

## TENDER DOCUMENTS FOR

### REPAIR AND REHABILITATION OF PHASE 1 AT STOCK PREPARATION AND FINISHING AREA STAR PAPER MILLS LIMITED, SAHARANPUR (U.P.)

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- Downloading of tender documents – 01<sup>ST</sup> September to 10<sup>th</sup> September 2021
- Site inspection and tender clarifications – 01<sup>st</sup> August to 10<sup>th</sup> September 2021
- Last date of receipts of sealed tender documents (Hard Copy) - 10th September 2021 up to **2:00 p.m.** at the office of Star Paper Mills Ltd., Saharanpur.

#### Consultants:



##### ASIAN GRID CONSULTANTS

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#### Client:



##### STAR PAPER MILLS LIMITED

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REPAIR AND REHABILITATION OF PHASE 1 AT STOCK PREPARATION  
AND FINISHING AREA  
STAR PAPER MILLS LIMITED, SAHARANPUR (U.P.)

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## TENDER NOTICE

1. Sealed tenders (in printed form issued by the consultant) are invited on behalf of M/s. Star Paper Mills Limited, Saharanpur, for the following work:

- a. NAME OF THE WORK : REPAIR AND REHABILITATION OF PHASE 1 AT STOCK PREPARATION AND FINISHING AREA STAR PAPER MILLS LIMITED, SAHARANPUR
- b. TYPE OF CONTRACT : ITEM RATE
- c. LOCATION OF THE WORK : SAHARANPUR (U.P.)
- d. TIME OF COMPLETION : 180 DAYS
- e. COST OF TENDER DOCUMENT : Rs. 5000/-

2. Tender documents can be obtained from the web site of Star Paper Mills. Free download of documents shall be available from 01<sup>ST</sup>September to 10<sup>th</sup> September 2021.

3. Drawings other than those enclosed can be seen and clarifications if any, can be obtained from the office of the Star Paper Mills. Site inspection can be done with the permission from Officer In-charge, Star Paper Mills (Attn.: Mr. B.K. Maheshwari).

4. Tender should be addressed and submitted to

To,  
The General Manager  
Star Paper Mills Limited  
Saharanpur (U.P.)

Sealed tender will be received upto **2:00 p.m. on or before 10<sup>th</sup> September 2021 in the office of** Star Paper Mills Limited., Saharanpur . Sealed offers will be opened by competent authority and Consultants, as decided by SPML.

5. A tender submitted shall remain valid for acceptance for a period of **90 days** from the date of opening. The validity of the tender may be extended beyond the stipulated period with the concurrence of the tenderer.

6. Tenders are to be submitted in hard copy only along with necessary documents and earnest money. The tenderer should quote the rates in figures as well as in words. The amount of each item shall be worked out and the requisite total shall be given. All corrections shall be attested by initials of the tenderer with the seal of the firm. In case any



discrepancy/difference if found on checking between rates quoted by the contractor in words and figures or in amount worked out by him, the following procedure shall be followed:

- a. When there is difference between the rates in figures and in words, the rate which corresponds to the amount worked out by the contractor, shall govern.
- b. When the amount of any item is not worked out by the contractor or it does not correspond with the rate written either in figures or in words, then the rates quoted by the contractor in words shall govern.
- c. When the rate quoted by the contractor in figures and in words tallies but the amount is not worked out correctly, rate quoted by the contractor shall be taken as correct and not the amount.
- d. Amendments as mentioned above shall be based on the tender marked `ORIGINAL' only.

**7. Sales tax or any tax on material or on finished work like WORKS CONTRACT TAX ETC., in respect of his contract shall be payable by the contractor and the CLIENT will not entertain any claim whatsoever in this respect.**

#### **8. Prequalification:**

##### Special notes for the bidders:

- a. The Repair work to the building at SPML comprises of
  - Removal of old and weak concrete
  - Protection to steel
  - Polymer and epoxy repair
  - Grouting with epoxy and polymer
  - Jacketing and Micro Concrete
  - Stiffing and strengthening with MS Angle
  - Carbon Fiber Wrap
  - Protection Coating
  - Roof waterproofing
  - Miscellaneous other ancillary repair
- b. Bidder should see the Technical specification, Standard specification
- c. Experience of similar work is a must.
- d. Work order copy of similar works executed for the large scale Project will be necessary to prequalify the contractor.
- e. Bidder /contractor should inspect Machine House Area at SPML and should also understand scope of work thoroughly well.
- f. Contractor must have successfully completed at least one single order of Rs.1.00 Crore in last two years.



- g. Average annual turnover of last three years should be more than Rs. 2.00 Crore.
- h. Earnest Money: Earnest Money of **Rs. 2,00,000/-** shall be payable with tender. EMD shall be in the form of Demand Draft in favour of Star Paper Mills Limited., Saharanpur.
- i. **As there can be minor variation in site dimension and design drawings, it is necessary for supplier to attend kickoff meeting at site with the designer prior to taking of the assignment.**
- j. **The minor changes if any shall be discussed in kickoff meeting as stated above.**

9. Time is the Essence of the Contract and the entire work must be completed in all respects within **180 days** of the issue of work order. If the Contractor fails to complete the work within this period, **a penalty @ 1% per week or part thereof subject to a maximum of 5% of the contract value will be imposed by the Employer. However, if there are site constrains, contractor can be given additional working time, without penalty as approved by consultant/SPML.**

10. The Contractor to whom the job is awarded **will have to comply with all the Statutory provisions of the State/Central Government/Local Bodies** in respect of contractual jobs. The Contractor **must** take out **necessary insurance policies and provide proper head gear and harnesses to all workers employed by him, for the duration of this contract and indemnify the Employer against any claim** by a worker or third party for injury/loss of life or property as a result of the work being done by the Contractor. The Contractor **must also insure the work against fire damages** till the completion of the entire work.

11. THE EMPLOYER DOES NOT BIND ITSELF TO ACCEPT THE LOWEST TENDER AND RESERVES TO ITSELF THE RIGHT TO REJECT ANY OR ALL THE TENDERS RECEIVED WITHOUT ASSIGNING ANY REASON THEREOF. THE NOTIFICATION OF AWARD OF THE CONTRACT WILL BE MADE TO THE SUCCESSFUL TENDERER BY THE CONSULTANT.

**CONSULTANT  
ASIAN GRID CONSULTANTS**



## INSTRUCTIONS TO THE TENDERER

Asian Grid Consultants (hereinafter referred as Consultant or AGC) for and on behalf of STAR PAPER MILLS LIMITED., SAHARANPUR, (hereinafter referred as Client / SPML, SAHARANPUR) will receive the tender for Repair and Rehabilitation of Phase 1 at Stock Preparation and Finishing Area on behalf of STAR PAPER MILLS LIMITED., SAHARANPUR. The tender / offer shall be in full compliance with Tender Notice, Technical Specifications, List of approved materials and BOQ enclosed with this document.

### 1. GENERAL INSTRUCTIONS:

- a. The Contractor should sign each and every page of the Tender Documents.
- b. The rates should be signed by Authorized Representative of the Company.
- c. Earnest Money Deposit should be enclosed with the tender. Earnest Money Deposit above Rs. 50,000/- can be in the form of Bank Guarantee from a Nationalized Bank.
- d. The rates quoted shall be for Completed items of work i.e. including labour, material, equipments, all taxes, any overheads, transport etc, all complete and every necessary thing, which is required to complete the items of work.
- e. The rates quoted should be firm till the completion of the contract
- f. Supporting to existing structure and all other constructional safety items are deemed to be included in mobilization work and rates quoted. No separate rate / payment will be made to the Contractor/Supplier on this account.

### DOCUMENTS TO BE ATTACHED:

1. Tender document full set, duly signed on every page. The schedule of works (BOQ) should be duly filled in with all rates. Conditional Tender, alternatives given with BOQ shall not be accepted.
2. The following Schedules shall be included in the documents to be submitted by the Tenderer along with the Tender documents :



- a. Schedule A – General Information about the contractor
- b. Schedule B – Financial standing,
- c. Schedule C – Works done in the last 5 years
- d. Schedule D – Works in hand
- e. Schedule E – Details of Technical Personnel available with the contractor
- f. Schedule F – Details of Tools, Equipments and Machineries available with the contractor

### **3. SITE VISIT :**

- ❖ The Tenderers are advised to visit and examine the site of work and it's surrounding and obtain for himself, on his own responsibility, all information which may be necessary for preparing the bid and entering into the contract. The cost of visiting the site shall be at the Tenderer's own expense.
- ❖ The rates quoted by the Tenderer shall be with full understanding of the site conditions and understanding of the job as per the Schedule. The contractor shall also understand the effect of other works going at the site and other working conditions

### **4. PERIOD OF VALIDITY :**

The Tender shall remain valid for the acceptance for a period of **90 days** from the date of submission of the Tender. If any Tenderer withdraws his Tender before the said period or makes any modifications in the terms or the conditions of the Tender, then the employer/client shall have the liberty to forfeit the said EMD.

### **5. QUANTUM OF WORK :**

1. The schedule of probable quantity in respect of each item and specifications accompanying these documents as the schedule of probable quantities is liable to alterations, omissions, deductions or additions at the direction of the Consultant. The schedule of probable quantities (BOQ) may vary considerably up to 10% on higher or lower side.



2. The contractor shall have no claim on the rate for the variations in quantities. However, if the specifications of the items are changed during the process of work, the Consultant shall approve the necessary variation in rates.

## **6. INTERPRETING SPECIFICATIONS:**

In interpreting the specifications the following order shall be followed :

1. Drawings / Technical specifications
2. Schedule of Quantities
3. Technical Specifications
4. Matters not covered in the specifications given in the contract. The schedule shall be covered by relevant Indian Standard codes. If such codes on a particular subject have not been formed, the decisions of the Consultants shall be final.

## **7. WORK INSTRUCTIONS:**

1. The work shall be carried out under the direction and supervision of the Consultant / Employer or their Representative.
2. On acceptance of the Tender the contractor shall intimate the name of the authorised Representative who will be supervising the work and shall be responsible for taking the instructions from the Consultants.
3. The contractor shall maintain standard records like Material Consumption Registers, Checklist for various items of work (shall be given by the Consultants), Material approval Registers, as directed.
4. The Consultant's decision with regard to the quality of the material and workmanship will be final and binding. The material rejected by the consultant shall be immediately removed from the site by the contractor.





## 8. DEFECT AND LIABILITY PERIOD:

Any defect developed within the Defect Liability Period of **Five Years** will have to be rectified by the contractor at his own cost and in case the defects are not rectified by the contractor, the Consultants or other Representative shall have power to get the work done at the risk and cost of the contractor.

The owner shall deduct the amount so spent from the Retention amount of the contractor.

## 9. CERTIFICATE OF VIRTUAL COMPLETION:

The work shall be considered as complete, after the satisfactory inspection of the Consultant and the Consultant shall issue a Certificate to that effect. The Defect Liability Period shall commence from the date of virtual completion

## 10. PERIOD OF COMPLETION:

1. The time is deemed to be the essence of the contract.
2. The total period of work to complete the project shall be **180 days**.
3. The commencement date of the work shall be Seven days from the date of signing the agreement or the date of letter of intent.
4. The contractor shall draw a detailed schedule of program in the form of bar / pert chart of the schedule work, within two weeks of the award of work and submit it to the Consultant for his approval

## 11. CONTRACTOR'S STORE / SITE OFFICE AND OTHER FACILITIES:

1. Suitable area near the site of work shall be allowed to the contractor free of cost for storing his tools, plants, materials and for his office.
2. A separate sanitary facility shall be provided and maintained by the contractor for his engineers and workers. The same shall be cleared after the completion of work
3. The contractor shall remove all the temporary construction constructed by him at the site for the purpose of completing the work.



## **12. MEASUREMENT AND BILLS:**

1. The mode of measurement shall be as per the standard code of practice for the measurement
2. The contractor or his Representative shall accompany the Consultant / employer or their Representative in taking and checking the measurement
3. All the necessary measuring tapes shall be of steel and shall be supplied by the contractor. The contractor shall then present his bill based on the agreed and recorded measurement.
4. The certification time for every Running bill by the consultant shall be minimum one week
5. The contractor shall raise the bill once a month

The period for the final measurement shall be one month from the date of completion of the project

## **13. EXTRA ITEMS:**

1. The rates for the extra items or additional / alternate or substituted works, shall be determined by the Consultants as follows :
  - a. At the derived rate of similar quoted item
  - b. At the actual expenditure incurred in the execution of item inclusive of all taxes + 15% for the contractor's profit and overheads. The actual expenditure will have basis for materials and labour as per the rate analysis.
  - c. The Consultant's decision in this regard shall be final

## **14. WATER AND ELECTRICITY:**

Water and Electricity shall be supplied by Star Paper Mills Limited., Saharanpur, free of charge.



**15. TAXES:**

The rates quoted shall be basic. Taxes shall be quoted separately.

**16. INSURANCE:**

1. The successful contractor shall have to prepare contractor's all risk (CAR) insurance policy, jointly in the name of the employer and the contractor and the original copy shall be deposited with the employer.
2. The insurance policy shall be obtained before the commencement of the work.
3. The contractor shall also obtain fire, theft and any other necessary insurance policies at his own cost. The employer or the client shall not be responsible for any damages to the contractor directly or indirectly.
4. The contractor shall also not to be entitled to claim any losses incurred by him, from the client. Contractor should deploy his own security.

**17. ADVANCES:**

Mobilisation advance of 10% of Contract value shall be paid against completion of mobilization activities and submission of Bank Guarantee of equal amount and after approval of the same by the Consultants.

The Mobilisation advance will be recovered at 10% of value of work done from the second bill onwards.

One time material advance shall be paid after receipt of material and the valuation of it, duly certified by consultant.

**18. ESI & P.F.:**

ESI & P.F. for labourers deployed on site shall be borne by the Contractor and he will be the Principal Employer. Contractor shall produce ESI & P.F. payment documents before the Clients for verification. Client shall release the payment only after such verification

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**Accepted by  
(Contractor)**

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**Signature  
(Consultant)**



## TECHNICAL SPECIFICATIONS OF MATERIAL

### 1. CEMENT

Cement to be used shall be confirming with

- i. Grade 43 : IS:8112
- ii. Grade 53 : IS:12269
- iii. Slag Cement : IS:455
- iv. PPC : IS:1489

Cement shall be of best quality, as approved by the consultant. The Contractor shall store the cement in dry condition in stacks with not more than 10 bags in a Stack under water tight shed and the stacking and storing shall be as per clause 4.2 of IS:4082.

Cement more than 3 months old shall not be used. Contractor shall arrange for testing of the cement.

### 2. AGGREGATES

The aggregates shall be procured from natural resources approved by consultants. The Aggregates shall conform to IS:2386 and IS:383 in respect of impurities and quality.

#### 2.1 FINE AGGREGATES

Fine Aggregates shall be natural river sand in general. Maximum size of the sand particle shall be 4.75mm. Silt content shall not be more than 6% by weight and quality shall be as per IS:383. Grading of fine aggregates shall be as per IS:383. Special grades, if approved by the Consultant, can be used. The storage of Aggregates shall be as per Clause 4.8 of IS:4082-1996.

### 3. WATER

Water shall conform to IS:456. Water shall be tested before using in construction, as per method given in IS:3025. Storage shall conform IS:4082.

### 4. ADMIXTURE

Supply of Admixture shall be from an ISO:9001:2000 Company, as approved by Consultants. Admixtures shall comply IS:9103. The admixture shall be tested for performance characteristics.



## **5. STEEL REINFORCEMENT**

Steel reinforcement for Concrete shall be rounded / ribbed bars, unless otherwise specified and shall comply to IS:1786. Steel shall be Corrosion Resistant Steel (CRS) from TATA or SAIL. No re-roll steel shall be incorporated in work.

Testing of the steel shall be arranged by Contractor, as per the samples taken with relevance to IS Specifications.

The reinforcement shall be secured with 16 / 18 Guages anneal steel wire confirming to IS:280.

The Mechanical splicing shall be used, only after approval of Consultant, by couplers (Couplers from approved manufacturers).

Storage of reinforcement and handling shall be as per IS:4082.

## **6. FORM WORK**

Shuttering for Concrete work shall be of Marine plywood, Timber, Steel and Fiber Glass of suitable thickness capable of resisting damages to the contact faces under normal conditions of erecting forms, fixing steel and placing concrete.

All form work, support shall be only be in structural steel confirming to IS Specifications. Plywood, if used, shall not be less than 12mm thickness and shall confirm to IS:4990. Steel Form Work, when used, shall be duly approved by Consultant.

## **7.PRESTRESSING MATERIALS:**

Prestressing steel, Sheathing Ducts, Prestressing equipments, gripping devices, anchors should be as per IS Specifications. Grouting of cement slurry shall be with Non-shrink admixtures of AC-EXPA-C by Apple Chemie or approved equivalent brand. Grouting equipments shall be as approved by the consultants.

## **8.REPAIR MATERIALS:**

Repair materials shall confirm with BS/ASTM/IS Specifications. For strengthening, injectable epoxy like AC-DUR-IE of Apple Chemie or equivalent is recommended. For repair polymer composite systems with acrylic / SBR based material shall be used. Polymer shall be from Asian Paint/Apcotex/Huntsman/Apple Chemie and as approved by consultants.



## **9.WATER PROOFING MATERIALS:**

Water proofing materials shall, in general, confirm to the requirements to the relevant standards depending upon the treatment prescribed in Schedule or as directed by the Consultant.

Crystalline penetrating coating shall be with AQUAGUARD 2G, AQUAGUARD G1 of Apple Chemie or equivalent and as approved by the Consultants.

Water proofing admixtures shall comply with IS:9103. Water proofing coating shall be tested as per IS:2645. Water proofing system shall be as approved by the Consultant.

## **10.STRUCTURAL STEEL**

Structural steel shall be from manufacturers such as Jindal, Tata, and Sail. All materials shall conform to their respective specifications.

All structural steel shall conform to IS:2062. Bolts and nuts, Foundation bolts, structural tubes, cold-formed sections shall conform to relevant specifications. Structural steel shall be tested before use. Welding, bolting, connections, fabrications shall be as approved by the consultant.

## **11.METAL SHEET**

Galvanized / Precoated metal sheets shall be from Lloyds, CRIL or as approved by the Consultant. GI Sheets shall confirm to IS:277. Storage of sheets shall conform IS: 4002.

## **12.BRICKS**

Bricks for Masonry work in Foundations, walls and other locations shall be hand / machine moulded and made from suitable soil and Kiln burnt. In general, bricks shall confirm IS:1077. Storage of bricks shall be as per IS:4082

## **13.HOLLOW AND SOLID CONCRETE BLOCKS**

General requirements of Hollow and Solid Concrete blocks shall be as per IS:2185. For actual work, consultant shall approve the blocks before use.

## **14.SAND**

Sand for masonry mortar shall comply with IS:2116. Sand for External Plaster/ Internal Plaster / Ceiling Plaster shall be as per IS:1542. The sand shall be tested as per relevant specifications and approved by the consultant.



## **15.TIMBER:**

All timber used in the permanent work shall be new and shall be as per IS:12896. Timber shall be brought at site with wood preservations as per the provisions given in IS:401. The preservations of the timber shall be done with Copper-Chrome, arsenic compositions as per IS:401 and minimum absorptions of preservative as 6.5 Kgs. per Cu.m of treated timber.

All relevant IS Specifications, normally, shall be valid for Teak wood, Country wood, processed rubber wood and Plywood.

## **16.TILES:**

Terrazzo Tiles shall generally confirm to standard prescribed in IS:1237 in all respects. Ceramic Tiles to be used for flooring and dado shall be as per IS:13712. Closed Ceramic Tiles, Floor tiles, wall tiles, vertified ceramic tiles, Antiskid tiles, PVC tiles, Vinyl flooring shall be as per relevant IS Specifications and shall be approved by consultants.

## **17.PAINTS:**

White wash / Colour wash shall be as per IS:6278. Distemper shall be as per prescription IS:427 and IS:428. Cement paint shall be generally as per the requirement of IS:5410

Plastic emulsion paint, emulsion paint PU Coating, textured coating, French polish and wax polish etc. shall conform to relevant IS or applicable specification and as per Consultant's approval.

## **18.MATERIAL FOR FILLING**

Sand, Moorum. Cinder and other materials shall be as per the relevant specifications and as per the Consultant's approval.

## **19.MISCELLANEOUS MATERIALS**

Bituminous preformed filler boards for joints, Polysulphide sealant, water bars, corkpads, non-shrink grout, welded steel wire fabric, expanded metal sheets, polycarbonate sheets, elastomeric bearing pads, polyurethane foam insulation, Expanded Polystyrene, Polyethylene sheets, barbed wire, geo-textile, Surface drainage, Concrete drains, Precast kerbs, interlocking blocks and Pavers, Random rubble masonry and any other material to be used in the construction shall be as per the relevant IS specifications and as approved by the consultants.

All building materials shall be tested in an approved test laboratory before incorporating it in the Structure. Testing Charges shall be borne by the Contractor.



## LIST OF APPROVED MATERIALS & SPECIALIZED AGENCIES

1. The Contractor shall obtain prior approval from the Engineer-in-Charge before placing order for any specific material or engaging any of the specialized agencies. The Contractor shall make a detailed submittal with catalogues and highlighted proposed specifications, as well as full details of the works executed by the specialized agency, as specified
2. Wherever applicable, the Consultants may approve any material equivalent to that specified in the tender subject to proof being offered by the Contractor for equivalence, to his satisfaction.
3. Unless otherwise specified, the brand / make of the material as specified in the item nomenclature, in the particular specifications and in the list of approved materials attached in the tender, shall be used in the work.
4. In case of non-availability of the brand specified in the Contract the Contractor shall be allowed to use alternate equivalent brand of the material subject to submission of documentary evidence of non-availability of the specified brand. The necessary cost adjustments on account of above change shall be made for the material.

1.	CEMENT (OPC/PPC)	ULTRATECH, ACC, AMBUJA, BIRLA, LAFARGE, KANARIA
2.	WHITE CEMENT	J.K., BIRLA
3.	CHLORPYRIPHOS	DE NOCIL, AIMCO
4.	READY MIX CONCRETE	ULTRATECH, R.M.C. INDIA
5.	SUPER PLASTICIZER	MBT, APPLECHEMIE, CHOKSEY
6.	WATERPROOFING COMPOUND LIQUID	CICO, FOSROC, APPLECHEMIE, CHOKSEY
7.	NON-SHRINK GROUT	ACC, FOSROC, APPLECHEMIE
8.	GALVANISING	JENCO, STEELLITE
9.	REINFORCEMENT STEEL	TISCO, SAIL, RINL, JINDAL
10.	STAINLESS STEEL	SALEM STEEL
11.	LOW RELAXATION PRESTRESSING CABLE	TATA SSL LTD., USHA MARTIN, INDORE WIRE CO
12.	GALVANISED / STAINLESS STEEL ANCHOR FASTENERS	HILTI, FISCHER
13.	METAL SHEETING	LLOYDS, INTERARCH, CRIL
14.	POLYCARBONATE SHEET	GE PLASTICS (LEXAN)





15.	FIBRE GLASS WOOL	U.P. TWIGA FIBERGLASS LIMITED, LLOYD INSULTAITONS (INDIA) LIMITED
16.	ROCKWOOL	VETROTEX INDUSTRIES INDIA PRIVATE LIMITED, LLOYD INSULATIONS (INDIA) LIMITED
17.	REPAIR MATERIAL:	
	AC-ACRYLATE-REPAIR, AC-DUR-IE	APPLE CHEMIE, MC-BAUCHEMIE
	SBR & BONDING AGENT	HUNTSMAN
	REPAIR MORTAR	ULTRATECH, FOSROCK, APPLE CHEMIE, BASF
18	SILICON SEALANT	G.E. SILICONS, DOW CORNING, FOSROC, STP, SIKA
19	POLYSULPHIDE SEALANT	CHOKSEY, SIKA, APPLECHEMIE
20	ITALIAN MARBLE SUPPLIER	NITCO, LITOLIER
21	COLOURED GLAZED CERAMIC TILES	H&R, JOHNSON, KAJARIA, BELL CERAMIC, MURUDESHWAR CERAMICS
22	CERAMIC TILES	KAJARIA, H&R JOHNSON, BELL CERAMIC, NITCO
23	VIRTIFIED CERAMIC TILES	H&R JOHNSON, NAVEEN, BELL CERAMIC, SPARTEK, REGENCY, KAJARIA
24	PVC TILES & ROLLS	ARMSTRONG, PREMIER, BHOR, KRISHNA
25	EPOXY FLOORING	FOSROC, APPLECHEMIE, SCHENECTADY-BECK
26	POLYMER MODIFIED CEMENTITIOUS GROUT	BAL ENDURA, APPLECHEMIE
27	GLASS MOSAIC TILES	BISSAZZA
28	HARDENERS	IRONITE, FERROK, HARDONATE
29	CALCINED PHOSPHO GYPSUM BLOCKS	GULFOIL CORPORATION LIMITED
30	CONCRETE BLOCKS	GURJARI, CONWOOD HINDUSTAN
31	GLASS BRICKS /BLOCKS	PITTSBURG CORNING, FIDENZA VETROARREDO



32	FLUSH DOORS	KUTTY, ANCHOR, KITPLY, GREEN, CENTURY
33	FRD SHUTTERS	KUTTY, NAVAIR, GLOBAL
34	NATURAL WOOD VEENERS	ARCHID, ANCHOR, DURIAN
35	PLYWOOD	ANCHOR, ARCHID, KITPLY, GREENPLY, CENTURY
36	PRELAMINATED PARTICLE BOARD	NOVOPAN, ANCHOR
37	LAMINATES	FORMICA, MERINO, DECOLUM, GREENLAM
38	MELAMINE POLISH	TOUCHWOOD OF ASIAN PAINTS WUDFIN OF PIDILITE INDUSTRIES
39	ANTISTATIC HIGH PRESSURE LAMINATE	FORICA, BAKELITE HYLAM
40	HIGH PRESSURE LAMINATES	MERINO, GREENLAM, DECOLAM, CENTURY, FORMICA
41	PRESSED STEEL DOOR FRAME & SHUTTERS – ORDINARY & FIREPROOF	AGEW, SHAKTI-MET DOR, GUARDIAN, SHUTTER INDIA, GODREJ
42	ROLLING SHUTTERS & GRILLS	STANDARD, SWASTIK, SHUBDHWAR, SHUTTER INDIA, MAHARAJA
43	BALL BEARING HINGES	JJ (IMPORTED) FROM SHALIMAR OR EQUIVALENT APPROVED BRAND
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46	HARDWARE / IRON MONGERY	MASTER, EVERITE, GODREJ, DORMA, YALE
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		REYNOBOND, SHUTTER INDIA
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53	EPOXY PRIMER AND PAINTS	BERGER, APPLE CHEMIE
54	POLYURETHANE PAINTS	MRF, BERGER
55	GYPHUM BOARD	INDIA GYPHUM, BORAL
56	FALSE CEILING	USG, ARMSTRONG, INTERARCH, HUNTER DOUGLAS, SHUTTER INDIA, BENGAL ROLLING SHUTTER
57	FALSE FLOORING	UNITED INSULATION
58	GI PIPE	TATA, ZENITH, LLOYD
59	COPPER PIPES	IBP CONEX LIMITED, U.K.



## TECHNICAL SPECIFICATIONS

### 1. TECHNICAL SPECIFICATION FOR CONCRETE WORKS

This specification covers the general requirement for plain and reinforced cement concrete of different grades.

The requirements for concrete shall be materials, storage of materials, design of concrete mix, sampling and testing, form and formwork, construction joints, preparation and placement of concrete including batching, mixing, conveying, depositing and curing, finishing, grouting inspection, clean-up etc. The concrete shall generally comply with the requirements of latest IS:456.

Unless otherwise specified, the rates for all RCC wall be exclusive of reinforcement. Reinforcements will be paid for separately. Unless otherwise specially mentioned, the rates for all plain and RCC works shall be inclusive of formwork, centering and shuttering.

#### **MATERIALS :**

##### **1. Cement :**

Unless otherwise specified, ordinary Portland cement of 43 grade conforming to latest IS:8112 shall be used for all concrete works. Test certificates from the manufacturers to show that the cement brought by the contractor to site for use in the works fully complies with the relevant IS Specification shall be submitted to the Engineer at the contractor's own cost. In addition, field test shall be conducted for every consignment of cement for the purpose of concrete design mix. Cement shall be stored and neatly packed in piles not exceeding 10 bags high in weather proof sheds with raised wooden plank flooring to prevent deterioration by dampness or intrusion of foreign matter. It shall be stored in such a way as to allow the removal and use of cement in chronological order of receipt, i.e. the first received being first used. Cement deteriorated and /or clotted shall not be used on work but shall be removed at once from the site. Daily record of cement received and consumed shall be maintained by the contractor in an approved form and a copy submitted to the Engineer once a week. Notwithstanding the above, the Engineer, for any reasons whatsoever, may at his discretion order to retest, the cement brought to site in an approved testing laboratory and fresh certificate of its soundness shall be produced at the Contractor's own cost. Cement ordered for retesting shall not be used for any work pending results of re-test.



## 2. Aggregates :

Fine and coarse aggregates shall conform to IS 383. If required, the aggregates shall be washed and screened. Sampling and testing shall be as per IS:2386.

Each size of aggregate shall be stored on a separate platform and shall avoid mixing and contamination with foreign material. Segregated aggregates shall be rejected.

Cost of stacking, washing, screening and cost of all tests, sampling etc. shall be borne by Contractor.

### a) Fine Aggregate :

Sand shall conform to IS:383. It shall pass through I.S. sieve 4.75 mm (3/16 B.S.0 test sieve, leaving a residue not more than 5%. It shall be from a natural source approved by the Engineer. It shall be washed if directed to reduce the percentage of deleterious substances to acceptable limits at Contractors own cost. Sand shall not contain any trace of salt and sand containing any trace of salt shall be rejected.

The fine aggregate for concrete shall be graded within limits as specified in IS:383 and the fineness modules shall range between 2.60 to 3.20. The fine aggregate shall be stacked carefully on a clean hard dry surface so that it will not get mixed up with deleterious foreign materials. If such a surface is not available a platform of planks or corrugated sheets or brick floor or concrete floor shall be prepared.

IS Sieve Designation	Percentage Passing			
	Grading Zone I	Grading Zone II	Grading Zone III	Grading Zone IV
10 mm	100	100	100	100
4.75	90-100	90-100	90-100	95-100
2.36	60-95	75-100	85-100	95-100
1.18	30-70	55-90	75-100	95-100
600 Micron	15-34	35-59	60-79	80-100
300 Micron	5-20	8-30	12-40	15-50
150 Micron	0-10	0-10	0-10	0-15

### b) Coarse Aggregate:

Coarse aggregate shall conform to IS:383. It shall consist of crushed or broken stone, 95% of which shall be retained on 4.75 mm IS test sieve. It shall be obtained from crushed granite, trap, basalt or similar approved stones from approved quarry. Coarse aggregate shall be chemically inert when mixed with cement & shall be angular in shape and free from dust and other foreign matter. Gravel/shingle of desired grading



may be permitted as a substitute in part or full in plain cement concrete if the Engineer is otherwise satisfied about the quality of aggregate.

IS Sieve Designation	A						B			
	% Passing for single sized aggregate of Nominal size						% Passing of graded aggregate of nominal size			
	63 Mm	40 mm	20 mm	16 mm	12.5 mm	10 mm	40 mm	20 mm	16 mm	12.5 mm
80 mm	100	-	-	-	-	-	100	-	-	-
63 mm	85 – 100	100	-	-	-	-	-	-	-	-
40 mm	0-30	85- 100	100	-	-	-	95- 100	100	-	-
20 mm	0-5	0-20	85- 100	100	-	-	30- 70	95- 100	100	100
16 mm	-	-	-	85- 100	100	-	-	-	90- 100	-
12.5 mm	-	-	-	-	85- 100	100	-	-	-	90- 100
10 mm	0-5	0-5	0-20	0-30	0-45	85- 100	10- 35	25- 55	30- 70	40- 85
4.75 mm	-	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36 mm	-	-	-	-	-	-	0-5	-	-	-

Unless otherwise specifically stated for all RCC works, the size of coarse aggregate shall be 20 mm and down size.

### 3. Water :

Water used for mixing concrete and curing shall be potable quality, fresh, clean, free from oil, salts, acids, alkali and shall be in accordance with the clause 4.3 of IS 456. The contractor shall produce test results of water proposed to be used on the job for approval by the Engineer for the mixing before casting any concrete.

### 4. Reinforcement :

Refer separate specification given elsewhere.



## 5. Admixtures :

The use of admixtures may be allowed only if approved by the Engineer and his decision in this regard shall be final.

### Concrete :

Concrete shall be specified in various graded designations as M-10, M-15, M-20 & M-45 etc. The letter 'M' refers to the mix and the number to the minimum compressive strength in N/Sq.mm to be established by 28 day of 15 cms works cube test with the probability of not more than 1 test out of 10 falling below that minimum .

The proportions of ingredients for concrete shall be such that in addition to complying with the strength requirement, the concrete shall have adequate workability and proper consistency to permit it to be worked readily into the forms and around reinforcement, under the conditions of placement to be employed without excessive segregation or bleeding.

All ingredients shall be proportioned and measured by weight using approved weigh-batching equipment. There shall be full field control of (1) predetermined grading of all aggregates that go into concrete (2) predetermined proportion of coarse aggregate, fine aggregate, cement and water for the required strength.

### Design Mix :

The Contractor is responsible for the design of the concrete mix. The Contractor shall design the mix and submit for the approval of the Engineer. No concreting works shall be commenced without approval of the design mix of concrete.

The Contractor shall make trials mixes using coarse aggregates, sand water and cement actually available at site to be used for making concrete. Before making trials mixes all the ingredients shall be tested in the field laboratory and should conform to the relevant IS Specifications. Suitable proportions of sand and the several sizes of coarse aggregates for each grade of concrete shall be selected to give as nearly as practicable the maximum density, this is to be determined by mathematical means, laboratory tests, field trials or other means.

The minimum cement contents for design mix concrete of various grades shall be as under:

<b>Grade of concrete</b>	<b>Cement per cum of concrete</b>
M-10	220 Kgs
M-20	320 Kgs
M-25	350 Kgs

The mix required to produce, place and compact the specified grade of concrete shall be designed by the Contractor. He shall carry out preliminary tests of specimen at his own cost at field laboratory as per IS:456 and IS: 516 and he shall furnish to the Engineer a statement of proportions proposed to be used for various concrete mixes and grades of concrete for approval.



The minimum strength requirements shall be as follows:

Minimum compressive strength of 15 cm cubes at 7 days and 28 days after mixing, conducted in accordance with IS:516.

Grade of Concrete	Preliminary Test N/Sqmm		Work Test N/Sqmm	
	At 7 days	At 28 days	At 7 days	At 28 days
M – 10	9.0	13.5	7.0	10
M – 20	17.5	26	13.5	20
M - 25	22.0	32	17.0	25

Once a mix including water cement ration has been determined and specified for use by the Engineer, that W/C ratio shall be maintained.

Details of design mix concrete approved by the Engineer shall be submitted to the Engineer for record along with the results of sieve analysis and such other tests on cement, aggregates and water etc. The approved design mix shall then be followed for subsequent concreting operations at site till a variation in some characteristics of any ingredient is observed or till a variation in the degree of quality control necessitates a change in the mix.

#### Batching and Mixing of Concrete :

All materials for controlled concrete shall be batched as per approved design mix in suitable weigh batcher of adequate capacity and of approved design. Mixers for concrete may be stationary mixers of either the tilting or non-tilting type, or truck mixers of approved design. Thorough mixing of the concrete is essential and mixers shall be capable of combining the materials into a uniform mixture, uniform colour and of discharging this mixture without segregation. The mixers should always be operated at the speed and time recommended by the makers. The mixers shall be maintained in satisfactory operating condition, and mixer drums shall be kept free of hardened concrete. The consistency of the concrete produced from the mixers should have sufficient workability to enable it to be well consolidated, to be worked into the corners of the shuttering and around the reinforcements.

The slump for concrete as determined by slump tests as per Indian Standard 1199 latest edition, shall not exceed the maximum slump indicated below for each type of construction using high frequency vibration unless otherwise approved or directed by the Engineer.





Workability	Slump in mm		Type of Construction
	Min.	Max.	
Medium	40	80	All RCC works

The contractor shall not place concrete having a slump outside the limits specified without the approval of the Engineer.

At least one slump test shall be made for every compressive strength test carried out. More frequent tests shall be made if there is a distinct change in job conditions, or if required by the Engineer.

### **Transporting :**

Concrete shall be conveyed from the place of mixing to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of any of the ingredients. If segregation does occur during transport, the concrete shall be remixed before being placed. Normally not more than 30 minutes shall lapse between mixing and consolidation in position. All means of conveyance shall be adopted to deliver concrete of the required consistency and plasticity without segregation or loss of slump.

### **Concrete should be transported only by transit mixers**

### **Placing :**

Method of placing shall be such as to preclude segregation and as far as practicable the placing shall be continuous. Special care shall be taken in accordance with latest IS : 456 while laying concrete under extreme weather.

Concrete shall be transported by transit mixers and placed in position without segregation. It is important that the concrete be placed in its final position before the cement reaches its initial set. The concrete should normally be compacted in its final position within 30 min. of leaving the mixer, and once compacted, it should not be disturbed. Before the concrete is actually placed in position, the insides of the forms should be inspected to see that they have been cleaned and oiled, care being taken to see that the reinforcements do not get contaminated. Temporary openings should be provided to facilitate inspection, especially at the bottom of columns, to permit the removal of all sawdust, wood shavings etc. Openings should be placed so that the water used to flush the forms will drain away. No water should be left in the forms. The concrete should be spread evenly in the form to avoid segregation and should completely fill all corners of the form work and the space between the reinforcement. Vibrator should not be used for spreading the concrete. Concreting should be carried on without interruption between predetermined construction joints.



### **Compacting :**

The object of compacting concreting is to achieve maximum density. The concrete should therefore, be placed a little in excess of its specified depth so that after proper compaction its final desired depth is obtained. Manually rodding and tapping the concrete and tapping the form work on its external face shall be continuously carried out at the actual pouring head, while compacting the concrete with mechanical vibrators shall be done sufficient distance away from the pouring head, so that the vibrators is utilized only to compact the concrete and not to spread it. The Engineer may, however, at his absolute discretion, permit concreting by increasing the slump and Corresponding increasing the cement contents at contractor's cost. Except for shallow or inaccessible concrete the vibrator shall be penetrated vertically and at regular distance intervals, not at an angle and not at haphazard intervals. At corners, obstructions, embedded fixtures and congested reinforcement areas, the vibrators shall be manipulated with the utmost care and handled only by the most experienced workmen.

The number and type of vibrator to be used shall be subject to the approval of the Engineer and in general immersion type vibrators shall be used. Consolidation by using immersion vibrator will be in accordance with IS code : 3558. Sufficient number of reserve vibrator in good working condition shall be kept on hand at all times, so as to ensure that there is no slacking of interruption in compacting.

### **Protection of Concrete :**

All freshly placed concrete surfaces shall be protected from damages by workmen equipment or any other cause. The surface shall be protected from dry wind and direct sun rays. The Contractor shall provide and use, where directed by the Engineer enough tarpaulins or other suitable materials to cover completely or enclosed all freshly finished concrete.

### **Curing :**

As soon as the concrete is hardened sufficiently, it shall be cured by maintaining the concrete in a damp condition by application of wet sacking or other approved moisture retaining covering for a period of 28 days after placing the concrete. In floors curing should be carried out by ponding and covering with polythene sheets to reduce evaporation losses. Extreme care should be taken to ensure that all surfaces are kept in a moist condition and no local area shall be allowed to dry out intermittently. Curing shall be done with potable water free from sediments of any kind.

### **Construction Joints :**

Construction joints in exposed concrete work shall be made only where shown on the drawings or directed by the Engineer and shall be in accordance with the details shown or approved by the Engineer. The procedure given in clause 20.1.4.2 of IS:456 shall be followed for general guidance. All foreign matters shall be removed from the concrete before it is allowed to fully harden. The removal shall be effected by scrubbing the concrete surface with wire and with bristle brushes and washing down to expose clearly the aggregate. However



care shall be taken to avoid dislodgment of particles of aggregate. If concrete has been allowed to harden excessively the surface shall be chipped over its whole surface and thereafter thoroughly washed. Before fresh concrete is added on the construction joints, the surface of old concrete shall be thoroughly wetted and covered with a thin layer of cement mortar 1:1.

Construction joints in concrete floors and walls of basement, water tanks or any other structures in contact with water or earth, shall be provided with PVC water stops of approved make coated on either side with hot asphalt. The longitudinal joints, in water stops, shall preferable be not welded or overlapped at least 200 mm.

Sampling and strength test of concrete :

Sampling and testing of concrete shall be conducted in accordance with the latest issue of Indian Standard 1199, 516 and 456.

During the progress of construction compression tests shall be made to determine whether the concrete being produced complies with the strength requirements specified. The test will be made in accordance with Indian Standard 516 latest edition.

The minimum frequency of sampling of concrete of each grade shall be in accordance with the following :

Quantity of concrete in the Work, Cum	Number of Samples
1-5 6-15 16-30 31-50 51 and above	Plus one additional sample of each additional 50 Cum of part thereof

**NOTE :**

At least one sample shall be taken from each shift

A set of six specimens from random mixer batches, shall constitute a test, three being tested for 7 days and three being tested for 28 days strength.

The strength test result shall be the average strength of the three companion test specimens, tested at 28 days, except that, if one specimen in a test shows manifest evidence of improper sampling, moulding or testing the result shall be discarded and the remaining two strengths averaged. Separate procedures shall be established when cements other than Portland cement are used.



- C. Concrete which does not meet the strength requirements as specified in para (A) but has a strength greater than that required by para (B) may be accepted as being structurally adequate without further testing by the Engineer in consultation with designer.

In the event that concrete tested in accordance with the requirements of the above clause, fails to meet the specification, the Engineer shall have the right to require any one or all the following:

- a) Changes in the concrete mix proportions for the remainder of the work
- b) Coring and testing of the concrete represented by the tests which failed as per IS : 456
- c) Load tests on part of structures as per IS:456
- d) Removal and replacement of any such portions of the structure.
- e) Extended curing of the concrete represented by the specimen.

The Contractor shall carryout all such measures as directed at his own expense, if the concrete cannot be accepted due to reasons attributed to the Contractor.

The unit rate of concrete shall be inclusive of all tests and remedial measures.

#### **FORMWORK :**

The formwork shall conform to the shapes, lines and dimensions for all the elements as shown on the drawing. The formwork shall be designed and constructed so that the concrete can be properly placed and thoroughly compacted to obtain the required shape, position and level subject to specified tolerances. The designed formwork arrangement shall be got approved by the Engineer. Approval of the proposed formwork by the Engineer will not diminish the Contractor's responsibility for the satisfactory performance of the formwork, nor for the safety and co-ordination of all operations.

Formwork for architectural shapes for columns, ring, beams, circular or spherical walls, shell roofs or bottoms in the case of water reservoirs or any other structure shall be made from approved wrought and put up timber or steel plates and frames.

The formwork to be used shall be of an approved system type.

9. Formwork for beams and slabs shall be so erected that the shuttering on the side of the beams and soffits of slab can be removed without disturbing the beam bottoms. Immediately before concreting is commenced, the formwork shall be carefully examined to ensure the following :
  - a) Removal of all dirt, shavings, sawdust and other refuse by brushing and washing.
  - b) The tightness of joints between panels of sheathing and between these and any hardened core.



- c) The correct location of tie bars, bracing and spacers, and especially connections of bracing.
- d) That all wedges are secured and firm in position.
- e) That provision is made for traffic on formwork not to bear directly on reinforcing steel.

The Contractor shall obtain the Engineer's approval for dimensional accuracies of the work and for the general arrangement of propping and bracing. It is imperative that for scaffolding heights of 3.6M and above, timber posts or steel scaffolding be used with adequate bracings in horizontal and vertical planes. The Contractor shall be entirely responsible for the adequacy of propping and for keeping the wedges and other locking arrangements undisturbed through the de-centering period.

#### **MODE OF MEASUREMENT:**

The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following:

Cement Concrete in P.C.C. & R.C.C. items shall be measured exclusive of reinforcement and plaster thickness but shall include necessary costs of shuttering, centering, hire charges of all equipment, curing, hacking and fair finish. Reinforcement and plaster shall be measured and paid separately.

Items like R.C.C. precast Jalli, R.C.C. pipes and other such items which are normally manufactured in factories as well as those items which have been specifically mentioned in schedule of quantities shall be measured inclusive of reinforcement.

No deductions will be made for openings up to 0.1 Sqm. and no extra labour for forming such opening or voids shall be paid.

Columns shall be measured from the top of the footing and shall be measured through including flare of the column in case of flat slab construction.

Beams shall be measured from face to face of columns/beams and shall include haunches, if any. The depth of the beams (other than raft foundation beams) shall be measured from the top of the slab to bottom of the beam.

In case of combined footings and raft foundation, the exposed portion of beam shall be measured as beam and the remaining portion measured in footing/raft slab.

Slab (other than in raft foundation) shall be measured in bays (clear of beams) with deductions for column portion.



Chajja : Only projected portion shall be measured in square meter.

Staircase : Measurements shall be in Cum. Staircase comprising of step, soffit slab, landing slab shall be measured and paid under this item. Side parapet walls, railings, finishing of risers and treads M.S. reinforcement and plastering etc. shall be paid separately under respective items.



## 2. TECHNICAL SPECIFICATION FOR STEEL REINFORCEMENT

This specification covers the general requirements of steel reinforcement.

Steel reinforcement shall be either mild steel of tested quality high yield strength deformed bars of grade Fe-520 conforming to IS:1786 or as called for on the drawings. Fabric reinforcement where called for shall be of hard drawn mild steel wire mesh conforming to IS:1566. Bars shall be free from deleterious materials, mill scale, loose rust, oil or paint.

The contractor shall submit bar bending schedules for approval of the Engineer prior to commencement of fabrication. These shall indicate the accurate dimensions and bending of bars as called for on the structural drawings. Fabrication shall be accurately done to the dimensions, spacing and ensuring minimum cover as called for on structural drawings.

### **BENDING :**

All reinforcement bars shall be made straight before bending. Bars shall be bent cold gradually by machine or other approved means without the use of heat. Bars having cracks or splits on the bends shall be rejected. Bars incorrectly bent once shall not be used without the approval of the Engineer.

The Contractor shall prepare bar bending schedules as per details given in IS 2502 and get them approved before proceeding with cutting and bending of bars.

All bars shall be carefully and accurately bent by the Contractor in accordance with the drawings and special care shall be taken such that :

- a) the depth of the crank is correct.
- b) the rods are placed in exact positions.
- c) Hooks where indicated shall be either a complete semi-circular turn with a radius of not less than four and not more than six bars diameters, plus an extension of at least four bar diameters at the free end, or a 90 degree bend having a radius of not less than 4 bar diameters plus an extension of 12 bar diameters, as shown or implied on the drawings.

### **LAPING :**

As far as possible bars of maximum length available shall be used.

Unless otherwise specified or shown on the drawings, all laps shall be 50 times the diameter of bar. Not more than 33% (Thirty Three Percent) of the bars shall have lapped joints at the same location.



### **COVER FOR REINFORCEMENT :**

Reinforcement shall have cover as shown on the structural drawings and where not specified the thickness of cover shall be as follows.

- a) At each end of reinforcing bar not less than 25 mm. nor less than twice the diameter of such bar.
- b) For a longitudinal reinforcing bar in a column not less than 40 mm nor less than the diameter of such bar. In the case of columns of minimum dimension of 20 cm. or under whose reinforcing bars do not exceed 13 mm., the cover 25 mm shall be used.
- c) For longitudinal reinforcing bar in a beam not less than 25 mm. nor less than the diameter of such bar.
- d) For tensile, compressive, shear or other reinforcement in a slab not less than 13 mm. nor less than the diameter of such reinforcement.
- e) For any other reinforcement not less than 13mm., nor less than diameter of such reinforcement. For giving the necessary covers, concrete cover blocks of same strength of concrete proposed for the structure shall be used. All cover blocks shall be secured firmly so that they are not disturbed during compaction.

### **MODE OF MEASUREMENT :**

The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following :

### **REINFORCEMENT :**

Shall be measured in length of bars as actually placed in position on standard weight basis, no allowance being made in the weight for rolling margin. Wastage and binding wire shall not be measured. Authorised overlaps and splices shall only be measured.





### 3. TECHNICAL SPECIFICATION FOR MASONRY WORKS

The specification covers the general requirements for stone and brick masonry.

#### **MATERIALS:**

##### **CEMENT:**

Ordinary Portland cement of 43 grade conforming to IS: 8112 (latest) shall be used for all masonry work. Cement shall be fresh when delivered at site.

##### **SAND:**

Sand shall conform to IS:383 & IS : 2116. Sand shall be hard, durable, clean and free from dirt, clay, organic mater or other impurities. Sand shall not be too fine nor too coarse and shall fall within the grading zones 1 to IV given in Table III of IS:383. The site content of sand shall not exceed 5% by volume.

##### **BRICKS:**

Bricks shall conform to the requirements of IS: 1077.

Bricks shall conform to the requirements of IS:1077. Bricks of normal size 8-3/4" X 4-1/2" X 2-3/4" shall be used. All bricks shall be chamber burnt and of first class quality sound, hard, well burnt throughout but not over burnt, of regular uniform size, shapes and colour (generally deep red or copper) homogenous in texture and free from flaws and cracks. They shall have plane rectangular faces with parallel side and square, straight and sharply defined arises. Brick shall not be broken, cracked stratified, under burnt, over burnt or soft. A fractured surface shall show a compact fine grained, uniform and dense texture free from lumps of lime, laminations, cracks air holes, grit, soluble salts causing efflorescence or other defects, which may in any way impair the strength, durability appearance and usefulness of the brick. A clear metallic ringing sound shall be emitted when two bricks are struck together. After 24 hours immersion in cold water, water absorption by weight shall not exceed 20 percent of the dry weight of the brick. They shall not break when thrown on the ground on their flat face in a saturated condition from a height of 600mm. The minimum compressive strength of bricks shall be 50kg/sqcm.

The tolerance permitted in the accepted size of the bricks shall be plus or minus 3mm in any dimension. Representative samples of bricks shall be submitted to the Engineer for approval before supply to site and the approved samples shall remain with the Engineer. All bricks proposed to be used shall conform to the approved samples in all respects. Any brick found not upto the specification shall be removed immediately from the site at the Contractor's cost.



**WATER:**

Water used for mixing mortar and curing shall be clean and free from oil, acid, salt and other injurious materials and shall be in accordance with clause 4.3 of IS: 456. Water fit for drinking will generally be found suitable.

**MORTAR MIXING:**

Mixing of mortar shall be done in a mechanical mixer. Hand mixing shall be resorted to only when specifically permitted by the Engineer,. Cement and sand shall be mixed dry in specified proportions thoroughly and then water shall be added gradually. Wet mixing shall be continued till mortar of the consistency of a stiff paste and uniform colour is obtained. Only the quantity of mortar which can be used within thirty minutes of its mixing shall be prepared at a time .

Mortar shall be used as soon as possible after mixing and before it has begun to set and in any case within thirty minutes after the water is added to the dry mixture. Mortar left unused for more than thirty minutes after mixing shall be rejected and removed from the site of work.

**BRICK WORK IN 230MM WALL:**

In case of 230mm thick walls, if bricks are of size such that the width of the header course does not come equal to the width of the stretcher course, the difference shall be made up during construction of brick work itself by the same mortar as used for construction of masonry to provide a plane vertical surface. The surface should also be scarified to receiver plaster.

All junctions of walls and cross walls shall be carefully bonded into the main walls. The rate of laying masonry will be upto a height of 100cm per day is cement mortar is used. Greater heights may be built only if permitted by the Engineer.

During rains, the work shall be carefully covered to prevent mortar from being washed away, should any mortar or cement be washed away, the work shall be removed and rebuilt at the contractors expense.

**MIX PROPORTION:**

The mortar shall consist of One part of cement and six parts of sand for brick work 230mm thick and above or as specified in the Bill of Quantities 9BOQ). For brick piers, half brick walls, honey combed brickwork and hollow (cavity) walls, the mortar mix shall consist of one of cement and four parts of sand or as specified in the BOQ.



**HALF BRICK WORK:**

This work shall be set in cement mortar as specified. Unless otherwise specified the walls will be provided with RCC binders reinforced with 2 Nos. of 8mm mild steel/ tort steel bars with M.S. tie bars at 1 meter interval from floor level. The cost of half brick work shall include the cost of reinforcement and form work for binders. RCC band shall be of size 115mm wide X 80mm high and shall be continuous , unless where broken by openings in walls.

**CURING:**

All fresh brick work shall be protected from the effects of sun, rain, etc. by suitable covering. All brick works shall be kept constantly moist on all the faces for atleast 10 days.

**SCAFFOLDING:**

Unless otherwise instructed by the Engineer, double scaffolding having two sets of vertical supports shall be provided for all building work. The supports shall be sound, strong and tied together with horizontal pieces over which scaffolding planks shall be fixed. The contractor shall be responsible for providing and maintaining sufficiently strong scaffolding so as to with stand all loads likely to come upon it.

**MODE OF MEASUREMENT:**

The method of measurement for various items in the tender shall be generally in accordance with the IS: 1200 subject to the following.

Except where otherwise described , stone work and stone walling generally shall be given in cubic meters and fascia work in square meters.

Brickwork shall be measured in cubic meter and half brick work shall be in square meter.



## 4. TECHNICAL SPECIFICATION FOR PLASTERING WORKS

This specification covers the general requirements for wall and ceiling plastering.

The contractor shall furnish all materials labour scaffolding equipments, tools plant and incidentals necessary and required for the completion of all plaster and wall finishes, subject to approval by the Engineer.

Plaster as herein specified shall be applied to all internal and external surfaces where called for. Glazed tile dado, terrazzo dado and other wall finishes shall be provided where indicated on drawings and schedule of finishes. Areas called for on drawings and typical shall be considered to apply to appropriate adjoining areas whether shown on same drawings or not and whether indicated or not.

All plaster work and other wall finishes shall be executed by skilled workmen in a workmanlike manner and shall be of the best workmanship and in strict accordance with the dimensions on drawings subject to the approval of the Engineer.

### **PLASTER WORK:**

The primary requirement of plasterwork shall be to provide absolutely water tight enclosure, dense, smooth and hard and devoid of any cracks on the interior and / or exterior. The Contractor shall do all that is necessary to ensure that this objective is achieved. All plastering shall be finished to true plane, without any imperfections and shall be square with adjoining work and form proper foundation for finishing material such as paint etc.

Masonry and concrete surfaces which call for applications of plaster shall be clean free from efflorescence, damp and sufficiently rough and keyed to ensure proper bond, subject to the approval of the Engineer.

Wherever directed by the Engineer, all joints between concrete frames and masonry in filling shall be expressed by a grooved cut in the plaster. The said groove shall coincide with the joints beneath as directed. Where grooves are not called for, the joints between concrete members and masonry in filling shall be covered by 24 gauge galvanized chicken mesh strips 400mm wide or as called for on drawings/ documents which shall be in position before plastering.

### **CHASING & BREAKAGES:**

All chasing , installations of conduits, insert boxes etc. shall be completed before any plastering or other wall finish is commenced on a surface. No chasing or cutting of plaster or other finish on a surface shall be permitted. Broken corners shall be cut back not less than



150mm on both sides and patched with plaster of paris as directed. All corners shall be rounded to a radius of 8mm or as directed by the Engineer.

### **SAMPLES:**

Samples of each type of plaster and other wall finish shall be prepared well in advance of undertaking the work for approval by the Engineer.

### **MATERIALS:**

Cement : Ordinary Portland cement of 43 grade conforming to IS:8112 shall be used and as specified under concrete Work

Water : As specified under concrete work

Sand : For internal plaster – washed fine sand

Waterproofing compound : AC-IMRPO or approved quality

### **PROPORTIONS:**

The materials used for plastering shall be proportioned by volume by means of gauge boxes.

### **PREPARATIONS OF SURFACES;**

The joints in all wall, both existing and freshly built shall be raked to a depth of 15mm, brush cleaned with wire brushes, dusted and thoroughly wetted before starting plastering work. Concrete surfaces to receive plaster shall be roughened by hacking over the entire surface so that the skin of the concrete is completely removed, as approved by the Engineer to ensure proper key for the plaster.

### **PLASTER TO WALLS:**

Plaster to internal faces of walls shall be 12 to 15 mm thick comprising of one part cement and five part clean fine sand or as specified in the item specification. The external surfaces of external wall shall have plaster of 12mm thickness comprising of one part of cement and five parts of clean fine sand or as specified in the item specification to form base for vapour barrier.

### **MORTAR MIXING:**

Mixing of mortar shall be done in a mechanical mixer. Hand mixing shall be resorted to only when specifically permitted by the Engineer. Cement and sand shall be mixed dry thoroughly and then water shall be added gradually. Wet mixing shall be continued till mortar of the



consistency of a stiff paste and uniform colour is obtained. Only the quantity of mortar which can be used within thirty minutes of its mixing shall be prepared at a time..

Mortar shall be used as soon as possible after mixing and before it has begun to set and in any case within thirty minutes after the water is added to the dry mixture. Mortar left un-used for more than thirty minutes after mixing shall be rejected and removed from the site of work.

#### **APPLICATIONS:**

Plaster application shall be commenced only after the preparatory work is approved by the Engineer. Correct thickness of plaster shall be obtained by laying plaster screeds(gauges ) at intervals of 1.5mtrs. as directed. Mortar shall be firmly applied, spread evenly well pressed into the joints, rubbed, smoothed with straight edge, wooden flat and trowel and finished as approved by the Engineer to give a smooth, true and even surface.

#### **CURING:**

Finished plaster shall be kept wet for at least 10 days after completion. In not weather, walls exposed to such shall be screened with matting kept constantly wet or by any other approved means.

#### **CEILING PLASTER:**

Plaster to ceilings, soffits or stairs flight slabs and similar locations where called for , shall be 12mm thick and comprise of one part of cement and three parts of clean fine sand or as specified in the item.

#### **PREPARATION OF SURFACE:**

The surfaces to be plastered shall be prepared as called for earlier. The surface shall be brushed, swept clean and thoroughly wetted before plastering.

#### **APPLICATIONS:**

Mortar shall be applied firmly, pressed to the surface rubbed and finished to a smooth and even surface subject to the approval of the Engineer.

#### **CHICKEN MESH TO WALLS:**

Galvanised chicken mesh (24gauge, 12mm size) shall be provided at junctions of brick masonry and concrete members, to be plastered and other locations 150mm on either side of the junction in double fold or as called for, properly stretched and nailed, ensuring equal thickness of plaster on both sides of the mesh. The rate includes in the plaster works.



## **CEMETN MORTAR:**

Cement mortar shall be a proportion specified for each type of work. It shall be composed of Portland cement of 43 grade and sand. The ingredients shall be accurately gauged sand shall be evenly mixed together in mechanical mixer. Care should be taken not to add more water than necessary. If hand mix is allowed it shall be done on pucca waterproof platform. The gauged materials shall be put on platform and thoroughly mixed dry. Water shall then be added and the whole mixed thoroughly until the mix is homogeneous and of uniform colour, quantity of mortar mixed should not more than what can be consumed within half an hour of mixing.

Cement mortar mix are specified as 1:2, 1:3, 1:4 etc. The first figure will mean one part of Portland cement by volume , the second figure will mean one part of cement and four parts of sand. Cement and sand must conform to relevant IS specification.

Plaster shall not in any place be thinner than specified. Any extra thickness of plaster required to be plastered in the case of brick masonry or extra thickness required due to raking of the joints or filling up depressions formed in concrete surface during the course of roughening or due to bad casting or centering shall not be paid separately, but shall be covered by the general rate of plastering.

The rate for plastering shall include the cost of scaffolding, platform, swing etc. needed for carrying out the plaster work and shall cover the extra labour for plastering the joints, sills and soffits of opening. No extra payment shall be made for roughening the surface to obtain key for plastering work.

## **MODE OF MEASUREMENT:**

The method of measurement for various items in the tender shall be generally in accordance with the IS: 1200 subject to the following:

All plastering work shall be measured in sqm unless otherwise described.

Net area of surface plastered shall be measured. No deductions will be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 sqm each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings.



## 5. TECHNICAL SPECIFICATION FOR PAINTING WORKS

### PAINTING GENERAL:

The specification covers the general requirements for various types of painting and finishing of all surfaces throughout the interior and exterior of the building. The scope shall include furnishing of all materials, labour scaffolding, tools and appliances to do all painting and or white/ colour casing of both interior and exterior surfaces of plastering , ceiling and all carpentry works. This also include painting structural and miscellaneous steel, railings, gratings, steel doors and frames, steel sashes, windows, louvers and frames, steel rolling shutters, MS grills etc. The number of coats required in various situation and also the types of finish required for the several items of work such as cement based paint, plastic emulsion paint, oil bound distemper, synthetic enamel paint etc. are specified in the schedule of quantities and specifications.

Before the commencement of the work the contractor shall provide sample panels of painting at his own cost for the approval of the Engineer to enable him to keep an accurate check on the materials supplied and final shade to be painted. It is however the express responsibility if the contractor to provide any deviations and defects shall have to be rectified by the contractor at his own cost.

Contractor shall protect not only his own work at all times but also all the adjacent to the Engineer during progress of painting. It is the responsibility of the contractor upon completion of painting work to remove all paint and varnish spots from floors, walls, glass panes and other surfaces and restore them to the original conditions. The work generally to be touched up shall be attended to after all other workmen have left. All accumulated material, rubbish etc. have to be cleared and the premises left in clean, orderly and acceptable conditions.

Contractor shall provide scaffolding wherever necessary erected on double supports tied together by horizontals, no ballies, bamboo's or planks shall rest on or touch the surface which is being painted. Contractor is deemed to have considered the following while tendering and no extra claim on account of these will be entertained.

- A. Supplying the paint and other materials required of approved colour and brand.
- B. Preparing the surfaces to be painted.
- C. Preparing the surfaces to be painted.
- D. Providing and erecting scaffolding and removing the same after completion of the work.
- E. Application of paint as per the specification and to manufacturer's instructions.
- F. Curing, protecting the painted surface, adjacent work and thoroughly cleaning of the premises.





All doors, partitions etc. shall be finished in the manner specified in the drawing, specifications and schedules, wherever painting and polishing are specified although three coats finishes specified are to be included in the rates, quoted, the contractor shall be required to carry out additional coats of paint/polish to obtain uniform and goods finish at no extra cost, wherever such additional coats are considered necessary in the opinion of the Engineer, If directed, putty shall be applied over the entire surface to ensure smooth and neat finish at no extra cost.

#### **MATERIAL:**

The paint shall generally conform to the chemical composition and other characteristics laid down in the relevant Indian Standard specification. The entire materials required for painting work shall be obtained direct from approved manufacturers or their authorized agents and brought to site in original manufacturer's containers with seals unbroken.

Paint shall be ready mixed and of 1<sup>st</sup> quality of the approved brand and manufacture. Mixing of paint by the contractor at site will not be allowed, except with preparation of ingredients and their quality shall be strictly maintained as per manufacturer's instructions and all as directed by the Engineer. All the materials shall be kept properly protected when not actually in use. Lids of containers shall be kept closed. Material which have become stale or flat (in the opinion of the Engineer) shall not be permitted to be used on the works and shall be removed from site forthwith. Wherever the word 'approved' occurs in these specifications it shall mean that the competent authority for such approval is the Engineer. Any material found not conforming to the relevant specification shall have to be removed by the contractor from the site at his own expenses. Colors shall be uniform and non-fading.

#### **WHITE WASHING WALLS AND CEILING:**

White wash shall be prepared from fat lime or shell lime slaked on site mixed with just enough water to make a thick paste and allowed to remain for at least 7 days before use. At the time of using, the paste shall be diluted with just sufficient water and stirred until the mixture attains the consistency of a thin cream and strained through clean and coarse cloth. Four kgs. of gum dissolved in hot water shall be added to each cum of the lime used. Ultra marine blue shall be added to give required whiteness. The number of coats shall be specified in the bill of quantities and shall be applied by using flat brushes or spray pump, on surface prepared. Before the wash is applied the surface shall be thoroughly cleaned of all dust, dirt scales, marks and mortar drops. All holes and depressions shall be filled in the cement mortar 1:4 or lime putty.



### **COLOUR WASH:**

Colour wash shall be prepared by adding mineral colours or approved pigments not affected by lime or light. Colour wash shall be applied as specified under "white wash"

Approval of the Engineer shall be obtained in regard to exact shade before applying colour wash.

### **CEMENT PAINT:**

The number of coats shall be indicated in the bill of quantities. The surface to be cement painted shall be thoroughly cleaned of dust, dirt, grease, oil marks, cement marks, loose scales, etc. by the use of a stiff wire brush or by coir rope. The cleaned surface should be wetted with clean water either by spray gun or any other convenient method, to ensure complete absorption. Cement paint shall not be applied on dripping or wet surface. All holes depressions, cavities etc. shall be filled in with cement mortar 1:4 or as directed by the Engineer, to render the entire surface smooth and even to receive the paint, at no extra cost. All fungus or organic matters, which may be present, shall be removed by scrapping and sand preparing and the surface rendered smooth.

### **PAINTING OIL/ENAMEL/ACRYLIC EMULSION ETC.**

Ready mixed oil paint, acrylic emulsion paint, ready mixed synthetic enamel paint. Aluminium paint etc. shall be brought in original containers and in sealed tins. If for any reason thinner is necessary the brand and quantity of thinner recommended by the manufacturer or as instructed by the Engineer shall be used.

The surface shall be prepared as specified above and a coat of approved primer shall be applied. After 24 hours drying, specified quality paint shall be applied evenly and smoothly. If required a filler putty coating may be given to give smooth finish. Each coat shall be allowed to dry out thoroughly and then lightly rubbed down with sand paper and cleaned of dust before the next coat is applied. Number of coats shall be as specified in the item and if however the finish of the surface is not uniform additional coats as required shall be applied to get good and uniform finish at not extra cost. After completion no hair marks from the brush or clogging of paint puddles in the corners of panel angles of mouldings shall be left on the work. The glass panes floor etc. shall be cleaned of stains.

When the final coat is applied, if directed, the surface shall be rolled with a roller or if directed it shall be stippled with a stippling brush.



## **MATERIAL APPROVAL PROCESS**

Approved process of materials through Consultants is as below:

Contractor should submit the following documents:

- 1) Product details.
- 2) Use of product for similar type of construction
- 3) IS/ ASTM confirmation
- 4) Third party test certificate
- 5) Manufacturer test certificate
- 6) Letter from the user where the product is successfully used.

The above parameters shall be necessarily followed for the equivalent brands given in the tenders. For the approved and recommended brands, following documents shall be submitted.

- 1) Catalogue of the product
- 2) Manufacturer Test certificate
- 3) Third party test certificate as and when required by consultant.
- 4) Consultant approval of the product or system of work shall be final as the repair system is based on the consultants appraisal of the project.
- 5) Material used without approval / verbal recommendation by clients engineer / officer shall not be accepted.
- 6) Violation of this clause will leads to termination of contract.



## **STANDARD PROCEDURE FOR REPAIRS**

### **SCHEDULE OF STANDARD PROCEDURES**

1. SP-1 : Brick column repairs
2. SP-2 : MS Steel fabrication and protection
3. SP-3 : Minor guniting repairs and protection
4. SP-4 : Minor RCC repairs and protection
5. SP-5 : Detailed guniting repairs and protection
6. SP-6 : Foundation checks and floor repairs. Underground structure protection.
7. SP-7 : Pipes and Service Line protection
8. SP-8 : Drainage repairs
9. SP-9 : Roof protection and waterproofing.
10. SP-10: Repair and Rehabilitation of Column (Jacketing)
11. SP-11: Repair and Rehabilitation of Column, Slab, Beams and other concrete structure
12. SP-12: Concrete surface protection Coating
13. SP-13: Epoxy Repair and Epoxy Injection
14. SP-14 Arch Roof Waterproofing System
15. SP-15 Expansion Joint Treatment
16. SP-16 Removal of Old Gunite and loose Concrete



## **STANDARD PROCEDURE FOR REPAIRS**

### **SP – 1 – Brick Column Repairs**

This item is related to “in-build” column portion in the brick wall. The procedure for repair shall be as below:

1. Repair to open joints and carry out the pointing in the brick work.
2. Drilling the crack with 16 mm dia drill bit.
3. Fixing of injection port.
4. Injection of lime + cement slurry modified with non-shrink additive of AC-EXPA-C.
5. Injection shall be done at low pressure with hand pump.
6. Pressure shall not exceed 3 kg/Sqm.
7. Cutting of nozzles.
8. Pointing and finishing of the surface.

**Note: -**

- At many places brick work joints are open and there are no cracks. Such areas shall be treated with cement + lime pointing.
- All the surface repaired shall be protected by Silicon Spray (like AC-CLEAN-COAT) so that the damages to the brick surface in future will be avoided.
- For the large cracks inside steel flat is to be given.  
*(Specified and detailed item of work shall be followed for the actual execution.)*



## **STANDARD PROCEDURE FOR REPAIRS**

### **SP – 2 – MS Steel Fabrication and Protection**

This item pertains to various structural steel element including steel grating, checker plates, angles, supporting system, etc.

#### **Standard Procedure:**

1. Cleaning of paint and rust.
2. AC-METAL-CLEANER, Xylene, standard paint remover or rust remover shall be used.
3. Clean surface shall be protected with Zinc rich primer like AC-DUR-ZRP.
4. Surface shall be coated with high build epoxy paint, AC-DUR-CRE.

#### **Note:**

- Before execution of this item, welding, fabrication correction and repairs to steel work shall be carried out as per available drawings or site conditions.



## STANDARD PROCEDURE FOR REPAIRS

### SP-3- Minor Guniting Repairs and Protection

This item is applicable where the existing gunite is cracked but it is not delaminated.

The damages to the surface area less than 20% of gunite area (approximately).

#### **Standard Procedure:**

1. Hacking and removal of weak gunite.
2. Fixing of nozzles into the cracks.
3. Injection of ports for grouting.
4. Injection AC-FLOW-GROUT, special ready to use polymer grout.
5. Grouting sequence shall be defined before starting of the work.
6. Repair to the old gunite shall be done as below:-
  - Removal of gunite.
  - Application of bonding coat of AC-DUR-BOND/AC-BOND-AID.
  - Repair to the patch with AC-REPAIR-10 (ready to use repair patch material)
7. Protection:-

Protection to the repaired area shall be done with –

  - Carbonation protection coating of AC-FLEX-CL
  - Cement polymer composite
  - Epoxy protection system.

#### **Note:-**

*Choice of the protection system will be depend upon location of the structure.*



## **STANDARD PROCEDURE FOR REPAIRS**

### **SP-4- Minor RCC Repair and Protection**

This item is to be operated where RCC Column, beam, slab or any other structural elements are having minor cracks or spalling of concrete. Below given repair system shall be adopted followed for protection.

#### **Standard Procedure:**

##### **A) Repairs:-**

1. Hacking and removal of loose concrete.
2. Cleaning of reinforcement with simple hand tools.
3. Removal of rust with rust cleaner/metal cleaner.
4. Providing and applying polymer bond coat of AC-BOND-AID.
5. Repair with readymade repair mortar of AC-REPAIR-10.
6. If there are cracks then cracks shall be filled by drilling of nozzles and injecting non-shrink free flow like AC-FLOW-GROUT.

##### **B) Protection:-**

Protection to the repaired area shall be done with –

- Carbonation protection coating of AC-FLEX-CL.
- Cement polymer composite
- Epoxy protection system.





## **STANDARD PROCEDURE FOR REPAIRS**

### **SP-5- Detailed Guniting Repairs and Protection**

This item is to be operated where guniting portion has cracks and spalling at many places.

#### **Standard Procedure:**

##### **A) Repairs:-**

1. Removal of entire guniting.
2. Removal of mesh, if it is there within the guniting.
3. The exposed concrete shall be repaired by AC-REPAIR-10 system and cracks, if any, shall be injected with AC-DUR-IE system.
4. Surface repairs to full depth shall be done with AC-ACRYLATE-REPAIR system.

##### **B) Protection:-**

Protection to the repaired area shall be done with –

- Carbonation protection coating of AC-FLEX-CL.
- Cement polymer composite
- Epoxy protection system.

#### **Note:-**

*Choice of the protection system will be depend upon location of the structure.*



## **STANDARD PROCEDURE FOR REPAIRS**

### **SP-6- Foundation Cracks, Floor Repairs & Underground structure Protection.**

This item is to be operated wherever there is a doubt about stability of flooring & foundation below it.

#### **A) Foundation Cracks-**

##### **Standard Procedure:**

1. Floor area around foundation shall be dismantled and excavation shall be done to the depth of foundation.
2. Steel props shall be provided all around structure to release the load. (Consultants opinion and structure consultants view shall be obtained during propping).
3. Foundation opened, shall be checked and then repair system shall be decided.
4. Underground foundation after the repairs shall be protected with AC-DUR-CT(S) Coal Tar Epoxy coating.
5. Back filling shall be done with proper material and compacting it.

#### **B) Floor Repairs – This item is to be operated where the flooring is damaged. (or opened for foundation repairs)**

##### **Standard Procedure:**

1. The damaged flooring shall be opened and removed in totality.
2. Base layer shall be re done / completed. (This shall be site decision.)
3. Providing and laying of 1000 gauze PVC sheets over the filling.
4. Laying of PCC.
5. Laying of RCC flooring or concrete flooring with steel fibers.
6. For all the patch works, it is recommended to use steel fibers, 30 Kg./Cum.
7. PVC fibers or other fibers shall be used only after discussions with consultants.
8. Freshly laid flooring shall be sprinkled with floor hardener. Non-metallic floor hardener like AC-HARDTOP is recommended.
9. Floor finish shall be done with steel trowel.
10. For larger area, grooves/joints shall be kept to avoid cracks.
11. Floor protection wherever necessary shall be done with AC-DUR-SELFLEVEL.



## **STANDARD PROCEDURE FOR REPAIRS**

### **SP-7 - Pipes and Service Line Protection**

Pipes and service lines of MS shall be protected as below:

Standard Procedure:

1. Cleaning and removing of old paint.
2. Removal of rust in totality by simple mechanical means.
3. Removal of rust by using chemical like AC-METAL-CLEANER.
4. Providing and applying zinc rich primer, AC-DUR-ZRP.
5. Application of TWO coats of AC-EPOXY-PAINT



## STANDARD PROCEDURE FOR REPAIRS

### SP-8 - Drainage repairs

There are lot of open drainages and underground drainages. Many of the drainages are running outside the shop floor. There are trenches and drainages within the shop floor or production area, also. Many of the drainages are damaged and invite immediate repairs. Procedure for the same is as below:

Standard Procedure:

1. Dressing / cleaning of the existing drain.
2. Correction of the geometry of the drains.
3. Defining the slope of the drain.
4. Providing and laying stone flooring to the base and sides. (If Shahabad stone or similar stone is available, locally).

OR

Repairing of the bottom of drain with PCC concrete. Repairs to the sides with cement & mortar with addition of inhibitor solution (AC-CORRODUR).

5. Application of AC-EPOXY-PAINT or Coal Tar Epoxy (AC-DUR-CT-S).

**Note:** Choice of the coating in the drainage will depend upon material/fluid which it is carrying. It shall be decided as per the case.



## **STANDARD PROCEDURE FOR REPAIRS**

### **SP-9 - Roof Protection and Waterproofing**

At many places roof is leaking and same shall be protected by appropriate waterproofing system.

Standard Procedure:

1. Cleaning of the surface area of the roof.
2. Repairs to the roof with readymade repair mortar.
3. Filling of cracks (if any).
4. Providing and applying One coat of AQUAGUARD-FLEX.
5. Providing and laying of geotextile membrane.
6. Providing and laying additional layer of AQUAGUARD-FLEX

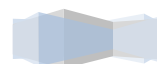
**OR**

For Arch Roof, Shell Roof or other area following system can be adopted.

Standard Procedure:

1. Cleaning of the surface.
2. Providing and applying TWO coats of ROOF-Y2-K over one coat of AC-PRIME-255.

**Note:** Roof waterproofing system shall be selected as per the condition of roof, age of the roof and use (if accessible).



## STANDARD PROCEDURE FOR REPAIRS

### SP-10 – Repair and Rehabilitation of Columns(Jacketing)

- Removal of entire old loose concrete from column surface.
- Clean the exposed reinforcement with AC-METAL-CLEANER.
- Put extra rebars where ever necessary (*This activity will be done when rebar size is reduced by 30% & more*).
- Apply corrosion inhibitor solution coating of AC-DUR-ZRP over rebars.
- Fix of MS Angle 50mm x 50mm x 5mm along 4 corner of the column (*where ever only 2 or 3 corners of column are visible and repairable, there only angles shall be weld with exiting rebar*).
- Fix the bracing straps of 50mm x 5mm as per the drawing.
- Bracing straps shall be 500 mm C/C (*where ever necessary the strap shall be secured by drilling and fixing it with expansion inserts*).
- Outer dimension of the columns after fixing angle at the corner shall be 50mm more on all sides. (*i.e. each dimension of column will increase by 100mm*).
- Fix MS plywood shuttering on all 4 sides.
- Fill the entire repair area by pouring micro concrete AC-GROUT-H1 as per manufacturer specification.
- Remove the plywood shuttering after 12 hrs.
- Cure the micro concrete with water for 3 days (*Micro concrete does not need very liberal water curing*) please refer manufacturer's catalogue.

OR

*After removal of shuttering carry out water curing and apply acrylic base curing compound AC-CURE-MS. Ensure full protection of repaired column.*

- After minimum 7 days of curing apply AC-DUR-ZRP (Corrosion resistance epoxy) on the entire exposed surface of concrete and corner angles, as directed by manufacturer.

**Note:-** Carry out epoxy grouting with AC-DUR-IE at the junction of Column and bottom slab (Foundation level) and at each intermediate slab/beam connection for strengthening



## **STANDARD PROCEDURE FOR REPAIRS**

### **SP-11 – Repair and rehabilitation of Columns, slab, beams and other concrete structures with FRP System**

- Repair any large areas of spalled, delaminated, or otherwise deteriorated areas of the concrete substrate and inject existing cracks in the substrate greater than 10 mm width. Profile the concrete surface by abrasive blasting, water blasting, or disc grinding. Grind sharp edges, if any.
- Contractor has to check concrete members / surface strengthened or retrofitted with FRP system is highly dependent on a sound concrete substrate and proper preparation and profiling of the concrete surface. The detail method for the repair and surface preparation of concrete shall be followed as stated in ACI 546R
- Primer AC-DUR-UPR should be applied uniformly using a roller on the prepared surface at the manufacturer specified rate of coverage. The applied primer should be protected from dust, moisture and other contaminants before applying the FRP system
- Apply AC-WRAP-EPOXY-PUTTY using a trowel or putty knife in an appropriate thickness and sequence with the primer as recommended by the manufacturer. AC-WRAP-PUTTY shall be used to fill the voids and smooth surface discontinuities before the application of AC-DUR-WARP (Resin) and adhesive. The putty shall be cured as per recommendation given by manufacturer
- The saturating resin / adhesive shall be applied with roller after 24 hrs curing of AC-WRAP-PUTTY. Cut the dry fiber AC-WRAP-CARBON-FABRIC 230 GSM into the proper width and length using shears or a utility knife. The warp shall be applied / fixing over tacky layer of saturating resin / adhesive.
- The warp shall be anchored with AC-WRAP-ANCHOR to tighten the FRP. Wrap the fabric on concrete surface ensuring no entrapment of air. Use roller to remove air trapped.
- The second layer of the saturating resin / adhesive shall be applied on the FRP wrap with roller extended upto 200 mm on all side of the concrete surface.
- Allow the fabric to cure for 72 hrs. (as suggested by manufacturer)



- **Equipment**

- The Equipment required for the application of FRP system are
  - i. Rein impregnators
  - ii. Sprayers
  - iii. Lifting/positioning devices,
  - iv. Winding machine
- All the equipment should be clean and in good operating condition
- Contractor should have protection equipment
  - i. Gloves
  - ii. Masks
  - iii. Eye guards
  - iv. Coveralls





## Specifications for FRP/CF Wrap Materials

The product shall be as approved by consultant and general specification shall be as below:

### **FRP/GRP MATERIAL:**

Fiber Reinforced is a composite material made of a polymer matrix reinforced with fibers. The fibers are usually fiberglass, carbon, or aramid, while the polymer is usually an epoxy vinyl ester or polyester thermosetting plastic.

### **RAW MATERIAL OF FRP:**

- Glass fibers: Glass Fibers are used to give stiffness and resist tensile and compressive loads.
- Resin: Resin is matrix material which transfers load between fibers and bonds and holds fibers together.
- Other Additives: To provide additional properties like Fire retardant, high electrical insulation etc.

The specification shall be-

### **Guide for the Design and Construction of Externally Bonded FRP System for Strengthening Concrete Structures (ACI 440.2R-08)**

- **Materials:**

Carbon Fiber Reinforce Polymer Composite material shall be 230 GSM.

Approved manufacturers for this are these

- Carbonext India Pvt Ltd
- SGL Carbon India Pvt Ltd
- Arrow Technical Textile Pvt Ltd
- Carbon Product (India)
- Reliance Composites



- **Specification of Wrap**

Fiber type	High Strength CF
Fabric Aerial weight, GSM	200, 230, 300, 400, 430, 450, 500, 600, 900, 1200
Width, mm	500
Fiber Direction	00
Weaving style	plain
Warp	12K / 24K Carbon
Weft	Glass Fiber (Thermo fixed)
Ends Warp, 10 cm	32 ± 1
Ends Weft, 10 cm	10 ± 1
Fibre Tensile Strength, MPa	> 4900
Fibre E-Modulus, GPa	> 240
Fibre Elongation, %	2.1 ± 0.1
Fibre Density, g/cc	~1.8

**A) RESIN SYSTEM:**

**1) Polyester:**

- Unsaturated polyester resins are the most commonly used for the composites industry. Polyester resins have a good balance of mechanical, electrical and chemical properties. The polyester resins are mainly used in glass fiber profiles. Polyester resins can be modified so that they are flame-retardant or self-extinguishing.
- The polyester resins have good chemical resistance properties. The chemical environment have to be known before a polyester or vinylester resin can be chosen. Polyester resins are good in weak alkalis and excellent in weak acid conditions.
- The maximum recommended operation temperature is 80°C for the basic grade polyesters. Modified versions are also available.

- **Specification for Anchor**

Fiber type	High Strength CF
Fiber Direction	00
Diameter*, mm	4 & 6
Tensile Strength of Fiber, MPa	≥ 4300
E-Modulus, GPa	≥ 230
Shelf Life	Not Applicable

- **Material Epoxy Resin**

Epoxy Resin shall be Vinyl Ester / Polyester/Polymeric. It should be for fo void range of environmental condition.



• **Specification for Two Component Epoxy Resin System**

Compressive Strength @ 250 C (As per ASTM C 579-01) 7 Days	> 50 MPa
Tensile Strength @ 250 C (As per ASTM D638) 7 Days	> 40 MPa
Flexural Strength @ 250 C (As per ASTM D790) 7 Days	> 60 MPa
Bond Strength @ 250 C	> 1.5 MPa (Concrete Failure) > 8 MPa ( Steel Failure)

Physical Property

	<b>Base</b>	<b>Hardener</b>	<b>Mixed</b>
Feel	Liquid	Liquid	Liquid
Color	Light	Dark Yellow	Dark Yellow
Mixing Ratio, By Weight	100	50	
Density @ 25 ° C	1.1 – 1.2	0.95-1.05	1.05 – 1.15
Viscosity @ 25 ° C , cps	4000 - 10000	500-1000	
*Pot Life @ 25° C			10 - 15 mins for ~ 5 Kg mix 30 - 40 mins for 100 g mix
*Waiting Time for fabric- application with chemical Adhesion			+10°C: 2 - 3 hrs. +20°C: 1 - 2 hrs. +30°C: 30 - 40 mins
Application Thickness			2 - 3mm
Yield (Pack)	4 kg	2 kg	6 kg

**2) Vinyl ester (VE):**

- Vinyl ester resins combine the best features of polyester and epoxy resins. The strength is good and the resin has a very good chemical resistance in acids and alkalis environments, especially at high temperatures. The glass fiber vinyl ester profile has good electrical and thermal insulation properties.
- Epoxy based vinyl ester resins have good chemical resistance at elevated temperatures.
- The maximum recommended operating temperature is 90-150°C. Modified versions are also available.



## **STANDARD PROCEDURE FOR REPAIRS**

### **SP-12- Concrete surface protection coating**

This item include the application of Epoxy Protection coating on repaired, FRP reinforced and other concrete surface

#### **Standard Producer:**

- Steel structure to be coated will comply with IS or BS specifications.
- Steel structure to be coated with AC-PU-PAINT should be sand blasted or cleaned with proper cleaners like AC-METAL CLEANER
- Concrete surface to be coated should be repaired properly, (if there are any honey combs) and it should be structurally sound.
- It should be dry and free from loose materials.
- Concrete should be fully cured before application of coating.

#### **Mixing**

The contents in each container should be stirred well.

- Add hardener into the resin fully.
- Mix the contents slowly (300- 500 r.p.m) to achieve uniform consistency.

#### **Coating**

- Mixed polyurethane paint shall be applied to dry and prepared surface to form continuous film using standard paint brush, roller or spray equipment.
- Dry film thickness of about max. 35 micron is to be achieved in two coats.



## STANDARD PROCEDURE FOR REPAIRS

### SP-13- Epoxy Repair and Epoxy Injection

#### **Standard Procedure:**

#### **Repairs:-**

1. Hacking and removal of loose concrete.
2. Cleaning of reinforcement with simple hand tools.
3. Removal of rust with rust cleaner/metal cleaner.
4. Providing and applying Epoxy bonding coat of AC-DUR-BOND.
5. Repair with Epoxy repair mortar of AC-DUR REPS.
6. If there are cracks then cracks shall be injected by fixing of injection ports by drilling.
7. Carry out the injection process by injectable epoxy AC-DUR-IE.
8. Cutting of injection ports and finishing of the surface with Epoxy repair AC-DUR-REPS

:-

Protection to the repaired area shall be done with –

- Application of AC-PU-PAINT is recommended on Steel structure, Repaired and sound concrete and (CFW) Surface
- The surface shall be cleaned and should be dirt/dust/oil or grease free.
- Repaired concrete shall be fully cured before application of AC-PU-PAINT.
- Product shall be as per IS 13213 – 2018
- AC-PU-PAINT shall be mixed slowly (300 – 500 rpm) by adding hardener into resin to achieve uniform consistency.
- Application of the Mixed material shall be done with paint brush/ Roller/ Spray Equipment
- Dry film thickness of about 250 micron shall be achieved in two coats



## **STANDARD PROCEDURE FOR REPAIRS**

### **SP-14- Arch Roof Waterproofing system**

#### **Surface Preparation:**

- The exiting bituminous material and other loose material shall be removal in totality
- Honeycomb and patches in the roof shall be repaired with Micro Concrete made out of AC-GROUT-H1
- Cleaning of the surface by simple mechanical means or by buffing machine before coating
- Apply one coat of AC-TEX-PROOF on the surface
- Apply 65 MM Cloth (Flexible Membered) over first coat
- Apply second coat of AC-TEX-PROOF on the cloth



## **STANDARD PROCEDURE FOR REPAIRS**

### **SP-15- Expansion Joint Treatment**

#### **Surface Preparation:**

- Remove the bitumen sheet from the surface by mechanical means
- Remove the old filler material, dirt / dust from the joints
- Fixing Shalitex expansion joint filling board below 80mm from the surface
- Fixing 50mm breaker rod above the board
- Placing of Bond Breaking Strip of 5mm thick as a shatter
- Apply AC-POLYSEAL PRIMER on the sides of groove
- Apply AC POLYSEAL (Polysulphide Sealant) 1mm below the concrete surface up to 25 mm depth
- Apply AC-TEX-POOF as a waterproofing membrane above the expansion joint



## STANDARD PROCEDURE FOR REPAIRS

### SP-16- Removal of old Guniting and old Concrete

This item is applicable where the existing guniting is cracked but it is not delaminated and also at damage or loose concrete

The damages to the surface area less than 20% of guniting area (approximately).

#### **Standard Procedure:**

1. Hacking and removal of weak guniting.
2. Cutting of M.S. Mesh
3. Cleaning of the Exposed Area from Arch Roof

AND

4. Hacking and removal of loose concrete
5. Cleaning of the exposed reinforcement with simple hand tool
6. Removal of Rust with Cleaner/Metal Cleaner
7. Fixing of rebars to the RCC Structure as per the design requirement

Application of Corrosion Inhibitor solution on the old and new reinforcement with **AC-DUR-ZRP**





## SAFETY CODE

01. There shall be maintained in readily accessible place first aid appliances including adequate supply of sterilized dressing and cotton wool.
02. An injured person shall be taken to a public hospital without loss of time, in cases where the injury necessitates hospitalization.
03. Suitable and strong scaffolds should be provided for workmen for all works that cannot safely be done from ground.
04. No portable single ladder shall be over 8 meters in length. The width between the side rails shall not be less than 30cm (clear) and the distance between two adjacent rungs shall not be more than 30cm. When a ladder is used an extra mazdoor shall be engaged for holding the ladder.
05. The excavation material shall not be placed within 1.5 meters of the edge of the trench or half of the depth of trench whichever is more. All trenches and excavations shall be provided with necessary fencing and lighting.
06. Every opening in the floor of a building or in a working platform be provided with Suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be one meter.
07. No floor, roof or other part of the structure shall be so overloaded with debris or materials as to render it unsafe.
08. Workers employed on mixing and handling material such as asphalt, cement mortar or concrete and lime mortar shall be provided with protective footwear and rubber hand-gloves.



09. Those engaged in welding works shall be provided with welder's protective eye-shields and gloves.
10. a. No paint containing lead or lead products shall be used except in the form of paste or readymade paint.  
b. Suitable facemasks should be supplied for use by the workers when the paint is applied in the form of spray or surface having lead paint dry rubbed and scrapped.
11. Overalls shall be supplied by the Contractor to the painters and adequate facilities shall be provided to enable the working painters to wash during the period of cessation of work.
12. Hoisting machines and tackle used in the work, including their attachments anchorage and supports shall be in perfect condition.
13. The ropes used in hoisting or lowering material or as a means of suspension shall be of durable quality and adequate strength and free from defects.



## SUMMARY OF NOTICE INVITING THE TENDER

01. Accepting Authority	:	Star Paper Mills Limited., Saharanpur
02. Earnest Money Deposit	:	Rs. 2,00,000/- (Rs. Two Lacs ) (D.D. in favour of Star Paper Mills Limited., Saharanpur)
03. Security Deposit	:	1% of contract value or Rs. 50,000/-
04. Retention Money	:	5% from Running bills.
05. Date of Commencement of works	:	October 2021
06. Period of completion of works	:	<b>180 Days</b>
07. Interim payments	:	Monthly or as approved by Consultants/SPML
08. Period of passing of the Running Bills by the Consultant	:	Within 7 days
09. Payment of the Running Bills by the Employer	:	Within 7 days
10. Period of Final Measurement & valuation	:	30 days after completion
11. Period of final bill payment by the Employer	:	15 days after certification of Consultants
12. Defect Liability period	:	5 Years
13. Liquidated Damages	:	1% of contract value
14. Tax registration details	:	_____
16. PAN Card details	:	_____

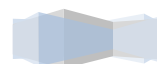
.....  
**Contractor**

.....  
**Consultants**



## CLARIFICATIONS OF BOQ

1. Repair contractor is supposed to be an expert in repair & restoration and techniques.
2. For any clarification of the work specifications and item specifications, Tenderer can communicate with consultant or SPML. For all the clarifications and detailing about the items of work/conditions of contract pertaining to the tender shall be send to the bidder within 72 Hrs.
3. All the communications shall be through e-mail address,  
Harrish Mishra  
[asiangrid@gmail.com](mailto:asiangrid@gmail.com)  
&  
B K Maheshwari  
[mechanical.sre@starpapers.com](mailto:mechanical.sre@starpapers.com).



# BILL OF QUANTITIES



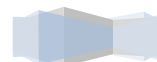
BOQ FOR REPAIR AND REHABILITATION WORK OF PHASE 1 AT STOCK PREPARATION AREA AND FINISHING AREA STAR PAPER MILLS LTD., SAHARANPUR					
SrNo.	Item Description	Unit	Qty	Rate (Rs. In Words & Figure)	Amount
<b>SECTION 1</b>					
<b>1</b>	<b>Dismantling</b>				
	Dismantling of concrete elements beams/column/roof portion with use of cutting machine, breaker or other large dismantling equipment. This item includes supporting of nearby structure, safety of adjoining building, protection of working structure around this area and disposal of removed concrete as directed by consultant / SPML. The lead distance of dismantled material shall be up to 500 m with in mill premises (Disposal of material including transportation cost outside mill premises or within the mill premises shall be paid separately	CUM	22		
<b>2</b>	<b>Scaffolding for Roof/Arch/Columns&amp; Beams</b>				
A	<b>Erection of Bamboo Scaffolding:</b> Providing and erecting bamboo scaffolding/ wooden balli/ minimum 50 mm diameter, fixing of the same with bracing, making of approach platform, safety precaution etc. All necessary for carrying out repairs. The scaffolding material shall be of best quality & shall be erected including making of access / entry passage for production work men. This item also includes fixing of hessian cloth, plastic mesh and other safety cloth / banners etc. complete to ensure comfortable working of men power. (Also without obstruction to regular production process in the area) Contractor shall prepare the scaffolding plan and barricading plan & get approved by the floor Engineer/supervisor considering all safety parameters	Sqm	15000		
B	<b>Removal of bamboo Scaffolding:</b> This item includes safely removing of scaffolding and working platform and stacking the same at designated place without interfering with production process and keeping it safely at it best.	Sqm	15000		



SrNo.	Item Description	Unit	Qty	Rate (Rs. In Words & Figure)	Amount
<b>3</b>	<b>Arch Roof and Beam Repair</b>				
A	<p><b>Removal of Old Gunite:</b> Old gunite work which is weak and falling likely to fall will be removed safely without damaging the arch roof part of the structure. (The sound gunite shall not be dismantled) (Good gunite with minor honeycombs will be repaired with micro concrete AC GROUT H1 ref SP-10) This item also includes disposal of the removed gunite / other material safely up to a distance of 500 m with in SPML premises as expanded in Item No1. This item also include cutting of M S Mesh if any in the gunite</p> <p><b>Ref: SP-16</b></p>	Sqm	2000		
B	<p><b>Removal of weak concrete from RCC Structure.</b> This item pertains to removal of weak concrete with simple hand tool and mechanical means necessary for the repair of concrete element. Removal of concrete beyond the gunite shall be within the scope of this item. Cleaning of reinforcement with simple hand tool. Removing of rust with rust cleaner/ metal cleaner</p> <p><b>Ref: SP-16</b></p>	Sqm	1500		
C	<p><b>Extra Steel Reinforcement:</b> Providing and fixing of new MS Steel / reinforcement as per the design requirements</p> <p><b>Ref: SP-16</b></p>	Kg	50		
D	<p><b>Corrosion Protection</b> Providing and applying Corrosion inhibitor solution on old and new reinforcement with <b>AC DUR ZRP</b></p> <p><b>Ref: SP-16</b></p>	Sqm	400		
E	<p><b>Epoxy Repairs:</b> Application of bonding coat of <b>AC-DUR-BOND</b> and repairs with <b>AC- DUR-REPS</b>. (Average thickness of Repair shall be 25mm and maximum up to 40mm.) Work will be done as per manufactures specification.</p> <p><b>Ref: SP-13</b></p>	Sqm	1000		



SrNo.	Item Description	Unit	Qty	Rate (Rs. In Words & Figure)	Amount
F	<p><b>Treatment to cracks more than 6mm:</b> This item pertains to injection &amp; grouting of visible cracks. (It is presumed that the fine cracks less than 6mm will be bridged by application of epoxy primer and hence they need not be injected. Also this Item includes opening of cracks (more the 6mm thick), fixing of injection ports for grouting. Carrying out the process of injection with <b>AC-DUR-IE</b>. This item includes cost of ports, epoxy material, removal of ports, and finishing etc.</p> <p style="text-align: right;"><b>Ref: SP-13</b></p>	Rmt	600		
G	<p><b>Application of Carbon Fiber Wrap (CFW)</b> Carbon Fiber Wrap (CFW) is proposed over the epoxy repair /polymer/micro concrete area for structural strengthening. The CFW area shall be marked and approved each time by consultant Engineer and entered in measurement book. Only after the approval of the work will, CFW will be done for the area. Providing and applying Carbon Fiber Wrap (CFW) from bottom surface and top of Arch roof and beams (As per the details specification)</p> <p style="text-align: right;"><b>Ref: SP-11 and Ref: Drawings</b></p>	Sqm	2000		
H	<p><b>Application of PU Based protection coating</b> Providing and applying PU based protection coating for Steel, repaired and sound concrete, and CFW structure in two coats to make min 250 micron thickness of <b>AC-PU-PAINT</b></p> <p style="text-align: right;"><b>Ref: SP-13</b></p>	Sqm	5000		
<b>4</b>	<b>RCC Repair to Columns, Beams &amp; Slab at Ground Level and First Floor Area</b>				
A	<p><b>Removal of Old Gunite:</b> Old gunite work which is weak and falling likely to fall will be removed safely. (The sound gunite shall not be dismantled) (Good gunite with minor changes will be repaired with micro concrete <b>AC GROUT H1 (Ref SP-10)</b> This item also includes disposal of the removed gunite / other material safely up to a distance of 500 m with in SPML premises as expanded in Item No1. This item also include cutting of M S Mesh if any in the gunite</p> <p style="text-align: right;"><b>Ref: SP-16</b></p>	Sqm	100		





SrNo.	Item Description	Unit	Qty	Rate (Rs. In Words & Figure)	Amount
B	<p><b>Removal of weak concrete from RCC Structure.</b> This item pertains to removal of weak concrete with simple hand tool and mechanical means necessary for the repair of concrete element. Removal of concrete beyond the gunite shall be within the scope of this item. Cleaning of reinforcement with simple hand tool. Removing of rust with rust cleaner/ metal cleaner</p> <p style="text-align: right;"><b>Ref: SP-16</b></p>	Sqm	1300		
C	<p><b>Extra Steel Reinforcement:</b> Providing and fixing of new MS Steel / reinforcement as per the design requirements</p> <p style="text-align: right;"><b>Ref: SP-16</b></p>	Kg	500		
D	<p><b>Corrosion Protection</b> Providing and applying Corrosion inhibitor solution on old and new reinforcement with <b>AC DUR ZRP</b></p> <p style="text-align: right;"><b>Ref: SP-16</b></p>	Sqm	400		
E	<p><b>Epoxy Repairs:</b> Application of bonding coat of <b>AC-DUR-BOND</b> and repairs with <b>AC- DUR-REPS</b>. (Average thickness of Repair shall be 25mm and maximum up to 40mm.) Work will be done as per manufactures specification. <b>Ref: SP-13</b></p>	Sqm	1500		
F	<p><b>Treatment to cracks more than 6mm:</b> This item pertains to injection &amp; grouting of visible cracks. (It is presumed that the fine cracks less than 6mm will be bridged by application of epoxy primer and hence they need not be injected. Also this Item includes opening of cracks (more the 6mm thick), fixing of injection ports for grouting. Carrying out the process of injection with <b>AC-DUR-IE</b>. This item includes cost of ports, epoxy material, removal of ports, and finishing etc.</p> <p style="text-align: right;"><b>Ref: SP-13</b></p>	Rmt	950		



SrNo.	Item Description	Unit	Qty	Rate (Rs. In Words & Figure)	Amount
G	<p><b>Application of Carbon Fiber Wrap (CFW)</b> Carbon Fiber Wrap (CFW) is proposed over the epoxy repair /polymer/micro concrete area for structural strengthening. The CFW area shall be marked and approved each time by consultant Engineer and entered in measurement book. Only after the approval of the work will, CFW will be done for the area. Providing and applying Carbon Fiber Wrap (CFW) on columns, beams and slab (As per the details specification)</p> <p style="text-align: right;"><b>Ref: SP-11 and Ref: Drawings</b></p>	Sqm	1600		
H	<p><b>Application of PU Based protection coating</b> Providing and applying PU based protection coating for Steel, repaired and sound concrete, and CFW structure in two coats to make min 250 micron thickness of <b>AC-PU-PAINT</b></p> <p style="text-align: right;"><b>Ref: SP-13</b></p>	Sqm	18000		
<b>5</b>	<b>Dome and Roof Waterproofing</b>				
A	<p><b>Removal of Bitumen Sheet:</b> Removal of old Bitumen Sheet</p> <p style="text-align: right;"><b>Ref: SP-14</b></p>	Sqm	3500		
B	<p><b>Application of Flexible Waterproofing Membrane</b> Providing and applying of <b>AC TEX PROOF</b> (Flexible Waterproof Membrane System)</p> <p style="text-align: right;"><b>Ref: SP-14</b></p>	Sqm	3500		
<b>6</b>	<b>Civil work</b>				
A	<p><b>Repair to Brick wall and Treatment to cracks:</b> This item includes opening of crack, fixing nozzle by drilling (16mm dia) in it, and Injection of cement slurry modified with non-shrink additive of AC-EXPA -C.</p> <p style="text-align: right;"><b>Ref: SP-01</b></p>	Rmt	500		



SrNo.	Item Description	Unit	Qty	Rate (Rs. In Words & Figure)	Amount
B	<b>Plaster Work:</b> This item includes the removal of old plaster and applying of new plaster 12 mm thick	Sqm	500		
<b>7</b>	<b>Expansion Joint Treatment</b>				
A	Providing and Application of Polysulphide sealant, including fixing of shalitek joint filler board and backup rod ( including cost of polysulphide sealant, <b>AC-POLYSEAL</b> and <b>AC-POLYSEAL-PRIMER</b> ) as per specifications <b>Ref: SP-15</b>	RMT	100		
<b>Total</b>					



<b>Section 2</b>					
SrNo.	Item Description	Unit	Qty	Rate (Rs. In Words & Figure)	Amount
<b>A</b>	<b>Strengthening of 12 numbers of columns for PEB Work</b>				
1	<b>Steel Jacketing:</b> This item pertains to strengthening of 12 Nos of columns, on which PEB structure will be constructed. The work shall be taken first in to the priority. Fabrication and installation of steel jacketing size (50mm x 50mm x 5mm) at all corners of the column up to full height. Angle shall be tied up with cross bracing as per the drawings.  <b>Ref: SP-10</b>	Kg	5000		
2	<b>Micro concreting:</b> Micro concreting with <b>AC Grout H1</b> up to 50 mm thickness. <b>Ref: SP-10</b>	Kg	2000 0		
<b>Total</b>					
<b>OR</b>					
<b>B</b>	<b>Strengthening of 12 numbers of columns for PEB Work with (CFW)</b>				
1	<b>Epoxy Repairs:</b> Application of bonding coat of <b>AC-DUR-BOND</b> and repairs with <b>AC- DUR-REPS</b> . (Average thickness of Repair shall be 25mm and maximum up to 40mm.) Work will be done as per manufactures specification. <b>Ref: SP-13</b>	Sqm	295		
2	<b>Application of Carbon Fiber Wrap (CFW)</b> Carbon Fiber Wrap (CFW) is proposed over the epoxy repair /polymer/micro concrete area for structure element. The CFW area shall be marked and approved each time by consultant Engineer and entered in measurement book only after the approval the work will be done for the area so approved. Providing and applying Carbon Fiber Wrap (CFW) from bottom surface and top of Arch roof and beams (As per the details specification) <b>Ref: SP-11 and Ref: Drawings</b>	Sqm	140		
<b>Total</b>					



Section 3					
SrNo.	Item Description	Unit	Qty	Rate (Rs. In Words & Figure)	Amount
	This item pertains to supply and fixing of MS Plates 25 mm thick, approx. (750 mm x 550 mm) - 12 Nos or as per the design given by designer. This item also includes of welding of Lugs, Anchor rods / bolts as per the fabrication design and fixing the MS plates over the top of column to the line and level with micro concrete <b>AC Grout H1</b>	kg	980		
<b>Total</b>					

**Note: -**

- Rates are for the completed item of work (including labour , material, infrastructure, safety and all other necessary activities).
- GST as applicable paid extra

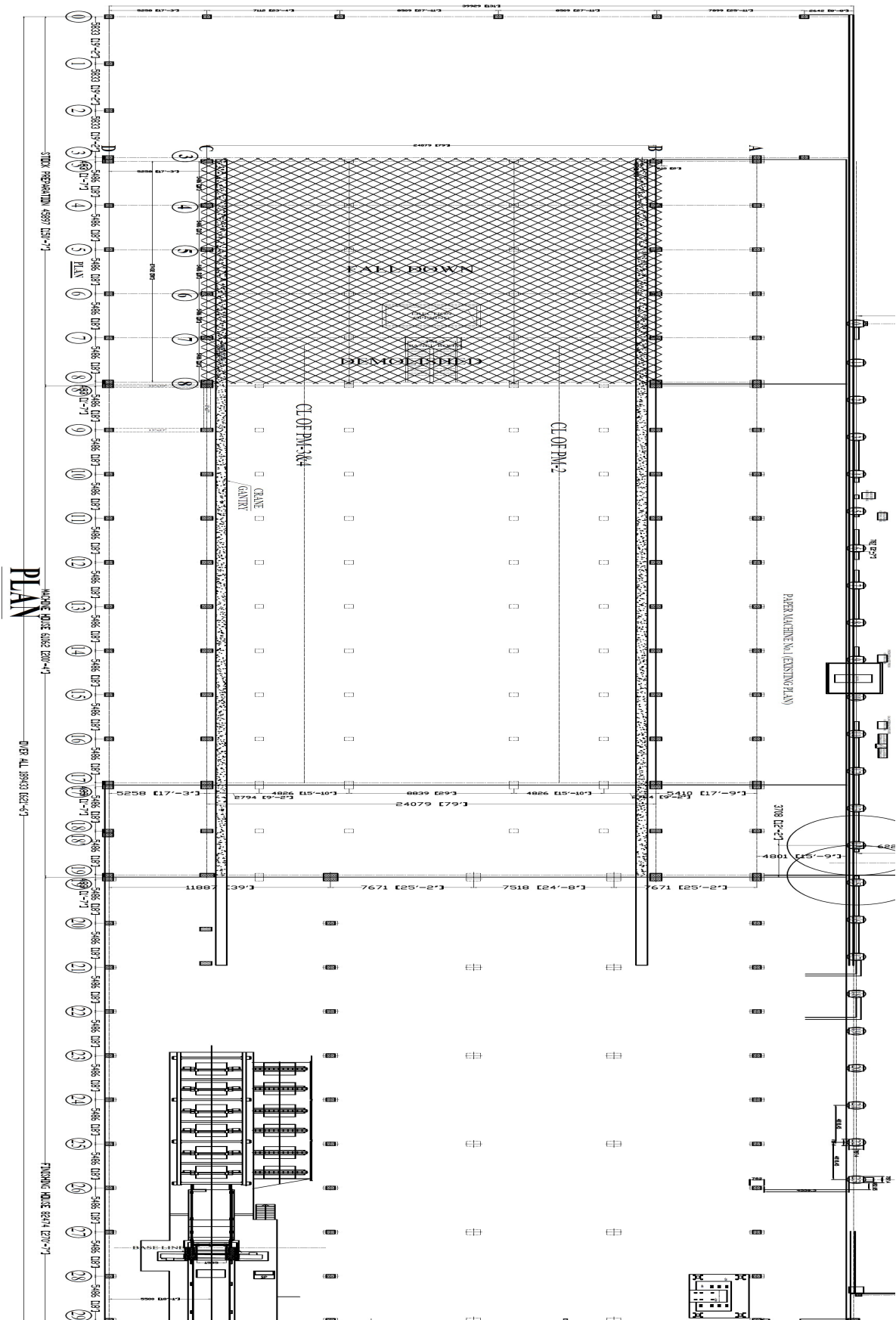


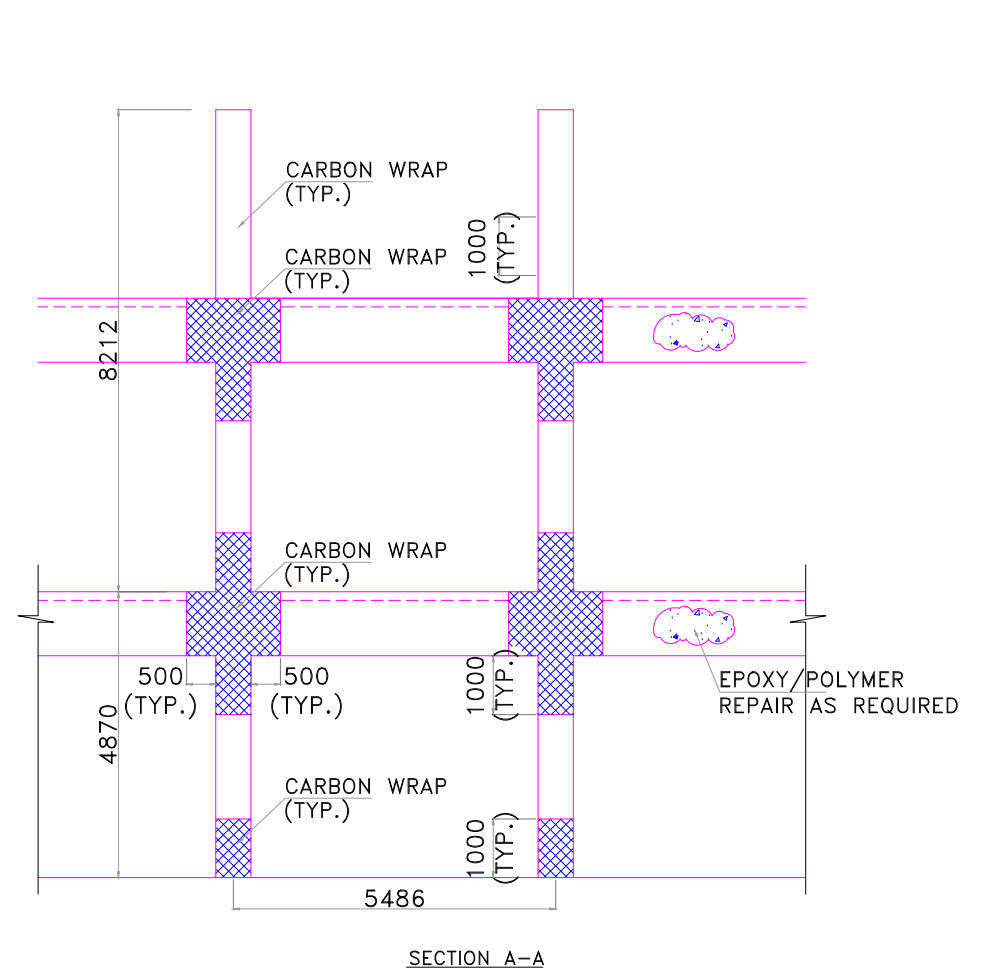
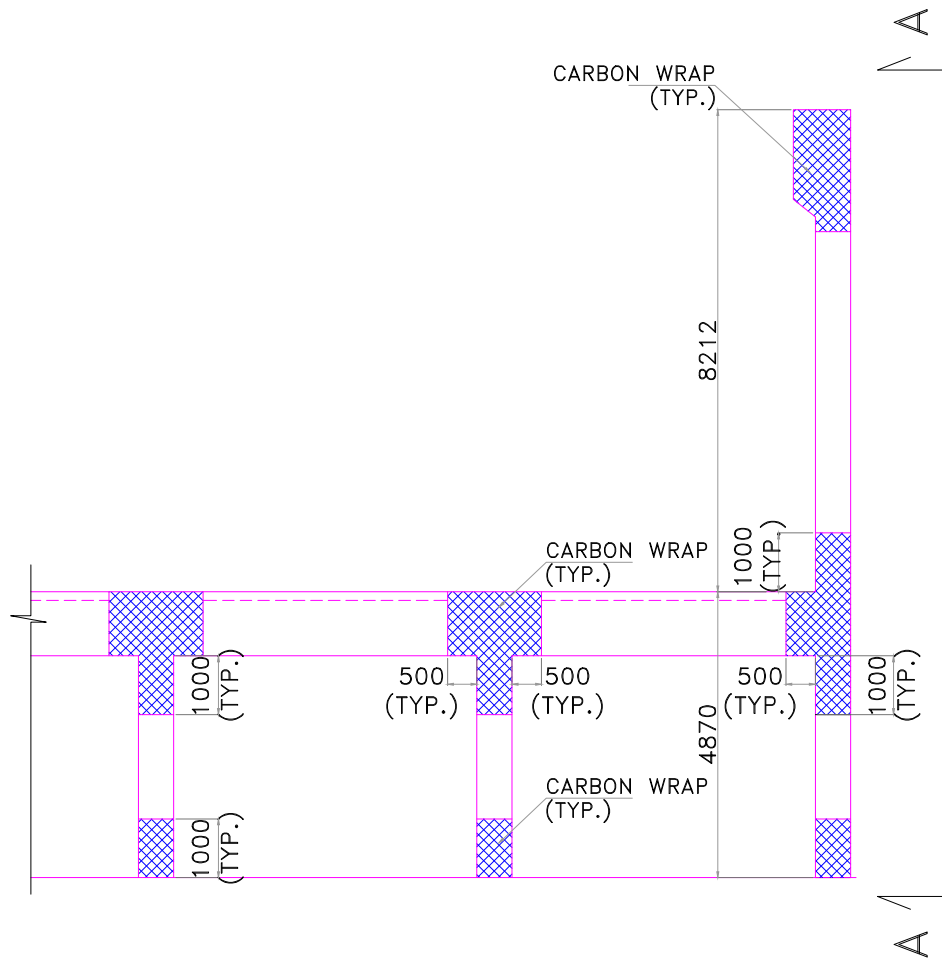
## SKETCHES / DRAWINGS

Drawing shown

Phase 1 Repair and Rehabilitation of Stock Preparation and Finishing Area (Grid 0.00 to 29.00)



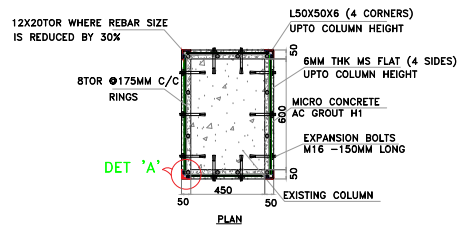
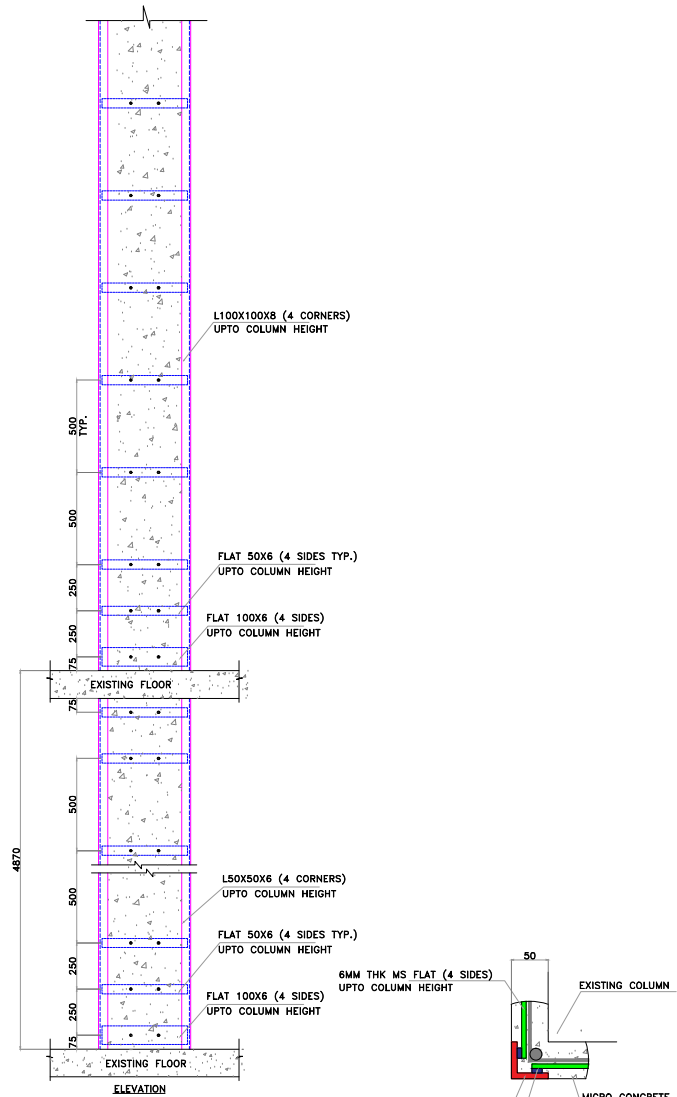




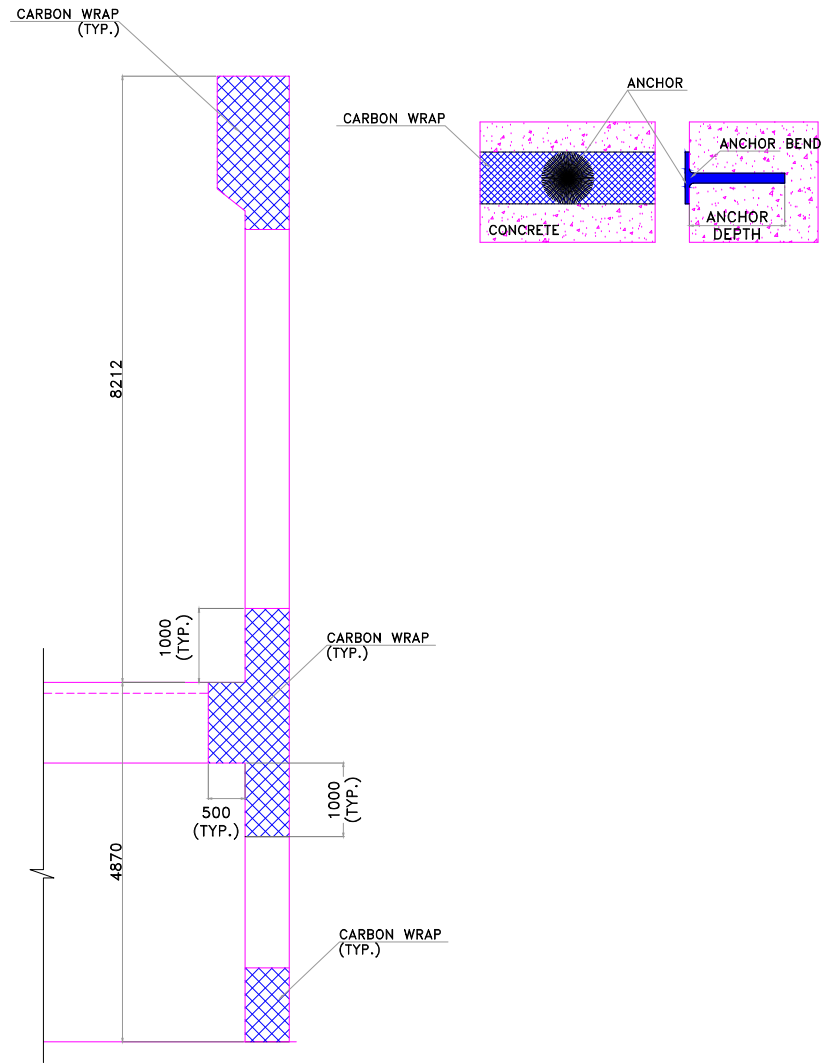
TYPICAL CARBON WRAP APPLICATION FOR BEAMS & COLUMNS

REV. NO.	DATE	DESCRIPTION	DRN	CHK	CHK1
00	30.08.2021	PROPOSAL DRAWING	DMB	KTZ	KTZ
PROJECT:- PHASE-I					
CLIENT:- M/s STAR PAPER MILLS LTD. SAHARANPUR (U.P.)					
DRG. NAME:- TYP. CARBON WRAP APPLICATION DETAILS FOR BEAMS & COLUMNS					
CONSULTANT:- <b>AGC</b> ASIAN GRID CONSULTANTS					
JOB NO. :- ES-DKA-21-07-0055			DRG. NO. :- CW01		




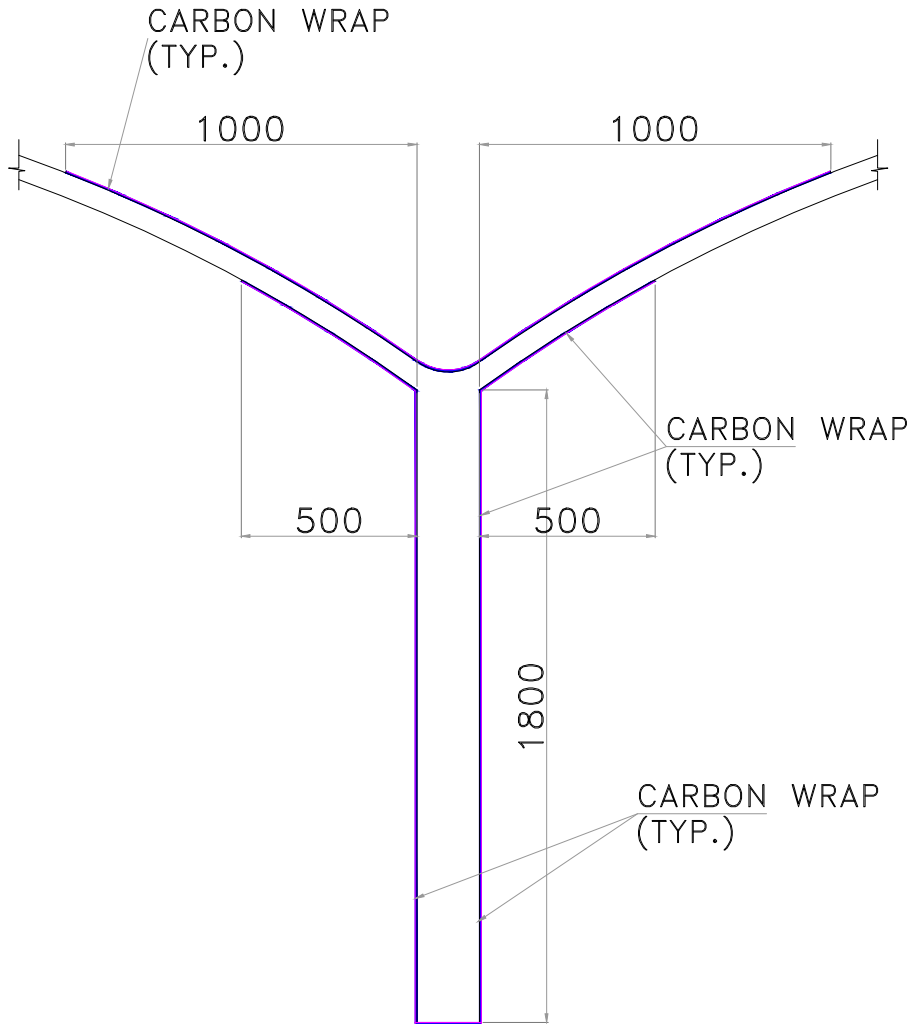


TYPICAL R.C.C. COLUMN STRENGTHENING  
DETAILS WITH STEEL JACKETING




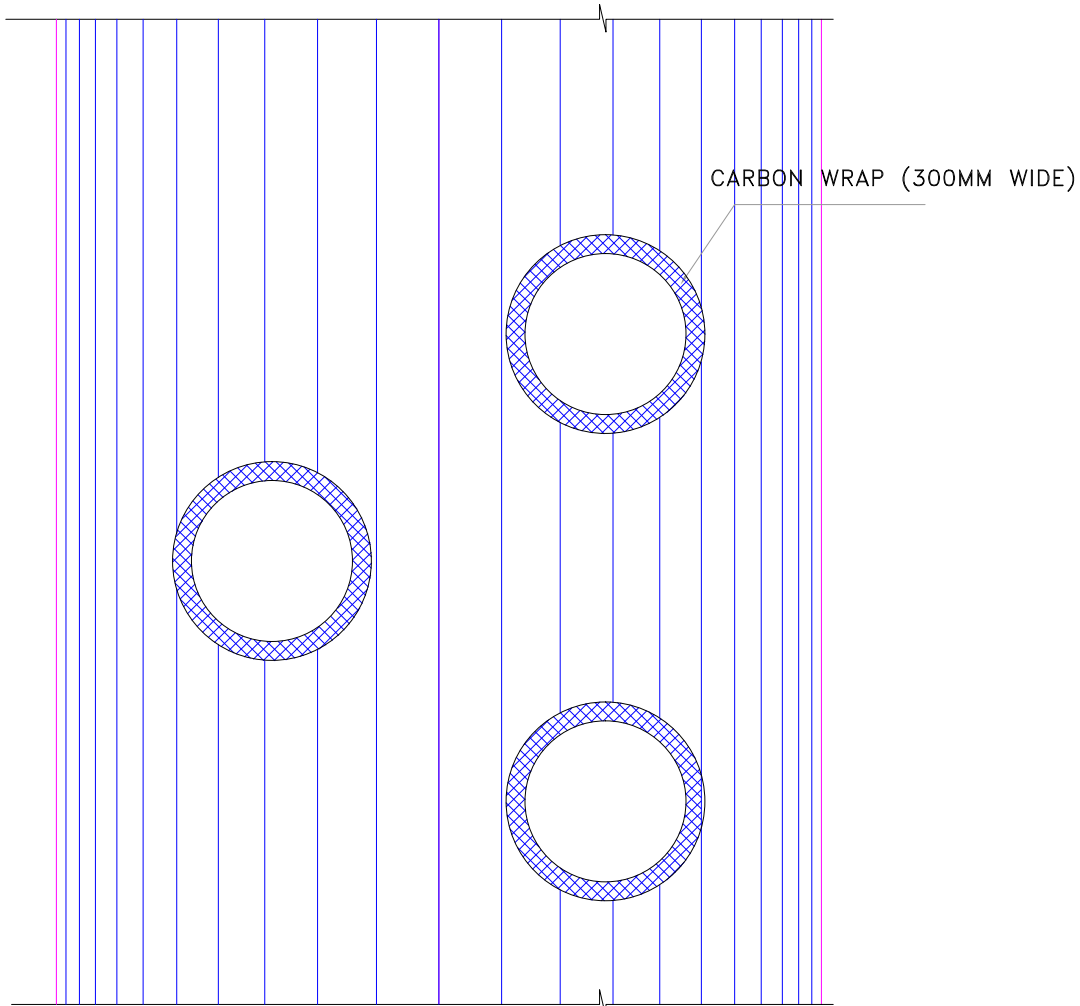
TYPICAL R.C.C. COLUMN STRENGTHENING  
DETAILS WITH CARBON WRAP

01	31.08.2021	PROPOSAL DRAWING	DMB	KTZ	KTZ
00	30.08.2021	PROPOSAL DRAWING	DMB	KTZ	KTZ
REV. NO	DATE	DESCRIPTION	DRN	CHK	CHK1
PROJECT:- PHASE-I					
CLIENT:- M/s STAR PAPER MILLS LTD. SAHARANPUR (U.P.)					
DRG. NAME:- TYP. CARBON WRAP / STEEL JACKETING FOR COLUMNS					
CONSULTANT:-					
 <b>ASIAN GRID CONSULTANTS</b>					
JOB NO. :- ES-DKA-21-07-0055			DRG. NO. :- CW02		

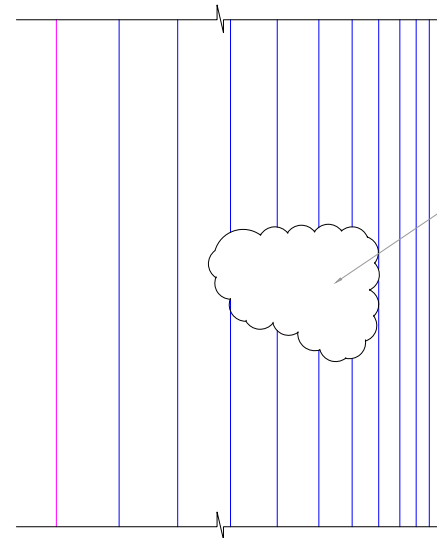


TYPICAL CARBON WRAP APPLICATION FOR  
ROOF ARCH AND ROOF BEAM


REV. NO	DATE	DESCRIPTION	DRN	CHK	CHK1
00	30.08.2021	PROPOSAL DRAWING	DMB	KTZ	KTZ
PROJECT:-		PHASE-I			
CLIENT:-		M/s STAR PAPER MILLS LTD. SAHARANPUR (U.P.)			
DRG. NAME:-		TYP. CARBON WRAP APPLICATION DETAILS ROOF ARCH AND ROOF BEAM			
CONSULTANT:-		 ASIAN GRID CONSULTANTS			
JOB NO. :- ES-DKA-21-07-0055			DRG. NO. :- CW03		

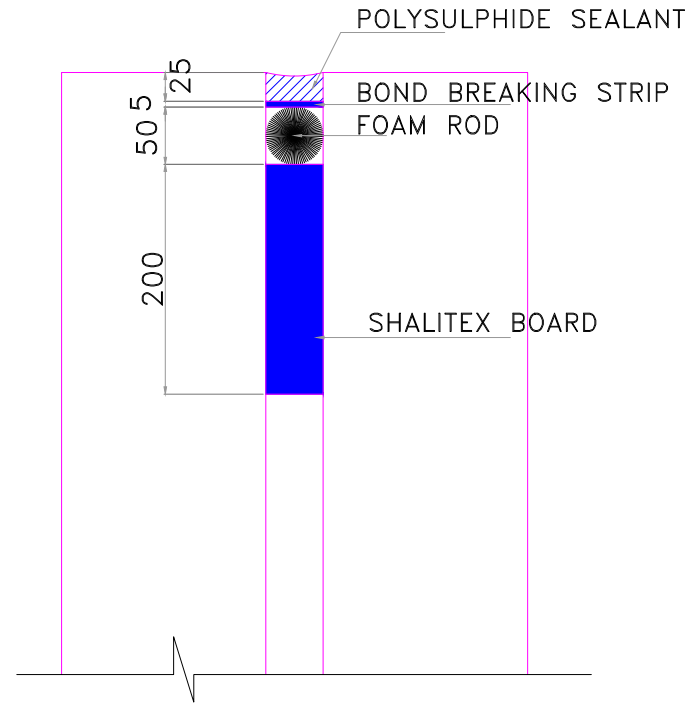
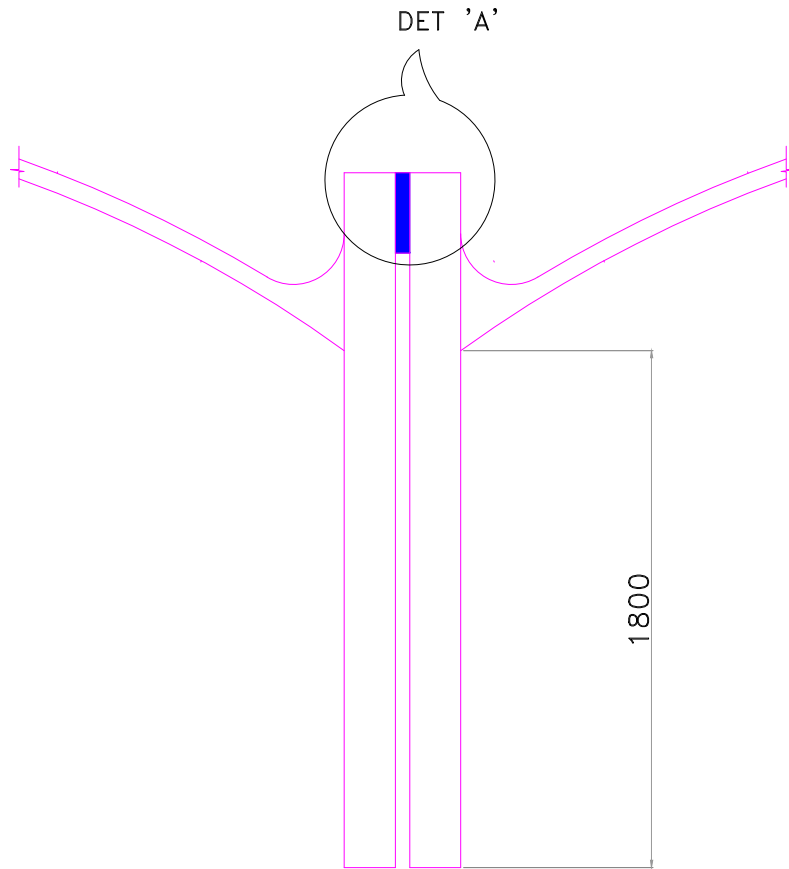


CARBON WRAP FOR VENTILATOR




DAMAGED ROOF ARCH

00	30.08.2021	PROPOSAL DRAWING	DMB	KTZ	KTZ
REV. NO	DATE	DESCRIPTION	DRN	CHK	CHK1
PROJECT:-		PHASE-1			
CLIENT:-		M/s STAR PAPER MILLS LTD. SAHARANPUR (U.P.)			
DRG. NAME:-		TYP. CARBON WRAP FOR VENTILATOR AND ARCH ROOF REPAIR			
CONSULTANT:-		 <b>ASIAN GRID CONSULTANTS</b>			
JOB NO. :-		ES-DKA-21-07-0055	DRG. NO. :- CW04		



TYPICAL EXPANSION JOINT TREATMENT

REV. NO	DATE	DESCRIPTION	DRN	CHK	CHK1
00	30.08.2021	PROPOSAL DRAWING	DMB	KTZ	KTZ
PROJECT:-		PHASE-I			
CLIENT:-		M/s STAR PAPER MILLS LTD. SAHARANPUR (U.P.)			
DRG. NAME:-		TYPICAL EXPANSION JOINT TREATMENT			
CONSULTANT:-		 ASIAN GRID CONSULTANTS			
JOB NO. :- ES-DKA-21-07-0055			DRG. NO. :- CW05		