seal is available in all drawing			
2	The consultant signature is available in all drawings.			
3	The drawing nos. sequence is noted.			
4	Compared the site plan with floor plan so it does not affected the setback & building measurement.			
5	The building line is parallel to road.			
6	The level given in all areas (G.F, Car park, Basement match the section Drawing, Staircase area, Toilet & Kitchen levels.			
7	The dimension given for duct opening and off set, refer drawings.			
8	The staircase details are comfortable to build.			
9	The elevations Band, Grooves, Tiling work size and shape given to match the architectural drawing.			
10	The landscape drawing, weather, slope / level drive way (or) road, crust level for landscaping are given.			
11	Ventilator openings are in straight line & will not affect the plumping pipe line.			
Checked By:		**Approved By:**		

SAMPLE FORMAT:

COMPARE WITH SOIL TEST REPORT & PRELIMINARY STRUCTURAL DESIGN			
S.No	**Description**	**Soil test report**	**Structural design**
1	Type of foundation	Bored cast situ pile	Bored cast situ pile
2	Foundation depth	11.5 Mtr - 13.3 Mtr (From RL)	13 Mtr.
3	Number of floors considered	Stilt + 19 floors	Stilt + 19 floors
4	Safe load capacity (If it is bored cast in situ pile)		
	600mm	110 Tonnes	110 Tonnes
	750mm	160 Tonnes	160 Tonnes
	900mm	220 Tonnes	220 Tonnes
5	Safe uplift capacity		
	600mm	19 Tonnes	Recommendations & suggestions
	750mm	25 Tonnes	
	900mm	32 Tonnes	
6	Recommendations & conclusions	For Soil quality & usage, PCC , dewatering	

CHECKLIST FOR STRUCTURAL DRAWING

Project name:		**Date:**		
Block No:		**Revision No:**		
Sl.No.	**Points to be Checked**	**Yes**	**No**	**Remarks**
1	The Good for construction seal is available in all drawings.			
2	The consultant signature is available in all drawings.			
3	The drawing nos. sequence is noted.			
4	Compare the outer to outer and centre to centre measurements in all Architect & Structural drawings.			
5	Compare the Beam line with reference to wall and column position.			
6	The orientation of the column and projection in all floors are correct.			
7	Column projection do not come inside any room.			
8	Sunken portion matches structural drawing for toilet.			
9	All grids line covered all column in structural drawing.			
10	To ensure all dimensions given for all reinforcement in structural drawing.			
11	Check torsion Reinforcement details given for discontinuous slab.			
12	Check the dowels of duct, plinth beam & upper level plinth beam is marked correctly as per architect drawing.			
13	Check the intermediate measurement of column.			
14	Check the dowels rod for lintel & staircase beam mentioned correctly where ever required.			
15	Check the floor levels / with reference to GL / NGL.			
16	Check the Zone - 3 endorsement available or not.			
17	To check Neighbour building foundation detail.			
Checked By:		**Approved By:**		

PART - II

MATERIAL QUALITY

INDEX

1. CEMENT

a) TYPES :

IS 269: OPC 33 Grade

IS 8112: OPC 43 Grade

IS 12269: OPC 53 Grade

IS 1489 (Part -1): PPC (Fly ash based)

IS 12230: Sulphate Resisting Portland cement.

b) INSTRUCTIONS : -

1. Any of the above cement shall be used and the type selected shall be appropriate for the intended use.
2. The MR shall carry out the required tests in an approved testing laboratory.
3. Stacking shall be so arranged that bags from the oldest consignment in the stack can be conveniently removed first for use following the principle of First in First out (FIFO) basis.
4. For this proper label tag indicating date of supply shall be displayed over the stack of stored cement received in a consignment (week number).
5. Cement which has hardened, form lumps or deteriorated due to over stacking or long storage shall not be used in the works and shall be removed from the site immediately with intimation to Engineer.

c) MATERIAL QUALITY CHECKLIST:-

Physical check

- Brand
- Weight
- Bag damages if any
- Lumps if any
- Date of manufacturing

TESTING:-

FIELD TEST:-

a) Fineness

b) Setting time

LABORATORY TESTs:-

a) Fineness

b) Setting time.

c) Compressive strength

d) Chemical properties

TEST REPORT ON PHYSICAL PROPERTIES OF CEMENT

Source of sample :

Customer's reference :

Project :

Brand/Grade/Type : OPC - 53 Grade

Period of Test :

Technical Reference : IS : 4031 (Part 3 to 6) 1988 (Reaffirmed 2009)

IS : 4031 (Part 2) - 1999 (Reaffirmed 2008).

Sl.No.	Test Conducted	Results %	Requirements as per IS:12269-2013
1	CONSISTENCY		Not Specified
2	INITIAL SETTING TIME		Should not be less than 30 minutes.
3	FINAL SETTING TIME		Shall not be more than 600 minutes.
4	COMPRESSIVE STRENGTH a) 72±1h (average of three results) b)168±2h (average of three results) c) 672±4h (average of three results)		 Shall not be less than 27.0 Mpa Shall not be less than 37.0 Mpa Shall not be less than 53.0 Mpa
5	FINENESS (Drive sieve method)		Shall not be more than 10 mm
6	SOUNDNESS (by Le-Chatelier's method)		Shall not be more than 10 mm

TEST REPORT ON CHEMICAL PROPERTIES OF CEMENT

Source of sample :

Customer's reference :

Project :

Brand/Grade/Type : OPC 53 Grade

Period of Test :

Technical Reference : IS : 4032 - 1985 (Reaffirmed 2009) and Amended No.2 (March 2010)

Sl.No.	Test Conducted	Results %	Requirements as per IS:12269-2013
1	Total Loss on Ignition (% by mass)		Max. 4.0%
2	Insoluble Residue (% by mass)		Max. 4.0%
3	Ratio of % of Lime to % of Silica, Alumina and Iron Oxide, when calculated by the formula: $CaO - 0.7 (SO_3)$ / $2.8 \times S_iO_2 + 1.2 \times Al_2O_3 + 0.65 \times Fe2O_3$		Not greater than 1.02 And not less than 0.80
4	Ratio of % of Alumina to Iron Oxide		Min. 0.66
5	Total Sulphur content calculated as sulphuric anhydride (SO_3) (% by mass)		Max. 3.50%
6	Magnesium (MgO), (% by mass)		Max. 6.0%
7	Chloride Content (% by mass)		Total Chloride Content in cement shall not be more than 0.05 percent (for prestressed structure) and 0.10 percent for plain concrete

TEST RESULT OF CEMENT CUBES

PROJECT :

DATE:

DIMENSION OF SPECIMEN:

LOCATION:

COMPRESSIVE STRENGTH TEST ON CEMENT CUBE SPECIMENS CARRIED OUT AS PER THE GUIDE LINES OF IS:8112 AND IS 12269 AND RESULTS ARE TABULATED BELOW

S/N	DESCRIPTION	WEIGHT (KG)	GRADE OF CEMENT	DATE OF CASTING	DATE OF TESTING	AGE AT TEST (DAYS)	CROSS SECTIONAL AREA (Sq.mm)	MAXIMUM LOAD (KN)	COMPRESSIVE STRENGTH (N/mm^2)	REMARKS

Number of cubes tested: _____

CHECKED BY:

APPROVED BY:

2. FINE & COARSE AGGREGATE

a) TECHNICAL INSTRUCTIONS :-

1. All aggregates shall conform to IS:383. Coarse aggregates shall be approved crushed stone. Fine aggregates shall be river sand.
2. Coarse and fine aggregates shall be stored at site separately on clean and hard base or in separate compartments/hoppers.
3. Samples of aggregates to be used shall be submitted to the Engineer for approval before commencement of work.
4. Aggregates shall be used with prior approval of the Engineer. Over the entire period of construction all consignments of coarse and fine aggregates brought to the site conforms to the quality and grading as approved in the mix design by the Engineer before the commencement of work.
5. Sampling of coarse aggregates shall conform to IS:2430 and tests shall conform to IS:2386. The percentage to flaky and elongated pieces should not exceed 15% for coarse aggregate.

b. MATERIAL QUALITY CHECKS :

i) Silt Content

Every load of River sand should be tested for Silt content.

The silt content should not be more than 10% for fine aggregate as per IS 2386 - Part - 3

Type of sand	Fineness Modulus
Fine sand	2.2 – 2.6
Medium sand	2.6 – 2.9
Coarse sand	2.9 – 3.2

Sand having a fineness modulus more than 3.2 will be unsuitable for making satisfactory concrete. In such a case the sand will be rejected for concreting.

SILT CONTENT TEST

Source of sample :

Customer's reference :

Project :

Date of Test :

Technical Reference : IS 2386 (Part I to VIII) - 1963
(Reaffirmed - 2007)

Sl.NO.	DEPTH OF SAMPLE TAKEN IN (ml)	DEPTH OF WATER ADDED IN (ml)	READING TAKEN AFTER SETTLEMENT IN (ml) (D1)	DEPTH OF SILT DEPOSITED IN (ml)	(D2)% OF SILT CONTENT

Note : River sand with silt content should not be more than 10%.

Formula : % of silt content = D2 / D1 X 100 =

REMARKS :

ii) Sieve Analysis Report

Sieve analysis test should be done for every source.

SIEVE ANALYSIS FOR FINE AGGREGATES

Source of sample :

Customer's reference :

Project :

Date of Test :

Technical Reference : IS 383 - 1970 (Reaffirmed 2007)

TOTAL WEIGHT OF SAMPLE	SIZE OF SIEVE	WEIGHT RETAINED IN EACH SIEVE (gm)	% OF WEIGHT RETAINED	CUMULATIVE % OF WEIGHT RETAINED	% OF PASSING	SPECIFICATION AS PER IS:383-1970 (Reaffirmed 2007) (percentage passing)		
						ZONE I	ZONE II	ZONE III
	4.75 mm					90-100	90-100	90-100
	2.36 mm					60-95	75-100	85-100
	1.18 mm					30-70	55-90	75-100
	600 microns					15-34	35-59	60-79
	300 microns					005-20	008-30	012-40
	150 microns					0-10	0-10	0-10

Remarks:

Tested By: **Approved by:**

SIEVE ANALYSIS FOR COARSE AGGREGATES OF 20 mm

Source of sample :

Customer's reference :

Project :

Date of Test :

Technical Reference : IS 383 - 1970 (Reaffirmed 2007)

TOTAL WEIGHT OF SAMPLE	SIZE OF SIEVE	WEIGHT RETAINED IN EACH SIEVE (gm)	% OF WEIGHT RETAINED	CUMULATIVE % OF WEIGHT RETAINED	% OF PASSING	SPECIFICATION AS PER IS:383-1970 (Reaffirmed 2007) (percentage passing)	
						GRADED	SINGLE SIZE
	40.00 mm					100	90-100
	20.00 mm					95-100	75-100
	12.50 mm						55-90
	10.00 mm					25-55	35-59
	4.75 mm					0-10	008-30
	150 mm						0-10

Remarks:

Tested By: **Approved by:**

SIEVE ANALYSIS FOR COARSE AGGREGATES OF 12.5 mm

Source of sample :

Customer's reference :

Project :

Date of Test :

Technical Reference : IS 383 - 1970 (Reaffirmed 2007)

TOTAL WEIGHT OF SAMPLE	SIZE OF SIEVE	WEIGHT RETAINED IN EACH SIEVE (gm)	% OF WEIGHT RETAINED	CUMULATIVE % OF WEIGHT RETAINED	% OF PASSING	SPECIFICATION AS PER IS:383-1970 (Reaffirmed 2007) (percentage passing)	
						GRADED	SINGLE SIZE
	20.00 mm					100	100
	12.50 mm					90-100	85-100
	10.00 mm					40-85	0-45
	4.75 mm					0-10	0-10
	PAN						

Remarks:

Tested By: **Approved by:**

3. CONCRETE

a) TECHNICAL INSTRUCTIONS:-

1. One technical person will ensure the mix ratio at the time of mixing in plant.
2. The following points should be checked at the time of mixing
    - Grade of concrete
    - Minimum cement content.
    - Water cement ratio
    - Nominal maximum aggregate size
    - Volume / type of admixtures
    - Water quality - TDS level

      (Also take one sample of 5 ltrs and send it for testing to external agencies)
    - Slump level
3. Before pouring the following points should be checked
    - Delivery Challan
    - Batch report with the technical person approval & signature
    - Also verify the grade of concrete, minimum cement content
    - slump value
    - Temperature
    - Truck starting & delivery time from mixing plant
    - Truck number as per the communication from plant

b) MATERIAL QUALITY CHECK:-

i) Compressive Strength

ii) Slump Cone Test

COMPRESSIVE STRENGTH REPORT – CONCRETE CUBE

Source of sample :

No. Of Cubes Tested :

Customer's reference :

Project :

Location :

Grade of concrete :

Dimension of Specimen :

Cross Sectional Area :

Technical Reference : IS : 516 - 1959 (Reaffirmed 2008)

Sl. No.	Location of Concrete Pour	Grade of Concrete	Slump Value (mm)	No. of Cubes Casted	Identification Nos.	Date of Casting	Date of Testing	Age at Test (Days)	Weight(Kg)	Load (KN)	Contact Area (mm2)	Compressive Strength (N / mm2)	Average(N /mm2)	As per IS (N /mm2)	Tested By	Remarks

Remarks:

Tested By: **Approved by:**

As per IS 456 : 2000

GRADE	DAY'S	COMPRESSIVE STRENGTH
M10	28 Day's	10N/mm^2
M20	28 Day's	20N/mm^2
M25	28 Day's	25N/mm^2

APPROXIMATE MATERIAL CONSUMPTION

Sl.No.	Description of Items	Ratio	Grade	Per M3	Cement (Bags)	Sand (Cft)	30 mm (cft)	20mm (Cft)	12mm (Cft)	Water (Lit)	Bricks (Nos)
1	PCC	1:04:08		M3	3.24	0.458	0.917	0	0		
2	PCC	1:05:10		M3	2.59	0.458	0.917	0	0		
3	RCC		M20	M3	6.48	0.458	0	0.413	0.275		
4	RCC		M25	M3	6.8	0.24	0	0.481	0		
5	Brick work	1:04		100 Sq.ft.	2	10	0	0	0	0	473
6	Brick work	1:05		M3	0.7	0.125	0	0	0	0	473

4. STEEL

a) TYPE:

CTD | TMT

b) GRADE : (IS 1786 : 2008)

Fe 415 | Fe 500 | Fe 500D

c) STANDARDS :

IS1786:2008 High strength deformed steel bars and wires for concrete reinforcement.

All reinforcements shall be free from oil, paint, loose rust, mill scale, mud or other matter likely to weaken or destroy their bond with the concrete.

Reinforcement bars received at site shall be stored on hard concrete platform and clear of the ground with the use of timber sleeper, concrete sleeper or any other means.

Reinforcement material shall be kept covered by tarpaulins or plastic to avoid excessive corrosion and other contamination.

It is advised to follow storage methods as described in IS 4082: 1996

BINDING WIRE : - (MS & GI Wire)

MS Binding wire shall be used - 16/18 Gauge.

d) MATERIAL QUALITY CHECKS: -

AT THE TIME MATERIAL RECEIVING:-

Brand

Grade

Tag & Lot number

ISI mark

Dia of the bar

Length

TESTING:-

FIELD TEST

i) Weight per mtr

ii) Bend & Rebend

iii) Rust

LABORATORY TEST

i) Mechanical Properties

ii) Chemical properties

PHYSICAL TEST REPORT ON REINFORCED STEEL

Source of sample :

Customer's Reference :

Project :

Brand/Grade :

Samples tested :

Date of test :

Technical Reference : IS: 1786-2008

Requirement as per IS: 1786-2008

GRADE	0.2% Proof Stress (N/mm^2) (min.)	UTS (N/mm^2) (min.)	Elongation (%)(min.)
Fe-415	415	485 or 10% more than Actual proof Stress whichever is higher	14.5
Fe-500	500	545 or 8% more than Actual proof Stress whichever is higher	12
Fe-500D	500	565 or 10% more than Actual proof Stress whichever is higher	16

Dia of bar	Cross sectional area	Mass / meter
8	50.3	0.395
10	78.6	0.617
12	113.1	0.888
16	201.2	1.58
20	314.3	2.47
25	419.1	3.85
32	804.6	6.31

Tolerance of the diameter

Upto 10mm dia ±7%

Over 10mm upto and including 16mm ±5%

Over 16mm ±3%

CHEMICAL TEST REPORT ON REINFORCED STEEL

Source of sample :

Customer's Reference :

Project :

Brand/Grade :

Samples tested :

Date of test :

Technical Reference : IS: 1786-2008

Sl.No.	Nominal Dia (mm)	Grade	Carbon (%)	Sulphur (%)	Phosphorus (%)	Sulphur + Phosphorus
1		Fe415	0.30	0.060	0.060	0.110
2		Fe500	0.30	0.055	0.055	0.105
3		Fe500D	0.25	0.040	0.040	0.075

PERMISSIBLE VARIATION LIMITS FOR CHEMICAL PROPERTIES

Constituent	Variation Maximum limit (percentage)
Carbon	0.02
Sulphur	0.005
Phosphorus	0.005
Sulphur & Phosphorus	0.010

5. WATER

a) STANDARD:-

IS 456 – 2000(RA: 2005): For construction purpose

IS 10500 – 1992 (RA: 1993): For drinking purpose

b) DESCRIPTION:-

Water shall be clean and reasonably free from injurious amounts of oils, acids, alkalis, salts, sugar, organic material or other substances that may be deleterious to concrete or steel.

c) WATER QUALITY CHECK:-

TESTING:-

i) FIELD TEST

- Visual inspection for clean
- Colour
- Taste
- Smell
- TDS

ii) LABORATORY TEST

- Test for construction/drinking purpose
- Chemical properties

WATER - TEST REPORT FOR CONSTRUCTION					
Sample Ref No :			Report No :		
Issued To:			Report Date		
Sample Description: Sample Drawn By/ Date: Customer's Reference: Sample Mark: Site:			Received on Commenced on Completed on		
Sl. No	PARAMETERS	RESULTS	As Per IS : 456-2000 (Reaffirmed 2005)		PROTOCOL: APHA 22nd Edition 2012
			Minimum	Maximum	
1	Organic Solids (mg/l)		-	200	IS : 3025 (P-18) 1984
2	Inorganic Solids (mg/l)		-	3000	IS : 3025 (P-18) 1984
3	Sulphate as So_3 (mg/l)		-	400	4500 SO_4E
4	Chloride as Cl (mg/l)		-	RCC 500 mg/l Plain 2000 mg/l	4500 Cl^-B
5	Total Suspended Solids (mg/l)		-	2000	IS : 3025 P-17:1984 R.2006
6	pH value @ 25˚C		6.0	-	IS : 3025 (P-11) 1983
NEUTRALIZATION					
7	To neutralize 100ml of water using Phenolphthalein indicator (ml) with 0.02N NaoH		-	5.0 ml	IS : 3025 (P-22) 1986
8	To neutralize 100 ml of water using Mixed Indicator (ml) with 0.02N H_2SO_4		-	25.0 ml	IS : 3025 (P-23) 2000

WATER TEST REPORT FOR DRINKING				
Sample Ref No :			Report No :	
Issued To:			Report Date	
Sample Description: Sample Drawn By/ Date: Customer's Reference: Sample Mark: Site:			Received on Commenced on Completed on	
Sl. No	PARAMETERS	RESULTS	Permissible limit as per IS 10500 : 2012 in the absence of alternate source	PROTOCOL:
MICROBIOLOGICAL EXAMINATION				
1	Total Coliforms (MPN /100 ml)		Absent	IS : 1622-1981R.2009
2	E.coli (MPN / 100 ml)		Absent	IS : 1622-1981R.2009
PHYSICAL PROPERTIES				
1	Appearance: When analyzed After filteration		- -	-
2	pH value @ 25ºC		6.5-8.5	4500 H^+ B
3	Color (Hazen Unit		15	2120 B
4	Odour		Agreeable	IS 3025 P.5 1983 R.2006
5	Turbidity (NTU)		5	2130 B
6	Electrical conductivity @ 25ºC (micramho/cm)		-	2510 B

Sl. No	PARAMETERS	RESULTS	Permissible limit as per IS 10500 : 2012 in the absence of alternate source	PROTOCOL:
CHEMICAL PROPERTIES (in mg / l)				
7	Total Suspended Solids		-	IS3025:P.17:1984:R.2006
8	Total dissolved solids		2000	IS3025:P.16:1984:R.2009
9	Total Hardness as $CaCO_3$		600	2340 C
10	Calcium Hardness as $CaCO_3$		-	3500 – Ca B
11	Magnesium Hardness as $CaCO_3$		-	3500 – Mg B
12	Calcium as Ca		200	3500 – Ca B
13	Magnesium as Mg		100	2340 C
14	Phenolphthalein Alkalinity as $CaCO_3$		-	2320 B
15	Total Alkalinity as $CaCO_3$		600	2320 B
16	Chlorides as Cl		1000	4500 Cl^- B
17	Sulphates as SO_4		400	4500 SO_4 E
18	Total Iron as Fe		0.3	3500 Fe B
19	Silica (Reactive) as SiO_2		-	4500 SiO_2 C
20	Carbonate Hardness as $CaCO_3$		-	2340 A
21	Non Carbonate Hardness as $CaCO_3$		-	2340 A
22	Free Residual Chlorine		-	4500 Cl B

6. BRICKS / BLOCKS

TYPE:-

- Chamber burnt bricks
- Fly ash bricks
- Solid/Hollow Blocks
- Porotherm bricks
- Aerocon blocks

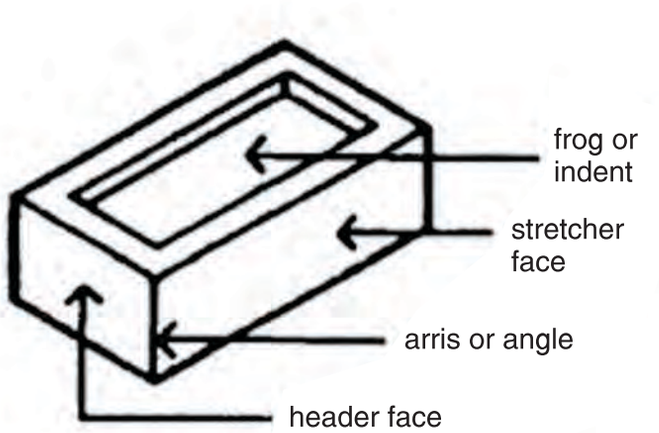
Bricks

STANDARDS:-

IS 2185 :2005

DESCRIPTION:-

1. Brick shall be locally available, fairly uniform in size, with plane rectangular faces, shape and colour.
2. Brick shall be uniformly well burnt so as to give clear ringing sound when struck and shall be free from cracks or other flaws which impair their strength.
3. They shall show a fine grained, uniform, homogeneous and dense texture on fracture and shall be free from lumps of lime, laminations, cracks, air holes, soluble salts causing efflorescence or other defects which may impair their strength, durability, appearance or usefulness for the purpose intended.
4. They shall have frog of 10 to 20 mm depth.



MATERIAL QUALITY CHECKS:

TESTING:-

i) Compressive Strength.

ii) Water Absorption

Hollow Block

A block having one or more large holes, and having the solid material between 50 and 75 percent of the total volume of the block calculated from the overall dimensions.

Quality Specifications:

Solid block size

400mm x 200mm x 200mm,

450mm x 150mm x 200mm

400mm x 100mm x 200mm

The variation in the length of the units shall not be more than ±5 mm and variation in height and width of units, not more than ± 3 mm.

All units shall be sound and free of cracks or other defects which interfere with the proper placing of the unit or impair the strength or performance of the construction. Minor chipping resulting from the customary methods of handling during delivery, shall not be deemed grounds for rejection.

Hollow Block density & Compressive strength:

Hollow Block shall have a minimum block density of 1500 kg/m3. The minimum average compressive strengths 3.5, 4.5, 5.5, 7.0 N/mm^2 respectively at 28 days

Solid Block Density and Compressive strength

The solid concrete block or use as load bearing units and shall have a block density not less then 1800 kg / m3.

The minimum compressive strength 4.0 N/mm^2

Water Absorption:

The water absorption, being the average of three units, when determined in the manner prescribed in Annexure (IS 2185 Part - 2) shall not be more than 10 percent by mass.

COMPRESSIVE STRENGTH REPORT – SOLID BLOCK

PROJECT NAME: **DATE:**

MATERIAL NAME: **SUPPLIER:**

SIZE:

Sl.No.	No. of Solid Block	Identification Nos.	Date of Casting	Date of Testing	Age at Test	Weight (Kg)	Density Min. 1800 kg/m^3	Load (KN)	Contact Area mm^2	Compressive Strength (N / mm^2)	Average (N /mm^2)	As per IS 2185 (P-1 RA 2005 by 28 days	Tested By	Remarks

TESTED BY: **CHECKED BY:** **APPROVED BY:**

POROTHERM BLOCKS

Description:

POROTHERM THERMO BRICK has been packed with special insulating material to achieve lowest 'U' value of 0.6 W/m^{2}K thus reducing transfer of heat from external environment to the interior of the building. Unlike walls built with traditional bricks, use of POROTHERM THERMO BRICK results in interiors being cool in summer and warm in winter, when compared to the external temperatures. Consequently this results in savings in energy costs, by reducing artificial cooling and heating.

Thermal Insulation:

Clay brick is traditionally the best building material and POROTHERM THERMO BRICK is a highly improved version of clay bricks. Specially formulated insulating material gives POROTHERM THERMO BRICK a 'U' Value of 0.6 W/m^{2}K compared to 1.8 W/m^{2}K for a solid clay brick and 2.0 W/m^{2}K for a solid concrete block. Which means superior thermal insulation that greatly improves the efficiency of buildings with regards to the use of energy, thereby contributing to the indoor comfort of the building.

Energy Saving:

POROTHERM THERMO BRICK offers advantages far superior compared to a solid brick wall, while eliminating the cost for installing external insulation, maintenance and loss of space due to increased thickness of wall. The insulating property of the product reduces use of cooling devices such as air conditioners in hot climate and heaters during the cold climate. There is no need for cavity walls with external insulating membranes. All this translates to increased energy saving.

Heat Living:

POROTHERM THERMO BRICK is a natural product made out of clay, sourced from de-silting of dead water tanks and only natural additives like coal ash, rice husk and granite slurry are added. No toxic or any chemical additives are used in the manufacturing process, it is 100% natural. Hence POROTHERM THERMO BRICK is environment friendly and free from toxic gases and fumes that can cause allergies and other health problems.

POROTHERM THERMO Brick Parameter

NAME	Length (mm)	Width (mm)	Height (mm)	Weight (Kg)	Density (Kg/m³)	Compressive strength (N/mm²)	Water absorption (%)	Efflorescence	"U" ValueW/m²k	Sound Insulation Rw (db)	Fire resistence (min)
Porotherm THERMO BRICK 200	200	200	200	11.7	731	⩾3.5	⩽20	slight	0.6	46	240

POROTHERM THERMO BRICK - Tolerance		
Dimensions (mm)	400	200
Tolerance (mm)	±8	±4

AUTOCLAVED AERATED CONCRETE (AAC) BLOCK

Description:-

1. AAC Block is light grey in color; it contains many micro cells due to aeration, which can be clearly seen when looked at closely. These cells contribute to the material's insulating properties.
2. AAC block is inorganic, incombustible and has about 1/4th the density of normal concrete blocks and 1/3rd the density of conventional clay bricks.
3. This has significant environmental advantages, addressing longevity, insulation and structural demands. These AAC Blocks are the right investment, justified for buildings intended to have a lifelong saving.
4. AAC can produce big savings in heating and cooling costs throughout the life of a building and national savings on electricity due to its thermal mass performance and insulating properties.
5. AAC block is an energy efficient product, eliminating emissions totally with the norms of Clean Development Mechanism (CDM), contributing towards the welfare of our planet by stabilizing green house gas concentrations in the atmosphere.
6. AAC blocks can be used for high rise buildings, small residential buildings, and commercial buildings.
7. AAC blocks can be cut using saws and angular cutting machine.
8. AAC blocks shall be stored in layer one over the other in criss-cross manner up -to a height of not more than 1.60 meters.
9. AAC Blocks shall be stored on a levelled ground.
10. The blocks shall be protected against rain fall and kept away from the wet area to avoid moisture absorption.
11. Savings in Cement and Steel
12. Dimensionally Stable

    Perfect Finish | Perfectly Aligned Smooth walls | Savings in cement Plaster

    Sound and Thermal Insulating | Fire Resistant.
13. Available Sizes:

    600mm x 200 mm x 200mm | 600 mm x 200 mm x 150 mm

    600 mm x 200mm x 100 mm

TEST REPORT ON AUTOCLAVED CELLULAR (AERATED) CONCRETE BLOCKS

Source of sample :

No. Of Samples tested :

Customer's reference :

Company Name :

Specimen Name :

Period of test :

Sl.No.	Size of test specimen	Compressive Strength (N/mm^2)	Average (N/mm^2)

Minimum Compressive strength as per IS:2185 (Part – III) – 1984 (Reaffirmed 2010)

Density In oven Dry Condition (Kg/m^3)	Compressive Strength (N/mm^2)	
	Grade I	Grade II
451 to 550	2-0	1-5
551 to 650	4-0	3-0
651 to 750	5-0	4-0
751 to 850	6-0	5-0
851 to 1000	7-0	6-0

II. BLOCK DENSITY

Sl.No	Size of test Specimen (mm)	Block Density (Kg/cu.m)	Average (Kg/cu.m)
1	150 x 150 x 150		
2	150 x 150 x 150		
3	150 x 150 x 150		

III. WATER ABSORPTION

Sl.No	Nominal Dimension (mm	Water Absorption (% by weight)	Average (% by wt.)
1	150 x 150 x 150		
2	150 x 150 x 150		
3	150 x 150 x 150		

7. ELECTRICAL (WIRES)

2.5 SQ.MM PVC FLEXIBLE CABLE TEST REPORT AS PER IS 694:2010

Sl.No.	Description of Test	IS requirement	Result
a)	Annealing test for copper, As per IS 8130-1984 cl.6.1.2.1 Elongation shall be not less than appropriate value given in spec.	For OD from 0.21mm to 0.41mm 13.5 (min)	
b)	Tensile test (for Aluminum)	NA	
c)	Wrapping test (for Aluminum)	NA	
d)	Conductor resistance at 20 degree C. As per IS 8130-1984 cl.6.3 The dc resistance of the conductor shall be measured at room temp and corrected to 0 degree C shall not be more than value specified in table no 3 (class 5)	For plain copper wires of 2.5 sq.mm 7.98 ohms/km (max)	
e)	Test for thickness of insulation As per IS 694:2010 relevant tables 4 i) Average thickness of insulation in mm ii) overall diameter in mm	0.8 (Nominal) 4.1(Max)	
f)	Tensile strength and elongation at break of insulation: a)Tensile strength of PVC insulation Elongation at break in %	12.5 N/mm2 (Min) 150% (Min)	
g)	Insulation Resistance Test a) Volume resistivity at room temp. b) Insulation resistance at room temp.	1X10 13 ohm cm 36.7 M ohm Km (Minimum)	

2.5 SQ.MM PVC FLEXIBLE CABLE TEST REPORT AS PER IS 694:2010

Sl.No	Description of Test	IS requirement	Result
h)	High voltage test: A cable test Sample of 3mm is immersed in water bath at ambient temp. 1 hour before testing. Then an ac voltage of 3KV (rms) at 50 HZ applied between conductor and earthed water bath and held constant at this value for 5 minutes.	should withstand the test for 5 minutes	
I)	Flammability Test: a) period of burning after removal of flame b)Length of unaffected portion of cable from the lower edge of the top clamp	60 sec.Maximum 50mm Minimum	

PART - III

SAFETY QUALITY

PART - III

1. CERTIFICATE FROM PM/PE

I hereby certify that I have executed the Work as per the safety norms.
The proof details are enclosed along with the report.

Enclosures:

1. Photograph
2. Checklist

Checklist for Design, Construction and Operation Stages

SL.NO	ASPECT	YES	NO	NA	REMARKS
1	Have the relevant construction code/ applicable for earthquake, cyclone, flood and landslides, been adopted During building/block design?				
2	Have adequate fire safety measures been put in place?				
3	Has the water supply arrangement been made as per norms?				
4	Is the provision of potable water arrangement sufficient?				
5	Has the sanitation arrangement been made as per norms?				
6	Is there any unhygienic area within the campus? Like open clogged drains carrying waste water				
7	Is there any water logging in the campus?				
8	Have adequate number of dust bins/garbage collection facilities been provided?				
9	Were any trees cut for the construction?				

10	Have sufficient number of display/notice boards been provided?				
11	Is there a proper and sufficient provision for parking?				
12	Are the required number of first-aid boxes available?				
13	Is the provision in the first aid boxes as per the norms?				
14	Are the following utilities / services/ facilities functioning properly and are these being maintained properly				
15	Water Supply Arrangement				
16	Potable Water Arrangement				
17	Sanitation Arrangement				
18	Solid Waste Collection and Disposal Arrangement				
19	Waste water collection and disposal system				
20	Storm water collection and disposal system				
21	Is there a clear demarcation of escape routes and assembly points for emergency situations?				
22	Are the fire safety arrangements being checked regularly?				
23	Is the follow-up action (such as refilling of fire extinguishers) action on fire safety issues being taken in time?				
24	Are the hooters/alarms in working condition?				
25	Does the institute conduct /arrange safety drills from time to time?				

Signature of PM / PE

CHECKLIST FOR SAFETY MEASURES FOR EXCAVATION

PROJECT : **DATE :**

LOCATION :

Sl.No	ASPECT	YES	NO	NA	REMARKS
1	Are there any underground utilities like sewers, water pipe lines, electrical cables etc. If yes, then bring to notice of site in-charge and take adequate precautions while excavating the pipe trench				
2	Check whether the trenches/pits are adequately shored / timbered if necessary.				
3	Are the excavated areas provided with fences/barricades?				
4	Is the excavated area provided with lighting arrangements during night time?				
5	Keep the excavated material from the edge of pit/trench by at least 1.0 Mtr.				
6	If the pit/trench is water logged, remove water gradually				
7	Keep heavy equipments such as cranes, shovels, and back hoe truck/dumpers at least 6 Mtrs. away from the edge of excavated area.				
8	Are danger signs provided near excavated areas?				
9	Provide means of access and egress.				

Signature of Safety Personnel

2. Insurance

What is insurance? Why we should buy?

An agreement by which an insurance company undertakes to provide a guarantee of compensation for specified loss, damage, illness, or death in return for specific premium payment.

“Builders buy insurance against unforeseen events such as Building collapse, workers falling from heights, electrical/ fire accidents, etc..

Contractor’s All Risk Policy (CAR)

This policy is specially designed to give financial protection to the Civil Engineering Contractors in the event of an accident to the civil engineering works under construction.

Workmen Compensation policy

The workmen’s compensation insurance policy provides for legal liability coverage for compensation to employees for bodily injury and death caused due to accidents / occupational diseases arising out of and in course of employment.

3. Material Storage.

Scope

Based on the following criteria, locate the material storage place

- Pre planning of location
- Theft
- Safety of workers
- Material wastage

Everyone including contractors, suppliers and the construction material traders should co-operate to ensure efficient material storage.

On all projects the arrangements for materials storage should be discussed and agreed between contractors and the Project Manager.

Guidelines for materials storage:

- ***Storage areas*** - Designate storage areas for plant, materials, waste, inflammable substances, Example.. Foam plastics, flammable liquids and gases such as propane and hazardous substances, Example.. pesticides and timber treatment chemicals;
- **Pedestrian routes** – Do not allow storage to 'spread' in an uncontrolled manner on footpaths and other walkways. Do not store materials where they obstruct access routes or where they could interfere with emergency escape;
- **Flammable materials** - Will usually need to be stored away from other materials and protected from accidental ignition;
- **Storage at height** - If materials are stored at height. Example.. on top of a container, make sure necessary guard rails are in place or else people could fall when stacking or collecting materials or equipment.

Cement

Cement shall be stored at the worksite in a building or a shed which is dry. The shed should be Leak proof and moisture proof.

The building or shed shall have minimum number of windows and doors which shall be kept closed at all times except during loading and unloading.

Maximum height of the stack shall be 12 bags and the width not more than 4 bags or 2 meters.

A minimum clear space of 450mm shall be provided between the stacks.

Steel

Steel reinforcement bars and structural steel shall be stored in a way to prevent distortion, corrosion, scaling and rusting.

Reinforcement bars and steel sections shall be stacked at least 200 mm above ground level.

Steel sections shall be stacked upon platforms, skids or any other suitable supports. Bars of different types, sizes and lengths and structural steel sections shall be stored separately to facilitate issues in required sizes and lengths without cutting from standard lengths.

Water

- Water to be used in construction shall be stored in tanks, bottom and the sides of which shall be constructed with brick or concrete. Contact with any organic impurities shall be prevented.
- If the length of water storage is more than 1mtr in site that area should be protected.
- The tank shall be located so as to facilitate easy storage and filling. The supply for construction work and for firefighting, from the water tank shall not be blocked at any time.

Aggregates

Aggregates shall be stored at site on a hard, dry and level ground. If such a surface is not available, a platform of planks or old corrugated iron sheets, or a floor of bricks, or a thin layer of lean concrete shall be used.

Contact With clay, dust, vegetable and other foreign matters shall be avoided.

Fine and coarse aggregates shall be stored separated by dividing walls.

At the time of unloading the aggregates care should be taken at rear side of the vehicle.

to avoid any accident or hit.

Bricks

Bricks shall be stacked on dry firm ground in regular tiers. For proper inspection of quality and ease in counting, the stacks shall be 50 bricks long and 10 bricks high and not more than 4 bricks in width, being placed on edge, two at a time along the width of the stack. Clear distance between adjacent stacks shall be not less than 800mm.

Blocks

Blocks shall be stacked on dry firm ground in regular tiers. For proper inspection of quality and easy in counting. Stacking of blocks to be segregated size wise.

The height of the stack shall not be more than 1.2 mtrs, the length of the stack shall not be more than 3 mtrs, the width shall be of two or three blocks.

Scaffolding Pipes

Scaffolding pipes should be stacked at 200 mm minimum height to avoid the water. It should be stacked to maximum 5'0" height, with vertical support to avoid sliding.

Storage area should be barricaded to avoid any accident.

Shuttering Materials

Timber shall be stored in stacks on well treated and even surfaced beams, sleepers or brick pillars so as to be at least 200 mm above the ground level. Contact with water shall be avoided under all circumstances.

Care must be taken that while handling workmen are not injured by rails, straps, etc.

Timber stock yard near Electrical provisions should be properly covered.

CHECKLIST - SAFETY MEASURES FOR STORAGE

PROJECT :

SITE : **LOCATION :** **DATE :**

Sl.No.	DESCRIPTION	YES	NO
1.	To avoid fire hazards, smoking and open fires strictly prohibited near timber yard.	☐	☐
2.	To stack separately	☐	☐
	▪ Wooden sleepers	☐	☐
	▪ Runners	☐	☐
	▪ Plywood	☐	☐
	▪ Bamboos	☐	☐
3.	To check whether stacking of following items of different sizes are stacked separately in steel yard with enough space all around.		
	▪ Steel reinforcement	☐	☐
	▪ MS Joists	☐	☐
	▪ Angles	☐	☐
	▪ Channels	☐	☐
	▪ Flats	☐	☐
	▪ MS Pipes	☐	☐
4.	The steel items to be stacked over wooden sleepers or raised platform – but not on ground.	☐	☐
	Adequate firefighting arrangement provided at each storage place.	☐	☐

_____

[Signature of Safety Personnel]

Name: _____

4. MACHINERY/ EQUIPMENT

CHECKLIST - SAFETY MEASURES FOR OPERATION OF EQUIPMENT

PROJECT : **DATE :**

LOCATION :

Sl.No.	DESCRIPTION	YES	NO	NA	REMARKS
1	Check whether operators, supervisors of the machines/equipment are thoroughly trained.				
2	No un-authorized persons are allowed to handle or operate any equipment.				
3	Safe guard moving parts of moving machinery by guards or made safe by positioning.				
4	Stop the machine first before carrying out cleaning, lubricating and maintenance of machines.				
5	Check the vehicle for the operation of alarm signal during the reverse moving.				
6	Check and inspect maintenance of all machinery at periodical intervals.				

Approved By _____

Signature of Safety Personnel

CHECKLIST - SAFETY MEASURES FOR HOIST

Sl.No.	DESCRIPTION	YES	NO	NA	REMARKS
1	Before use, all lifting equipment should be load tested by competent engineer.				
2	Provide safety devices for hoists, lifts, crane etc., to prevent overloading.				
3	Schedule for regular inspection and maintenance for all equipments.				
4	Implement standard signals for proper communication.				
5	No worker should be allowed to work under suspended loads and operators should avoid swinging loads over the workers head .				
6	Check the wire ropes				
7	Check for safe working load for each equipment.				
8	Check whether uninsulated electric wires near working platform, gangway etc., on scaffolding materials.				

Approved By _____

Signature of Safety Personnel

CHECKLIST - SAFETY MEASURES FOR USE OF CRANES

PROJECT : **DATE :**

LOCATION :

Sl.No.	DESCRIPTION	YES	NO	NA	REMARKS
	Check & inspect:				
1	Over hoist limit				
2	Limits for trolley				
3	Overload warning and cut off				
4	Automatic safe load indicator				
5	Angle radius indicator				
6	Load charts				
7	Check and test after major repairs				
8	Brace adequately tall tower crane				
9	Maintain adequate supports before lifting				
10	Check for any overhead electric cables.				

Approved By _____

Signature of Safety Personnel

CHECKLIST - SAFETY MEASURES FOR SCAFFOLDING, LADDERS

PROJECT : **DATE :**

LOCATION :

Sl.No.	DESCRIPTION	YES	NO	NA	REMARKS
1	Provide good quality of scaffolding materials.				
2	If timber is used, the diameter of scaffold should not be less than 50mm.				
3	For tubular scaffold diameter should not be less than 48 mm and thickness not less than 2.3mm.				
4	Check whether every scaffold is securely supported or suspended and properly strutted or braced.				
5	Check whether all scaffolds & working platforms are securely fastened to the building or structure and braced properly.				
6	Provide a regular plank stairway wide enough for two people to pass and to provide handrails on both sides.				
7	The length of the ladders should not be more than 4 Mtrs.				
8	Check for fall of loose material, bracings and other parts of scaffold.				
9	Check whether un-insulated electric wires exist near working platform, gangway etc., on scaffold materials.				

Approved By _____

Signature of Safety Personnel

5. Personnel

- At the time of entering the site all the laboures, employees, contractors, client should wear Helmet. The helmet should be kept near Security gate.
- Work involving men at more than 2 meters height, should wear the safety belt and helmet.
- Once in two weeks Safety person should conduct the safety awareness training for labours.
- Knowledge about what to do during emergency.

PPEs (Personnel Protective Equipments)

The following PPEs must be made readily available at site before start of the work based on the labour strength.

a) Helmet

b) Safety belt

c) Safety shoe

d) Reflective Jacket

e) Goggles

f) Ear plug

g) Nose mask

h) Hand gloves, etc.,

I) Barricading cone / Tape

Safety helmet Colour code:

a) Engineer – White

b) Client – Blue

c) Electrical – Red

d) Safety in charge – Green

e) Contractor / Trainer / Foremen - Orange

f) Labour – Yellow

g) Load bearing helmet - ladies - Yellow

For each project one safety engineer should be appointed to ensure the labour and employee safety.

CHECKLIST - SAFETY MEASURES FOR PERSONNEL WORKING AT SITE

PROJECT : **DATE :**

LOCATION :

Sl.No.	DESCRIPTION	YES	NO	NA	REMARKS
1	Check for helmet				
2	Check for safety shoes				
3	Check for protective goggles				
4	Check for welder's protective eye-shields				
5	Check for safety belts while working at height				
6	Check whether first aid box available at site				
7	Check for telephone numbers, addresses for ambulance, nearest dispensary, hospital, Police station				
8	Knowledge about the Location of assembles point.				
9	Knowledge about what to do during emergency.				

Approved By _____

Signature of Safety Personnel

6. Safety Measures for Demolition

Precautions during demolition shall be as follows:

- The demolition shall not commence until precautionary measures have been inspected and approved. It is advisable to inform adjoining neighbours prior to the demolition so that they may close windows or take other measures.
- Before commencing demolition and also during the progress of such work, all electric cables or apparatus which are liable to be a source of danger, other than a cable or apparatus used for the demolition works shall be disconnected.
- During the progress of demolition, the work shall be under the continuous supervision of the demolisher or of an experienced engineer.
- Unless otherwise expressly approved, demolition shall be executed floor by floor commencing at the roof and working downward.
- All practicable precautions shall be taken to avoid danger from collapse of a building when any part of a framed or partly framed building is removed.
- When the demolition site adjoins a street or public walkway, a 2.4 meter high solid hoarding shall be erected on the street boundary unless the building is setback at least twice its height from the street boundary, in which case a security fence having a minimum height of 1.5 meters may be utilized.
- Display of **"WARNING DEMOLITION IN PROGRESS"** Boards to be fixed to the hoarding or security fence.

Precautions during Removal shall be as follows:

- Demolished material shall not be allowed to remain on any floor or structure.
- If the weight of the material exceeds the safe carrying capacity of the floor or structure and such material shall be so stacked that it will not endanger workmen or other persons. It shall be removed as soon as possible from the site unless otherwise authorized by the engineer.
- Dust creating material, unless thoroughly dampened shall not be thrown or dropped from the building but shall be lowered by hoisting apparatus or removed by material chutes.

- Chutes shall be completely enclosed and a danger sign shall be placed at the discharge end of every chute.
- No wall, or other structures or part of a structure shall be left unattended or unsupported in such a condition, that it may collapse due to wind or vibration or otherwise becomes dangerous.
- Protective frame works shall be installed where ever necessary to guard against danger to life or property or when required by the Engineer.
- Upon completion of the work, notification shall be given to the Engineer that the work has been completed satisfactorily.
- No bulk excavation or levelling of the site forms part of this demolition permit.

CHECKLIST - SAFETY MEASURES FOR DEMOLITION OF STRUCTURES

PROJECT : **DATE :**

LOCATION :

Sl.No.	DESCRIPTION	YES	NO	NA	REMARKS
1	Are danger signs displayed all around the structure?				
2	Are barricades provided around the structure?				
3	Two exits to be provided for escape of workmen.				
4	Check whether red lights are provided around the barricades.				
5	Make sure that there is no entry for trespassers.				
6	Switch off the electric power and disconnect lines.				
7	Prevent uncontrolled collapse of structure				
8	No demolition work after sunset.				
9	Is sufficient place available for the worker for carrying out demolishing job?				
10	Are sufficient personal protective equipment used by the worker eg. safety belt etc.				
11	Are sufficient firefighting equipment available at the site during gas cutting operations				

Approved By _____

Signature of Safety Personnel

7. General Safety Measures

- **Labour contract agreement OR Work order Conditions:** Contractors and workers should be allowed to work only as per the safety conditions mentioned in the contract. copy of the contract is as below.

பணி ஒப்பந்தம்

இந்த பணி ஒப்பந்தமானது சென்னையில் ..... அன்று கம்பெனிகள் சட்டம் 1956ன் கீழ் நிறுவப்பட்ட ..... என்ற முகவரியில் உள்ள நிறுவனமான ..... அதன் இயக்குநர் திரு .... இவர் இது முதல் "கட்டுமானக் கலைஞர்" எனவும், இந்த சொல் எங்கெல்லாம் குறிப்பிடுகிறதோ அங்கெல்லாம் நிறுவனத்தின் வழிதோன்றல்கள் மற்றும் நியமனதாரர்களைக் குறிக்கும், என்பவராலும்

மற்றும்

.....

.....என்ற முகவரியில் அலுவலகம்/பணியகத்தை உடைய .....

..... என்பவரின்

மகனுமான/மனைவியுமான/மகளுமான.....

என்பவருக்கிடையிலும் [இது முதல் இவர் எல்லா சம்பந்தப்பட்ட விஷயங்களிலும் ஒப்பந்தக்காரர் என அழைக்கப்படுவதோடு அன்றி, இவரது வாரிசுகள், சட்டபூர்வமான பிரதிநிதிகள், நிர்வாகிகள், செயல் அலுவலர் மற்றும் நியமனதாரர்கள் ஆகியவர்களைக் குறிக்கும்].

அல்லது

.....என்ற முகவரியில் அலுவலகம்/பணியகத்தைக் கொண்ட ஒரு தனி உரிமை நிறுவனம்/கூட்டாண்மை நிறுவனத்தை உடைய ..... என்ற உரிமையாளர்/கூட்டாண்மையாளர் என்பவருக்கும் கையெழுத்தான இந்த ஒப்பந்தமானது கீழ் கண்ட அம்சங்களை கொண்டுள்ளது [இது முதல் இவர் எல்லா சம்பந்தப்பட்ட விஷயங்களிலும் "ஒப்பந்தக்காரர்" என அழைக்கப்படுவதோடு அன்றி, இவரது வாரிசுகள் சட்டபூர்வமான பிரதிநிதிகள், நிர்வாகிகள், செயல் அலுவலர் மற்றும் நியமனதாரர்கள் ஆகியவர்களைக் குறிக்கும்]

சொத்து விரிவாக்கம் மற்றும் கட்டுமானம் ஆகிய வர்த்தகத்தை செய்யும் நிறுவனமான "கட்டுமானக் கலைஞர்" பிற்சேர்க்கையில் கொடுக்கப்பட்டுள்ள பணிகளை அதில் வழங்கப்பட்ட விலைகளின்படியும் கால வரையறைக்குள்ளும் நிறைவேற்றுவதற்கான ஒப்பந்தக்காரரின் சேவைகளை அவரது சம்மதத்துடன் பெற நியமித்துள்ளதால் இருதரப்பினறிடையேயும் கீழ்கண்டவிதத்தில் ஒப்பந்தம் நிறைவேற்றியுள்ளன.

1. ஒப்பந்தக்காரர் இதன்படி பிற்சேர்க்கையில் கொடுக்கப்பட்டுள்ள விலைகள் படி கட்டுமானக் கலைஞருக்கு பணிகளை நிறைவேற்றி தருவதாக உறுதி கூறி சம்மதிக்கிறார்.

2. ஒப்பந்தக்காரர் இப்பணிகளை நிறைவேற்றுவதற்காக அவரது சொந்த வேலையாட்களை உபகரணங்களுடன் அழைத்து வந்து, அவர்களை அவரது சுய நிர்வாகத்தின் கட்டுப்பாட்டின் கீழும் பணிபுரிய வைப்பதோடு அவர்களுக்கு வழங்கப்படக்கூடிய கூலிகளுக்கும் அவரே பொறுப்புள்ளவராக இருப்பார்.

3. கட்டுமான நிறுவனம் ஒப்பந்தக்காரர் மேற்கொள்ளும் பணிகளை மேற்பார்வையாளரை நியமித்து ஆய்வு செய்யலாம். மேலும் அதிலுள்ள குறைபாடுகளை ஒப்பந்தக்காரரிடம் எடுத்துக் கூறலாம். அவரும் அதை உடனடியாக சரி செய்வார்.

4. ஒப்பந்தக்காரர் இதனுடன் இணைக்கப்பட்ட பிற்சேர்க்கையில் கண்டுள்ள குறிப்புகள் மற்றும் அளவு கோல்களின்படியும கட்டுமான நிறுவனத்தின் முழு திருப்தியின்படியும் பணிகளை நிறைவேற்ற உறுதி கூறுகிறார்.

5. ஒவ்வொரு வாரம் புதன்கிழமை முடிய நிறைவேற்றப்படும் பணிக்கான தொகையானது கட்டுமான நிறுவனம் அப்பணிகளின் தரத்தை உறுதி செய்தபிறகே அதனை அடுத்த சனிக்கிழமை பட்டுவாடா செய்யப்படும்.

6. இப்பணிகளுக்கான முழு வேலையாட்களும் ஒப்பந்தக்காரரால் ஏற்பாடு செய்யப்படுவதால் [கட்டுமான நிறுவனத்திற்கு இதில் எந்த தொடர்புமில்லை] வேலையாட்கள் பணியின் போது காயப்பட்டாலோ இறக்க நேரிட்டாலோ அவர்களுக்கு நஷ்டஈடு கொடுப்பதற்கு ஒப்பந்தக்காரரே பொறுப்பாவார். ஒப்பந்தக்காரரால் இப்பணிகளுக்காக ஒப்பந்தம் செய்யப்பட்ட வேலையாட்களுக்கு ஈடு செய்ய கட்டுமான நிறுவனம் எந்த விதத்திலும் பொறுப்பேற்காது.

7. இந்த ஒப்பந்தமானது ..... மாதங்கள் முதல் ..... வரையோ அல்லது கட்டுமான இடத்தில் ஒப்பந்தக்காரரின் வேலை முடியும் வரையோ, எது விரைவில் முடிவடைகிறதோ அதுவரை நீடிக்கும்.

8. ஒப்பந்தக்காரர் கட்டுமான வளாகத்தின் பாதுகாப்பு வழிமுறைகளுக்கிணங்கி நடந்து கொள்ளல் வேண்டும். பணி விபத்துக்களை குறைக்க ஒப்பந்தக்காரர் போதுமான எச்சரிக்கைகளை மேற்கொள்ள வேண்டும். ஒப்பந்தக்காரர் அவரால் வரவழைக்கப்பட்ட வேலையாட்கள் பாதுகாப்பான கருவிகளையே உபயோகிப்பதை உறுதி செய்ய வேண்டும்.

9. ஒப்பந்தக்காரர் அவரது வேலையாட்களின் அலட்சியப் போக்கினால் எழும் நஷ்டங்களுக்கு எதிராக நிறுவனத்திற்கு ஈடு அளிக்க வேண்டும்.

10. ஒப்பந்தக்காரர் அல்லது அவரது பணியாட்கள் அல்லது வேறு ஊழியர்கள் ஆகியோரால் பணி நிமித்தம் ஏற்பட்ட சேதங்களுக்கு ஒப்பந்தக்காரரின் நிலுவைத்தொகை/பில்களில் பிடித்தம் செய்யப்படும்.

11. ஒப்பந்தக்காரர் அவர் கீழ் பணிபுரிய நபர்களின் நல்வாழ்விற்கு தேவையான சட்டபூர்வமான விஷயங்களுக்கு பொறுப்பானவர். பணியின்போது பணியாட்களுக்கு எற்படும் பாதிப்புகளுக்கு எதிரான காப்பீடு வசதிக்கும் ஒப்பந்தக்காரர் ஏற்பாடு செய்ய வேண்டும்.

12. ஒப்பந்தக்காரரின் தரப்பில் ஏற்பட்ட எந்தவித விடுபட்ட செயல்களுக்கும் கட்டுமான நிறுவனம் பொறுப்பேற்காது. அதுபோல, பணியமர்த்துதல், கூலி மற்றும் இதர பலன்கள் ஆகிய ஒப்பந்தக்காரர் மற்றும் வேலையாட்களுக்கிடையே ஏற்படும் நடவடிக்கைகளுக்கும் கட்டுமான நிறுவனம் பொறுப்பேற்காது.

13. ஒப்பந்த பணியாளர் விதிகள் குறித்த மஸ்டர் ரோல், கூலி பதிவேடு, ஊதிய ரசீது மற்றும் இதர சட்டபூர்வமான பதிவேடுகளை ஒப்பந்தக்காரர்தான் பராமரிக்க வேண்டும். இவை கட்டுமான நிறுவனத்தின் அத்தாட்சி பெற்ற பிரதிநிதிக்கு தேவைப்படும்போது வழங்கப்பட வேண்டும். இப்பதிவேடுகள் பராமரிக்கப்படாமல் போனால் நிறுவனம் சட்டபூர்வமான வழிமுறைகளின்படி ஒரு முகமையை நாடி அதன் சேவையைப் பெறும். இதற்கான மதிப்பானது ஒப்பந்தக்காரரின் அடுத்த பில்களிலிருந்து கழிக்கப்படும்.

14. ஒப்பந்தக்காரர் குறிப்பிட்ட காலம் மற்றும் அட்டவணையின்படி பணியை நிறைவேற்றும் வண்ணம் போதுமான நபர்களை பணியமர்த்த வேண்டும்.

15. ஒப்பந்த காலம் மேற்குறிப்பிடப்பட்ட காலம் வரை மட்டுமே செல்லுபடியாகும். நிறுவனம் இதை இருதரப்பினரின் ஒப்பந்தப்படி திருத்தப்பட்ட நிபந்தனைகளின்படி அவ்வப்போது மாற்றியமைக்கும் உரிமையைப்பெற்றுள்ளது.

16. ஒப்பந்தமானது இருதரப்பினரில் யாராவது ஒரு மாத கால அவகாசம் கொடுக்கும் பட்சத்திலோ அல்லது பணியாளர்/ஒப்பந்தக்காரரின் அலட்சியம் மற்றும் ஒழுங்கீன நடவடிக்கையின் காரணமாகவோ முடிவுறலாம். ஒப்பந்தத்தின் சட்டபூர்வமான தேவைகளை மீறும் பட்சத்தில் முன்னறிவிப்பின்றி ஒப்பந்தம் முறிக்கப்படும்.

17. ஒப்பந்தக்காரர் மற்றும் நிறுவனத்திற்குமிடையே வழக்கு எழுந்தால் இருதரப்பினரும் நியமிக்கும் ஒரு மத்தியஸ்தரால் விசாரிக்கப்படும். இவரது தீர்ப்பே இறுதியானதும் பிணைக்கக் கூடியதுமாகும்.

18. இரு தரப்பினருக்குமிடையே முடிவான ஒப்பந்தக் கட்டணமானது கூஈகு சேவை வரி மற்றும் இதர சட்டபூர்வமான பிடித்தங்களுக்குட்பட்டது.

19. ஒப்பந்தக்காரர் ஒப்பந்த பணியாளர்கள் ஒவ்வொருவரும் தனித்தனியாக அவர்கள் ஒப்பந்தக்காரரின் வேலை பட்டியலில் உள்ளதை உறுதி செய்ய வேண்டும்.

20. வேலையாட்களுக்கான கட்டணங்கள் ஒப்பந்தக்காரரால் அவர்களது திறமையின் அடிப்படையில் நிர்ணயிக்கப்படவேண்டும். இது எந்த நேரத்திலும் கட்டுமான கலைஞர்களுக்காக குறிப்பிடப்பட்ட குறைந்தபட்ச கூலியைவிட குறைவாக இருக்கக் கூடாது.

21. ஒப்பந்தக்காரர் கீழ்கண்ட பதிவேடுகளை பராமரித்தல் வேண்டும்:

(ச்) பணியாளர் பட்டியல் மற்றும் கூலி பதிவேடு

(ஞ) பிடித்தம் குறித்த பதிவேடு

(ஞி) கூடுதல் பணி குறித்த பதிவேடு

(ஞீ) அபராத பதிவேடு

(ஞு) முன்பண பதிவேடு

(ஞூ) தமிழ்நாடு ஒப்பந்த பணியாளர் (ஒழுங்குமுறை – ரத்து) சட்டத்தின் கீழ் கூலி ரசீதுபடிவம் 25 மற்றும் படிவம் 25ஆ ஆகியவை.

22. ஒப்பந்தக்காரர், தமிழ்நாடு ஒப்பந்த பணியாளர் (ஒழுங்குமுறை – ரத்து) விதிகளின் கீழ் அவ்வப்போது திருத்தியமைக்கப்படும் விதிகளுக்கு இணங்க நடத்தல் வேண்டும்.

23. ஒப்பந்தக்காரர் அவரால் பணியமர்த்தப்பட்ட நபர்கள் பணி வளாகத்தில் உள்ள விதிமுறைகள் மற்றும் ஒழுங்கு முறைகள் மற்றும் நடத்தை விதிகள் ஆகியவற்றிற்கு இணங்க நடப்பதோடு அங்கு நல்ல ஒழுக்கத்துடனும் இருக்க வேண்டும். இதனை மீறினால் அவரது சேவைகள் உடனடியாக நிறுத்தப்படும்.

24. ஒப்பந்தக்காரரால் பணியமர்த்தப்பட்ட நபர்கள் பணி வளாகத்திற்கு வெளியே செல்லும் நேரம் மட்டுமின்றி வளாகத்தினுள்ளும் வளாக பாதுகாப்பு அதிகாரிகளால் சோதனையிடப்படுவர். அவர்கள் பணி நிமித்தம் பணி வளாகத்திற்கு எடுத்துச் செல்லும் உபகரணங்கள் மற்றும் கருவிகளும் சோதனைக்குட்படப்படும்.

25. ஒப்பந்தக்காரரால் நியமிக்கப்படும் நபர்கள் வளாகத்தினுள் புகைபிடிப்பதோ, ஆல்கஹால் பானங்களை அருந்துவதோ, போதை மருந்துகளை உட்கொள்ளவோ மாட்டார்கள். அவர்கள் வளாகத்தினுள் இருக்கும்போது போதை மருந்துகளின் பிடிப்பில் இல்லாததை ஒப்பந்தக்காரர்கள் உறுதி செய்ய வேண்டும்.

26. கட்டுமான நிறுவனம் திட்டம் முடிவடைந்த 6 மாதங்களுக்குப்பிறகு பணி சரியாக நிறைவேற்றியிருக்கும் பட்சத்தில் வாராந்திர பில்களிலிருந்து பிடித்தம் செய்யப்பட்ட 5% பாதுகாப்பு டெபாசிட் தொகையை ஒப்பந்தக் காரருக்கு திருப்பியளிக்க வேண்டும்.

27. குழந்தை தொழிளாலர் சட்டப்படி பதினெட்டு வயதுகுட்பட்ட (18) நபர்களை பணியமர்தகூடாது.

பிற்சேர்க்கை
பணி குறித்த விபரம், கட்டணங்கள், பட்டுவாடா விபரங்கள்

இதற்கு ஆமோதிக்கும் விதத்தில் மேற்கண்ட கட்டுமான நிறுவனமும் ஒப்பந்தக்காரரும் இந்த தேதியில் சமமதித்து கையொப்பமிடுகின்றன.

கட்டுமானநிறுவனம் **ஒப்பந்தக்காரர்**

சாட்சிகள்:

1.

2.

- **Life line rope :** Labourers working at heights should always harness themselves to the life line rope for their safety. Safety engineers should make sure that the life line rope is available around the perimeter of the building and also in between the columns.
- **Safety display board :** A notice board displaying the safety precautions has to be placed in most prominent locations in the site.
- **Training program for Engineers and workers about the safety and First aid** : Once in a month, first aid drills and safety training programs has to be conducted in the site so that all workers and contractors are aware of the expected safety procedures.
- **Safety net for materials and men**: A safety net has to be erected around the building so that any falling objects are contained within the site and do not cause public disturbance.
- **Column demolishing**: Any column demolition requires that it is done in such a manner so as not to affect the rest of the building and the area around. A net has to be erected around the column that needs to be demolished.
- **Labour IN to OUT:** At any point of time the site Engineer should be aware of how many workers are working in the site. He/She is responsible for the safety of the workers.
- **Roll call for Night work labour:** Taking a roll call in the night is a compulsory safety procedure. This will ensure that no wounded works are unintentionally left behind when closing the site.
- **Night shifts:** Adequate lighting arrangement for night working should be provided. The inside of the sump should always have adequate lighting
- **Rainy season:** During rains, it is strictly prohibited to walk on oily surfaces, scaffolding and shuttering platform.
- **Lift well and trench dowel:** These areas should be always be closed to prevent unexpected falls. In passenger lifts the other side door should be closed at all times.
- **Crane Arm:** When using cranes, the safety lock should always be used.
- **Working at heights:** Workers who are afraid of heights should not be allowed to work at heights on scaffoldings.
- **Nails in Plank :** The nails in the plank should either be bent or removed completely to prevent injury to workers.
- **Electric shocks:** Drilling and cutting machine work should not be done at wet areas.
- **Lightening arrestor:** This should be provided at the topmost level.
- **Assembly point:** A designated assembly point should be made known to everyone. All labourers should assemble at the Assembly Point during emergencies such as cyclone, fire, or any accident. They should leave only after a head count has been taken.

SAFETY	
FIRST AID BOX	First aid treatment for the injured
EMERGENCY CONTACT DETAILS.	Display details of nearby hospitals, ambulance, project head, project Incharge & safety officials in case of emergency.
PPE	Procurement & Use of safety PPE is mandatory. Safety meeting is to be conducted on regular basis to educate the workers on safety measures to ensure accident free working condition.
EQUIPMENTS	Operators of equipments like JCB, Cranes, Tractors etc., should be well experienced and posses valid documents.
SIGN BOARDS	Appropriate signboards and barricading shall be installed.
FIRE EXTINGUISHERS	Fire extinguishers to be located at appropriate locations like stores, diesel yard, welding works etc., and requires periodic maintenance,

- Keep passages clear all the time. Separate access for Workers and Vehicle movement to be provided.
- Provide sufficient lighting around the building, pathways, staircase and wherever night work is in progress.
- Keep adequate firefighting equipment and Sand bucket at Flammable materials storage, Electrical room etc.,
- Training on fire extinguisher usage method should be imparted to all the employees.
- Training on First Aid procedure should be imparted to all the employees.
- Before engaging any worker in site, following document should be collected from the worker.

Documents

i. Labour Name

ii. Photo copy of the photo ID proof

iii. Photo copy of the Address proof

iv. Photo copy of the Age Proof

v. Thumb impression

The Nature of Fire

- Generally, for a fire to occur, three elements are needed: fuel, oxygen and an ignition source.
- The aim of fire prevention is to avoid these three coming into contact - and fires can be extinguished by removing one of the three from the equation.
- There are substances that will burn without oxygen - and certain chemicals and preparations can react to oxygen in the air or other chemicals to produce their own 'internal' source of ignition.
- In most working environments to avoid oxygen and fuel coming together and to prevent fires, the quantity and location of the fuel must be controlled and kept away from possible sources of ignition.
- So, the first step in a fire risk assessment is to identify the possible sources of fuel and ignition.

Flammable Materials

Everyday materials in workplaces, such as paper, furnishings etc., provide a ready source of fuel. Bulk supplies of such materials should be stored away from main work areas, in cupboards, not left in a corner of the room on the floor.

Some materials - flammable liquids, gases, paint and varnish - ignite readily and burn with high heat or lots of smoke. Ideally such materials should be isolated from the workplace.

Where this is not possible, simple precautions such as fire-resistant cupboards and covering the containers will help to minimize the risks.

Waste materials should never be allowed to accumulate in the workplace Good housekeeping is particularly important in minimizing fire risks.

Fire Fighting Equipment

Most premises are provided with fire fighting equipment. If the staff is not properly trained, they can put themselves and others at risk in using this equipment.

It is vital that all staff are aware of who is trained and when it is safe to attempt to control or extinguish a fire themselves, rather than evacuate the area and rely on the skills of the fire brigade.

As a general rule, fire fighting equipment should only be used to limit the spread of fire to enable safe evacuation. Before tackling any fire, it is vital that the alarm is raised and the fire brigade are called.

Fire Extinguishers

The most common form of fire fighting equipment are extinguishers.

Fires are classified into 4 classes, depending on the fuels involves:

- Class A - Fires involving ordinary combustible materials
- Class B - Fires involving flammable liquids or liquefiable solids
- Class C - Fires involving gases.
- Class D - Fires involving burning metals.

Different extinguishers are designated for different classes of fires:

Water (Colour Code: Red)

Suitable for Class A fires. Must not be used on live electrical fires, though can be safely used on burning electrical equipment once the electrical supply has been isolated.

Foam (Colour Code: Cream)

Different foams are suitable for different classes of fires. Some contain a water – based foam and are not suitable for use on live electrical equipment. Usually foam extinguishers can be used either on Class A or on Class A& B fires.

Powder (Colour Code: Blue)

Suitable for Class A fires - and some also suitable for Class B. Usually safe used on live electrical equipment, but not ideal because it does not always penetrate inside spaces and causes clogging of machinery which might otherwise be re-usable.

Special dry powders can be used on Class D fires.

Carbon Dioxide (Colour Code: Black)

Suitable for Class B fires and safe and clean if used on live electrical equipment. CO_2 is an asphyxiant, and great care must be taken in its use.

Vapourising Liquids (Colour Code : Green)

Suitable for Class B fires and on live electrical equipment. Older extinguishers of this type may contain Halon gas, which is environmentally harmful.

Halon extinguishers should be replaced wherever possible. This type of extinguisher also produces asphyxiant gases and the same care is needed as for CO2.

From January, 1997, all new extinguishers are now colour-coded in accordance with a new British and European Standard (BS EN 3 Part 5), which states that all extinguishers should be coloured RED - with an area of not more than 5% of the body coloured to denote the type of extinguisher.

This only applies to new extinguishers - existing ones do not have to be replaced or repainted before the end of their useful life.

Siting of extinguishers

It is important that people can access extinguishers easily. If they are provided to control specific risks (e.g. CO2 extinguishers for VDUs), they need to be situated close to that risk are otherwise, the fire may well spread before someone can go and collect the extinguisher.

Extinguishers provided for general protection need to be located close to exit points from work areas and on the escape routes.

Notice should be displayed to pinpoint the locations of fire fighting equipment. The notices should also specify the type of extinguisher and its applicability.

Fire detection and warnings

The sooner a fire is detected, and a warning given to staff, the safer it is for everyone. In most workplaces, a fire would be quickly spotted by staff / labour working or moving around the premises. However, if there are parts of the workplace that are frequently visited they may be better protected by installing a fire detection system, especially if a fire in that area could threaten the escape route.

In a very small workplaces, a mechanical system of raising the alarm in case of fire will be necessary. Any system must be easily operated and audible throughout the workplace.

Testing and Maintenance

Extinguishers, alarm and fire detection systems and any emergency lighting all need to be frequently checked and tested, to ensure that everything will work in the event of a fire.

Fire escape routes should be checked to ensure that they are free of obstructions, preferably on a daily basis. Similarly, a quick visual check to ensure that all fire extinguisher are in place, and not off somewhere else.

Training staff

It is vital that people know exactly what to do (and what not to do) in the event of fire.

Staff should be trained to ensure that:

- They are aware of how to raise the alarm if they notice a fire;
- They know what the fire alarm sounds like;
- They know who is responsible for calling the Fire Brigade;
- They can follow the shortest escape route from the premises;
- They know where to assemble outside of the premises - this should be at a near -by location but far enough away to allow unrestricted access to the premises for the emergency services.
- They are aware of how, when and where to use fire fighting equipment.

  In larger premises, it may be necessary to designate certain staff to carry out specific tasks in the event of fire - such as ensuring that a part of the building is clear of people. This may require additional training.

Regular visitors to the building may also benefit from training on the fire procedures. Staff should be made aware of how to deal with any visitors who may be present - it is preferable for them to be escorted by the person they are visiting.

Regular drills help to enforce the messages from the training. These can be held with or without prior warning. Drills should involve everyone.

Printed notices, at strategic points within the workplace, can help reinforce the messages from training and remind staff of their actions to take in case of fire.

Precaution & prevention for Electric Shock

Electric shock can occur due to faults in main wiring system or other reasons which must be prevented by fixing the faults in due time when detected. Electric current is deadly for all of us and can have fatal consequences on physical and mental health. Any kind of fault that may arise in wiring system or cable must be detected and fixed immediately to avoid any mishap or accident that could also lead to fire.

There are several causes that have been detected to cause electric shock such as:

- Fault in electric wires
- Exposed wires
- Wet wire
- Open electric sockets

The intensity of electric shock decides the consequences on body while low intensity doesn't cause much harm but high voltage shock can even lead to death or paralysis.

There have been many cases of violent collision of body with electricity that has lead to permanent disability of organ or deterioration in nervous system etc, Therefore, electric collision is the most pernicious thing which should be avoided to save life.

There are ways for systematic implementation which can effectively prevent occurrence of electric shock. Read the precautions for the prevention of electic collision or shock :

- Always hire a qualified engineer to fix the wiring system well in place with all care and caution.
- It is ideal to wear rubber gloves or shoes while working on electric wires as rubber and wood are not good conductors of electricity and lessens the intensity of current.
- Keep the main wiring system and meters in special room / closed racks, to prevent contact with children and infants.
- If there ıs sudden fıre ın the house, turn off the maın swıtch of power supply immediately and use sand or fire extinguisher to put the fire off. However, avoid water on the electric appliances or switch as it can deteriorate the situation.
- While repairing or working on electrical systems turn off the supply from main switch.
- Install main plugs and switches at normal height and out of reach of children for safety measures.
- All necessary wiring should be sealed and qualitative for better protection.
- To prevent frequent electric shocks from wires, earthing should be effective.
- Always follow safety standards while working or repairing some electric system to prevent shock.
- Avoid working on electric system during damp or moist conditions such as raining. If the main electrical system is placed near the wet area then cover it with essential material and work with caution or seek professional help.

Electric Shock Treatment

1. Separate the Person From Power Source

To turn off power:

- Unplug the appliance if plug is undamaged or shut off power via circuit breaker, fuse box, or outside switch.

If you can't turn off power:

- Stand on something dry and non-conductive, such as dry newspapers, telephone book, or wooden board.
- Try to separate the person from electrical shock using non-conductive object such as wooden or plastic broom handle, chair, or rubber doormat.

If high voltage lines are involved:

- The local power company must shut them off.
- Do not try to separate the person from current if you feel a tingling sensation in your legs and lower body. Hop on one foot to a safe place where you can wait for lines to be disconnected.
- If a power line falls on a car, instruct the passengers to stay inside unless explosion or fire threatens.

2. Do CPR, if Necessary

When you can safely touch the person, do CPR if the person is not breathing or does not have a pulse.

- For a child, start CPR for children.
- For an adult, start for adult CPR.

First-aid Boxes. - The employer shall ensure at construction site that :

(a) Sufficient number of first-aid boxes are provided and maintained for first-aid to the building workers:

(b) Every first-aid box is distinctly marked "FIRST AID" and is equipped with the articles specified below.

(c) Nothing except First Aid requisites are kept in a first-aid box or cupboard and such box or cupboard is so kept as to protect it from dust and moisture. The box or cupboard should be in-charge of a person trained in first-aid and is readily available during the working hours.

List of Items in First Aid Kit

S.no	Description of item	Quantity
1	First Aid book	1 No
2	Box plastic adhesive Bandages(1" x3")	16 Boxes
3	Tweezers	1 No
4	Scissors	1 No
5	Spool tape -1/2 " x 5 yards	1 No
6	Compress bandage - 3" x3"	2 No
7	Triangular bandage - 40"	1 No
8	Small ice pack	1 No
9	Box fingertip bandage - 10/box	1 No
10	Box cloth knuckle bandage	1 Box
11	Eye dressing	1
12	Box teflon pads - 11/2" x2" 12/box	1 No
13	Roller Gauze	1 No
14	Packages clean wipes	3 No
15	Compact CPR shield	1 No
16	Latex gloves	1 No
17	Emergency blankets	2 No

CHECKLIST - GENERAL SAFETY

SL.NO	ASPECT	YES	NO	NA	REMARKS
1	Is the required Personal Protective Equipment (PPE) (as relevant to the needs of the work) being provided to the workers?				
2	Is the PPE being used by engineers and supervisors?				
3	Is the PPE being used by the labour?				
4	Have any enforcement mechanism been put in to place towards ensuring use of PPE provide?				
5	Are proper safety precautions/practices being taken during erection and use of temporary structures such as scaffoldings?				
6	Are proper safety precautions/practices in place for working Platform sand ladders?				
7	Does the work site have restricted access?				
8	Is/are the worksite / barricaded properly?				
9	Have proper precautions been taken to ensure fire safety during construction?				
10	Are the required measures in place to ensure electrical safety during construction?				
11	Is there a mechanism in place to check the safety of various mechanical equipment and machinery that is being used for construction?				
12	Has the information on Minimum Wages been displayed in the local language?				

SL.NO	ASPECT	YES	NO	NA	REMARKS
13	Is the worker accommodation in line with legal provisions?				
14	Is there a proper potable water supply arrangement for workers?				
15	Has proper sanitation arrangement (toilets, urinals, bathrooms) For workers (including separate ones for women workers, as required) been made?				
16	Has the contractor made first aid and emergency response. Arrangement on the worksite?				
17	Has the storage/stacking of materials been appropriately (safely) done?				
18	Are there adequate and proper waste collection and disposal arrangements on the work site?				
19	Are acoustic generators being used for construction?				
20	Is the construction work causing any inconvenience to any of the Campus residents/users?				
21	Has the work site been cleared off all debris, waste sand left over materials?				
22	Has the work site or are a used temporarily during construction been restored?				

Signature of Safety Personnel

8. DO's and DON'Ts

i. Earthwork / Shoring

ii. Reinforcement

iii. Formwork

iv. Concrete

v. Brickwork / Block work

vi. Plaster

vii. Scaffolding

viii. Electrical

ix. Fire

x. General Safety

DO's & DON T's

i) Earthwork/ Shoring:

DO's	DON'Ts
a) Erect and maintain good warning signs. b) Protect public and employees from falling objects. c) Keep all plant and gear in good working order. d) Be aware of all electric lines both overhead and Underground. e) Compact all fillings. f) Seek professional advice if unsure.	a) Leave signs up when not required. b) Fire a blast before clearing everyone from the danger area. c) Forget to wear a protective helmet. d) Start digging before checking on all underground services. e) Cause a dust nuisance. f) Let drains block. g) Allow hazards to develop. h) Take chances on the weather. i) Take shortcuts or risks.

ii). Reinforcement

Do's and Don'ts for steel work :

DO's	DON'Ts
1. Cut the reinforcement using with proper cutting machine in steel yard. 2. Keep the scrap reinforcement in separate location. 3. Use PPEs during the work. 4. More than 3 meter reinforcement to be shifted by 2 person. 5. During the night work ensure proper lighting.	1. Don't allow other labourers in steel fabrication yard. 2. Don't keep the rod in other work places. 3. Don't keep the rod in water stagnent area. 4. Don't fix the light in column reinforcement. 5. Don't lay the electrical wires above the reinforcement.

iii). Formwork

Do's and Don'ts for formwork :

DO's	DON'Ts
1. Life line rope should be fixed before starting the roof beam bottom shuttering. 2. Use large size panels to keep the number of joints minimum. 3. Use clamps of adequate strength to hold the forms together. 4. Use angle iron (not steel bars) bracings for column supports. 5. Allow to keep the props in levelled & hardened surface. 6. Use PPEs, work at above 2 Mtrs. height.	1. Do not keep centering and shuttering on soft or filled up earth. 2. Do not allow stagnation of water near the base plate supporting the staging. 3. Do not use more than one plank / timber block at the base of a prop to plug the gap, if any. 4. Do not permit deflection of unsupported areas . 5. Don't allow the labour without PPEs.

iv). Concrete

Do's and Don'ts for Concrete work :

DO's	DON'Ts
1. Pouring of concrete should start from one side. 2. Check the props for any deflection during the concrete. 3. Ensure vibration properly. 4. Use the tripod stand for holding the RMC horizontal pipe line. 5. Lifeline rop should be fixed before start of concrete work. 6. Erect and maintain good warning signs. 7. Protect public and employees from falling objects. 8. Keep all plant and gear in good working order. 9. Be aware of all electric lines both overhead and underground. 10. Compact all fillings. 11. Seek professional advice if unsure.	1. Don't permit the concrete without lifeline rope in outer side, OTS, Lift well & duct areas. 2. Don't disturb the form work during the RMC pipeline fixing. 3. Don't dump the concrete in one place. 4. During vibrating the needle should not touch the reinforcement. 5. Don't drop concrete into place freely from a height exceeding 1.5 m. 6. Don't leave signs up when not required. 7. Don't Fire a blast before clearing everyone from the danger area. 8. Don't Forget to wear a protective helmet. 9. Don't cause a dust nuisance. 10. Don't let drains block. 11. Don't allow hazards to develop. 12. Don't Take chances on the weather. 13. Don't take shortcuts or risks.

v). Brickwork / Block work

Do's and Don'ts for Brickwork :

DO's	DON'Ts
1. Use the PPEs during the block work. 2. Use the equipment to lift the block. (Hoist, Crane, Wheel Barrow). 3. Use proper equipment to cut the brick / block. 4. Use the proper scaffolding, more than 1.2 Mtrs. height block work. 5 Do the honeycombs block work in lift well.	1. Don'ts stack the block / brick in single location. 2. Don't permit the labour without PPEs. 3. Don't allow the labours to stroll at the time of the outer wall block work. 4. Do not start masonry work earlier than 48 hours of casting of concrete.

vi). Plastering

DO's	DON'Ts
1. Use the PPEs during plastering work. 2. Use the proper scaffolding. 3. After the safety personnel assurance, allow to use the scaffolding.	1. Don't permit the labour without PPEs. 2. Don't allow the labours to stroll at the time of the outer wall plastering. 3. Don't use the scaffolding without proper approval.

vii). SCAFFOLDING

Safety Requirements for Scaffolds

- The footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks shall not be used to support scaffolds or planks.
- No scaffold shall be erected, moved, dismantled, or altered except under the supervision of competent persons or as requested for corrective reasons by Safety.
- Scaffolds 4 feet to 10 feet in height having a minimum horizontal dimension in either direction of less than 45 inches shall have standard guardrails installed on all open sides and ends of the platform.
- Scaffolds and their components must be capable of supporting without failure at least 4 times the maximum intended load.
- Any scaffold, including accessories such as braces, brackets, trusses, screw legs, ladders, couplers, etc., damaged or weakened from any cause must be repaired or replaced immediately, and shall not be used until repairs have been completed.
- All planking or platforms must be overlapped minimum 12 inches.
- An access ladder or equivalent safe access must be provided.
- Scaffold plank must extend over their end supports not less than 6 inches or more than 18 inches.
- The poles, legs, or uprights of scaffolds must be plumb and securely and rigidly braced to prevent displacement.
- Wire, synthetic, or fibre rope used for scaffold suspension shall be capable of Supporting at least 6 times the intended load.
- A safe distance from energized power lines shall be maintained.
- Scaffolds shall not be used during high wind and storms.

  Scaffolds and components shall be inspected at the erection location. Scaffolds shall be inspected periodically.
- Tube and coupler scaffolds shall be tied to and securely braced against the building

DO's AND DON'Ts IN SCAFFOLDING

DO's	DON'Ts
Inspect the equipment. Make sure all scaffold components are sound. Look for damaged welds, dents, and crooked or bent members. **Plan the scaffolding setup** 1. The given area is available. 2. The ground is level and stable. 3. The original scaffold layout is still feasible. 4. Access to the site allows easy and safe delivery of scaffold materials. 5. Overhead power lines are not present. 6. Other hazards, such as excavations, are not present. 7. A forklift or crane is available to move the scaffolding. 8. There are enough sound scaffolding materials to complete the requird areas. **Provide a stable base,** Firm, level, undisturbed soil, properly compacted aggregate or concrete thick enough to carry imposed loads are the best supports for the base of a scaffold. Backfilled, water-bearing, or frozen soil should be tested by the site engineer to determine if it has adequate bearing capacity. Soil that cannot support the	**Don't Mix scaffold frames and parts**, made by different manufacturers. Frames from one manufacturer normally are not compatible with frames from another. **Don't Skimp on scaffold accessories**, and construct a scaffold that is structurally incomplete and unsafe. Masonry contractors who own their own scaffolding materials should not try to cut costs by using fewer parts. **DON't Omit cross braces.** Although all cross braces are not always needed, it takes a well-trained scaffold designer to know when and where some of them can be omitted. **Don't Block up bases** with blocks, bricks, or lumber. Vibrations often move a leg off this type of support. The weight of the scaffold also can cause the brick or block to crack and fall away. **Don't Use excessive force** to install cross braces. If force is required, then the bottom of each plank so vibrations don't cause the plank to slide off the bearing member. **DON'T Use nominal 2 x 10 wooden planks.** Nominal 2x10s are actually 11⁄2 x 91⁄2 inches, which is not adequate for

DO's	DON'Ts
proposed loads can cause a scaffold failure in a short time. **Compact all backfill,** even a small area of backfill, differential settlement of the bases can concentrate stress in one area of the scaffold, resulting in damage and possibly failure of that section of the scaffold. Therefore, every area of the bearing surface should be able to support the maximum intended load on that area. **Use at least three workers** to assemble the scaffolding: two on the scaffold, connecting parts, and one passing up parts. Two workers can do the job but not as safely and efficiently. **Use adjustable screw jacks** with fixed base plates. They allow the base of the scaffold to follow the natural contours of the soil while the scaffold frame itself is erected plumb and level. **Join the frames with cross braces.** The cross braces hold the frames in place and ensure that subsequent levels are true and plumb. After the cross braces are in place, make sure the screw jacks are still bearing weight. Sometimes a cross brace will lift frame off the jacks. **Install locking devices,** such a toggle pins, in the connecting pins to prevent the scaffold from separating at the vertical joints. **Check ties regularly** and particularly	scaffolds loaded with heavy masonry materials. Planks must be rough cut at least 2x10 inches. **Don't Use wood planks with loose or large knots,** checks, splits, or prominent sap lines. **Don't Paint wood planks.** Paint hides defects. **Don't Use scaffold planks for mud sills** and then reuse them as scaffold planks. **Don't Leave the deck partially planked.** Space between adjacent planks should not be greater than 1 inch. **Don't store materials on side brackets** or end brackets. Brackets are for work platforms only.

DO's	DON'Ts
Before dismantling the scaffold. Make sure they are properly placed. **Add extra ties in winter** when tarps are used to enclose the scaffold. Tarps increase the wind resistance of the scaffold. **Inspection** **Check the following items as soon as the scaffold is erected and periodically during use.** 1. Ground beneath the mud sills has not thawed, eroded, or settled. 2. Scaffold bases are not near excavations or holes. 3. All screw jack handles are snug against frame legs and each screw jack is bearing weight. 4. Scaffold is plumb and level. 5. All planking is in place and secure. 6. All ties are intact. 7. Connecting pins have locking devices in place. 8. All guardrails are in place. 9. No loose scaffold materials are lying around. If there are, check where they have come from.	**Don't work on a platform without** guardrails. Wind can blow you off, or when you're busy you can forget you're off the ground. **Don't use a ladder** that is too short or not secured. **Don't drop or throw removed sections.** Lower them to the ground as soon as possible.

viii). Electrical

DO'S	DON'TS
Before replacing a lamp or handling a fan, make sure that the supply is switched off. Use correct size and good quality of fuse wire when replacing blown fuse. When removing fuse, pull out the supply end first and when replacing the supply end should be put in last. Place sign 'men working' or other warning boards on main switch before commencing work. Before working on any circuit or apparatus, make sure that the controlling switches are opened and locked or the fuse holders withdrawn. Always treat circuit as alive until you have proved them to be dead, the insulation of the conductors may be defective. Before working on motor or other rotating machine, make sure that it cannot be set in motion without your permission. Cultivate the habit of turning your face away whenever an arc or flash may occur.	Do not connect single pole switch or fuse in a neutral circuit, but always connect in the live or phase wire. DO not renew a blown fuse until you are satisfied as to the cause and have rectified any irregularity. DO not use copper wire as substitute for fuse wire. Do not close any switch, unless you are familiar with the circuit which controls & know the reason for its being opened. Do not touch or tamper with any electrical gear or conductor, unless you have made sure that it is dead and earthed. High voltage apparatus may give leakage shock or flashover even without touching. Do not work in live, circuits without the express orders of the person-in-charge. Make certain that all safety Precautions have been taken and you are accompanied by a second person competent to render first aid and artificial respiration. Do not disconnect earthing connections or render ineffective the safety gadgets installed on mains and apparatus.

DO'S	DON'TS
Guard against arcs as well as high voltage, remember that burns from arcs may be very severe. See that all splices and connections are securely made. Use extreme care when breaking an inductive circuit as dangerously high voltage is likely to result. Thoroughly discharge to earth all cables before working on the cores. Test rubber gloves periodically. Place rubber mats in front of electrical switchboards. Prevent accumulation of gases in unventilated manholes. Varnishes emit flammable vapour.	Do not tamper with the meter boards and cutouts, unless you are authorized to do so. Do not expose your eyes to an electric arc. Painful injury may results even with short exposure. Do not close or open a switch or fuse slowly or hesitatingly; do it quickly and positively. Do not turn your face and then grope for switch or fuse. Do not use metal case flashlight around apparatus which is energized. Do not place any part of your body in circuit either to round or across the terminal when making a connection or operating. Do not use wires with poor insulation. Do not touch an electric circuit when your hands are wet, or bleeding from a cut or an abrasion. Do not work on energized circuits without taking extra precautions, such as the use of rubber gloves and wooden handles.

DO'S	DON'TS
Portable Lamps & Appliances Ensure that all portable appliances are provided with 3-pin plug and socket connections and the metal work of the apparatus is effectively earthed. Always use portable hand lamps of the insulated safety type and provided with a rubber, plastic or wooden handle and wire guard.	Do not use a lamp in a metal holder fixed to the end of a loose flexible wire as a portable hand lamp. Do not disconnect a plug by pulling the flexible cable or when the switch in ON. Do not use kinked or perished cables for portable lamps and appliances. Do not plug in any portable lamp or apparatus before making sure that the switch is OFF and that the wall plug is properly inserted in the socket.
Electrical Shock Remove the causality from the place, render first aid send for doctor or take the casualty to a hospital or dispensary. Report all accidents, whether minor or major, non-fatal or fatal, immediately to the person-in-charge. Study carefully and practise first aid treatment for injured persons. Study carefully and practice regularly the instructions for resuscitation (artificial respiration) after electric shock, displayed at every major electrical installation, Whenever possible, use one hand only when working about an electrical circuit, even though it is supposed to be dead.	Do not take unnecessary risk with electricity. Low voltage, under certain circumstances, can be more dangerous than high voltage. Do not leave the casualty in contact with live apparatus. Switch off the power immediately. Do not attempt to disengage a person in contact with a live apparatus which cannot be switched off immediately. Insulate yourself from earth by standing on rubber mat, or dry board before attempting to get him clear. Do not touch his body. Pull him by clothes if they are dry or push him clear with a piece of dry wood. Do not discontinue artificial respiration until recovery or death is certified by doctor. It may take even more than 2 to 3 hours for recovery. Do not remove the body without the permission of the police even after certification of death by doctor

ix). Fire

DO'S	DON'TS
Disconnect the supply immediately in case of fire on or near electrical apparatus, Make sure, when using water hose, that the water jet does not come into contact with live apparatus. Keep flammable material only in special containers and in fireproof rooms. Be sure that your men, are familiar with the location of fire fighting apparatus. Organize precautionary fire drill. Have sufficient number of fire extinguishers located in strategic position, so that they may be available for immediate use in various areas. Check fire. fighting apparatus periodically. Wipe oil spills as soon as possible; use sand to cover oil spots.	Do not use fire extinguishers on electrical equipment, unless it is clearly marked as suitable for that purpose. Use sand/ blanket instead. Do not throw water on live electrical equipment in case of fire. It is dangerous to you.

x). GENERAL SAFETY

DO'S	DON'TS
Preach and practise safety at all times. Good work can be spoiled by an accident. Work deliberately and carefully. Haste causes many accidents, be sure of what you are doing. Examine before use all safety appliances, such as rubber gloves, mats, ladders, goggles, insulated pliers, etc, for their soundness. Always add the acid or soda to water and not vice versa? when mixing sulphuric acid or caustic soda and water. Always report immediately to the person-in-charge or to any other proper authority any dangerous condition or a dangerous practice which you may observe. Always be cautious while lifting or removing a heavy apparatus or material. Warn others when they seem to be in danger near a live conductor or apparatus. Always be careful and take no chance against any possible accident. Attend immediately to all injuries however slight or severe they may be. Always obey the safety instructions given by the person incharge.	Do not wear loose clothing, metal watch straps, bangles or finger rings while working on electrical appliances. Do not hang clothes and such other things on electrical fittings Do not work on a pole or other elevated position if there is a live part on it without safety belt and rubber gloves, 'and unless a competent person stands on the ground nearby to direct operations and give warning. Do not use a ladder without a lashing rope; otherwise the ladder should be held firmly by another person. Do not go carelessly near running belts on machines. Do not remove danger notice plates or other signs or interfere with safety barriers or go beyond them. Do not bring a naked light near battery. Smoking in the battery room is prohibited. Do not allow visitors and unauthorized persons to touch or handle electrical apparatus or come within the danger zone of high voltage apparatus. Do not enter excavations which give out obnoxious smell, or work in badly lit, badly ventilated and congested areas. Do not touch a circuit with bare fingers or hand or other makeshift devices to determine whether or not it is alive.

INCIDENT REPORTING FORM

PROJECT :

SITE : **LOCATION :** **DATE :**

PERSONAL DETAILS

Name of Employee

Nature of work

Full residential address

Age

Grade

Job Experience

INCIDENT DETAILS

Site in which the incident occurred

Date of accident

Time of accident

Description of accident

Witness to the accident:

Name

Address

Form filled by:

Name of the Engineer

Address

DETAILS - INCIDENT ANALYSIS

PROJECT :

LOCATION : **DATE :**

SL.NO	DESCRIPTION	YES	NO	NA	REMARKS
	UNSAFE WORKING CONDITION				
1	Inadequate/no guards				
2	Failure of material/equipment				
3	Unsafe design/layout/structure				
4	Bad housekeeping				
5	Fire/Explosion/Emission				
6	Injury due to contact with corrosive/hot substances please specify				
	UNSAFE ACTS				
7	Working without order/instruction/authorisation				
8	In attention / negligence while working with order / authorisation etc.				
9	Working with unsafe speed / method / procedure				
10	Working by taking in operable safety devices.				
11	Use of wrong tools or wrong use of tools				
12	Working on parts in motion				
13	Unsafe handling/stocking/mixing/positioning				
14	Failure to use safety equipments				
15	Damage of property/machine				
16	Suggested remedial measures				
17	Action taken				
18	Remarks by project in-charge				

Approved By
(Signature of safety personnel)

Safety IS Codes

Electrical and Electronics works safety codes

IS: 616:1986	Safety requirements for mains operated electronic and related apparatus for household and similar general use
IS:2309:1989	code of practice for the protection of building and allied structures against lighting
IS:3043:1987	code of practice for earthling
IS:4691:1985	Rotating electrical machinery, degrees of protection provided by enclosure
IS 5216(PART1) 1982	Recommendations on safety procedures Practices in electrical work part 1 general
IS :5571 1979	Guide for selection of electrical equipment for hazardous areas
IS:5572(PART1) 1944	Classification of Hazardous areas (other than mines) for electrical installation Part 1 Areas having flammable gases and vapors
IS:7689:1989	Guide for control of undesirable state electricity (rev1)
IS:9249 PART1 1979	Indicating and recording electrical measuring instruments and their accessories. Common safety requirements for instruments
PART2 1982	Safety requirements for instruments using main supplies

Transportation Safety Codes

IS 4357:1974	Methods for stability testing of forklift
IS6305 (part1) 1980	Safety code for powered industrial trucks:Part(1) Applications operation and Maintenance(First revision)
IS6305 (part2) 1980	Safety code for powered industrial trucks: Part(2) Manufacture(first revision)
IS7155:1986 1994	Code of recommended practice for conveyor safety. Part 1 to8
IS7631: 1993	Stability tests for pallet stackers and high lift platform truck pedestrian and rider controlled
IS9618:1980	Road tankers for liquefied petroleum gas
IS10311:1982	General Requirements for powered platform trucks and their acceptance criteria
ISO10312:1982	Safety code for powered two trucks
IS 11006: 1984	Flash back arrestor (Flame arrestor)
IS 12056 :1987	Recommendations for safety requirements for fuel tanks

9. Workmen Accommodation

Based on the below criteria , promoters to arrange the workman accommodation.

1. Project duration
2. Labour Strength
3. Location
4. Lighting arrangement
5. Water arrangement
6. Sewerage arrangement
7. Shops
8. Security facilities
9. Storm water drum
10. The Room dimension should be minimum 8’0” x 8’0”
11. Canteen facilities

PART - III

WORK QUALITY

1.0 Preliminary works (Before foundation)

1.1 Certificate from PE/ PM

Before starting the construction activities site preliminary analysis should be done as per the attached format and clearance certificate to be received from Project Engineer to start the work.

START OF WORK CERTIFICATE FORMAT:

CERTIFICATE FROM PM / PE

Company Name:	
Project Name:	
Survey No:	
Address:	
No. of Phase / Block:	
No. of floors	

I hereby certify that I will execute the Preliminary Works as Per the specification & drawing given by the MR / developer. And also I have verified all the checklist and all the safety precautions are in place.

PM / PE Signature

Date:

Enclosures:

1.Photograph

1.2. PROCEDURE FOR SITE PREPARATION:-

01. Check whether the available plot is approved.
02. Site should be cleared from all bushes and it should be kept in proper level.
03. Bench mark should be fixed.
04. Road map for approaching the site and width of the road.
05. All available resources should be checked.
06. Water and soil test should be carried out.
07. Land survey should be carried out and boundaries should be identified.
08. Mobilization of tools and machineries to be carried out.

1.3. Checklist for site preparation

Project Name : **Date :**

Sl.No.	Description of work	Verified		Remarks
		Yes	No	
	Mobilization			
1	Isolation of site (Fencing)			
2	Location of site office			
3	Location of Staff & labour welfare facilities			
4	Locations of store room			
5	Location of materials stocking yard (steel, Shuttering material, aggregates, bricks & debris, etc.)			
6	Location of first aid kit			
7	Ensuring safe access and safe working environment			
8	Temporary electrical supply			
9	Temporary water supply			
10	Trench works			
11	Proper lighting arrangements			
12	Providing security and monitoring the entry list			
13	Providing CCTV / Biometric system			
14	RMC Plant			
15	Providing telephone & Broad band facility			

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2. FOUNDATION WORK:

2.1 PROCEDURE FOR MARKING:-

Manual marking:

1. Check whether the foundation drawing and working drawing is available with approved signature and good for construction seal.
2. All setbacks should be checked along with GFC and approved drawings.
3. Formation of roads as per approved layout drawing.
4. The road area should be identified and cleaned. Road boundary stone to be laid.
5. All grid pillars should be made in level and line without any disturbance.
6. All grid pillars should be away from excavation area.
7. All centre line should be marked with arrow sign along with grid no's or name on the top of the grid pillar.
8. After checking the dimensions along with the diagonal, marking in grid pillars should be carried out.
9. All tools for marking should be made available.
10. Footing marking should be done as per drawing with as allowance of one foot on either side for workability if done manually.
11. Approval for marking should be obtained from QA/QC Engineers via checklist.
12. Before starting the earthwork for footing, marking should be done with lime or chalk powder.

Total station marking: (Survey)

1. Detailed drawing to be shared with surveyor (Survey drawing, Centerline drawing or super imposed drawings, etc.)
2. Reference point should be marked & properly fixed.
3. North point should be checked & marked.
4. As per the drawing set back should be marked first.
5. Plot the building foot print
6. Pile / Raft / column centre point should be marked and numbering to be provided for identification
7. Cross checking should be done with approved plan.

2.2 EXCAVATION

The Site Engineer / Site In-charge shall ensure the following:-

1. Marking as per the given Architectural GFC drawings and verify the set back and measurements as per the approved / sanction drawings along with the Quality–in charge. / PMC (If Appointed)
2. All the set out should be according to the drawings. Diagonals have to be checked.
3. Set out Main grid lines to be transferred outside the excavation area in the form of pillars as required, constructed at the same level.

4. Site Levels should be recorded and verified. Generally consider centre of the road level 0' 0" / GL+1 '0''and Stilt floor Car park level + 1'6" unless otherwise specified in Site Instruction Book / Drawing.
5. Safety measures to prevent sliding of earth and Barricading should be done around excavation if depth is greater than 6'0".
6. Checking the size of the excavated trenches to proper measurements.
7. For major structures structural consultant's clearance for the pilot pits to be obtained.
8. In case of overlapping foundation footings, structural consultant's advice to be obtained, where footings are very close.
9. When excavation is done using JCB / Poclain, final 6"depth to be excavated manually, in any case of over excavation, over excavated portion should be filled with approved soil.
10. Trees / roots which fall within the excavation pit should be cleared.
11. Working tolerances on all four sides of excavation pits shall be as follows unless otherwise specified in the "Good for Construction Drawings".
    a) Isolated / Combined Footings – 6" on all sides.
    b) Pilecap - 1' 0"
    c) Sump below 8' depth – 2'0"
    d) Lift Well – 1' 6"
    e) Plinth beam– 0' 6"
    f) Basement – 3' 0"

    The above tolerance level again depends upon the type of soil encountered.
12. Stacking of excavated earth to be done at a minimum distance 5 ' 0" away from the excavation pit.

Incase Pile foundation – earth work should be done carefully without disturbing the pile. In case of Raft foundation – Earth work should be done as per the required depth, and care should be taken for side wall sliding, barricading / railing, shoring, dewatering, etc,

Types of shoring work,

i. Diaphragm walls
ii. Pile walls (Contiguous, Tangent or Secant)
iii. Soldier pile with wooden lagging walls
iv. Sheet pile walls
v. Composite supporting systems – that is, any of the retaining

Systems (i) to (iv) above strengthened by Anchors, internal

Strutting etc.

2.3 QUALITY INSPECTION REPORT EXCAVATION FOR FOUNDATION

Project Name : **Date :**

Plot / Flat No : **Drawing No.:**

Location :

Sl.No.	Points to be Checked	Yes	No	NA	Remarks
	Earthwork Excavation				
1	Check set out				
2	Steel plug to be placed in all corners of the E/W pit				
3	Marking should be approved for earthwork				
4	Size and depth of excavation as per approved drawing				
5	Check barrication done after earthwork excavation				
6	Check ramp/ stairway/ ladder for access into excavated area				
7	Check shore slope				
8	Check for loose material				
9	Structural consultant's inspection for the initial pit done or not				
	Back Filling				
10	Check all construction debris are cleaned				
11	Check consolidation done every 300mm depth				
12	Check approved material is used				
13	Check compaction done on every 150mm				
14	Comments :				

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2.4. EARTH / SAND FILLING

1. Filling in should be in layers of 300 mm and consolidated by stagnating water and Roding. Clayey Soil should not be used for back filling. It should be carted away from site.
2. River Sand filling shall be done for a depth of 4" below PCC for foundation and flooring PCC.
3. Proper Button marks to be done in the trench to ensure that depth of sand filling does not exceed 4".
4. In case of lime sand filling, the same has to be consolidated with the help of ramming equipment, and the level of compaction needs to been sured as guided by the structural consultant.

Foundation Work

Foundations classified into 4 types

1.1 Isolated footing

1.2 Spread footing

1.3 Pile foundation

1.4 Raft foundation

Footing

2.5 PROCEDURE FOR FOUNDATION:-

1. After completion of sand filling pest control should be done with specified chemical by using sprayer.
2. P.C.C should be laid as specified in structural drawings which includes thickness and mix ratio (Refer Structural Drawing) of concrete. After laying P.C.C the surface should be rammed. All the footing bottom should be maintained same level.
3. After laying P.C.C, footing size, column size and orientation to be marked in bottom.
4. Footing matt and columns should be placed as specified in structural drawings.
5. After erecting the footing and column, column should be supported on both directions with plumb
6. Cover for footing bottom and side should be given as specified in structural drawings.
7. Depth of concrete for matt and slope should be marked at column reinforcement as specified in structural drawings.
8. Four sides of the footing should be supported with shuttering with clear cover.
9. Concrete should be approved by a QA/QC engineers via checklist.
10. Mixed concrete should not be poured more than 5' 0"height from footing bottom. If more than 5'0" use chute .

11. After laying, footing concrete required slope and shape should be attained.
12. After finishing footing, column concrete should be laid with specified ratio up to plinth beam bottom level. For column proper cover reinforcement should be maintained as per structural drawing.
13. After laying column pedestal concrete earth back filling to be done if it is approved to a minimum depth of 1m/layer and it should be consolidated in 300mm level /layer.
14. For laying plinth beam, bottom surface should be leveled and hardened by P.C.C.
15. After laying P.C.C plinth beam alignment should be marked on P.C.C where ever required.
16. Plinth beam Shuttering should be supported properly.
17. Concrete to be poured with specified mix as per structural drawings with check list.
18. Curing time minimum 7 days required.

2.6. PROCEDURE FOR PLAIN CEMENT CONCRETE

1. Use only the grade of cement recommended in the structural drawing.
2. Clean the sides of trenches at the PCC laid level.
3. Pest control to be done.
4. P.C.C in specified mix consisting of 25/40 mm aggregate shall be done below foundations and flooring as indicated in the drawing.
5. Marking & levels to be done with respect to drawing.
6. 6" off set shall be provided from the periphery of the RCC footing or as specified in the structural drawings.
7. Remove any loose soil by the side of the pit so that it may not collapse during Concreting.
8. Shuttering should with stand self weight, lateral pressure and stresses during placement and vibration of concrete .If water table is high dewatering should be carried out simultaneously during concreting.
9. Shuttering should be of exact size and thickness.
10. Button marks to be fixed over rivers and filling.
11. Concrete pouring area must be free from dirt and loose particles.
12. The concrete must not be dropped from more than 1 Mtr. height.
13. Ramming with hand rammer in the layers not exceeding 6" thickness.
14. Confirm that the cement, sand and aggregate are properly mixed before placing. Machine mixing only to be permitted.
15. If depth of pits exceeds 3 feet one labour should be in the pit to receive and pour concrete in position to avoid segregation.
16. Ensure that the top surface of PCC is levelled by ramming.
17. The sides of shuttering should be gently tapered & finished to get the smooth and uniform surface after deshuttering.
18. Do not allow use of extra cement mortar on top of PCC for smooth finishing.

    Curing must be done for a minimum period of 7 days.

2.7. CHECKLIST FOR FOOTING CONCRETE

Project Name : **Date :**

Plot / Flat No : **Drawing No.:**

Location : **Mix Proportion:**

Sl.No.	Points to be Checked	Yes	No	NA	Remarks
PCC					
1	Checked the footing size & depth of the Excavation				
2	Check the thickness of sand filling & PCC				
3	Check the anti-termite treatment properly done				
4	Check the proportion of mix (as per specification) properly done				
5	Check the top finishing is properly done				
RCC					
6	Checked the diagonal of footing				
7	Checked the diagonal of column marking				
8	Checked the outer edge of footing with reference to column outer				
9	Checked the dimension and orientation of the column as per drawing				
10	Check the depth of footing concrete provided as per drawing by using nail or binding wire mark				
11	Bar bending schedule are checked for footing and column as per drawing including nos. and orientation				
12	Check the reinforcements are free from clay, dust etc.				
13	Check whether cover block is provided for base and side of footing and also size of cover blocks				
14	Check the shuttering for concrete in straight line and with proper support				
15	Check footing are approved for concreting				
16	Check whether proper work force are in place 1. Vibrator 2. Gunny bags				
Comments:					

Prepared By **Checked By** **Approved By**

2.8. Pile foundation:

Type of foundation:

1. Driven pile
2. Bored cast in situ

2.8.1 DRIVEN PILES

Mobilization of Plant & Machinery

1. The contractor on award of contract shall mobilize all plant and machinery required to install the piles as provided in the pile layout drawing.
2. The piles shall be installed to carry the specified working load with the factor of safety of 2.5
3. If the plant brought by the contractor is not capable of required size, length and capacity, the same shall be replaced by suitable set contractor's expense.
4. It will be the responsibility of the contractor to provide evidence of the reported weight of the driving hammer in the case of drop hammers and detailed specifications of other types of hammers the contractor proposes to use in the work.

Working level

Piles shall be driven from existing ground level.

Positioning of the piles

1. Piles shall be positioned as per the working drawings supplied and revised from time to time, by means of standard surveying procedures.
2. Few groups of piles are located at a stretch, pile shoes fixed to the correct positions, before start of the piling in the area. Movement of rigs shall be done in such away that already placed piles shoes are not disturbed from its correct position.
3. The piles shall be positioned and driven as accurately as possible to the vertical and to the position. As a general guide the permissible positional deviation at cutoff, level shall be less than 75 mm for the piles in the group and be less than 40 mm for single piles.

Basic length of Pile

The cut off level(s) indicated in the working drawings may be with respect to the existing ground level as datum and the same shall be translated to the levels with respect to the original ground level with the help of the client or his authorized representative including owner's Expert Consultant.

Materials

1. Steel Reinforcements shall conform to IS1786 and IS432 for deformed steel bars and mild steel bars respectively and shall be used in all the RCC work.
2. The steel used shall be Fe 415/500 grade as specified by the Structural drawing.
3. Concrete shall conform to the requirements stipulated in IS456, M25 concrete is the minimum grade that shall be used for all RCC work.
4. Minimum cement content shall be 400 kg per cubicmetre. The slump shall be between 120 mm and 140 mm for the piling work.
5. The contractor shall submit the following before the commencement of piling work, for Engineer's review and recommendations.
   a. Weight of the hammer.
   b. Drop height of the hammer.
   c. Set criteria to achieve the specified working load, with the required factor of safety of 2.5.
   d. While calculating the final set for the pile, the assumption made for the temporary compression shall be specified.
6. The working pile shall be installed upon successful completion of load test on the test pile.
7. The sequence of the piling shall generally be from center to periphery, or from one side to the other side.
8. The contractor shall provide complete driving record in duplicate indicating number of blows for every 1 min the initial driving depths and for every 50 cm towards the end of the driving. The set stipulated during driving of the test pile shall be confirmed for three consecutive sets for all the piles and recorded in the driving record.

Concreting of piles

1. Concrete shall be placed by pouring into the casing free of water. If water is percolated into the casing before concreting, the same shall be drained out by suitable means. Workability of the concrete shall be maintained keeping the slump at 120 mm to 140 mm. The contractor shall keep one set of slump cone equipment for each piling rig and the slump shall be taken for atleast two batches of concrete, and if found not to the requirements, the entire concrete shall be summarily rejected before pouring into the casing.

2. One set of 6 cubes shall be taken for each pile and shall be tested for 7days and 28 days strength. The cube tests shall prove the required strengths within permissible deviations.
3. Minimum time shall be used for completing the concreting preferably within the initial setting of the first batch of concrete.
4. Height of concrete column in the casing shall be sufficient to overcome the hydrostatic pressure at the pile tip at the time of retrieval of the casing.

Reinforcement Cage

1. The reinforcement cage shall be fabricated using approved steel and according to the working drawing details. Length of reinforcement cage for each pile shall be estimated depending upon the driving length and the cut-off level
2. All the laps shall be 50 times the diameter and shall be tack welded. As far as possible the lap shall be provided at the bottom so that while resting on the shoe shall not get twisted.
3. The cover of 75 mm for the main reinforcement shall be achieved by sufficient number of concrete cover block as cover spacer, provided on the helicals. These spacer blocks shall be properly cured to attain enough strength.
4. The Contractor shall make the reinforcement cages with all the main bars truly vertical without any twist especially during lowering of the cage.

Initial load test

1. A systematic driving record shall be made available for the test pile so as to establish the set criteria for working piles. These piles shall be casted up to working level so as to facilitate testing at working level.
2. Test piles shall be tested up to 2.5 times the design load to account for skin friction along the excess length above cut off level.
3. The test shall otherwise be carried out according to the procedure stipulated in IS
4. The hydraulic jack and pressure gauges shall be calibrated and the calibrated chart made available before starting of the test.

Rejected piles and rectifications

Piles not conforming to the specifications may at the discretion of the owner or his authorized representative including Owner's Expert Consultant be totally rejected. Any remedial measures such as additional piles, enlarging pile caps, providing extra tie beams, etc., Shall be executed on prior confirmation from the Structural and Design consultant.

2.8.2.Bored cast in situ pile:

Pile Boring:

Work instruction

1. Prepare & check the column center line drawing.
2. Super impose the pile layout on the column center line drawing.
3. Spacing of pile should be checked With the help of digital survey. Plot the super imposed drawings at site .
4. Prepare rig movement chart for planning the sequence of work.
5. Marking the pile locations at site.
6. Pile spacing should be minimum 2.5 times of the diameter.
7. Cross checking of pile center point with adjacent piles.
8. Ensure the center point of rig to center point of pile.
9. The tripod should be centered to the pile point by using plumb bob.
10. Check the dia of the casing and chisel to avoid the eccentricity of pile and ensure verticality of pile.
11. Casing pipe diameter should be equal to the pile diameter.
12. The pile point should be checked with minimum 2 or 3 reference pile points.
13. Boring should not done in the adjacent pile immediately
14. Use Bentonite solution for bore wall stability.
15. Bentonite with heavier density will protect the bore hole from collapsing
16. Bentonite density to be checked with Hydro meter for 1.45 to 1.5
17. Before reaching the hard strata sample to be collected at every meter intervals to check & compare the actual soil sample as per soil test report
18. Pile socketing to be done with minimum depth of 1.5 times of pile diameter
19. The expelled soil particles of bore to be collected at every metre level
20. After reaching the hard strata close monitoring is required to ensure the socketing depth.
21. To ensure whether the pile is socketed inside the hard strata.
22. Drilling Mud, corresponding to basic properties given under appendix A under Clause 4.3 of Part I-IS 2911, Sec-2, shall be used to keep the sides of the bore holes established.
23. The drilling mud shall not get spread outside the working area and shall not create any hindrance to moving traffic and shall be suitably disposed off without causing any nuisance to the surrounding area in a manner approved by the Engineer-in -charge.

Pile Reinforcement:

1. Check the Dia and spacing of bars
2. Check the stiffener bars to avoid twisting of Reinforcement
3. Check the helical & Staggered lap length as per structural drawing.
4. Lap length to be welded properly
5. Cover to be ensured
6. Anti-corrosive coating used for shallow water depth.
7. To ensure the bars as per design
8. Welding done at lapping area (Avoid continuous welding) Joints in longitudinal reinforcement bars, if unavoidable, shall be made by lapping and the laps shall be tack-welded to prevent distortions of the reinforcement cage.
9. 16mm diameter Stiffener rings used at 2 metre spacing for holding the reinforcement.
10. Helical continuous stirrups should be used
11. Special type of cover blocks of minimum 40mm thick to be casted and tied to the stirrups.
12. The reinforcements of the Pile should projected out, above the top level of the Pile by a minimum length of 1000 mm or as specified, to be later or bent and embedded in the Pile Cap Concrete.

Pile Flushing:

13. Tremmie pipe dia and depth to be measured
14. Decrease the density of bentonite solution from 1.5 to 1.2
15. Tremmie pipe to be fixed and depth to be calculated by deducting the immersion depth of funnel into the casing pipe to identify the length of tremmie pipe.
16. Maintain minimum bottom clearance of 40 cm from the bottom of bore hole.
17. Bentonite density should be measured by using hydro meter.
18. The density of bentonite should be lower than concrete.
19. To avoid concrete getting mixed up with the thicker suspension of mud.

Pile Concrete: (Before concrete)

1. Calculate the volume of concrete and minimum cement content to ensure the correct quantity and quality of work
2. Ensure reinforcement & bore depth are same

3. Slump of concrete should be 150 – 180 mm (For under water) to ensure the workability & free flow of concrete
4. Slump level to be measured by using slump cone apparatus
5. Based on the bore depth volume to be calculated and cement content as per structural consultant instruction
6. As per bore depth pile reinforcement should be made and inserted on the bore.
7. Maintain minimum 0.4 meter clearance from the bottom of the bore hole.

Pile Concrete (During concrete):

1. To ensure the tremmie pipe always inside the concrete (Min 1.5 Mtr depth) up to completion of concrete to avoid slush entering in to the concrete
2. Total volume of concrete & raising level to be monitored, for avoid sliding / caving of soil and No slush mixing with concrete.
3. By measuring the volume of concrete the tremmie pipe should be removed at regular intervals
4. 0.4 metre clearance ensure free flow of concrete
5. Allow the concrete to over flow
6. The first load of concrete poured mixed with mud and it should be brought out
7. Pour calculated excess loads to bailout the first load of concrete mixed with mud
8. Concrete shall be placed at least up to 1000 mm above the Cut-Off Level.

Pile Concrete (After concrete)

1. Remove the casing pipe with double rope and tremmie pipes.
2. Check the volume of concrete poured inside the bore hole to ensure the concrete depth
3. Compare actual & theoretical consumption of concrete

Labour mistakes can be possible at the time of piling

- Labour will not aware the maximum eccentricity of pile - Before fixing of casing & boring, the pile point should be marked and cross verifying with three reference points. (Include diagonal verification)
- Labour will not aware the DMC rod boring at the centre point of casing – incase the DMC rod was not in centre of casing bore will not go straight. So always monitor the DMC rod boring at the centre of casing pipe.
- Labour will not aware the bentonite density and use – So always monitor the bentonite density around 1.45 – 1.5 at the time of boring.
- Incase labours will throw some scrap bit rods in to the borehole to show the

stratum is reached when boring – so closely monitored the operators and labours. (don't allow the labours misuse scrap bit rods)

- At the time of 100 blows test, reference line to be taken from the top of the DMC rod, In case we take the measurement from casing (bottom) marking can be altered by the labors. And also close monitoring required for the DMC rope movement at the time of checking. Ensure run weld length of maximum 4'' in equal intervals of lapping when concreting funnel should not be taken more than 1.5 meter from inside the concrete.
- In case of manual concrete – Labour will do mistake for measuring & adding the minimum cement content for each load.(Using measuring box / jar)

Pile chipping

Pile chipping should be done as per the required size.

To construct the Pile Cap, the ground will be excavated to expose the top portion of the Piles, which will be dismantled neatly up to the cut-off level, chipping / removing all cracked, loose and unsound concrete.

The top surfaces of the piles will be kept rough and treated by keeping wet and application of neat cement coat, before concreting of pile cap to ensure bond with the pile cap concrete

(i) Preparation of Pile Head

The pile head should be chipped off to natural horizontal plane till sound concrete is met. The projecting reinforcement should be cut off or bent suitably and the top finished smooth and level with plaster of paris of similar synthetic material where required. A bearing plate with a hole at the center should be placed on the head of the pile for the jacks to rest.

(ii) Pile test

After completion of pile work, Testing should be done randomly or as per the structural consultant instruction.

The number of tests may generally be two percent of the total number of piles

required. The number of tests may be increased upto 5 percent in a particular case depending upon nature, type of structure and strata condition: The decision of the structural consultant in this regard is final.

Pile integrity test, Pile dynamic test, etc., test to be conducted prior to casting of pit caps to ensure its stability.

General Quality points:

For cast-in-situ bored RCC Piles, the Contractor shall get inspected the bore hole by the Engineer in Charge for proper Plumb, location, pressure of water and other requisites.

The diameter of the bore hole also to be checked in the case of Bentonite slurry circulated Bored Piles by lowering a guide ring through the depth of the hole.

The depth of the bore hole shall be measured by means of a chain to which a Plumb Bob weighing not less than 250 gm is attached.

The Quality Control requirements stipulated under relevant clauses vide

IS 2911 and IS 456 for Plain and Reinforced Cement Concrete, wherever relevant.

Recording of Results

1.	Pile No.	:
2.	Dia of Pile	:
3.	Date of pile casting	:
4.	Depth of pile	:
5.	Type of pile	:
6.	Concrete mix	:
7.	Test load	:
8.	Type of test conducted	:
9.	Date of start	:
10.	Date of completion	:
11.	Details of pressure gauge & dial gauges used for testing including calibration certificates	:
12.	Details of pile load test set-up	:
13.	Dial gauge observation	:
14.	Load displacement curve	:
15.	Results	:

1. The total settlement of mm ..... dia ..... pile corresponding to the load of MTis…….mm.
2. Total rebound after releasing the load is ..... mm
3. Net settlement for mm dia pile is ..... mm

CHECKLIST FOR BORED CAST IN-SITU PILES - BORING				
Project Name:		Block / Floor :		
Drawing Ref:		Date:		
Sl.No	Description of work	Verified		Remarks
		Yes	No	
	BORING			
1	Pile point marking as per drawings with total station			
2	Designate the pile points with numbers			
3	Check the respective pile points with adjacent points			
4	Plan the rig movement			
5	Ensure centre line of pulley is in line with pile point			
6	Check the dia of pile as per drawings			
7	Install min three reference pegs for casing pipe errection			
8	Check casing pipe dia and length			
9	Casing pipe errection to be checked with reference pegs			
10	Check chisel dia (max -75 mm from pile dia)			
11	Check one hour penetration for three consecutive hours (<250mm)			
12	100 blows check (< 20mm)			
13	Ensure depth within hard strata (1.5 D) at termination level			
14	Determination of depth of boring from casing top (chisel length + total length of DMC pipe)			
15	Check the sample at terminated level			
16	Density of bentonite solution during boring (1.45 to 1.5)			
17	Monitor flushing throughout the boring process			
Checklist for Bored cast in-situ piles - Reinforcement				
Project Name:		Block / Floor :		

CHECKLIST FOR BORED CAST IN-SITU PILES - REINFORCEMENT

Drawing Ref:		Date:		
Sl.No	Description of work	Verified		Remarks
		Yes	No	
	REINFORCEMENT			
1	Length of pile cage according to bore depth of site			
2	Diameter and number of longitudinal bars as per drawings			
3	As Per drawing			
4	Length beyond 12m,use welded lapping			
5	Min length of weld and numbers(150mm @ 450c/c) for lapping			
6	Dia of helical bars and spacing			
7	Dia of cage			
8	Dia of stiffner bar and spacing			
9	Overlapping of stiffner (350mm)			
10	Providing circular cover blocks			
11	Mainbar to stiffner - welded connections			
12	Rigid tie of mainbar to helical bar at intersections			
	FLUSHING			
1	Selection of tremmie pipes(individual length and dia)			
2	Length of Tremmie pipes			
3	Check funnel depth inside the casing pipe			
4	Gap between the trimmie and bore bottom (200 to 400mm)			
5	Density of bentonite solutions(1.1 to 1.2) before concreting			
6	Check concrete stopper (lid) properly fixed. Ensure funnel surface is completely wet			
7	Remove slush from funnel after lid fixing			

CHECKLIST FOR BORED CAST IN-SITU PILES - CONCRETING				
Project Name:		Block / Floor :		
Drawing Ref:		Date:		
SI.No	WORK DESCRIPTION	Verified		Remarks
		Yes	No	
	CONCRETING			
1	Type of cement - OPC/PPC - Grade - 43/53			
2	Mix ratio - As per structural drawing			
3	Ensure Min cement content - As per structural drawing			
4	Slump value (150-180mm)			
5	Quantity of water			
6	Drop the first concrete for the min of 0.5 to 0.6m^3 (using lid)			
7	Ensure tremmie always inside concrete (min 1.5m)			
8	Take specimen for testing min six (150mm cubes)			
9	Continue pouring till the fresh concrete coming out			
10	Remove the casing pipe with two side rope			
11	Compare actual and theoritical consumption			

2.8.3 Raft Foundation:

1. Soil surface to be checked with soil test report for soil strata
2. Earth work should be done as per the required depth
3. After completion of earth work structural consultant should visit the site
4. Before PCC laying work slush to be removed
5. Consolidation should be done properly
6. Dewatering to be done if required
7. Loose soil should be removed before PCC
8. Sand filling should be done as per the required depth & ramming to be done.
9. PCC as per structural dwg
10. Removing slush by manually and earth ramming with mechanical rammer.
11. The foundation should be rested on hard strata.
12. Reinforcement as per the structural / architectural drawing and bar bending schedule
13. Reinforcement to be checked to ensure the correct placing, and ensure the dia, spacing , lapping, development length and anchorage, and ensure the cover and alignment
14. To ensure the quality of material as per IS standards.
15. Dia and spacing of bars to be checked
16. Location & size of beams to be checked
17. Stirrups spacing at column and beam junction to be checked
18. Binding with double strands of GI wires.
19. Spacer bar should be placed in double level reinforcement
20. Bar cutting , staggered lapping, anchorage, development length as per structural drawing
21. Column & beam orientation to be checked with centre
22. Proper cover to be checked.

CHECKLIST FOR RAFT SLAB / BEAM REINFORCEMENT

	Poject Name:	
	Archirectural dwg rev no with date	
	Structural dwg rev no with date	
	Date :	
	Slab Detail :	

S.NO	PARTICULARS	YES	NO	REMARKS
1	Centering Material acceptable quality			
2	Reinforcement for beams & slabs as per Structural drawings Eloborate			
3	Structural Drawing Details			
4	Structural engineers signed drawing			
5	Beam & column orientation marking as per dwg			
6	Column reinforcement before slab casting			
a	Diameter of the rod (as per structural dwg)			
b	No. of rods (as per structural dwg)			
c	Check the spacing of the stirrups (as per the dwg)			
d	Check the distance of the lap length			
e	If using coupler proper threading (covered with proper PVC cap)			
f	Check the lap length			
g	Check the proper tie			
h	Check the cover block provided (as per dwg)			
7	Beams Reinforcement			
a	Stirrup dia & spacing			
b	Main Reinforcement(Bottom & Top)			
c	Anchorage			

d	if lapped,lapping at appropriate point			
e	Proper tying			
f	Cover Block			
8	Slab Reinforcement			
a	Dimensions Of Reinforcement			
b	Spacing of Reinforcement			
c	Crank Length			
d	Development Length			
e	Space for top and bottom reinforcement			
f	Cover Block			
9	Beam & Column Junction reinforecement tying			
10	Cut and open if required			
10a	Electrical concealed line completed as per Electrical Drawing (if required)			
11	Proper shuttering / Brickwork Raft slab outer side			
11a	(PCC) Floor cleaning			
	SITE ENGINEER'S SIGN			
	DATE			

RMC:

One engineer will ensure the quality of mix at the batching plant.

RMC CHEKLIST

SL NO	DESCRIPTIPON	YES	NO	REMARKS
1.	Does the Delivery ticket (Challan) contains the following information regarding the Customer:			
2.	Name of the ready mixed concrete Company			
3.	Plant designation if Company operates more than one plant			
4.	Serial No. Of ticket			
5.	Delivery date			
6.	Truck No.			
7.	Name of the Purchaser			
8.	Name& location of the site			
9.	Does the Delivery ticket (Challan) contains the following information regarding the Product			
10.	Unique reference for the fabrication mix design			
11.	Grade of concrete or mix description of the concrete			
12.	Specified target workability at pour site			
13.	Minimum cement content (if specified)			
14.	Type of cement and grade (if specified)			
15.	Maximum free water-cement ratio			
16.	Nominal maximum size of aggregate			
17.	Generic type or name of chemical admixtures included			
18.	Generic type or name of mineral admixtures included			
19.	Quantity of concrete in $_{m}3$			
20.	Time of loading			
21.	Signature of authorized person			
22.	A statement warning the purchaser of the precautions needed to be taken when working with cement and wet concrete.			
23.	Does the Delivery ticket (Challan) contain the following information regarding the Delivery?			
24	Time of arrival at site			
25	Time when discharge was completed			
26	Any admixture added by the customer to meet the specific workability			
27	Any extra admixture added at request of the purchaser of the concrete, or his representative and his signature			
28	Pour location			
29	Is the Delivery Ticket (Challan) duly completed and undersigned by a relevant authority or by the customer on site?			

READYMIX CONCRETE ENTRY CHART

Project Name :					Block :			Date :	
S.No	Vehicle No	In Time	Out Time	Concrete Qty	Slump Value	Cube Sample	Quantity	Cum. Total	Remarks
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Site Engineer Name **Checked by**

2.9 ANTI – TERMITE TREATMENT

The Site Incharge and Site Engineer shall ensure the following:-

1. The area should be cleaned before application and the treatment should be done as specified in Contract / IS Code.
2. Incase of RCC foundations, the concrete being dense (1:2:4 rich mix), treating the surface from the bottom of excavation is not necessary. The termites are unable to penetrate through the dense concrete mix.
3. The treatment shall start at a depth of 500 mm below the GL except when such ground level is raised or lowered by filling or cutting after the foundation is cast. In such cases the depth of 500 mm shall be determined from the new soil resulting from the filling or cutting mentioned above and soil in immediate contact with the vertical surfaces of RCC foundations. Such area to be treated at the rate of 7.5 ltr / m2.
4. The top surface of consolidated earth within plinth walls shall be treated with chemical emulsion at the rate of 5 ltr / m2 of the surface before the sand bedor sub-grade is laid.
5. If the filled earth has been well compacted / rammed and the surface does not allow the emulsion to seep through, holes upto 50 to 75 mm deep at 150 mm centers both ways to be made with 12 mm diameter mild steel rod on the surface.
6. Saturation of the soil with the chemical emulsion to be ensured.

QUALITY INSPECTION REPORT – ANTI – TERMITE

Project Area :

Project Name : **Description of Work:**

Sl.No.	Item/Activity Inspected	Conforms To Plan Yes/No/NA	Remarks Initials of Site Engineer
	Check Surface Preparation		
	Check Chemicals, including the expiry date. Chemicals to be brought in original container and diluted in presence of site in charge?		
	Check Treatment (Finished Work)		Application as per Manufacturer's Instructions

3. STRUCTURAL WORK

3.1 COLUMN WORKS:

Column Shoe marking:

1. Below ground level shoe concrete to be ensured without mud or foreign particles
2. Check Size of the column , Grade of concrete & thickness of shoe concrete as per the architectural & structural drawing.
3. After placing the shoe concrete shear key should be provide (Blue metal stones)
4. Marking & Cast the column Shoe concrete in grid wise to ensure the alignment / orientation of the columns
5. Shoe mould should be removed after setting the concrete
6. Avoid cracks and damages in shoe concrete

Column Reinforcement work:

1. Check the location and size of column shoe to comply with the structural requirements.
2. Check the finishing of shoe concrete to ensure the column size & alignment
3. Placing of Reinforcement with proper cover to withstand more shear stress developed at support, to counteract with seismic force.
4. If we don't provide proper cover the rod will corrode with time and it will cause pre matured failure.
5. Check Dia of bars, Spacing of bars, spacing of stirrups.
6. Check Spacing of stirrups at column junctions.
7. Check Lap length and staggered lapping as per structural dwg.
8. Check Cover block & Binding with double strands of MS wires.
9. Rust if any, the rod should be scrapped properly.
10. Check for dowel provision wherever necessary.
11. Top level of column height should be marked on all column reinforcement before concreting.

CHECKLIST FOR COLUMN REINFORCEMENT				
Project Name :		Date:		
Arch. dwg rev no with date		Block / Slab Details		
Structural dwg rev no with date				
S.NO	PARTICULARS	YES	NO	REMARKS
1	Dia of the reinforcement (As per the dwg)			
2	No of rods (As per the dwg)			
3	Check the dia & spacing of the stirrups (As per the dwg)			
4	If using coupler, ensure it is properly threaded.			
5	Check the lap length (As per the dwg)			
6	Check the distance of lap length for next floor level			
7	Check proper tie			
8	Check cover block provided (As per the dwg)			
9	Column curtailment followed as per structural drawing			
	SITE ENGINEER'S SIGN			
`	DATE			

3.2 Column Shuttering:

1. Check the material quality to ensure the good finishing of concrete
2. Check the column size , alignment & orientation to ensure the shuttering in position and vertical and to maintain the cover properly
3. Check the supports and tie.
4. To avoid bulging of concrete and cement slurry loosing out through joints while concreting (Bleeding) , which creates honeycomb
5. Check the verticality to ensure the eccentricity as mentioned in IS 456 sec 3 – 25.4
6. Use ply wood of minimum 12mm thickness with density of 34 kg /mm^2 , and Oil apply to be checked.
7. Column size & alignment as per structural / architectural drawing , and Fix wooden gauge at the top of the column box to maintain the cover.
8. Proper props support at four sides and proper tie rods with Bolt nut and it should be air tight.
9. Column verticality checked by using plumb bob at two adjacent face.
10. The propping angle should be inclined at (45^0) to the floor.
11. Plumb and column alignment to be checked before and immediately after the concrete has been poured and vibrated.

3.3 Column concrete:

1. Check mix ratio by using concrete pour card & checklist, it should be monitored to ensure the quality of concrete
2. Before laying the concrete, the surface should be cleaned & wetted.
3. Before laying the concrete, the entire existing concrete surface should be applied or smeared with cement slurry. Bonding chemical to be use wherever necessary.
4. Proper pouring , vibrating and leveling to be done
5. Check the verticality of column, for 2 adjacent sides of the column verticality should be checked by using plumb bob.
6. Check water cement ratio / slump Value by using slump cone apparatus it should be checked at regular intervals, to ensure the workability of the concrete
7. Take cube samples at every 5 cu.m of concrete as per NBC norms, by using Cube mould as per the standard procedure, to ensure the compressive strength of concrete.
8. For end columns concrete should be poured after verifying the structural drawing for seismic design, by verifying structural dwg and physical inspection.

9. Proper vibrating & Curing to be done - Compacting by vibrator needle with layer by layer & curing with wet gunny bags..
10. Top level of column should be checked for any loose mortar, if any should be removed after de-shuttering.
11. Date of concreting should be marked on column. After de shuttering Minimum 7 days curing required.
12. While loading the material in the mixer machine hopper, the sequence of loading is to be followed as per the mix design.

Concrete Mixing machine should run for 2 to 3 minutes.

Admixtures if any should be added during mixing in water as per recommended dosage. Then balance aggregates to be fed into the concrete mixer drum.

Date of concreting should be marked by paint and minimum. 7days (Three times per day) curing should be done.

CHECKLIST FOR COLUMN CONCRETE

Project Name:		Date:			
Plot / Flat No:		Drawing No.:			
Location:		Mix Proportion:			
S. No	Points to be Checked	Yes	No	NA	Remarks
PRE Concrete					
1	Checked the shoe marking before shoe casting				
2	Checked the reinforcement details as per the reference drawing				
3	Checked all binding wires tied properly and not projected outwards				
4	Checked the verticality of column shuttering				
5	Checked the roof top level marking with paint in all columns				
6	Checked the cover block properly placed				
7	Checked the shoe is clear from dust particles				
8	Checked the column shuttering is free from twisting				
9	Checked the dowels for lintel beams if wherever necessary				
10	Checked the supporting of column box properly (If width is more than 1’3" support should be fixed 2 nos. at each directions)				
11	Checked the column rod lapping				
12	Checked Whether proper work force are in place 1. Vibrator 2. Mixer Machine 3. Measurement box 4. Gunny bags				
During Concrete					
13	Checked the column plumb properly with 6" wooden plug at top and bottom				
14	Checked the cement slurry is laid (CM 1:1)				

15	Checked the vibrating properly done				
16	Checked the 20 mm aggregate is placed for friction purpose at the top of the column				
Post Concrete					
17	Checked the honey comb is properly injected				
18	Checked the column concrete is higher than bottom of the roof beam				
19	Checked the hacking is done properly				
20	Checked the date of casting is marked				
21	Checked the column surface is covered with gunny bags				
Comments:					

3.4 CUBE TESTING

1. Take the number of cubes as per the specifications.
2. Damaged or irregular cubes should not be tested.
3. Measure the cube dimensions to determine density of concrete.
4. Record dimensions and calculate volume.
5. Record face dimensions and calculate area.
6. Weigh each specimen and record its weight to the nearest 0.5 gms.
7. Ensure that the testing machine bearing surface and the cube surfaces are in proper contact and the plates are clean and free from any loose materials.
8. Ensure that no packing issued between the cubes and the plates.
9. Center the cube on the lower plate .
10. The load shall be applied to two opposite faces of the cube.
11. Apply and gradually increase the load at a nominal rate within a range of 12-24 N/mm2 (270-540 N) in1 min. There should be no jerky movement.
12. Record the maximum load applied to the cube which results in its failure.
13. Calculate the strength in N/mm2 and round off to the nearest value of 0.05 N/mm2.
14. Record any unusual features in the type of failure.
15. In the Cube Test Register, record the weight, size, strength and any remarks and compressive strength of the concrete cube.
16. The no. of cubes as per IS 456

Quantity of Concrete in M^3	No.of samples
1 - 05	1
6 - 15	2
16 - 30	3
31 - 50	4
51 to above sample for	4 plus one additional
Each 50M3 orpart thereof	additional

17. Where concrete is produced at continuous production unit such as ready mixed concrete plant, frequency of sampling may be done as a minimum of 6 cubes shall be taken for every pour. If pour quantity is above 30 cum, 1 set of cubes is to be taken for every 6 cum poured.
18. For the accurate results, the casted sample cubes are to be placed near the respective structure constructed. Curing of the structure and cube takes place at same time For eg: for the cube samples of column to place near the column and curing activity to happen as that of column.
19. The concrete cubes are to be tested at 7 days and 28 days.

3.5 SLUMP TESTING

Slump shall be checked as per the sampling rate specified in the specifications or whenever there change in the consistency of the concrete

1. Ensure that the internal surface of the slump cone is clean and damp.
2. Place the slump cone on a smooth horizontal non-absorbent surface.
3. Hold the slump cone firmly and fill in three layers, each of approximately 1/3rd height of the slump cone when tamped.
4. Using tamping rod of diameter 16 mm and length 60 cm, tampeach layer with 25 strokes uniformly distributed over the cross-section of the concrete layer.
5. While tamping the first layer, it must be ensured that the tamping rod does not forcibly strike the surface below.
6. When tamping the 2nd and 3rd layer, ensure that the tamping rod does not penetrate significantly any previous layer.
7. Wipe of the external surfaces of the slump cone and clean the base plate.
8. Slowly and gradually, lift the slump cone vertically and place it adjacent to the slumped concrete.
9. Place the tamping rod on top of the slump cone.
10. Measure from the underside of the tamping rod to the highest point of the slumped concrete.
11. Record the slump to the nearest 5 mm accuracy.
12. In the Concrete Pour Card record the details such as slump, concrete temperature, day, date, time, location of concrete.
13. Allowable slump for pumpable concrete should be in the range of 90-100. And should not exceed 100.

3.6 Roof slab shuttering:

1. Check Room dimensions, alignment of beams, proper support, bracing the supports, to be checked with Architectural and Structural dwg.
2. Check Shuttering levels by using leveling instrument & spirit level / level tubes and marking gauge to ensure alignment and finishing
3. Check shuttering gap filled with wooden planks / Taping and oiling to avoid bleeding of concrete.
4. Check Props and spans should not be extended to the maximum length,(incl cantilever areas), to ensure maximum efficiency of props & spans and to avoid bulging .
5. To check the inner surface cleaning from rubbish, wooden pieces, sawdust by verifying physical inspection and it should cleaned with air blower ,broom stick & water.

3.7 Roof slab reinforcement:

1. Check the cut openings & ducts.
2. Check development length ,crank, lapping, cover, column & beam joints
3. Check spacing between top & bottom of reinforcement
4. Check the column lapping for next floor level.
5. The above points to be checked to ensure the work as per the structural drawing.
6. Binding with double strands of MS wires.
7. Work to be checked with Bar bending schedule
8. Dowels if required
9. Extra rod provisions if any.
10. Roof beam reinforcement bent up & tied with column for seismic.
11. Column & beam junctions stirrups should be provided in column.

3.8 Roof slab concrete:

1. Material quality tests (Cement, Sand, Blue metals & water) should be done before starting the work. To ensure the strength of concrete.
2. Always check the materials before using, and after getting the report with meets the IS requirements then only it should be used.

3. Water must be clean, fresh and free from any dirt (Don't use sea water), unwanted chemicals or rubbish mixed in water that may affect concrete and it may rust the steel reinforcement in the concrete. so Always check water before use.

4. Check Grade of concrete & minimum cement content instructed by the structural consultant (also refer NBC norms) To ensure the strength achieved as per the structural design, Mix ratio - To be checked with every load of concrete by using concrete pour card

5. Check slump level, admixture if required. The slump test is done to make sure a concrete mix is workable. (Water cement ratio)

6. Water cement ratio to be used as per NBC norms , and ensure the quantity of water to be measured before mixing the concrete, slump cone apparatus to be used for slump level checking.

7. Avoid delay when transporting and placing of concrete, Delay can cause the concrete to dry-out and stiffen quickly.

8. To avoid delay plan ahead. Check that all labour, tools and containers are ready and that all preparations for placing have been done before the concrete is delivered.

9. Never try to make a mixture more workable by just adding more water, because this lowers the strength and durability of concrete

10. Check proper cover for reinforcement, to avoid the corrosion of steel bars.

11. Check the construction joint, Proper binding in between concrete joints to avoid cracks, which creates leakage. Cracking can weaken the concrete and spoil its appearance.

12. Number of joints should be planned well before the concrete is placed.

13. Old concrete joints to be chipped and required bonding material applied, after laying the fresh concrete proper compaction to be done.

14. Check the Electrical & plumbing pipe routings , To avoid the pipe routing in compression members.

15. Before placing the concrete , service lines should be laid as per the drawing properly.

16. Check proper compaction to be done, (Never touch the vibrator needle in form work & reinforcement and Never spread concrete sideways) , Strength and Durability are affected by improper compaction. And it may cause segregation of concrete.

17. Compaction is done by shaking, or vibrating. Put the Vibrator needle in to the concrete quickly and remove slowly.

18. Proper curing to be done , Curing is keeping concrete damp for a period, to allow it to reach maximum strength and Longer curing will give more durable concrete.

19. To avoid the pipe routing in compression members.

20. Proper cover to be placed & tied as per the structural requirement at regular intervals.

21. After laying the concrete pre wetting to be done, then water stagnation to be done (By constructing bunds and ponding water).

22. Expansion joints - Concrete expands and contracts with temperature variations, To allow this moment expansion joint must be provided at required intervals. This must be to the full depth of the slab and filled with flexible material, not timber. Reinforcement shall not extend across and expansion joint. (As per NBC or IS 3414 (1968) section 4.4 table -2)

CONCRETE POUR CARD

Site **Location** **Date**

Drawing Ref No.

S.No	DESCRIPTION OF WORK	YES	NO	NA	CHECKED BY	REMARKS
A. Before Concrete						
01	Shuttering checklist approved					
02	Reinforcement checklist approved					
03	Electrical checklist approved					
	If the surface is clean					
04	No. of cube taken					
05	Material Requirements Cement/Sand/Bluemetal/Cover blocks					
06	Labour, Machineries available					
07	Slump Value :					
08	Cement Consumption : Actual : Theoretical					
09	Quality of Water, Sand, Coarse Aggregate					
B. After Concrete						
10	Curing 7 days completed					
11	After De shuttering honey combs grouting if necessary					
12	Dampness in anywhere					
13	Hacking work completed					
14	Cube Test Results – RMC Name of Concern: 7 Days: Test Report No.: 28 Days: Test Report No.:					
15	Cube Test Results – Self 7 Days: Test Report No.: 28 Days: Test Report No.:					
16	Quality of Work					
Head of Site Incharge Sign With Name						
Head of QA / QC Sign with Name						

CHECKLIST PRIOR TO CONCRETING

Site **Location** **Date**

Drawing Ref No.

SL.NO.	DESCRIPTION OF WORK	YES	NO	NA	REMARKS
1	Check for completion of other preceding activities such as fixing of inserts & embedments and service conduits etc.				
2	Check for supports to forms and rigidity of the assembly. Is it OK?				
3	Check for provision of access platforms & walkways.				
4	Check for provision and working condition of concrete aids.				
5	Is the sequence explained to and understood by the concreting gang?				
6	Check for readiness of concreting & finishing gangs.				
7	Mode of concreting proposed				
8	No. of vibrators provided				
9	Quantity of concrete to be poured				
10	Starting time of concrete				
11	Grade of cement				
12	Concrete requisition slip no.				

Prepared by **Checked by** **Approved by**

CHECKLIST DURING TO CONCRETING

Site **Location** **Date**

Drawing Ref No.

SL.NO.	DESCRIPTION OF WORK	YES	NO	NA	REMARKS
1	Check for slump of the concrete being poured.				
2	Is a continuous flow of concrete being ensured?				
3	Check for pouring height of concrete. Is it acceptable?				
4	Is proper vibration being done till concrete fits tightly against all the form surfaces, reinforcements and embedments?				
5	Is blending of concrete poured in separate layers being ensured?				
6	Check for correct use of plant & machinery?				
7	Is concrete being poured within the initial setting time of cement?				
8	Check for provision of construction joints, if necessary.				
9	Check for levelling & finishing of exposed concrete surface for planar structures like slabs and pavements				
10	Quantity of concrete to be poured				
11	Completion time of concreting				
12	No. of concrete cubes taken				
13	Slump of concrete noted				
14	Concrete despatch slip no.				

Prepared by **Checked by** **Approved by**

CHECKLIST AFTER CONCRETING

Site **Location** **Date**

Drawing Ref No.

Sl.No.	DESCRIPTION OF WORK	Yes	No	NA	REMARKS
1	Check for suitable curing arrangements.				
2	Is adequate curing being ensured for specified period?				
3	Check for exposing of inserts and embedments that are flush with the concrete surface.				
4	Check for marking of location of service conduits & fittings where applicable.				
5	Check for corrective action on surface defects on exposed concrete.				
6	Check for removal of forms and their cleaning.				

Prepared by **Checked by** **Approved by**

WATER CEMENT RATIO:

Table 5 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum size (Clauses 5.1.2, 5.1.3, 7.2.4.1 and 8.1.2)

Sl.No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m^3	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m^3	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
1	2	3	4	5	6	7	8
I	Mild	220	0.60	-	300	0.55	M20
ii	Moderate	240	0.60	M15	300	0.50	M25
iii	Severe	250	0.50	M20	320	0.45	M30
iv	Very Severe	260	0.45	M20	340	0.45	M35
v	Extreme	280	0.40	M25	360	0.40	M40

Notes :

1. Cement content prescribed in this table is irrespective of the grades of cement and it is inclusive of additions mentioned in 4.2 The additions such as fly ash or ground granulated blast furnace slag may be taken into account in the concrete composition with respect to the cement content and water-cement ratio if the suitability is established and as long as the maximum amounts taken into account do not exceed the limit of pozzolana and slag specified in accordance with accepted standard [6-5A(19)]
2. Minimum grade for plain concrete under mild exposure condition is not specified.

3.9 Removal of shuttering:

Before removing the Form work props support should be given at the cantilever portions.

1. Sunshade – shuttering should be removed by giving counter weight at the lintel
2. When removing formwork it is important to avoid damage to the surface of the concrete and particularly to edges and corners.
3. Shuttering forming vertical faces of walls, beams & column sides should be removed first. Shuttering forming soffit to slab should be removed next.
4. Shuttering forming soffit to beams, girders or other heavily loaded member should be removed in the end.

Sl.No.	Type of form work	Minimum period before striking formwork
1	Vertical formwork to columns, walls, beams	16 - 24 hrs
2	Soffit formwork to slabs (props to be refixed immediately after removal of formwork)	3 days
3	Soffit form work to beams (props to be refixed immediately after removal of formwork)	7 days
4	Probs to slabs	
	Spanning up to 4.5 mtr	7 days
	Spanning over 4.5 mtr	14 days
	Probs to beams & arches	
	Spanning up to 6 mtr	14 days
5	Spanning over 6 mtr	21 days

CHECKLIST FOR CUTTING, BENDING & FIXING OF REINFORCEMENT

Site **Location** **Date**

Drawing Ref No.

SL.NO.	DESCRIPTION OF WORK	YES	NO	NA	REMARKS
1	Is the BAR BENDING SCHEDULE prepared				
2	Is the Bar Bending Schedule available for reference?				
3	Check for correct CUTTING & BENDING OF BARS as per BBS.				
4	BAR DIAMETERS				
5	SHAPES OF BARS				
6	DIMENSIONS OF BARS				
7	NUMBER OF BARS				
8	DENTIFICATION TAGS				
9	Check for CLEANLINESS of Bars.				
10	Check for correct FIXING OF BARS as per Construction Drawings.				
11	Relative positions of bars, spacing of bars				
12	Covers for reinforcement				
13	Provision of chairs, cover blocks & spacers				
14	Lap lengths & location of laps				
15	Check for satisfactory TYING of REINFORCEMENT with BINDING WIRE				
16	Check for location of Services conduits				
17	Check for READINESS of reinforcement for release for concreting				

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CHECKLIST FOR SHUTTERING DESIGN & MATERIALS

Site **Location** **Date**

Drawing Ref No.

SL.NO.	DESCRIPTION OF WORK	YES	NO	NA	REMARKS
1	Is a STRUCTURE-SPECIFIC SHUTTERING SCHEME designed?				
2	Is the shuttering scheme verified for SUITABILITY & SAFETY?				
3	Are SKETCHES showing the approved shuttering scheme available for reference?				
4	Check for PHYSICAL CONDITION of scaffolds and shutters. Are damaged and defective elements removed?				
5	Check for CLEANLINESS of forms. Is it acceptable?				
6	Check for application of MOULD RELEASING AGENT.				

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CHECKLIST FOR SHUTTERING ASSEMBLY

Site **Location** **Date**

Drawing Ref No.

SL.NO.	DESCRIPTION OF WORK	YES	NO	NA	REMARKS
1	Check for Assembly of Scaffolds and Shutters w.r.t. SHUTTERING SCHEME				
2	Check for Provision and Arrangement of the following: Ref. Shuttering Scheme				
3	H-FRAMES				
4	PROPS				
5	ADJUSTABLE SPANS				
6	BRACINGS				
7	CLAMPS & COUPLERS				
8	CHANNELS				
9	CLIPS				
10	PIPES				
11	WALL FORM PANELS				
12	CORNER ANGLES				
13	PLYWOOD OR TIMBER FORMS				
14	Check for RIGIDITY of Assembled Forms				
15	Check for CONFORMANCE of the Assembled Forms to DIMENSIONS, SHAPES, LINES & GRADES as shown on the drawings				
16	Check for SEALING OF JOINTS & HOLES in Shutter Forms.				
17	Check for READINESS of Shutter Forms for RELEASE to fix Reinforcement.				

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CHECK LIST FOR SHUTTERING AFTER REMOVAL OF SHUTTERS

Site **Location** **Date**

Drawing Ref No.

SL.NO.	DESCRIPTION OF WORK	YES	NO	NA	REMARKS
1	Check for removal of Shutter Forms & Scaffolds after SPECIFIED DURATION.				
2	Check Exposed Surfaces of Concrete for the possible occurrence of the following surface defects:				
3	HONEY COMBING				
4	LOSS OF GROUT				
5	SEGREGATION OF AGGREGATES				
6	BULGING				
7	INSUFFICIENT COVER TO REINFORCEMENT OR EXPOSED REINFORCEMENT				
8	ROUGH CORNERS OR EDGES				
9	BIG SIZED AIR BUBBLES				
	IF 'YES', THEN ENGINEER IN-CHARGE SHALL TAKE SUITABLE CORRECTIVE ACTION AND RECHECK				
10	Check for REPAIR & FINISHING of Exposed Concrete Surface. Is it satisfactory?				
11	Check for CLEANING of scaffolds & shutters after removal.				
12	Check for PROPER STACKING of scaffolds & shutters after removal.				

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4. BRICK WORK AND BLOCK WORK

4.1 Procedure For Brick Work / Solid Block Work:-

01. Bricks that we use it should be checked for quality such as soundness, size, and color and clean edges before unloading at site.
02. Quality Bricks only should be used.
03. Solid blocks can also be used with standard specification.
04. Damaged Blocks should be avoided.
05. All Solid Blocks and Bricks should be wetted before construction.
06. Cement mortar 1:5 for 9" wall and 1:4 for partition wall should be used.
07. Before starting the Brick works, entire surface should be cleaned and hacking should be one on concrete surface.
08. Brick work marking should be done as per working drawing and client requirement drawing duly approved by client and promoter authorized Person.
09. 9" brick work wall should be done up to 1.5m height only per day & 4.5" BW Wall should be done up to 1m height only per day.
10. Brick work marking should be carried out by doing 1 layer of wall by checking the room dimension right angle and diagonals.
11. For Partition wall Binder should be used for every 600mm height.
12. Horizontal & Vertical level should be checked in each and every layer.
13. In Brick Work vertical straight joint should be avoided.
14. Brickwork should be approved by QA/QC engineer via checklist
15. Pointing should be done properly and raked properly.
16. Gaps between beam bottom & Wall should be filled with Grano concrete.
17. All the openings should be marked during the progress of the work at specified Levels.
20. Date of construction should be marked with paints and minimum. 7 days (Three times per day) curing to be done.

4.2 AEROCON BLOCKS (Size 600 x 200 x 200 / 600 x 200 x 150 / 600 x 200 x 100)

Aerocon Blocks (Autoclaved Aerated Concrete Blocks) is an excellent substitute for clay bricks and hollow / solid concrete blocks for construction of walls. Aerocon Blocks are eco-friendly and gives comfortable living. Aerocon Blocks are made with a mixture of cement, fly ash, lime and special additives along with water involving aeration process that impart sits unique cellular structure. Aerocon Blocks are auto claved, i.e. high pressure steam cured, which gives strength and dimensional stability to the blocks.

4.2.1 Attributes of AEROCON Blocks:

1. Light Weight (Dry Density: 551-600 kg / cum)
1. 1/3 rd weight of clay bricks
2. Most ideal for high rise structures
3. Ideal for extension of existing buildings and for unplanned constructions
4. Saving in cement and steel due to less dead load
5. Suitable for low soil bearing capacity zones
6. Faster constructions-Saving in Labour

4.2.2.High Thermal Insulation (K value:0.12W/mK)

1. Thermal performance five times better than brick and ten times better than RCC
2. Provides comfortable interiors in all conditions
3. Saving in recurring energy cost in air-conditioning
4. Highly suitable for air-conditioned buildings

4.2.3.High Sound Insulation

1. Reduction up to 42 db
2. Can fulfill required STC (Sound Transmission Class) rating
3. Most ideal walling material for Hotels, Auditoriums, Malls, Hospitals, etc.

4.2.4.Easy of Workability

1. Can be cut using handsaw
2. Easy to cut and chase for plumbing and electrical works
3. Minimum wastage due to excellent workability.

4.2.5.Perfect Finish

1. Factory finished product with accurate and true to shape and size
2. Savings in cement plaster.

4.2.6.Green Building Benefits:

1. Manufacturing process is 100% recyclable-cut/use.
2. Reduces emission of Co2.
3. Raw material contains appx.70% recycled power plant waste (Fly Ash).

4.2.7.AEROCON For Big savings

1. Saving of Time and Labour.
2. Considerable saving in cement in wall constructions and substructure cost
3. Saving due to minimum wastage
4. Provides more carpet area than bricks due to wide range of size.

4.3 Method statement

1. Block work shall be constructed generally in accordance with BS 5628 part1.1978.
2. The area is to be cleaned, all loose materials to be removed.
3. Before starting of blockwork, the area is to be washed with water.
4. All block shall be thoroughly wetted with water before they are laid and tops of walls left from previous day work shall be similarly wetted before the new work commences.
5. Block work shall rise at the rate of four courses per 900 mm. A maximum of 6 courses being built in a section in any one day.
6. Walls shall be built in stretcher bond unless otherwise specified.
7. Cutting of blocks shall be kept to a minimum. When cutting of blocks is essential, a bolster shall be used in preference to a trowel.
8. All units shall be laid on a full bed of mortar in perfectly horizontal courses. All perpendicular joints shall be in perfect vertical alignment and well filled by buttering the ends of the unit and then sliding in to position against its neighbor. Collar joints shall be filled by buttering the stretcher side.
9. All joints shall be solidly filled and the thickness of the joints shall not exceed 10mm. All mortar joints shall be finished flush with the general face of the wall unless otherwise specified.
10. Curing of block work should be done for at least 7 days.

CHECK LIST FOR BLOCK / BRICKWORK

	Project Name :			
	Archirectural dwg rev no with date:			
	Date :			
	Block/Flat Detail :			
S.NO	PARTICULARS	YES	NO	REMARKS
	R.C.C Surface hacked (Column & Beam bottom)			
1	Cleaning of entire Flat before starting masonry marking			
2	Dimensions & right angle of room (after marking)			
3	Sill level and lintel level marked on the column			
4	External wall features Windows, Doors & Ventilators check with architectural drawing			
5	First layer of brick work completed and checked			
6	Horizontal & vertical alignment of brick work			
7	Mortar mix ratio			
8	Bricks pre wettting			
9	Window Sill crete - Reinforcement & Concrete			
10	A/C sill crete -Reinforcement & Concrete			
11	4.5" wall 3' level sill crete - Reinforcement & Concrete, inn through sill concrete at 3" level for 4.5" brickwall			
12	Lintel loft - Reinforcement & Concrete			
13	At 7' level through sill concrete at 3" level for 4.5" brickwall			
14	Brick work pointing on both sides(v Groove)			

DATE

SITE ENGINEER'S SIGN

5. Electrical work

1. Ensure that all combustible material like paints, thinner, cotton waste paper etc. are isolated from the work area. If not possible, the same should be covered with fire resistance blankets.
2. Ensure that fire extinguisher is available.
3. Heat spread due to radiation should be prevented.
4. Do not weld by keeping fire-prone material inside your pocket.
5. Never mix water and electricity. Always keep electrical appliances away from water and moisture. Whether it is on or off, if a plugged-in appliance falls – or is accidentally dropped – into water, do not attempt to retrieve or unplug it. Go immediately to your home's panel board and shut off power to the corresponding circuit. Once that is done, the appliance can be safely unplugged and removed from the water. Once the device has dried thoroughly, have an electrician evaluate whether or not it is fit for continued use.

5.1 Procedure For Electrical Works:-

1. Electrical layout should be compared with specifications and client requirement for further progress.
2. 2mm wall thickness conduit should be used for roofing.
3. All electrical points to provide as per electrical drawing.
4. Sufficient Earth link should be done.
5. Modular metal box should be fixed only after completion of button mark fixing in wall and it should be plain with plastering level.
6. All the heights of the switch boxes should be followed as per the drawing.
7. All the conduits joints should be pasted.
8. No conduits can be left open on the terrace and external surfaces.
9. Uniform colour of the wire should be maintained for phase and Neutral.
10. Unnecessary wire Joints should be avoided.
11. Size of wire should be checked with specifications.
12. Two way switches and fan points should be done as per drawing.
13. Electrical & TV, Telephone, Speaker line should not run together or cross at any junction.
14. Electrical works should be approved by QA-QC Engineer and the circuit diagrams should be recorded.

CHECKLIST FOR ELECTRICAL WORK BEFORE ROOF CONCRETE

Project Name:		Date:			
Plot / Flat No:		Drawing No.:			
Location:					
S. No	Points to be Checked	Yes	No	NA	Remarks
1	Checked the electrical points are given as per client requirement and drawings				
2	Checked the possibility of route as possible as shortest distance from D.B				
3	Checked the required size of pipe is placed				
4	Checked the possibility to avoid overlapping in pipe line				
5	Checked the fan points are given at top of cot or sofa sets position				
6	Checked the gap given between two or more pipe lines				
7	Checked the gaps are given between drops pipes				
8	Checked there is no crossing between power line and telephone line				
9	Checked the ceiling light points or fan points are given after deduction of loft area and placed at centre				
10	Checked that all drops are packed properly by packing tape and thermocol				
11	Checked there is no damage in pipe line and tied by G.I wire and packing tape				
12	Checked the fan box and chandelier points are tied in top of steel properly				
13	Checked the telephone, TV point & pipe line are fixed for GF & FF requirement				
Comments:					

Prepared By	Checked By	Approved By
Site Engineer	Sr. Engineer	QA/QC Engineer

CHECKLIST FOR BEFORE WALL PLASTERING - ELECTRICAL

Project Name:		Date:			
Plot / Flat No:		Drawing No.:			
Location:					
S. No	Points to be Checked	Yes	No	NA	Remarks
Electrical Pipe					
1	Checked the marking of switch box and pipe line works completed before starting wall chasing work				
2	Checked the switch box are placed easily accessible area and not affected by door shutters and any other furnishing work				
3	Checked the circuit lines are shortest distance from DB board				
4	Checked the model of switch box are given as persuitable for required points				
5	Checked that all points are given as per client requirement				
6	Checked the gaps (3 - 6mm) are given between pipelines				
7	Checked there is no crossing between power line and telephone line or TV or speaker lines				
8	Checked there is no damage in pipe lines and joints				
9	Checked the pipes are tied by wire with nails properly				
10	Checked the switch boxes were packed properly by packing tape or sand.				
11	Checked there is no light points and split AC points were placed in same wall				
12	Checked the light point are in correct position				
13	Checked the outlet pipe were provided for split AC line				
14	Checked that all geyser point in toilet were placed correctly and it is not disturbed by geyser unit and shower				
15	Checked the points were given within MCCB capacity				
16	Checked the TV, Telephone & computer points were given as per drawing				
17	Checked the switch boxes were fixed as per required height from FFL				

CHECKLIST FOR FIXING OF ELECTRICAL SWITCHES AND COVER PLATES

Project Name:		Date:			
Plot / Flat No:		Drawing No.:			
Location:					
S. No	Points to be Checked	Yes	No	NA	Remarks
1	Checked whether all the circuit lines are properly				
2	Checked whether the colour of switch and cover plate were fixed as per specification or client requirement				
3	Checked whether capacity of switches fixed as per required capacity				
4	Checked whether all cover plates are fixed properly with tube level				
5	Checked whether switches and grid plates were properly screwed				
6	Checked whether all cover plates and switches were packed by mica cover after fixing				
Comments:					

Prepared By	Checked By	Approved By
Site Engineer	Sr. Engineer	QA/QC Engineer

6. Water-proofing

Procedure for Water Proofing :

1. Check for leakage. There should not be any leaks in the sunken slab / tank for 24 hrs or as per specifications.
2. If leakage is there, do pressure grouting with non-shrink grouting chemical.
3. Packing of holes testing for any leakage, leaving pout pipes
4. Check all embedded pipe lines / flanges. Inwall / slabs / beams
5. Check packing of pipes with concrete, add water proof in gad mixture. Check use of stoppers, in UG sump sand Over Head tanks at the junction of base slabs and walls.
6. Check application of water proofing chemical coating as per manufacturer's specifications.
7. Check the mortar proportion with water proofing admixture, thickness, and slope and finishing of the plaster. (Protective layer)
8. Carry out 7 days curing.
9. Once again flood the water up to finished floor level and leave it for 24 hours.
10. Check for leaks and packing of holes and test for any leakage.
11. Ensure that laying brick jelly concrete is done in the presence off site engineer & soil / waste pipes are not damaged while consolidating.
12. Record of Water proofing Material Consumption must be maintained as shown below:

WATERPROOFING MATERIAL CONSUMPTION

Sl.No	Material	Theoretical Coverage	QUANTITY	Actual Coverage

QUALITY INSPECTION REPORT - WATER PROOFING

CHECKLIST FOR SUNKEN WATER PROOFING (Floor Concealed Plumbing)

Project Name: **Date :**

Villa / Flat No: **Mix Proportion :**

Location :

S. No	Points to be Checked	Yes	No	NA	Remarks
1	Checked the surface is clean and free from dust and dead mortar				
2	Checked the surface is free from honey comb				
3	Checked the surface for nozzle grouting (if necessary)				
4	Check the waterproofing coats were applied the coats minimum 6 hours interval				
5	Check the waterproof plastering thickness were given as per required and proper slope towards spout pipe				
6	Checked the waterproof plaster surface is neat and free from hair cracks				
7	Check the test by staging water for 3 days in top of surface				
8	Checked the waterproof done on wall 6" above from normal floor level on sunken portion				
9	Checked for leakage after Concrete holes packing all plumbing lines sunken areas.				
Comments:					

Prepared By	Checked By	Approved By
Site Engineer	Sr. Engineer	QA/QC Engineer

Checklist for Sunken water proofing (Ceiling Suspension type Plumbing)

Project Name: **Date :**

Villa / Flat No: **Mix Proportion :**

Location :

		Flat A		
Sl.No	Description of work	Verified		Remarks
		Yes	No	
1	Surface Preparation			
a	Floor chipping			
b	' V ' groove making between brickwork and beam			
c	Removal of Wall plastering upto 6" height			
d	Hacking of corecutting holes inner side and top surface slab chipping			
2	Bostee fixing			
3	Water Stagnation			
4	Leak observation and water removing			
5	Haunch and angle fillet fixing, Packing Brickwork at beam joint			
6	1st coat of Bosco elastic on the 1st day			
7	2nd coat of Bosco elastic on the 2nd day			
8	Plastering Wall and Floor monolithically			
9	Water Stagnation			

Prepared By Checked By

7. SCAFFOLDING

1. For brick masonry in buildings, single scaffolding shall be permitted.
2. The inner end of the horizontal scaffolding pole shall rest in brick masonry by omitting one header brick in Header course. Such holes for scaffolding shall be filled and made good before plastering.
3. Before execute the work scaffolding pipes and fittings should be checked, Existing earth to be compact and concrete platform to be arranged , work to be carried out with proper support as per the site engineers instruction shade nut , safety nut , safety platform to be provided wherever required.
4. To define the scaffolding for G+1, special building & MSB.

SCAFFOLDING CHECKLIST

Project name:		Date:		
Location :				
S. No	Points to be Checked	Yes	No	Remarks
1	Soil Condition			
2	Check the tubular scaffold diameter should not be less than 48 mm and wall thickness less than 2.3mm			
3	Check whether all scaffolds & working platforms are securely fastened to the building or structure and braced or guyed properly.			
4	Check whether un-insulated electric wires exists near working platform, gangway etc., of a scaffold			
5	The length of the ladders should not be more than 4m			
6	Provide a regular plank stairway wide enough for two people to pass and to provide handrails on both sides.			
7	Check the Base Plate fixed proper			
8	Check the Toe Board			
9	Check the Top Rail			
10	Check the Mid Rail			
11	Check the Cross Bracing			
12	Check the Lockin accessories			
Checked By:		Approved By:		

8. MATERIAL HANDLING

- Wear appropriate Personal Protective Equipments such as work gloves when handling objects with sharp edges and safety footwear when handling heavy objects.
- Ensure there is adequate clearance for safe lifting/material handling. (Foundation pit, Electrical wire, water stagnation)
- Ensure storage areas are kept clean.
- Use a hand truck, cart, dolly, wheelbarrow, etc to move heavy, awkward or bulky objects. Ask for assistance.
- Reduce repetition as much as possible by pacing your work and by varying tasks.
- Use a step ladder or stepstool to reach high places.
- Wherever possible use an elevator to move supplies and equipment between floors. Ask for assistance and/or use a two-wheeled hand truck dolly to move heavy, awkward or bulky items up or down stairs if an elevator is not available.
- Isolate the usable and unusable materials

Don't practice:

- o Do not lift or carry items by the packing straps or cords.
- o Do not use a box, desk or chair to reach high objects.
- o Do not lift a load if you are not sure that you can handle it safely.
- o Do not attempt to lift a load that is too heavy or too bulky for you. Ask for assistance.

Reference IS code:

1. IS: 456 – code of practice for plain and reinforced concrete
2. IS: 1199 – methods of sampling and analysis of concrete.
3. IS: 516 – methods of test for strength of concrete
4. IS: 4925 – specifications for concrete batching plant
5. IS: 4990 – specifications for plywood formwork for concrete
6. IS: 9103 – specifications for concrete admixtures
7. IS: 1077 – specifications for bricks for masonry work.
8. IS: 456; 10262; SP 23 – codes for designing concrete mixes.
9. IS: 1566 – specifications for hard drawn steel wire fabric for reinforcing concrete.
10. IS 2911 : Part 1 : Sec 1 : 1979 Code of practice for design and construction of pile foundations: Part 1 Concrete piles, Section 1 Driven cast in-situ concrete piles
11. IS 2911 : Part 1 : Sec 2 : 1979 Code of practice for design and construction of pile foundations: Part 1 Concrete piles, Section 2 Bored cast-in-situ piles
12. IS 2911 : Part 1 : Sec 3 : 1979 Code of practice for design and construction of pile foundations: Part 1 Concrete piles, Section 3 Driven precast concrete piles
13. IS 2911 : Part 1 : Sec 4 : 1984 Code of practice for design and construction of pile foundations: Part 1 concrete piles, Section 4 Bored precast concrete piles
14. IS 2911 : Part 4 : 1985 Code of practice for design and construction of pile foundations:
    Part 4 Load test on piles
15. IS 4926 : 2003 Ready-Mixed Concrete - Code of Practice
16. IS 2212 : 1991 Code of practice for brickwork
17. IS 1892 : 1979 Code of practice for subsurface investigations for foundations
18. IS 1904 : 1986 Code of practice for design and construction of foundations in soils: general requirements
19. IS 2502 : 1963 Code of Practice for Bending and Fixing of Bars for Concrete Reinforcement
20. IS 2505 : 1992 Concrete vibrators - Immersion type - General requirements

GLOSSARY / ABBREVIATION:

CREDAI	-	Confederation of Real Estate Developers Associations of India
IS	-	Indian Standard
PMC	-	Project Management & Consultants
DCR	-	Development Control Rules
NBC	-	National Building Code Of India
STP	-	Sewage Treatment Plant
SBC	-	Safe Bearing Capacity
MR	-	Member Representative
PCC	-	Plain Cement Concrete
GFC	-	Good For Construction
MSB	-	Multi Storied Building
SPT	-	Standard Penetration Test
EGL	-	Existing Ground Level
GL	-	Ground Level
NA	-	Not Applicable
A/C	-	Air-condition
QA/QC	-	Quality Assurance and Quality Control

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