



Attock

**CONSTRUCTION OF BOUNDARY WALL AT MINI
STORAGE FACILITY AT MANSEHRA**



CONDITIONS OF CONTRACT PART-1

General Conditions

Article 1.0: Security

- 1.1 All Contractors' Manpower has to prove their identity by submitting National Identity cards.
- 1.2 All contractors' staff working must wear yellow I.D. Cards during working.

Article 2.0: Material and Equipment

- 2.1 Unless specified otherwise, all the material required for the job will be supplied by the Contractor. The Contractor shall be allowed to proceed with the job only after material has been inspected and approved by the Owner/authorized representative of the Owner. The inspection of both the work and material shall progress till the completion of the job.
- 2.2 Deleted.
- 2.3 Diesel generator sets, cable and all accessories including fuel to be provided by the Contractor, as and when required.
- 2.4 All tools/equipment required for the execution of the said job to be provided by the Contractor.
- 2.5 All equipment/material, consumable or other required for the welding operation i.e., welding rods, helmets/visors, goggles, grinder wheels/machines etc. to be provided by the Contractor. All protective apparel/gear/canopies required during/before or after the welding operation also to be provided by the Contractor.
- 2.6 All equipment required for the testing of the executed job to be provided by the Contractor.

Article 3.0: Site Cleaning

- 3.1 It is the responsibility of the Contractor to clear away all rubbish and surplus materials from the site at his own expenses on completion of the work and shall leave the site clean and tidy. The debris shall be removed from site.
- 3.2 Any usable surplus items redundant from site which are the property of the APL shall be delivered to the General Stores by the Contractor against a Credit Delivery Order duly authorized by a representative of the APL. However, in case of material supplied by the



Contractor, the Contractor can take the surplus material out of APL site after thorough inspection and approval by the Representative of the Owner.

Article 4.0: Guaranties and Warranties

4.1 A high standard of workmanship shall be maintained by the Contractor as per Specifications.

4.2 All work shall be guaranteed for a period of **one year** after issuance of Provisional Completion Certificate. Should any defect develop during this period, due to bad workmanship or faulty material supplied by the Contractor, he shall rectify the same at his own cost to the satisfaction of the Owner's authorized representative.

Article 5.0: Errors and Omissions

5.1 The Contractor will be responsible for corrections of all errors and omissions related to their work including resolution of all issues related to their work to the satisfaction of APL at no additional cost for a period of one year starting from the date of issuance of Provisional Completion Certificate. Previous approval by the owner shall not relieve Contractor of the responsibility of rectifying any shortcomings or discrepancies.

Article 6.0: Insurance/Medical

6.1 The contractor shall be responsible for obtaining and keeping in force at his cost an appropriate (contractors all risk/workman compensation comprehensive insurance policy), in a manner and to an extent and only from an Insurance Company to be approved in writing, by the owner, valid during the entire period of execution, completion and maintenance of the works. Contractor shall be able to invoke it when required.

6.2 The Contractor ALL RISK & Workman compensation policy shall, inter alias, cover the following risks:

1. Insurance coverage of total contract value including equipment / material to be supplied by APL.
2. Insurance coverage of third party risk including accidental bodily injury and property damage.
3. After completion of works Contractor All Risk insurance policy shall remain valid for 12 months maintenance period.
4. Compensation for accident or injury to workman as per Workman Compensation Act 1923 or any other applicable law in Pakistan.
5. All loss or damage from whatever cause arising for which the contractor is responsible under the contract.

6.3 In case the contractor fails to submit the **insurance policies** mentioned in Article 6.2, then deduction @ 3.43% or as applicable under the law will be made from contractor's bills.



- 6.4 In case of any injury / accident caused to any employee / worker during the course of employment the Contractor shall immediately refer him to any recommended Hospital of APL for necessary medical treatment for which charges shall be borne by the Contractor.
- 6.5 All employees hired by the Contractor for the execution of the works shall be provided all medical treatment from recommended Hospital of APL at against the prescribed charges of the Hospital to be paid by the Contractor on case-to-case basis.

Article 7.0: Contractor's employment conditions

- 7.1 Contractor shall be independently and directly responsible for payment of dues and wages to his employees and to settle terms and conditions of their service. He would also be directly responsible for compliance with all laws, Rules and Regulations that may be applicable to the employees hired by him for the due execution of this agreement.
- 7.2 Contractor shall be solely and exclusively responsible for payment of dues under the Provincial Employees Social Security Ordinance 1965 and contribution payable under Employees Old-Age Benefits act 1976 and any other law applicable to his establishment.

Article 8.0: Taxes

- 8.1 Owner will make tax deductions from payments made to the Contractor under this Contract, as required under the law.

Article 9.0: Additional Services/Change Orders

- 9.1 Owner during the execution of the said project may call upon Contractor to render any extra/additional services or change orders with regard to the said project. Payment and time schedule will be on mutually agreed basis between the Contractor and the owner. However, in case of any dispute the authorized representative of the Owner reserves the rights to fix the rates.

Article 10.0: Indemnity

- 10.1 The Contractor shall indemnify and keep indemnified the owner and all its employees and assignees against all losses and claims for injuries or damage to any person or any property what-so-ever which may arise out of or in consequence of the awarded work and against all claims, demands, proceedings, damages, costs, charge and expenses what-so-ever in respect of or in relation thereto.



Article 11.0: Confidentiality

11.1 All data, drawings, analysis etc. provided by the owner or conducted by the Contractor on behalf of the owner will be held confidential and would not be revealed to any outside agency/party.

Article 12.0: Law to Govern

12.1 This contract shall be interpreted in accordance with the laws of Pakistan.

Article 13.0: Force Majeure

13.1 The term "Force majeure" means any cause beyond the control of the Contractor, which the Contractor could not foresee and/or reasonably provide against and which prevents the Contractor from wholly or partly performing any duties under the Contract. Force Majeure includes, but is not limited to, any of the following:

13.1.1 War, revolution, insurrection or hostilities (whether declared or not).

13.1.2 Riot, civil commotion or civil uprising
(Other than among the Contractor's Employees);

13.1.3 Earthquake, flood, tempest, hurricane, lightning or other natural disasters (not including rains of any proportion);

13.1.4 Any fire of major proportions, or explosion;

13.1.5 Epidemic;

13.2 If any event occurs constituting Force Majeure, the Contractor shall give written notice to the owner as soon as possible describing the Force Majeure and its effect upon the performance of this Contract, and shall continue to undertake and perform the duties set forth in this contract as far as is reasonably practicable.

13.3 In the event of a Force Majeure, resulting in a suspension of work, this Contract shall be extended by a period equal to that for which the Contractor was prevented from performing.

13.4 If the Contractor's inability to perform by reason of the Force majeure lasts for more than 45 days after notice has been given to the Owner, either party may terminate this contract



and the Contractor shall be entitled to any sums which would be payable in case of termination of this contract.

Article 14.0: Suspension of Work

- 14.1 The Owner may, at any time, by written order to the Contractor (Suspension of Work), require the Contractor to stop all, or any part, of the work required by the contract for a period of up to 21 days from the specified effective date.
- 14.2 Upon receipt of such an order, the Contractor shall immediately comply with its term, and take all reasonable steps to minimize the incurring of costs allocable to the work covered by the order.
- 14.3 Within the period of the Suspension of Work Order, the Owner shall either:
- 14.3.1 Cancel the Suspension of Work Order; or
 - 14.3.2 Terminate the work covered by such Order as provided in the termination clause of the contract.
 - 14.3.3 If the Suspension of Work Order is cancelled or the Order expires, the Contractor shall resume work. An equitable adjustment shall be made as necessary in the time schedule, the budget, or a combination thereof, or any other provisions of the contract that may be affected and the contract shall be amended accordingly, if the Contractor asserts a claim for such adjustment within 30 days after the end of the period of work suspension.

Article 15.0: Termination by the Owner for Default

- 15.1 The performance of work under the contract may be terminated by the Owner in whole, or from time to time in part, in accordance with this clause, whenever the Contractor defaults in performance of this contract and shall fail to cure such default within a period of 10 days (or such longer period as the Owner may allow) after receipt from the Owner of a written notice specifying the default.
- 15.2 Termination shall be effected by a Notice of Termination to the Contractor specifying that termination is for the default of the Contractor, the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective.



- 15.3 After receipt of a Notice of Termination and except as otherwise directed by the Owner, the Contractor shall:
- 15.3.1 Stop work under the contract on the date and to the extent specified in the Notice of Termination; and place no further orders, except as may be necessary for completion of the portion of the work under the contract.
 - 15.3.2 Terminate all orders and to the extent that they relate to the performance of work terminated by the Notice of termination;
 - 15.3.3 Assign to the Owner as it may direct, all of the rights, titles, and interests of the Contractor under the orders so terminated, in which case the Owner shall have the right to settle or pay any claims arising out of the termination of such orders;
 - 15.3.4 With the approval or ratification of the Owner to the extent the Owner may require, which approval or ratification shall be final and conclusive for all purposes of this clause, settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, the cost of which would be reimbursable in whole or in part in accordance with the provisions of this contract;
 - 15.3.5 Transfer title to the Contracting Office and deliver as directed by the Owner, the completed or partially completed drawings, information, and other property which would be required to be furnished to the Owner under the contract except that this requirement shall not apply to goods for which the Contractor has not been reimbursed.
 - 15.3.6 Complete performance of the part of the work which has not been terminated by the Notice of Termination; and
 - 15.3.7 Take such action as may be necessary for the protection of the property related to this contract which is in the possession of the Contractor and to which the Owner has title.
 - 15.3.8 If the contractor fails to complete the job the owner reserves the right to carry out the remaining jobs at the risk and cost of the contractor by engaging another contractor.
 - 15.3.9 If the contractor fails to start the work after the lapse of mobilization period or his performance is slow, the Owner reserves the right to terminate the contract.



15.4 If the progress of the work is slow or the Contractor fails to complete his obligations under this Contract then the Owner may terminate the Contract and will carry out the remaining work through other sources at the risk and cost of Contractor.

Article 16.0 Subcontracts or Assignments

16.1 The Contractor shall not subcontract all or any part of the Contract without first obtaining Owner's approval in writing of the sub-contracting and the sub-contractor.

16.2 The Contractor guarantees that any or all sub-contractors to the Contractor for performance of any part of the work under the Contract will comply fully with the terms of the Contract applicable to such part of the work under the Contract.

Article 17.0: Inspections

17.1 The Contractor agrees to permit Owner/authorized representatives of the Owner to inspect the activities, and work pertinent to this Contract.

Article 18.0: Amendments

18.1 Modification of the terms of this contract shall be made by an amendment signed by the parties. Any amendments, including such amendments, which increase the Contract amount or extend the completion date of the Contract, must be approved by the Owner.

Article 19.0: Dispute and Appeals

19.1 In the event of any dispute that the parties hereto are unable to resolve, "Inter parties" the parties hereto agree to submit such dispute to arbitration under Pakistan's Arbitration Act (X of) 1940 in Civil Courts of Rawalpindi.

Article 20.0: Delays on the part of Owner

No delay in the contract on the owner's side will be admissible unless the contractor has advised the owner about it in writing within two working days after occurrence.



CONDITIONS OF CONTRACT - PART -2

Conditions of particular application (Terminals)

Article 1.0: Work Schedule

- 1.1 Work to be carried out according to specifications and instructions of Owner/authorized representative of the Owner following the work schedule provided by the Contractor and approved by the Owner.

Article 2.0: Liquidated Damages

The work shall be completed to the approval of the Owner/ authorized representative of the Owner within **45 Calendar days** of start failing which the Contractor will be liable to Liquidated Damages @ **0.3%** of the contract value per day up to a maximum of **10%** of contract value after final measurement. The liquidated damages will be imposed for each day of delay in achieving the milestones stipulated in work schedule and shall be deducted from the amount of the running bills. This shall however, be refunded whenever the progress is back on schedule.

Article 3.0: Payment Schedule

- 3.1 All payments shall be made on monthly basis after bills submitted by Contractor have been verified by Owner/ authorized representative of the Owner, whose decision will be final and binding. Payment will be made to the Contractor once a month up to a maximum of **90%** (after deduction of **10% retention money**) of estimated value of work (supply & services) done while amount of Federal and Provincial Sales Tax will be retained in addition to retention money and will be released after provision of relevant sales tax returns which clearly disclose supply/sales to APL. However, other deductions (advance, taxes, insurance etc.) will be made from the bills as applicable under the contract. All the payments will be subject to deduction of taxes in accordance with applicable laws.
- 3.2 The contract price **includes** all charges such as labor, plants, tools, cartage and all taxes as may be levied by the Federal / Provincial Governments / Competent Authorities etc till completion of the job.
- 3.3 Payment against secured advance will be made @ **85 %** of estimated cost of material as per verification of Owner's authorized representative. No advance against cement is allowed.
- 3.4 No increase or decrease resulting through any change in the fiscal policies of the Federal/Provincial Governments affecting the existing taxes or levies on such materials as are to be incorporated in the works or by way of any additional/enhanced benefits to the labor or any fluctuations in the foreign exchange rates or on any other account shall affect



the contract price. For clarity, any change in taxes on procurement of products/services by Contractor will not affect the contract price.

- 3.5 Contract price can be varied up to a maximum of **10%** on same unit rates as given in the Scope of Work. However if variations are exceeding **10%** of contract value or additional work (non BOQ) whose rates are not covered in the contract has been included then the contract will be amended after mutual agreement with the Contractor.
- 3.6 The federal and provincial sales tax will be applicable as per prevailing laws at the time of issuance of invoice to APL for supply of product and services.

Article 4.0: **Authorized Representatives**

- 4.1 For coordination / execution and other purposes to this contract and the Project, _____ will act as the Contractor's authorized representative. He will coordinate and will inform the Owner regarding progress of the work.
- 4.2 For implementation and other purposes of this contract and the Project, _____ will be authorized to act for & on behalf of the Owner.

Article 5.0: **Retention money**

- 5.1 **10%** of the contract value will be retained from the running bills as retention money. Retention money will not be deducted from advance payments; however, deductions from all running bills will be made proportionately so as to retain **10%** of the contract value. The Owner will release retention money after issuance of **Final Completion Certificate** of works.

Article 6.0: **Earnest money**

- 6.1 **2%** of bid amount deposited, as earnest money along with the bid will be released after the Contractor has furnished Performance Bond from a scheduled bank acceptable to the Owner as per Article 8.0, below.

Article 7.0: **Advance payments**

- 7.1 **10%** of the contract value will be paid to the Contractor as advance against mobilization if required by Contractor after the contract has been signed and the Contractor has furnished a **Bank Guarantee** for the **full amount** of advance payment. The guarantee should be from a scheduled bank acceptable to the Owner and the conditions of the guarantee shall bind the Contractor to pay the Owner in full or any part of the advance payment, which remains not, paid by the Contractor to the Owner. Advance payment made to the Contractor will be



adjusted **proportionately** from all running bills or as Owner considers appropriate till full adjustment of the advance payment.

Article 8.0: **Performance Bond**

8.1 Contractor will have to submit Performance Bond equivalent to 5% of the contract value from a scheduled bank acceptable to the Owner within seven (7) days from the date of signing of the contract, failing which an amount equivalent to 5% of the contract value will be deducted from the amount of the initial running bill(s). The performance bond shall remain valid for the entire contract period. After the completion of the contract period, the above also remain effective for twelve- (12) month's maintenance period in addition to the above term.

Article 9.0: **Transportation**

9.1 Transportation of material to site is the responsibility of the Contractor.

Article 10.0: **Supply/Storage of material**

10.1 Contractor will have to make his own arrangement for storage of material and equipment at site during contract period.

10.2.1 Unless specified all material required for the execution of job is to be provided by the Contractor including consumables. However, material supplied by the Contractor will only be incorporated in permanent work after Owner's representative has **verified** it.

Article 11.0: **Progress Report**

11.1 Daily/weekly & monthly progress reports shall be prepared by the Contractor and submitted to the Owner in accordance with the requirement of the contract.

Article 12.0: **Miscellaneous**

12.1 Any deliberations held, correspondence exchanged, minutes recorded or any views expressed for or any issue in any manner whatsoever prior to the signing of the contract shall have no legal sanctity and will be construed as non-existent. The same partly or wholly shall not be cited for any clarification or interpretation on any of the provisions contained in the contract in aid thereof. The stipulations contained in the contract mutually agreed and lawfully signed shall only be enforceable in its own tone and tenor without any consideration to any eventuality outside the scope of contract.



- 12.2 Any damages to property caused due to Contractor's executions shall be repaired at Contractor's risk and cost.
- 12.3 Compaction tests shall be undertaken at Contractor's cost as and when desired by the Owner.
- 12.4 Work execution must be planned to ensure that movement of vehicles is least disturbed.
- 12.5 Payment shall be made on actual measurements.



APL'S SAFETY REQUIREMENTS (Terminals)

The contractor is responsible for all employees working for him and all other persons calling on him or doing business with his firm while working inside the premises of APL Site. The contractor is responsible for explaining all safety instructions to the concerned staff and he is also responsible for explaining and securing compliance with APL Site's rules and practices by any sub-contractor engaged by him for work inside APL Site.

It is imperative to eliminate a cause of accident by engineering revision or by safe guarding or to limit exposure time to hazardous dust, mist, vapors or excessive noise to acceptable levels by administrative procedures, use of personnel protective equipment (PPE) is mandatory.

The following requirements must be strictly adhered to:

- 1) No work shall be carried out without a valid Cold/Hot/ confined space entry work permit for all applicable jobs at site
- 2) Use of safety helmets, safety shoes, cotton gloves (wherever required) and overalls approved by the owner are must for working inside the APL Site.
- 3) In case of work to be carried out at a height to 10 ft. or above, safety belts to be used.
- 4) Cranes, winches and chain blocks must not be used to lift persons.
- 5) For works above 8 ft., scaffolding should be used and use of ladders should be strictly avoided, except where platforms are available or with the permission of safety department.
- 6) Smoking is strictly prohibited at site, except at specified areas.
- 7) Mobile phones, match box / lighters are not allowed at site.
- 8) For following specialized jobs, the required safety measures/equipment will be must to use as mentioned below:

8.1 **Welding and grinding jobs**

- a) Welding helmet
- b) Face shield



- c) Chrome leather welder's gloves (welder only)
- d) Aural Plugs
- e) Flashback Arrestors

8.2 **Rockwool/Glasswool Insulation**

- a) Peak helmet with chin straps
- b) Safety goggles
- c) Filter /dust/mist masks

8.3 **Crane operations/rigging jobs**

- a) Periodic crane testing to be carried out
- b) Peak helmet with chin strap
- c) Safety goggles
- d) Area to be cordoned off
- e) Contractor to provide detailed rigging plan for critical lifts along with load charts.

8.4 **Confined space working**

The Contractor will obtain confined space entry permit before entering any vessel/confined space

9.0 **Transport inside APL Site**

All heavy vehicles operating in the APL Site and camp area must have a helper to guide the driver while reversing the vehicle.

10.0 **Penalty for violation of safety rules**

If the contractor or any of his employee or sub-contractor found not complying with the safety requirements of APL during the execution of the jobs, the firm will be liable to a penalty as given below:

- a) For contract **up to Rs. 5 million**, a penalty of **Rs.10,000/-** will be imposed if the contractor fails to adhere by APL's safety rules.
- b) For contract **above Rs. 5 million**, a penalty ranging from Rs.10,000/- upto Rs.100,000/- will be imposed if the contractor fails to adhere by APL's safety rules.



For any serious violation of safety rules, the Owner reserves the right to terminate the contract without assigning any reason. In this case, outstanding bills of the contractor will be **forfeited** or otherwise adjusted against the assessed loss to the company.

APL SAFETY RULES: ELECTRICAL CABLE & CONNECTION

Safety at work is of prime importance. Temporary job sites / project areas are most vulnerable and extra precautions must be taken for making these places safe for working. It has been observed that due care is not taken when temporary electrical connections are made. Following instructions must be followed for eliminating hazards due to electrical cables:-

1. A qualified person from electrical section for suitability of its rating and type must check all temporary cables. Megger test of all cables to be carried out.
2. Temporary cables must not be laid on the ground. It must either be supported on proper supports such that it is at least 18 inches above ground throughout its length (Wye type supports can be used for this) or it must be buried underground / placed in proper sleeves to avoid any damage.
3. Road crossings must be done from under the culverts, through already laid underground sleeves or through metallic pipe laid on the road properly fastened at both ends of the road and covered with sand to make a smooth slope.
4. Where overhead crossing is done, at least 10 feet clearance shall be given on the walkways and eighteen feet on the roads. All underground cables must be marked with suitable signboard.
5. All main cables must have safety cut outs at both its ends. (MCCB can be used for this). Electrical department shall confirm suitability of the circuit breaker / cutout in writing on the back of the permit issued for the job. All circuit breakers / cut outs shall be placed at easily accessible well-illuminated and prominent place.
6. Cable joints must be avoided in all temporary cables. However, where unavoidable due to the length of the circuit, each joint shall be thoroughly checked by electrical department and yellow PVC tape bands shall be used on both ends of the joint to make it prominent. Electrical section shall note down the number of joints on the back of the permit issued for the job. No one is allowed to open or repair the joint in the absence of a qualified person from electrical section.



7. All electrical switchgears shall be adequately protected from rain and adverse weather by using proper housings and shades. Safety department shall ensure this.
8. All live wires, cable ends, connections etc. shall be properly covered to avoid accidental touching by those working in the area.
9. All metallic housings, stands for switchgear and machines shall be properly earthed. Safety department shall ensure this. Electrical section shall identify suitable grounding point.
10. All underground cables when removed must be completely checked before it is again used.
11. No electrical cable to be laid inside dyke wall of a live / operational tank.
12. All the electrical fittings to be of industrial type.

FIRE AND SAFETY CHECKLIST

1. Inspection of tools and equipment (Hand & Power Tools, Sling and Lifting Gears, Scaffolding, Ladders, Sandblasting and Grid Blasting Equipment, Gas Cylinders, Main Riding Baskets, Pressure Testing Equipment etc.) will be implemented by all contractors on monthly basis.
2. Compliance of personal protective equipment should be done 100%.
3. Load Lifting Certificates of Cranes and Lifting Gears should be provided by the contractors.
4. Flame arrestors should be used on the any vehicle / equipment of Contractors. Contractor drivers should obtain safety-driving permit from fire & safety department.
5. If any unsafe act / conditions found during execution of job, Fire & Safety department / project coordinator is authorized to stop the job and contractor will be responsible for the implementation of recommended corrective measures.
6. APL management reserves the right to add / amend in safety regulations as and when required.
7. Contractor to get his equipment (welding sets, grinders, gas cutters etc.) certified from APL Fire & Safety Department on quarterly basis.



APL's SECURITY REQUIREMENTS (Terminals)

1. Contractor's and their employees will have to obtain verification from their respective Police Stations (i.e. the place of their permanent residence) and from the Special Branch of Police of their respective district/division/province. Only after the submission of the Police Verification forms, the Contractors' employees or personnel will be allowed to enter the APL premises.
2. All tools & materials for the construction, going inside the APL premises or coming outside, will be subjected to Material Gate Pass.
3. The Contractor will be allowed to work at site from 7 a.m. till sunset. Special permission will have to be obtained to work after sunset.
4. In case of emergencies, the Contractor shall clear all the roads and in no case shall block the Main entrance.
5. Contractors and their employees will have to display their yellow ID Cards.
6. Contractors' employees will not have to stay within the Project Area. Loitering inside the APL premises shall not be allowed under any circumstances and the Contractors' employees shall be confined to immediate vicinity of work site.
7. All Contractors' vehicles are allowed, provided the vehicle is searched and cleared by the Security. The transport is generally allowed only for shifting material from outside the APL premises to the work site.
8. All Contractors' employees must possess the National Identity Cards, a photo-copy of which shall be deposited to APL.
9. Contractors' employees will not be allowed to stay inside the APL Premises over-night.
10. In case of breach of Security or Safety requirements of APL, the Company shall impose a fine and/or the APL premises Entry Permit of the concerned employee shall be cancelled.
11. Tractor trolley will not be allowed to enter inside the APL Premises without Co-driver.
12. Security Passes are returnable.
13. For urination proper places are utilized.

ATTOCK PETROLEUM LIMITED
BILL OF QUANTITIES FOR CONSTRUCTION OF BOUNDARY WALL AT APL MINI STORAGE
FACILITY MANSEHRA

S.NO.	DESCRIPTION	DOCUMENT NO.	AMOUNT	REMARKS
2	BOUNDARY WALL & ENTRANCE GATES	BOQC-002		
TOTAL				
PST			Included	
TOTAL INCLUDING PST				

BILL OF QUANTITIES FOR CONSTRUCTION OF BOUNDARY WALL AT APL MINI STORAGE FACILITY MANSEHRA

S.NO.	DESCRIPTION	UNIT	QUANTITY	COST	
				Unit Rate	AMOUNT
2.1	EXCAVATION IN ORDINARY SOIL				
	EXCAVATION FOR FOUNDATIONS TO THE REQUIRED DEPTH AS SHOWN ON DRAWINGS IN ORDINARY SOIL AND ALL OPERATIONS OF BACKFILLING IN 150mm THICK LAYERS WHEREVER REQUIRED WITHIN THE SPECIFIED DEPTH AND DISPOSAL OF EXCESS MATERIAL AT DESIGNATED PLACES. BACKFILL SHALL INCLUDE BREAKING CLODS, LEVELING, DRESSING, WATERING, CONSOLIDATION AND COMPACTION TO ATTAIN 95% DRY DENSITY AS PER ASTM D 1557. COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER. (INCLUDING COST OF EDT AS REQUIRED)	CFT	503		
2.2	EXCAVATION IN HARD STRAITA				
	EXCAVATION FOR FOUNDATIONS TO THE REQUIRED DEPTH AS SHOWN ON DRAWINGS IN STONE INCLUDING ALL OPERATIONS OF BACKFILLING IN 150mm THICK LAYERS WHEREVER REQUIRED WITHIN THE SPECIFIED DEPTH AND DISPOSAL OF EXCESS MATERIAL AT DESIGNATED PLACES. BACKFILL SHALL INCLUDE BREAKING CLODS, LEVELING, DRESSING, WATERING, CONSOLIDATION AND COMPACTION TO ATTAIN 95% DRY DENSITY AS PER ASTM D 1557. COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER.	CFT	4,528		
2.3	PLAIN CEMENT CONCRETE 1:4:8 (1000 PSI)				
	PROVIDING AND LAYING CEMENT CONCRETE 1:4:8 IN FOUNDATION USING APPROVED QUALITY 25mm AND DOWN SIZE STONE AND APPROVED QUALITY OF COARSE SAND INCLUDING ALL FORMWORK RODING COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER	CFT	921		
2.3	BITUMEN COATING				
	PROVIDING AND APPLYING 02 COATS OF BITUMEN GRADE 10 / 20 ON CONCRETE SURFACE EXPOSED TO EARTH. COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATIONS AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER.	SFT	11,524		
2.4	PLAIN CEMENT CONCRETE 1:3:6 (1500 PSI)				
	PROVIDING AND LAYING 1:3:6 CEMENT CONCRETE WHEREVER REQUIRED INCLUDING FORMWORK, VIBRATING, LEVELING, SPREADING, AND CURING USING APPROVED COARSE & FINE AGGREGATES, COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER	CFT	1,892		
2.5	REINFORCED CEMENT CONCRETE (3,000 PSI) USING O.P CEMENT				
	PROVIDING AND LAYING RCC OF 3,000 PSI (CYLINDRICAL STRENGTH) AS PER DRAWING & RELATED B.O.Q USING APPROVED QUALITY 20mm MAXIMUM CRUSHED GRADED STONES AND FINE AGGREGATE OF APPROVED QUALITY INCLUDING APPROVED FORMWORK AND ITS REMOVAL, ALL OPERATIONS OF VIBRATING, LEVELING, COMPACTING, SPREADING, CURING AND TESTING ETC. COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER	CFT	4,501		
2.6	REINFORCEMENT				
	PROVIDING AND FIXING STEEL REINFORCEMENT OF 60,000 PSI YIELD STRENGTH (AS PER ASTM A-615) INCLUDING THE COST OF STRAIGHTENING, CUTTING, BENDING, BINDING, WASTAGE AND SUCH OVERLAPS AS ARE NOT SHOWN OVER THE DRAWINGS, PLACING IN POSITION ON M.S. CHAIRS, TYING WITH MS BINDING WIRES, ETC. IN ALL KINDS OF RCC WORK INCLUDING THE COST OF 18 GAUGE BINDING WIRES, CHAIRS, SPACERS ETC. COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER.	KGs	12,570		
2.7	BRICK MASONRY				
	PROVIDING AND LAYING BURNT BRICK MASONRY HAVING STRENGTH 1400 PSI AS SHOWN IN DRAWINGS. IT SHOULD BE THOROUGHLY SOAKED IN WATER BEFORE BEING LAID AND JOINED IN CEMENT MORTAR 1:4 INCLUDING ALL OPERATIONS OF CURING AND TESTING ETC. INCLUDING PROVIDING DOWELS FOR ANCHORAGE BETWEEN BRICK MASONRY AND R.C.C. COLUMN. COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER	CFT	710		
2.8	CEMENT PLASTER				
	PROVIDING AND LAYING 1/2" THICK PLASTER WITH CEMENT SAND 1:3 RATIO MORTAR ON BRICK AND CONCRETE SURFACES, INCLUDING HACKING, AND CURING COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER.	SFT	18,920		
2.9	ISOLATION JOINT				
	SUPPLYING & MAKING ISOLATION JOINT BETWEEN THE COLUMNS WITH THERAPORE SHEET 1" WIDE INCLUDING CUTTING FIXING IN POSITION ETC; COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER.	SFT	127		
2.11	STRUCTURAL STEEL				
	SUPPLYING AND FIXING OF ANGLE IRON INCLUDING 02 COATS OF ENAMEL PAINT AND 01 COAT OF PRIMER. COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER.	KGs	2,208		
2.12	BARBED WIRE				
	SUPPLYING AND FIXING BARBED WIRE GALVANIZED 12 GAUGE, BABRS ON STANDARD DISTANCES (UNIT WEIGHT 185 GRAMS / METER), AND FIXING IN ANGLE HOLES, COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER. (EXCLUDING THE COST OF ANGLE IRON)	KGs	315		
2.13	RAZOR WIRE				
	SUPPLYING AND FIXING OF RAZOR WIRE GALVANIZED 21" DIA CONCERTINA TYPE, RAZOR WIRE SHALL BE MAKE OF CORE WIRE 12 SWG, MEDIUM TYPE BLADE 0.5 mm (+/- 0.03 mm) THICK, ZINC COATED, STAPLES NAILS 0.75 mm (+/- 0.03 mm), STAINLESS STEEL WIRE 2NOS. 12 SWG FOR HOLDING & BINDING OF RAZOR WIRE WITH BARBED WIRE ETC; INCLUDING PROPER FIXING WITH BARBED WIRES WITH HOOKS ETC; COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER (EXCLUDING THE COST OF ANGLE IRON)	KGs	330		
2.14	ENTRANCE GATE				
	SUPPLYING, FABRICATING & FIXING STEEL GATE CONSISTING OF ANGLES, BARS, PLATES, MS SHEET, ASSEMBLING BY WELDING OR WITH THE USE OF BOLTS, INCLUDING MAKING LOCKING ARRANGEMENT, PROVIDING ROLLERS, HOLD FAST, GUARD BARS, SURFACE PREPARATION, PRIMER AND PAINTING (USING SYSTHETIC ENAMEL) OF GATE WITH WIRE BRUSH ETC. COMPLETE IN ALL RESPECTS AS PER DRAWINGS, SPECIFICATION AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE / ENGINEER				
a)	DOUBLE LEAF GATE	SFT	413		
TOTAL AMOUNT					

NOTE:-

- THE QUANTITIES TAKEN IN BOQ'S ARE ESTIMATED, ONLY FOR BIDDING PURPOSE. CONTRACTOR IS RESPONSIBLE TO ESTIMATE THE QUANTITIES AS PER SITE REQUIREMENTS, DRAWINGS & TENDER DOCUMENTS.
- CONTRACTOR IS RESPONSIBLE TO ADD ANY MISSING / REQUIRED ITEMS AS PER SCOPE OF WORKS, DRAWINGS, SPECIFICATION & TENDER DOCUMENTS.
- CONTRACTOR IS RESPONSIBLE TO ESTIMATES THE QUANTITIES BEFORE GOING TO PURCHASE THE SUPPLY ITEMS.
- OWNER RESERVES THE RIGHT TO INCREASE OR DECREASE BOQ OR DELETE ANY ITEM OR PART COVERED IN BID DOCUMENT.
- IN THE EVEN OF CONFLICT, INCONSISTENCY OR AMBIGUITY BETWEEN THE CONTRACT SCOPE OF WORK, BOQ & SPECIFICATION, NATIONAL CODES & STANDARDS REFERENCED IN SPECIFICATION OR ANY OTHER DOCUMENTS, THE CONTRACTOR SHALL REFER TO OWNER / ENGINEER WHO DECESION SHALL PREVAIL.

ANNEXURE-F



Attock

ATTOCK PETROLEUM LIMITED

SPECIFICATION FOR

PLAIN AND REINFORCED CONCRETE WORKS

TABLE OF CONTENTS

<u>S. NO.</u>	<u>DESCRIPTION</u>	<u>PAGE NO.</u>
1.0	SCOPE	3
2.0	GENERAL	3
3.0	MATERIAL	3
4.0	WATER	6
5.0	CLASSIFICATION OF CONCRETE	6
6.0	PROPORTIONING OF CONCRETE MIXES	7
7.0	MAXIMUM ALLOWABLE WATER CONTENT	8
8.0	SLUMP TESTS	8
9.0	BATCHING & MIXING	8
10.0	PROTECTION & CURING	14
11.0	PVC RUBBER SEAL JOINT/WATER STOPPER	14
12.0	FORMWORK	15
13.0	CONSTRUCTION JOINTS	17
14.0	ANCHOR BOLTS & BASE PLATE/EMBEDDED PARTS	18
15.0	REINFORCEMENT STEEL	18
16.0	SAMPLES & TESTING	21

1.0 **SCOPE**

- 1.1 This specification covers the proportioning, mixing and placing of plain and reinforced concrete, including requirements for concrete materials, storage of materials, design of concrete mix, sampling and testing, batching, forms and form work, construction joints, preparation, placement of concrete including mixing, conveying, depositing and curing, finishing, grouting, inspection and clean-up.
- 1.2 All information pertaining to plain and reinforced concrete shown and noted on the construction drawings shall be considered part of this specification.

2.0 **GENERAL**

Full cooperation shall be extended to other trades to install embedding items, and form ducts and opening, etc. Embedded items shall have been inspected and check tested for concrete and other materials or for mechanical operations and approved before concrete is placed.

3.0 **MATERIAL**

3.1 **Cement**

- i) Grey Portland cement shall be normal setting cement of the specific gravity, fineness and chemical composition fully conforming to British Standard Specifications B.S. No. 12:1958 and shall be capable of satisfying all tests such as the tensile strength tests contained therein. Standard test briquettes prepared with 1:3 cement sand mortar shall give the following tensile strengths:

At 3 days not less than 300 lbs/in² (2.1 N/mm²)

At 7 days not less than 400 lbs/in² (2.8 N/mm²)

- ii) Sulphate Resistant Cement whenever required shall be sulphate resistant cement type 'A' fully conforming to British Standard Specification B.S. No. 4027, Part 2, 1972 satisfying the requirements for fineness, chemical composition, strength, setting time and soundness, etc.
- iii) Test certificate of each batch of cement delivered should be made available for Owner's Representative / Engineer review. If vendor of the cement supplied is changed, the Contractor should submit the concrete mix design along-with the necessary test for cement supplied by new vendor before it is used at site.

- iv) The supply of cement must be so programmed by the Contractor that at no time the quantity of cement stock shall be less than that required for an average consumption of four weeks. Lorry or truck or other means of transportation, for the conveyance of cement to the site of works, shall be clean, dry, metallised lined and covered from top with water proof sheets, so that cement is sufficiently protected from any deterioration during transit.
- v) The Contractor shall provide at his own cost, on the site, all necessary sheds which shall be perfectly dry and water tight for the storing of cement to be delivered to the works, to ensure adequate supplies being available at site of work.
- vi) If at any time the Owner's Representative/Engineer considers that any batch of cement may have deteriorated on the site during storage for any reason, he will direct the Contractor that tests shall be made and the batch of cement on the site which may be in question shall not be used until it has been shown by test at laboratory, approved or appointed by the Owner's Representative / Engineer to be satisfactory. Contractor shall bear all costs of such testing. Any rejected cement shall be removed from the site by the Contractor without delay. Cement reclaimed from cleaning bags or leaking containers shall not be used.

3.2 **Aggregates**

- i) All fine and coarse aggregates to be used shall be supplied from approved source, which shall not be changed without permission in written from the Owner's Representative / Engineer. Aggregates shall conform to the test requirements of British Standard 882:1954 or equivalent.
- ii) Fine aggregates, shall be approved sand having specific gravity in the region of 2.65 and shall be clean, sharp, free from clay, earth, vegetable and organic matters, alkaline or acid reactions or other deleterious matter or impurities and conforming to British Standard BS 812:1954.
- iii) Fine aggregates shall conform to British Standard Specifications BS No. 882:1954 "Natural Aggregates for Concrete" and shall be graded as follows:

BS SIEVE NUMBER	PERCENTAGE (BY WEIGHT) PASSING	
	GRADING ZONE-1	GRADING ZONE-2
$\frac{3}{8}$ " (9.5 MM)	100	100
$\frac{3}{6}$ " (4.8 MM)	90-100	90-100

BS SIEVE NUMBER	PERCENTAGE (BY WEIGHT) PASSING	
	GRADING ZONE-1	GRADING ZONE-2
No. 7	60-95	75-100
No. 14	30-70	55-90
No. 25	15-34	35-59
No. 52	5-20	8-30
No.100	0-10	0-10

- iv) Coarse aggregates shall be approved hard crushed stone from a source approved by the Owner's Representative/Engineer, with specific gravity of 2.66 and shall be clean free from sand, dust, salt, lime, chalk, clay, organic impurities or other deleterious matter and conforming to BS 812: 1954.
- v) Coarse aggregates shall conform to the relevant British Standard Specifications BS No. 882:1954.

Coarse aggregate shall be graded as follows:

FOR CONCRETE CLASSES A, B & C (NOMINAL SIZE OF GRADED AGGREGATE 1" TO $\frac{3}{16}$ " (25.4 MM TO 4.8 MM)

<u>BS SIEVE</u>	<u>PERCENTAGE (BY WEIGHT) PASSING</u>
1" (25.4 MM)	100
$\frac{3}{4}$ " (19 MM)	90-100
$\frac{3}{8}$ " (9.5 MM)	20-55
$\frac{3}{16}$ " (4.8 MM)	0-10

FOR CONCRETE CLASSES D & E (NOMINAL SIZE OF GRADED AGGREGATE $1\frac{1}{2}$ " TO $\frac{3}{16}$ " (38 MM TO 4.8 MM)

<u>BS SIEVE</u>	<u>PERCENTAGE (BY WEIGHT) PASSING</u>
$1\frac{1}{2}$ " (38 MM)	100
1" (25.4 MM)	95-100
$\frac{3}{4}$ " (19 MM)	35-70
$\frac{3}{8}$ " (9.5 MM)	10-33
$\frac{3}{16}$ " (4.8 MM)	0-5

- vi) All aggregates shall be stored on properly constructed paving and in bins and there shall be a physical partition between the stock piles of coarse and fine aggregate. No mixed-up aggregates shall be used in any concrete. Under no circumstances aggregates shall be allowed to be in contact with ground.
- vii) If required, aggregates shall be washed and screened to the satisfaction of the Owner's Representative/Engineer before use by processing through proper screening and washing plant. Adequate time is to be allowed therefore, for the moisture content to become substantially uniform before use in works.
- viii) Sieve analysis and other necessary tests of all aggregates shall be carried out as and when required by the Owner's Representative/Engineer. Samples for such tests shall be taken in the presence of the Owner's Representative/Engineer. All costs in connection with the test shall be borne by the Contractor.
- ix) All aggregates shall be subject to the approval of the Owner's Representative/Engineer. Any aggregates not found to the required standard shall be rejected by the Owner's Representative/Engineer and shall have to be removed from site without delay. Concrete structures executed with rejected aggregate shall be removed and rebuilt at the Contractor's expense.

4.0 **WATER**

Unless otherwise authorized in writing only water from potable supply system will be used for mixing concrete. Similarly only potable water shall be used for curing of concrete.

The source of water for construction purposes shall be approved by the Owner's Representative/Engineer, based on the satisfactory results of test for potability of water. Sampling and testing of water shall be the responsibility of Contractor, all cost thereof shall be deemed to have been included in the quoted rates for concrete works.

5.0 **CLASSIFICATION OF CONCRETE**

Classes of concrete to be used in various parts of the works shall be as indicated on the drawings and mentioned in Bills of Quantity. The concrete of various grades shall be proportioned as set out in **Table - 1** appended hereto.

TABLE - 1

Showing minimum required crushing strengths of 150 × 150 × 150mm (6" × 6" × 6") test cubes and minimum quantity of cement required per cubic meter or 100 cft. of finished concrete for various mixes and under various conditions.

Nominal Mix.	Class of Concrete	Min. Qty. of Cement		Preliminary Cube Strength				Work Cube Strength			
				at 7 days		at 28 days		at 7 days		at 28 days	
		lbs. for 100 cft.	kg/m ³	lbs/Inch ²	N/mm ²	lbs/Inch ²	N/mm ²	lbs/Inch ²	N/mm ²	lbs/Inch ²	N/mm ²
1:1:2	A	3395	544	4000	28	6000	42	3000	21	4500	31.5
1:1½:3	B	2470	396	3350	23.4	5000	35	2500	17.5	3750	26.2
1:2:4	C	2000	311	2700	18.9	4000	28	2000	14	3000	21
1:3:6	D	1358	218	1300	9.1	2000	14	1000	7	1500	10.5
1:4:8	E	1045	167	820	5.9	1350	9.4	650	4.5	1000	7

6.0 PROPORTIONING OF CONCRETE MIXES

All concrete shall be proportioned by weight for concrete mixes, unless specifically directed by Owner's Representative/Engineer to proportion them by volume. The Contractor shall submit to the Owner's Representative/Engineer proposed mix designs for concrete to be used, based on preliminary laboratory tests to determine proportion of cement, aggregates and water in the concrete conforming to the quality and strength requirements as specified herein. However, the amount of cement for any class of concrete shall not be less than that indicated in the above table. Preliminary test results of at least three different mixes of each class of concrete with varied water cement ratios shall be submitted. The results of 7 days and 28 days cube tests shall be used to establish the ratio between 7 days and 28 days strengths. The Contractor may make adjustments in the ratio of fine to coarse aggregate in the mix for a certain work. Preliminary design of mixes and testing shall be the responsibility of the Contractor. The proportion of voids in the coarse aggregate shall be controlled and if it exceeds than 45%, sand and consequently the cement content shall be increased by the Contractor without any charge. If the proportion is less than 40%, sand shall be decreased but not the cement.

7.0 **MAXIMUM ALLOWABLE WATER CONTENT**

All concrete specimens shall be made, cured and tested in accordance with British Standard or ASTM Standard. A curve representing the relation between the water content and the average 28 days Crushing Strength or earlier strength at which the concrete is to receive its full working load shall be established for a range of values, including all the crushing strengths shown on the plans. The curve shall be established by at least four points, each point representing average values for at least four specimens. The maximum allowable water content for the concrete shall be as determined from this curve and shall correspond to a strength 15% greater than indicated on the plans. No substitution shall be made in the materials used in the work without additional tests in accordance with this procedure to indicate that the quality of the concrete is satisfactory.

8.0 **SLUMP TESTS**

The slump for concrete, determined in accordance with BS No. 1880:1952 "Slump Test for Concrete" shall be minimum of 25mm (1") and a maximum of 75mm (3") provided the requisite strength is obtained. Corrective additions to remedy deficiencies in aggregate gradations shall be used only with the written approval of the Owner's Representative/Engineer. When such additions are permitted, the materials shall be measured separately for each batch of concrete.

9.0 **BATCHING & MIXING**

9.1 Concrete can be mixed by a mechanical batch type mixing plant with adequate facilities for accurate measurements and control of each material entering the mixer and for changing the proportions to conform to varying conditions of the work. If approved by the Contractor, volumetric batching can be adopted using cement by weight. Water shall be measured for every batch with due allowance made for water already present in aggregates. The mixing plant assembly, if used by the Contractor, shall permit ready inspection of operations at all times. The plant and its location shall be subject to approval of the Owner's Representative / Engineer.

The Contractor shall ensure and arrange sufficient mixing machines along with standby arrangement are made available for mass concreting to ensure monolithic concreting.

9.2 **Batching**

Units whenever used shall be supplied with the following items:

- i) Weighing unit shall be provided for each type of material to indicate the scale load at convenient stages of the weighing operations. Weighing units shall be checked at times directed by as well as in the presence of the Owner’s Representative / Engineer and required adjustments shall be made before further use.
- ii) Water mechanism shall be tight with the valve interlocked so that the discharge valve cannot be opened before the filling the valve is fully closed and shall be fitted with graduated gauge.
- iii) Discharge gate shall control the mix to produce a ribboning and mixing of cement with aggregates. Delivery of materials from the batching equipment to the mixer shall be accurate within the following limits:

<u>MATERIAL</u>	<u>PERCENTAGE BY WEIGHT</u>
Cement	1/2
Water	1/4
Fine Aggregate	1
Coarse Aggregate	2

9.3 **Mixing Unit**

i) **Operations**

Mixers shall not be charged in excess of noted capacity nor be operated in excess of noted speed. In general not more than 20 revolutions per minute are necessary for adequate mixing. Excessive mixing requiring addition of water to preserve required consistency shall not be permitted. The entire batch shall be discharged before recharging.

- ii) Mixing time shall be measured from the instant water is introduced into the mixer drum containing before one fourth of the mixing time has elapsed. Mixing time for mixers of one cubic yard or less shall be between 1 minute and 1½ minute; for larger than one cubic yard capacity mixers time shall be increased 15 seconds for each additional cubic yard or fraction thereof. If an air-entraining agent is used, additional mixing time shall be allowed such as to provide the specified air content.

- iii) On cessation of work, including all stoppages exceeding 20 minutes, the mixers and all handling plant shall be washed with clean mixing water. If old concrete deposits remain in the mixer drum, it shall be rotated with clean aggregate and water prior to production of new concrete.
- iv) **Discharge Lock**
 Unless waived by the Owner's Representative/Engineer, device to lock the discharge mechanism, until the required mixing time has elapsed, shall be provided on each mixer.
- v) No hand mixing under any circumstances even with extra cement shall be permitted. If during concreting, the mixing plant fails, the concrete already poured shall be removed, unless directed otherwise by the Owner's Representative / Engineer.

9.4 **Batching Aggregate by Volume**

- i) Whenever batching aggregates by volume is allowed, as and when required, the cement shall be batched by weight and the water by weight or volume. Each size of aggregate shall be measured in metallic containers the dimensions of which are 1'-0 (300) × 1'-0 (300) × 1.25' (375). The containers shall be of such shape that their volume can be easily checked by measurement.
- ii) Concrete shall be mixed in a (Full Load) batch mixer (half load or hand operated mixers will not be allowed) of an approved type and in good condition having a drum rotating about a horizontal or inclined axis.

 Continuous mixers shall not be used. Each mixer is to be fitted with a water measuring device having accuracy within one per cent of the quantity of water required for the batch. The water measuring device shall be such that its accuracy is not affected by variations in the water supply pressure.
- iii) The batch shall be so charged into the mixer that some water (about 10 percent) enters the drum in advance of the cement and aggregates. Water shall then be added gradually while the drum is in motion such that all required water shall be in the drum by the end of the first quarter of the mixing time. The concrete shall be mixed until a mixture of uniform colour and consistency is obtained.

- iv) The amount of concrete mixed in any batch is not to exceed the rated capacity of the mixer. The whole of the batch is to be removed before materials for a fresh batch enters the drum.

9.5 **Transporting & Placing Concrete**

- a) Concrete shall be conveyed and deposited as quickly as possible after mixing and shall proceed so that, as far as possible a complete section of the work is done in one operation.
- b) Transport of concrete shall be in a manner approved by the Owner's Representative/Engineer and shall be so as to avoid segregation or loss of ingredients of concrete.
- c) All foundations and portions of work to be concreted shall be approved by the Owner's Representative/Engineer before concrete is poured.
- d) All forms and reinforcement shall be completed, cleared inspected and approved before pouring of concrete. No concrete is to be deposited till the Owner's Representative/Engineer has inspected and approved in writing all reinforcement, foundations, forms, details, positioning of all fixture and materials to be embedded in concrete, control levels and screeds etc., and he is satisfied with the arrangements that the Contractors has made to efficiently proceed with the work such as sufficient labor, materials, plants, etc. Such an approval will not relieve the Contractor from any of his obligations under this Contract. Water shall be removed from excavations before concrete is deposited.
- e) Placing of concrete shall not be permitted when, in the opinion of the Owner's Representative/Engineer, the sun, heat, wind, cold, snow or limitations or facilities furnished by the Contractor prevent proper placing finishing and curing of concrete.
- f) All concrete shall be thoroughly compacted and consolidated by means of pneumatic or mechanical vibrators or other approved compacting method. Care shall be taken to avoid segregation due to excessive vibration. The Contractor shall maintain on site at all times one or more standby vibrators. Tapping or other external vibration of forms shall not be allowed, unless so directed by the Owner's Representative/Engineer. Compaction shall be done until the whole mass assumes a jelly like appearance and consistency with the water just appearing on the surface.

Concrete shall be sufficiently tamped and consolidated around the steel rods, care taken that the vibrator does not touch steel or formwork and into all parts of the moulds in order that no voids or cavities are left. Steel shall not be disturbed during operations of concreting. Concrete shall be brought up in even layers not more than 150mm (6") thickness and worked against side of forms to give a smooth and uniform surface. No excessive water shall be allowed to come out and lie on the surface of concrete.

The concrete must be of such a consistency that after ramming, consolidating and tamping is completed, a thin film of water is just appearing on the surface.

- g) Hardened concrete, debris and foreign material shall be removed from interior of forms and from inner surface of mixing and conveying equipments.
- h) Concrete shall not be dropped freely from a height of more than 2.0 meters. In cases where an excessive drop is inevitable the Contractor shall provide spouts, down pipes, chutes, or side parts to forms with pockets which will protect concrete from segregation. The discharge of the spouts, down pipes or chutes shall be controlled so that the concrete may be effectively compacted into horizontal layers not more than 200 mm (8") thick.
- i) Concrete is to be deposited as quickly as possible after mixing and to proceed continuously. Concrete which has attained its initial set or has contained its mixing water for more than 20 minutes shall not be allowed to be placed in the work.
- j) When concrete is laid on hard core, such as sub grade for floor slabs, or other absorbed material, the surface is to be watered, consolidated and, where specified, blinded before the concrete is deposited.
- k) Fresh concrete shall not be placed on previously laid concrete or on old concrete surfaces until the later has been cleaned of dirt, scum and laitence by wire brushes. The clean surface shall then be thoroughly wetted and grouted with cement slurry as approved by the Owner's Representative / Engineer.
- l) Care shall be taken not to disturb newly placed concrete by vibrator, indirect loading or otherwise. No traffic or loading shall be allowed on the concrete until it has thoroughly set and hardened.

- m) Construction joints in concrete shall only be given at locations indicated on the drawings or as approved by the Owner's Representative/Engineer. At the end of the day's work the concrete shall be finished off against a temporary shutter stop which shall be vertical and securely fixed. Such stops shall be removed within 24 hours of placing of concrete.

Construction joints not shown on the drawings shall be reinforced with steel bars or dowels, if deemed necessary by the Owner's Representative / Engineer shall be furnished without any additional payment. Surface shall be wetted and coated with neat cement grout immediately before placing new concrete.

- n) No concrete shall be placed during rains or in acclement weather and all fresh concrete shall be suitably protected from rainfall and excessive heat or cold.
- o) Should any part of the exposed surface present a rough uneven or imperfect appearance when the shuttering is removed, it shall be picked out to honeycomb depth and refilled and properly re- surfaced or entirely redone as per directions of Owner's Representative/Engineer at the cost of the Contractor.
- p) On removal of the forms and before the skin has had time to harden, all faces of the concrete inside or outside, to be kept exposed shall be rubbed over with carborandum stone, and washed with cement to remove all marks, projections, hollows or any other defect. No extra payment shall be made for this work.

All exposed surfaces and lines of the concrete work are to be true and fair without cracks, bends, windings and distortions of all kinds, and if accruing, shall be removed without any extra charges by the Contractor. All un-plastered concrete works is to be fair faced, smooth, pleasing and to the entire satisfaction of the Owner's Representative/Engineer.

- q) A float or screed is to be worked over the exposed surfaces of all concrete work on the flat or curve, so as to render the surfaces perfectly smooth, clear, and to the necessary slopes or falls or as required to receive the floor or roof finishes, according to the drawings, and as directed by the Owner's Representative/Engineer without any extra charges by the Contractor.

10.0 **PROTECTION & CURING**

All exposed concrete shall be cured. Curing shall be accomplished by preventing loss of moisture, rapid temperature change and mechanical injury or injury from rain or flowing water for a period of at least 7 days. Curing shall be started as soon as the concrete has hardened sufficiently for the surface not to be marked. Curing shall be done either by continuous sprinkling of water on the surface or by covering with sand, hessian, canvas or other approved fabrics mats, which shall be kept continually wet. If required and so directed by the Owner's Representative/Engineer, formed surfaces with forms in position shall also be cured by keeping all forms continually wet. As an alternative, curing of concrete, on all exposed surfaces which could not be kept covered, such as sides of the beams, under side of the slabs, may also be done by sealing concrete surfaces with curing compounds like "Paccacure" or equal so as to arrest loss of moisture from concrete, with approval of Owner's Representative/Engineer. The Contractor shall take special care that curing of concrete is satisfactorily carried out and in accordance with methods specified herein and/or as specified. Any negligence in this regard may result in total rejection of such concrete works, which in the opinion of the Owner's Representative/Engineer have not been adequately cured.

All concrete components of concreted structures shall be clearly marked with non-washable paints to indicate the date of placing concrete. During hot weather, curing shall be done even at night.

11.0 **PVC RUBBER SEAL JOINT/WATER STOPPER**

a) **Material**

All PVC hydrofoil water stops shall be central bulb type 230mm wide from a manufacturer approved by the Owner's Representative/Engineer. The specific gravity of PVC hydrofoil water stop shall not be less than 1.07. Full stretch breakout intensity when tested at normal temperature shall not be less than 12.94 MPa.

The material shall have a modulus of rigidity of 853 psi at 106°C 72.65 MPa at 200°C.

b) Placing & Connections

In general all PVC hydrofoil water stop shall be placed in the centre of the structural member as shown on the drawings and as directed by Owner's Representative / Engineer. Each piece of the hydrofoil water stop shall be of maximum practicable length. An ordinary sharp knife saw or any other sharp tool can be used to cut the water stop. Joints at inter sections and at ends of pieces shall be made in the manner most appropriate to the material being used. Joints shall develop effective water tightness fully equal to that of the continuous water stop material and shall permanently retain their flexibility. For straight line connection melting method of connection can be used by pressing two water stops intended for connection against a heated iron or copper sheet when they are melted, the two are combined.

After joining, the water stop should be allowed to cool.

For all other connection such as T-type or L-type, the welding method of joining should be used. Welding rod of same material as the water stop shall be used. The welding rod and the water stop shall be heated and melted at the same time by means of heated air jetting from the hot jet gun.

12.0 FORMWORK

12.1 The formwork shall be inclusive of all labor, material, workmanship and alike. All formwork and supports thereto shall be designed by the Contractor and relevant drawings for approval from the Owner's Representative / Engineer before the work is put in hand. Such an approval shall not relieve the Contractor from all the obligations of the Contract or give rise to any claims. The material for formwork shall be of steel.

12.2 Making Forms

i) The formwork for columns, beams, slabs and all other works whether to be precast or cast in situ shall be capable of obtaining industrial finishing and shall be rigidly formed and designed by the Contractor to the shapes and forms as per drawings in accordance with the best of the existing practices so as to be able to withstand, without displacement, deflection or deformation movements of any kind, the pressure of the moist concrete and all other loads. The exposed surfaces of all beams, columns, walls, slabs, etc., shall be Homogenous, perfectly even and smooth in appearance.

- ii) Scaffolding pipes shall be used for supporting the shuttering of walls, beams, columns and slabs etc.

12.3 **Rigid with allowance for camber and bulges**

It shall be fabricated and erected in position, perfect in alignment, levels and true to plumb and shape and securely braced so as to enable it to stand all weights, live and vibrating to be endured during placing of concrete and its subsequent hardening till the formwork is struck. It shall be so sufficiently rigid as not to lose its form and shall be so made for bulging, and deflection as to give the finished concrete the required lines, plumb, size and shape.

12.4 **Exposed surfaces left un-plastered**

For concrete work, where concrete surface is to be exposed for Industrial finish and left un-plastered, the formwork shall be made up of M.S. plates as approved by the Owner's Representative/Engineer, so as to make a perfectly smooth surface of the finished concrete.

Where any surface defects on the exposed concrete surfaces occur and which do not impair the structural performance, being in excess of the designed surfaces, and the architectural appearance of the work in the opinion of Owner's Representative/Engineer, such defects may be removed by ganting and grinding with carborandum stone or in any other approved manner, at the cost of the Contractor, otherwise the whole or part of the work may have to be removed and remade good by the Contractor at his own cost. For precast concrete members the forms shall be rigid, exact, smooth and made of steel.

12.5 **Injury or Damage**

The Contractor shall be responsible for any injury to the work and any consequential damages caused by or arising from the removal and striking of forms, centering and supports, due to striking too soon, and any advice, permission or approval given by the Owner's Representative / Engineer, related to the removal and striking of forms, centering and supports shall not relieve the Contractor from the responsibilities herein defined.

12.6 Treatment after removal of Forms

Any minor surface honey combing or other irregularities are to be properly made good immediately upon the removal of the formwork and the surface made good to the satisfaction of the Owner's Representative/Engineer. Any small voids shall be neatly filled with cement mortar consisting of one part of cement to two parts of sand and the whole surface rubbed over with carborandum stone and cement wash and bring the whole to a smooth a pleasing finish and uniform colour.

13.0 CONSTRUCTION JOINTS

Construction joints shall be located within the middle third of spans of slabs, beams and girders or as indicated on the drawings or as approved or directed by the Owner's Representative/Engineer. Joints in columns shall be made at the under-side of the deepest beam framing thereto. Beam stems shall be poured monolithically unless directed otherwise by the Owner's Representative/Engineer. Joints not specified or shown on the drawings shall be so located as to least impair the strength and appearance of the work. Except where indicated on the drawings no joint shall be made in footings or foundations without written approval of the Owner's Representative/Engineer.

Construction jointing shall be at angles to the member and shall be formed against firm stop boards, the stop boards shall be removed as soon as possible after placing the concrete but without the risk of movement of the concrete and the concrete surface shall be well brushed with a hard brush and washed-off with a spray of water, two (2) to four (4) hours after casing, to expose the aggregates and provide a key for the next pour. In all liquid retaining structures and other sub-structures pits and trenches, etc. PVC or any other approved water stops shall be provided at the construction joint in the manner shown on the drawings and/or approved by the Owner's Representative/Engineer.

Whenever a section of concrete is left unfinished, for any reasons with the approval of Owner's Representative/Engineer, leaving a surface which will be hard set before additional concrete can be joined to it, dovetails, grooves or other bond with the new work shall be provided at cost of the Contractor. Before depositing fresh concrete upon or against any concrete which has already set, the surface of the set concrete shall be roughened with a cutting tool, any laitance removed, thoroughly cleaned of all foreign matter, well watered and covered with cement grout, and special care shall be taken to ram the fresh concrete thoroughly up and against the set concrete; and, if deemed necessary by the Owner's Representative/Engineer, the joints shall be reinforced with steel bars or dowels to be all furnished and done by the Contractor without any additional payment.

14.0 ANCHOR BOLTS & BASE PLATE/EMBEDDED PARTS

- 14.1 All sleeves, inserts, anchor bolts, and other embedded items shall be positioned accurately and supported against displacement by template wherever required or as directed.
- 14.2 Material for Anchor bolts and nuts shall be ASTM A-307 Gr.B.
- 14.3 Material for Base Plates, Embedded plates/template shall be ASTM A-36.
- 14.4 Anchor bolts shall be positioned inside vertical reinforcement by means of temporary template 5mm thick.
- 14.5 The Contractor shall fabricate template as per bolt circle Diameter at no extra cost to the Owner.
- 14.6 Special anchor bolts for machinery engines pumps and compressors shall be in accordance with the equipment manufacturer recommendations.
- 14.7 Plates and sections shall be true to form Stiffeners, plates and the like shall be ground to fit the profile of the member. Sections to be cut to 'exact' lengths shall be accurately cold sawn or machined. Preparation of edges by flame-cutting shall, wherever practicable, be done by machine. Cold sawn, machine-cut and flame-cut edges shall be cleaned free of burrs and slag and left as smooth and regular as those produced by edge planing. All holes shall be drilled properly.
- 14.8 No welding allowance will be paid while calculating the weight of embedded parts.

15.0 REINFORCEMENT STEEL**15.1 Scope of Work**

The work covered in this section of the specifications consists of furnishing all materials, tools, labors and in performing all operations in connection with providing, straightening, cutting, bending, binding, fixing, including binding wire, chairs, pins, spacer block complete in strict accordance with this section of the specifications, the applicable drawings, approved bar bending schedule, and the terms and conditions of the Contract.

15.2 **Materials**

- a) Reinforcing steel to be new billet stock of mild steel (plain bar), hard grade (deformed bar) and ribbed tor steel as specified on the drawings and shall confirm to British Standard Specifications or equivalent ASTM or Pakistan Standard.
- b) The Contractor shall purchase the steel from Owner's Representative / Engineer approved factory of steel manufacturing. The Contractor shall furnish to Owner's Representative / Engineer, Manufacture's mill certificate to guarantee that steel meets the standard, specification requirement and minimum certified yield stresses as follows:
 - i) Mild Steel plain bars confirming to BSS 15 or BSS 4449 or PS-231-1962.
 - Tensile Strength - 438 to 517 N/mm² (63500 to 75000 lbs/in²)
 - Yield Strength - 250 N/ mm² (36000 lbs/in²)
 - Elongation - 16% to 24% (average 20%)
 - ii) Ribbed Tor Steel confirming to BS 4461.
 - Tensile Strength - 490 N/mm² (70,000 lbs/in²).
 - Yield Strength - 420 N/mm² (60,000 lbs/in²)
 - Elongation - 14.5%
- c) All steel to be true to the Standard Specifications with regard to bend ability specially the hard grade deformed bars under Ø19mm (¾") shall be capable of being bent cold through 90 degrees round a bar of four times its own diameter without fractures or injury of any kind. In case of deformed bars over Ø19mm and under Ø28mm round a bar of 6 times its own diameter shall be capable of being bent cold.
- d) 20 gauge galvanized wire shall be used for binding the steel reinforcement.

15.3 **Testing**

Samples shall be tested for above specification in an approved laboratory whenever required by the Owner's Representative/Engineer and all costs of such tests shall be borne by the Contractor.

15.4 **Storage**

Reinforcing bars shall be stored on platforms above surface of ground and be free from scale, oil, structural defects prior to placement in works. Rusted or dirty steel bars shall not be used in the works unless brushed and cleaned by proper steel wire brushes and after being approved for use by the Owner's Representative / Engineer.

15.5 **Reinforcement Cutting & Placing**

- a) All reinforcement steel shall be cut and bent cold in strict accordance with approved bar bending schedules and drawings supplied by the Contractor. The Contractor shall prepare bar bending schedule from approved structural working drawings and instructions to be provided to him by the Owner's Representative/Engineer. The bending schedules shall be drawn on approved forms and submitted to the Owner's Representative/Engineer for checking and approval. The steel reinforcement shall be cut and bent to sizes as per drawings and approved bending schedules. In case any bars, cut, bent or even fixed in position are found incorrect in dimension size or shape according to the requirements of the drawings and instructions of the Owner's Representative/Engineer, the Contractor shall replace such steel bars cut bent or fixed in position by correct sized bars at his own cost and no extra payment shall be made to the Contractor on such account.

The system of holding bars in place shall ensure that all steel in top section will support weight of workmen without displacement or distortion. Suitable spacers/ chairs as approved by the Owner's Representative/Engineer shall be used for supporting and spacing of bars. In case, any bars are bent or displaced they shall be straightened on the limit of a days pour and shall be in place and firmly tied with 20 gauge G.I. wires. Bars with kinks or bends not shown on drawings shall not be used.

- b) Where indicated in the drawings, mesh shall be of the sizes as shown on drawings and confirm to British Standard BS 785. Mesh reinforcement when used in slabs shall be supported at proper elevations by standard accessories. In slabs on ground, precast concrete blocks may be substituted for chairs.

15.6 **Laps & Splices**

- a) No splicing of bars shall be allowed at position other than shown on the drawings. All lap lengths shall not be less than 48 times of the diameter for nominal M.S. bars while hard grade bars and tor steel shall have laps of 50 times the bigger diameter of lapping bars unless otherwise indicated on the drawings. Splices of adjacent bars shall be staggered or as directed by the Owner's Representative / Engineer.
- b) All reinforcing steel fixed in position shall be inspected by the Owner's Representative/Engineer and no concrete shall be poured until steel placement has been approved by the Owner's Representative / Engineer. For inspection purposes the Contractor shall give to the Owner's Representative / Engineer reasonable notice before the scheduled pouring time. Clear concrete cover to reinforcement steel shall be as indicated on the drawings/specified.

16.0 **SAMPLES & TESTING**

16.1 **Cement**

Cement shall be tested as prescribed in the following British Standard or equivalent ASTM Standards.

- a) Ordinary Portland Cement BS 12
- b) Sulphate Resistant Cement BS4027

16.2 **Aggregates**

Aggregates shall be tested as prescribed in relevant Pakistan Standard or British Standard 882. In addition fine aggregates shall be tested for organic impurities in conformity with BS 812 or equal ASTM Standard or Pakistan standard.

16.3 **Testing of Concrete**

- i) The Contractor shall provide for test purposes one set of mix cubes taken for each class of concrete poured on each day. The Owner's Representative / Engineer, however, may order for more cube tests if any irregularity is found in the concrete.
- ii) All test cubes shall be 150 × 150 × 150mm (6" × 6" × 6") size.

- iii) All test cubes of the same set shall be made from the same batch of concrete.
- iv) Three cubes of the set shall be tested at 7 days and three shall be tested at 28 days or at a date as directed by the Owner's Representative/Engineer.
- v) All test specimens shall be made and cured in accordance with Pakistan Standard PS 560:1965 or British Standard BS 1881 or ASTM C-31.
- vi) Specimens shall be cured under laboratory conditions except that the Owner's Representative/Engineer may require curing under field conditions.
- vii) All cube moulds shall be steel-moulds perfectly true having all internal and the meeting faces machined to a smooth surface.
- viii) If the strength tests of the laboratory controlled specimens for any portion of the work falls below the minimum allowable compressive strength at 28 days required for the class of concrete used in that portion, the Owner's Representative/Engineer shall have the right to order replacement of the effected work.
- ix) All test cubes cast at site shall bear distinguishing mark showing serial number, date of casting, quality of concrete and place from where sample was taken and where that batch of concrete was placed in the structure. A proper daily record of test specimen made, best results obtained shall be maintained by the Contractor and weekly test results shall be submitted to the Owner's Representative/Engineer.
- x) The Owner's Representative/Engineer may require load tests for the part of the structure from where test specimens have shown unsatisfactory results at the cost of the Contractor.

In the event that load test indicate bad quality of concrete, measures as prescribed by the Owner's Representative/Engineer shall be taken to correct the deficiency at no additional cost to the Owner. The nature, descriptions and details of load test shall be determined by the Owner's Representative/Engineer and shall be binding on the Contractor.

16.4 **Reinforcement**

Reinforcing bars shall be tested as per relevant B.S 785 and B.S 4461: 1969 or ASTM Standard.

The Contractor shall furnish copies of manufacturer certificates of tests for steel reinforcement to be supplied to prove yield, ductility, (elongation) and tensile strength.

The cost of the tests is a Contractor charge. In any case, materials not according to requirements shall be rejected.



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SPECIFICATION FOR
CEMENT PLASTER

TABLE OF CONTENTS

<u>S. NO.</u>	<u>DESCRIPTION</u>	<u>PAGE NO.</u>
1.0	SCOPE	3
2.0	APPLICABLE STANDARDS	3
3.0	GENERAL	4
4.0	MATERIAL	4
5.0	PROPORTIONING AND MIXING	5
6.0	PREPARATION OF SURFACE TO BE PLASTERED	5
7.0	APPLICATION OF PLASTER	5
8.0	METAL LATH OVER REINFORCED CONCRETE AND MASONRY JOINT	6
9.0	BEADS	6
10.0	PLASTER WORKS	7
11.0	CLEANING AND PROTECTION	7
12.0	TOLERANCES	7

1.0 **SCOPE**

The work under this specification consists of furnishing all plant, labor, equipment, appliances, and materials and in performing all operations in connection with providing and installation of cement plaster and specified external rendering completion in strict accordance with this section of the specifications and the applicable drawings and subject to the terms and conditions of the Contract. The work described herein is to be performed by the Contractor. The scope of this section of specification is covered with detailed specifications as laid down herein.

2.0 **APPLICABLE STANDARDS**

Latest editions of following Pakistan, British and ASTM Standards are relevant to these specifications wherever applicable.

- **Pakistan Standard**

P.S 232 Ordinary Portland Cement

- **ISO (International Organization for Standardization)**

R.597 Definitions and terminology of cement

R.679 Method of testing strength of cements, compressive and flexural strength of plastic mortar (Rilembureau method).

R.680 Chemical analysis of cement & main constituents of Portland Cement

R.681 Chemical analysis of cements-mixer Constituents of Portland cement.

R.682 Chemical analysis of cements - determination of sulphur as sulphuride

- **ASTM (American Society for Testing and Material)**

C.144 Aggregate for Masonry mortar

C.631 Bonding compounds for interior plastering

- **BSI (British Standards Institution)**

812 Methods for sampling and testing of mineral aggregates, sands and fillers

1199	Sands for external renderings internal plastering with lime and Portland cement and floor screeds
1369	Metal lathing (steel) for plastering.
5262	External rendered finishes
5492	Internal Plastering

3.0 **GENERAL**

Except as may be otherwise shown on surfaces specified, all plaster work, both internal and external shall be ordinary Portland cement plaster of the required thickness as shown on the drawings.

Plastering shall not commence until all electric conduits, drainage and sanitary pipes, inlets to tanks, brackets, clamps, doors and window frames and all sorts of inserts and embedded items are fixed in position. It shall be the responsibility of the Contractor to make sure that all such work is carried out properly before start of plaster work, Chiseling and repairing of cement plaster shall not be permitted without the written approval of the Owner's Representative / Engineer.

Sample of materials shall be submitted to the Owner's Representative / Engineer for his approval prior to use in the Works.

4.0 **MATERIAL**

Cement for plaster shall be Sulphate Resisting Cement (SRC) (B.S. 4027 or P.S. 612) as specified and shall conform to requirements specified in the section "Plain and Reinforced Concrete".

Sand for plaster shall comply with the requirements of BS 1199, BS 1200 or the draft Pakistan Standard "Sand for Plaster" or as directed by the Owner's Representative / Engineer.

Water for plaster shall conform to requirements specified in the section for "plain and reinforced concrete".

All materials and workmanship for plaster, not explained in these specifications, shall comply with the requirements of relevant BS CP 211 and CP 221 and as directed by the Owner's Engineer.

5.0 **PROPORTIONING AND MIXING**

Measurement of materials shall be made by containers of known capacity to maintain consistent proportions. No lumpy or caked material shall be used. Mixing equipment boxes and tools shall be cleaned. Materials shall be proportioned as specified on the drawings, in the Bill of Quantities or as directed by the Owner's Representative/Engineer. Mixing shall be continuous until all ingredients are evenly distributed and thoroughly mixed.

Only limited water shall be added for proper workability and such quantity of mortar shall be prepared which can be consumed in thirty minutes after preparation. Preparation of mortar in bulk quantity for use during the entire day or for any other time more than that stipulated above is expressly prohibited. Re-tempering shall not be permitted and all mortar which has begun to stiffen shall be discarded.

Plaster ingredients shall be thorough mixed either by hand on a clean cement concrete platform or by a mechanical mixer and as directed by the Owner's Representative / Engineer.

6.0 **PREPARATION OF SURFACE TO BE PLASTERED**

Concrete surface to be plastered shall be cleaned to remove all grease, oil and other surface impurities, which will otherwise adversely affect the adhesion of plaster to the surface concerned. The surface of concrete ceilings, beams and columns shall be lightly hacked by approved means to give the required key for plastering.

The surface shall be washed with clean water and kept damp for 24 hours before further treatment. The surface thus prepared shall be treated uniformly with cement and sand slurry just before the application of plaster.

7.0 **APPLICATION OF PLASTER**

The plaster of thickness less than the specified thickness shall be rejected. If the plaster is to be more than 13mm thick, it shall be done in two coats. The surface of first coat shall be made rough before the second coat is applied. The plaster shall not have wavy surface and shall be perfectly in plumb. The edges and corners shall represent a straight line. The plaster shall be kept wet continuously for at least ten (10) days. No extra payment shall be allowed for jambs, junctions, corners, edges, round surfaces or for more than one layer of plaster required due to any unevenness in the work done by the Contractor. The plasterwork is to cover all conduits, pipes etc. fixed in the walls and ceiling. Wherever specified, metal lath shall be nailed firmly before plastering is commenced. The plaster surface shall be tested frequently with a 3-meter straight edge gazzaz and plumb bob.

Plaster containing cracks, blisters, pits, discoloration or any other defects shall not be acceptable. Any such plaster or loose plaster shall be removed and replaced with plaster in conformity with these specifications and as additionally directed by the Owner's Representative / Engineer.

The contractor shall cut out and patch all defective work at his own cost. All damaged plaster shall be patched up as directed by the Owner's Representative/Engineer. Patching plaster shall have a matching appearance as well as finishing surface, level with adjoining plaster.

8.0 **METAL LATH OVER REINFORCED CONCRETE AND MASONRY JOINT**

Metal lathing shall be fabricated from sheet steel and shall be of uniform quality and free from flaws broken strands, cracks and corrosive pitting, shall be rectangular and true to shape and shall comply with BS 1369.

All lathing shall be galvanized, where plastering material depends entirely on the lathing for its key, these shall not be less than two complete mesh openings per 28mm in one direction and the width of the aperture shall not be less than 5mm.

Sheets shall not be less than 1.60 kg/m² when fabricated, using 0.7mm thick steel sheet. Where used on smooth surfaces to form a key it shall be not less than 1.20 kg/m² when fabricated, using 0.5mm thick steel sheet. Tying wire shall be 1.2mm diameter galvanized annealed from wire.

Before plastering, wherever block masonry meets with reinforced concrete members a 150mm wide continuous strip of expanded metal lath shall be nailed to masonry and the reinforced concrete member covering the joint completely to prevent cracking of the joint.

9.0 **BEADS**

Angle beads, stop beads, depth gauge beads, edging profiles, plaster dividing profiles, interior angle profiles, plaster borders and the like shall all be manufactured from sheet steel and galvanized after fabrication, all beads shall be perforated at edges to ensure good adhesion of the plaster work. Thickness and dimensions shall suit particular locations and plaster thickness.

All angle beads, stop beads, depth gauge beads and the like are to be fixed in accordance with the manufacturer's instructions, wherever shown on the drawings.

10.0 **PLASTER WORKS**

Wherever specified in the drawings external surface shall have an average 20mm thick plaster finish, consisting of a base coat of 1:3 cement sand mortar in Grey cement and the finish coat of smooth plaster as shown on the drawings or as directed by the Owner's Representative/Engineer.

Wherever specified in the drawings all internal plaster shall have an average 12mm thick consisting of base coat of 1:3 cement sand mortar in gray cement and finish coat of smooth plaster as shown on the drawings or as directed by the Owner's Representative / Engineer.

10.1 **Water Proofing Plaster**

Water proof plaster shall be composed of 1:4 cement sand mortar mixed with approved water proofing agent (pudlo) as 2.5 Kg/bag of cement.

11.0 **CLEANING AND PROTECTION**

Rubbish and debris shall be removed by the Contractor as necessary to make way for work of other trades and as directed by the Owner's Representative / Engineer. As soon as each room or space is completed all rubbish, debris, scaffolding and tools should be removed to leave the room empty and clean.

Prior to plastering; all doors, windows and other finished metals should be covered by sheet of plastic or tarpaulin to protect them from damage.

Protect finished plaster from injury by any source. Contractor shall also protect all walls, floors etc. and work of other trades from plaster materials.

12.0 **TOLERANCES**

Surfaces of plaster work shall be finished with a true plane to correct line and level with all angle and corners to a right angle unless otherwise specified and with walls and reveals plumb and square.

Maximum permitted tolerances shall not exceed 3mm in 2m variation from plumb or level in any exposed line or surface and 1.5 mm variation between planes of abutting edges or ends.



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SPECIFICATION FOR

BRICK MASONRY

TABLE OF CONTENTS

<u>S. NO.</u>	<u>DESCRIPTION</u>	<u>PAGE NO.</u>
1.0	GENERAL	3
2.0	BRICK	3
3.0	DAMP PROOF COURSE (DPC)	5
4.0	POINTING	5
5.0	CURING AND REPAIR	5
6.0	FINISHING	6

1.0 **GENERAL**

1.1 **Scope**

This section defines the materials and workmanship related to Brick Masonry work.

2.0 **BRICK**

2.1 The moulds to be used by the manufacturer of bricks shall be thoroughly sanded before each use and shall be sufficiently larger than the size of the bricks being manufactured to allow shrinkage in drying and burning Process. Over-sized, irregular and worn moulds shall be destroyed. Each finished brick for the masonry work shall be 230 X 115 X 75mm in size and shall weigh between 3.2 to 4.2 kgs. All bricks shall have a "frog" 6mm deep on one face.

2.2 All bricks shall be manufactured by the Trench Kiln Method or other standard methods. The earth being used in manufacturing bricks shall be carefully selected and shall be free from objectionable quantities of lime, gravel, coarse sand, roots, or other organic matter. Salts shall not exceed 0.3% and calcium carbonate shall not exceed 2.0%.

2.3 All bricks shall be of first class quality made from good brick earth, free from saline deposit and shall be hand moulded. They shall be thoroughly burnt without being vitrified, shall be regular, uniform in shape and size with sharp and square edges, parallel faces and of deep red or copper colour. First class bricks shall be homogeneous in texture and shall emit a clear ringing sound when struck, and shall be free from flaws, cracks, chips, stones and modules of lime.

2.4 All facing bricks shall be fair face. The size of the facing brick shall be as per drawings.

2.5 **Physical Requirements of Bricks shall be:**

Minimum compressive strength, brick flatwise (using average gross area)	9.65 MPa (1400 psi)	15 MPa (2175 psi)
Minimum Modulus of Rupture, brick flatwise (using average gross area)	3 MPa	2 MPa
Maximum water absorption (by 5-hour boiling)	22%	25%

Maximum saturation coefficient *	0.88	0.90
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* Saturation Coefficient is the ratio of absorption by 24-hour submersion in cold water to that after 5 hour submersion of brick in boiling water.

2.6 **Placing**

Brick shall not be placed during rains sufficiently heavy or prolonged to wash the mortar from the brick. Mortar which becomes diluted by rain shall be removed and replaced before continuing with the work.

Only limited water shall be added for proper workability and such quantity of mortar shall be prepared which can be consumed in thirty minutes after preparation. Preparation of mortar in bulk quantity for use during the entire day or for any other time more than that stipulated above is expressly prohibited. Re tempering shall not be permitted and all mortar which has begun to stiffen shall be discarded.

All bricks to be used in brick masonry shall be soaked in water for minimum two hours before they are used by a method which will ensure that each brick is thoroughly and uniformly wetted. All bricks shall be free from water adhering to their surface when they are placed in the brick masonry.

Bricks shall be laid "frog" upward with mortar joints and in English and Flemish bond as shown on the Drawings or as directed by the Owner's Representative / Engineer. Both bed and vertical joints shall be 6mm in thickness completely filled with cement mortar as specified herein and each brick shall be bedded by firmly tapping with the handle of the trowel. All horizontal joints shall be parallel and all vertical joints in alternate courses shall be directly over one another. Excess mortar at the outer edges shall be removed and joints drawn straight with the edge of trowel and a straight edge. All anchors and similar work required to be embedded in the brick masonry shall be installed as the work progresses. On the completion of the work all holes or defective mortar joints shall be cut out and repointed.

3.0 **DAMP PROOF COURSE (DPC)**

All damp proof course unless otherwise specified shall consist of Grade 'C' cement concrete, 50mm thick, mixed with 2.5 kg of pudlo per bag of cement or other approved quality water-proofing-compound as per Manufacturer's specifications and shall be laid at required levels as per Drawings and instructions of the Owner's Representative/Engineer. The D.P.C. shall be tamped and consolidated, the levels, edges and corners made to the requirements of the relevant Drawings, including finishing and curing complete. All damp proof courses shall be laid over bitumen coating with 10/20 and polyethylene sheet or equivalent approved material as specified on the Drawings.

4.0 **POINTING**

4.1 The joints of brick masonry walls shall be given fine groove pointing by striking the joints to external surfaces of the wall. Tooling shall be done when the mortar is partially set but still sufficiently plastic to bond. All tooling shall be done with a tool which compacts the mortar, pressing the mortar out of the joint rather than dragging it out. Raked joints shall be 12mm deep fine grooved in order to give pressed and compacted surface. All joints shall be given finish with 1:3 cement sand mortar with a pointing tool.

4.2 On the completion of the work all holes and defective mortar joints shall be cut and repointed, Exposed masonry shall be protected against staining or other damages and excess mortar shall be cleared off the surfaces as the work progresses. All exposed masonry shall be clean, smooth, fine and shall be of acceptable finish. If in this event ordinary cleaning is inadequate, then special methods such as sand plasting or as otherwise approved by the Owner's Representative / Engineer shall be used to clean the surfaces perfectly.

5.0 **CURING AND REPAIR**

All brick masonry shall be water cured and shall be kept wet for at least seven days by an approved method which will keep all surfaces to be cured continuously wet. Water being used for curing shall meet the requirements of the specifications for water to be used in the manufacturing of bricks.

6.0 FINISHING

- 6.1 The exterior faces of the wall shall be finished by striking the joints as the work proceeds. The joints shall be struck by raking the green mortar after the brick work has been laid and finishing the joint with a pointing tool. Horizontal joints shall be struck to form a weathered joint and vertical joints shall be struck with a V-notch. Care shall be taken that the striking tools do not develop any cutting edge as the object of striking the joint is to compress the mortar into the joints.
- 6.2 One coat of cement mortar plaster shall be applied to the inside faces of all brick masonry walls. The exposed faces of all other brick masonry shall be thoroughly cleaned and left bare with struck joints as specified above.

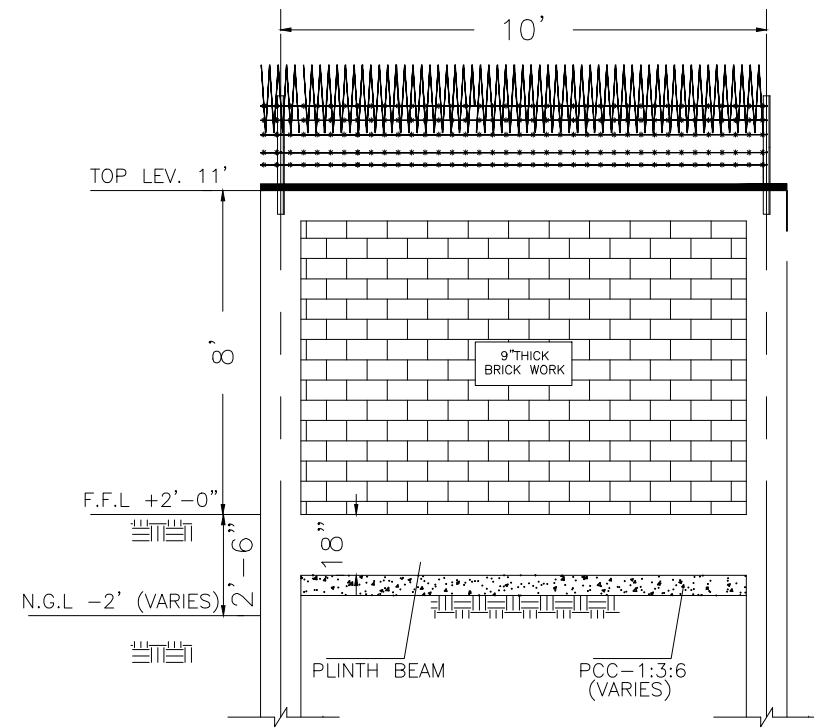
Tolerances

Brick Work

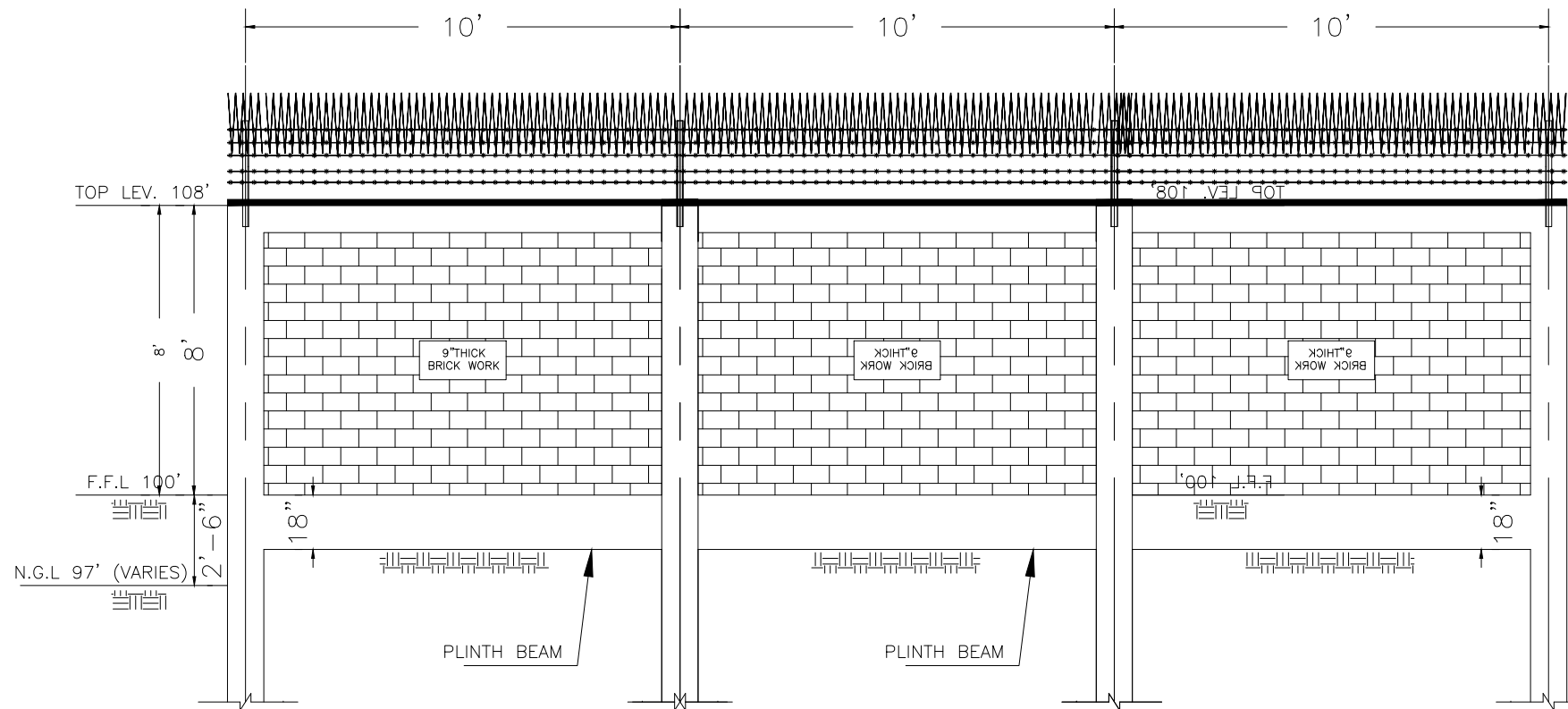
All brick work shall be erected plumb and true to line and level with maximum variation in any height of storey or any length of all to be one mm in one meter.

The maximum tolerance in the length, height or width of any single masonry unit shall be +/- 3 mm.

ANNEXURE-G



ELEVATION DETAILS -1



**TYPICAL BOUNDARY WALL
ELEVATION DETAILS -1**

2	11-15-2021	ISSUE FOR CONSTRUCTION	JQ	TR	KM
1	23-10-2017	ISSUE FOR CONSTRUCTION	ZA	TR	JA
0	31-08-2016	ISSUE FOR TENDER	ZA	TR	JA
REV.	DATE	DESCRIPTION OF REVISION	DRAWN	CHECKED	APPR.



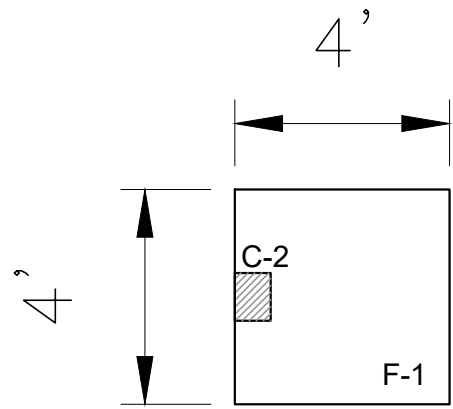
ATTOCK PETROLEUM LIMITED

**PROJECT:- CONSTRUCTION OF OIL DEPOT
AT PASHTOON GARHI**

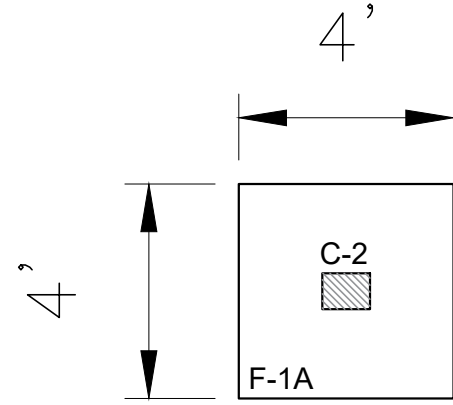
**JOB NO.
PACKAGE-I**

**TITLE:- BOUNDARY WALL
ELEVATION DETAILS - 1**

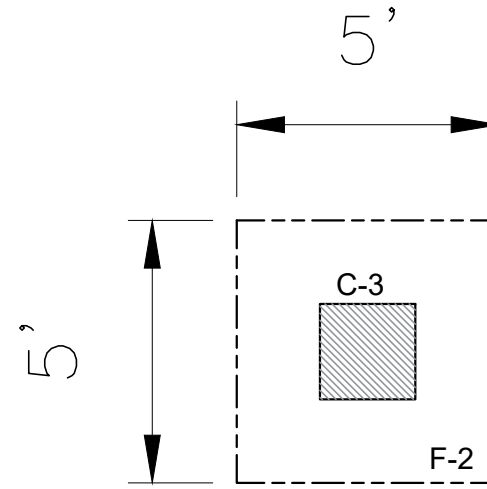
SIZE	SCALE	SHEET
A-4	AS SHOWN	3 OF 7



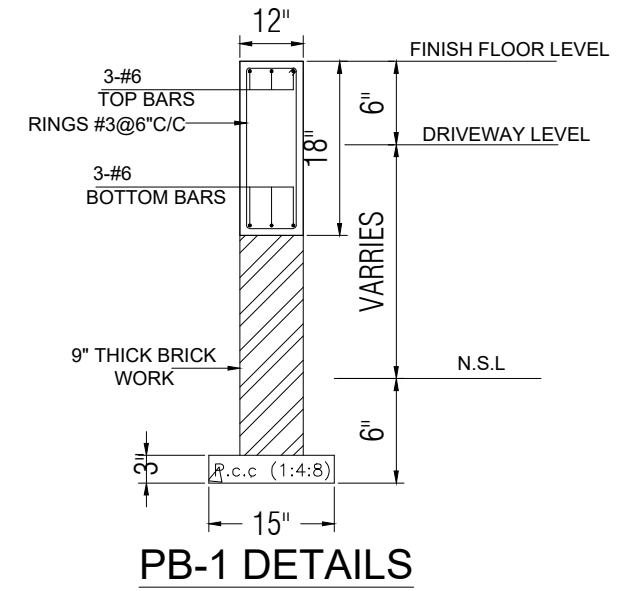
Footing F-1



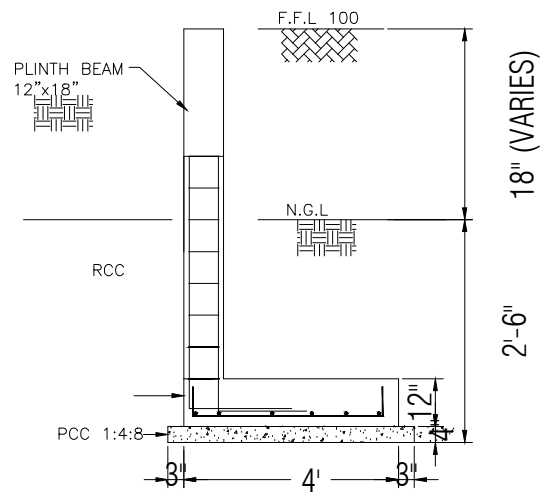
Footing F-1A



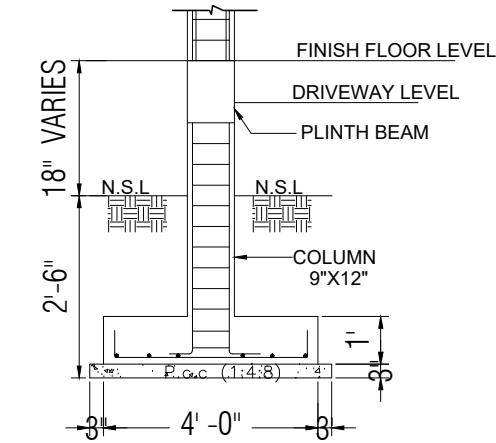
Footing F-2 (Gate Column)



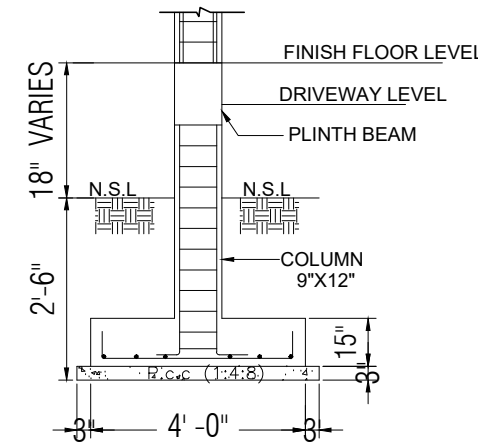
PB-1 DETAILS



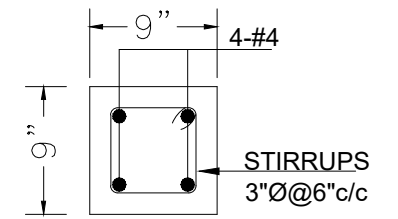
SECTIONAL ELEVATION OF COL. (C-2)



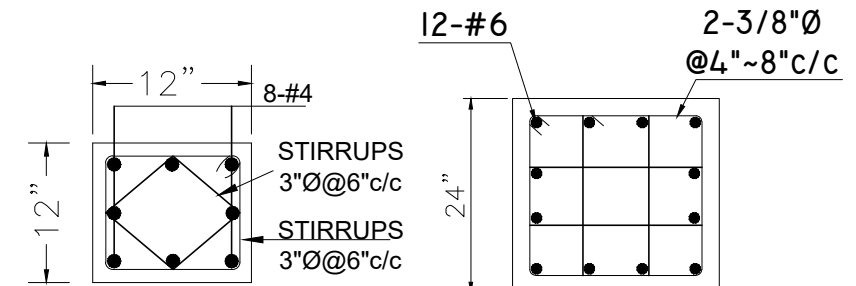
SECTIONAL ELEVATION OF COL. (C-2)



SECTIONAL ELEVATION OF COL. (C-3)



SECTION OF WATCH TOWER COLUMN C-1



SECTION OF COLUMN C-2

SECTION OF GATE COLUMN C-3

2	11-15-2021	ISSUE FOR CONSTRUCTION	JQ	TR	KM
1	23-10-2017	ISSUE FOR CONSTRUCTION	ZA	TR	JA
0	31-08-2016	ISSUE FOR TENDER	ZA	TR	JA
REV.	DATE	DESCRIPTION OF REVISION	DRAWN	CHECKED	APPR.



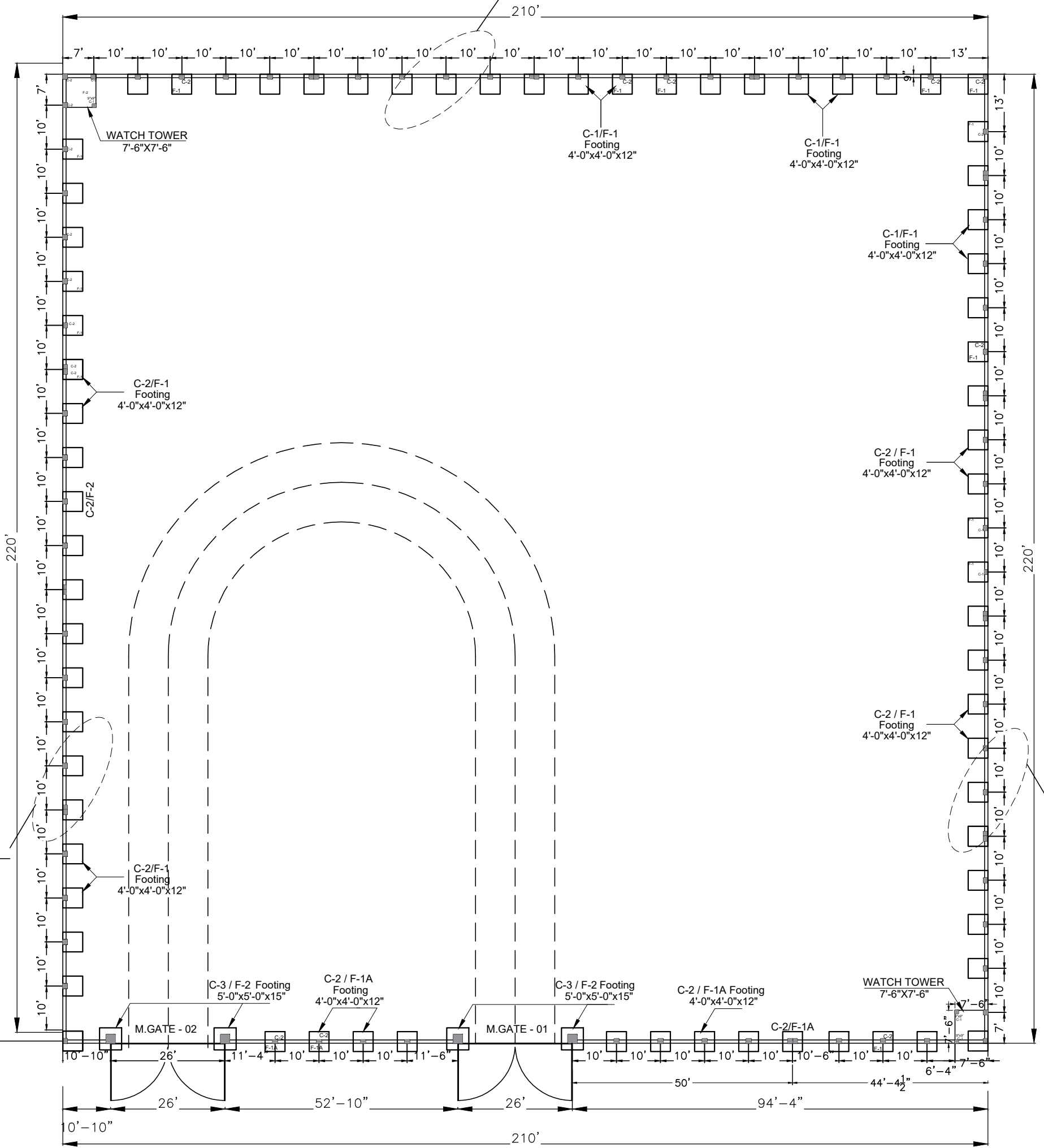
ATTOCK PETROLEUM LIMITED

PROJECT:-	MINI STORAGE FACILITY AT MANSEHRA	JOB NO.		
TITLE:-	MAIN GATE ELEVATION DETAILS OF FRONT WALL	SIZE	SCALE	SHEET
		A-4	AS SHOWN	2 OF 7

See Detail -1

See Detail -1

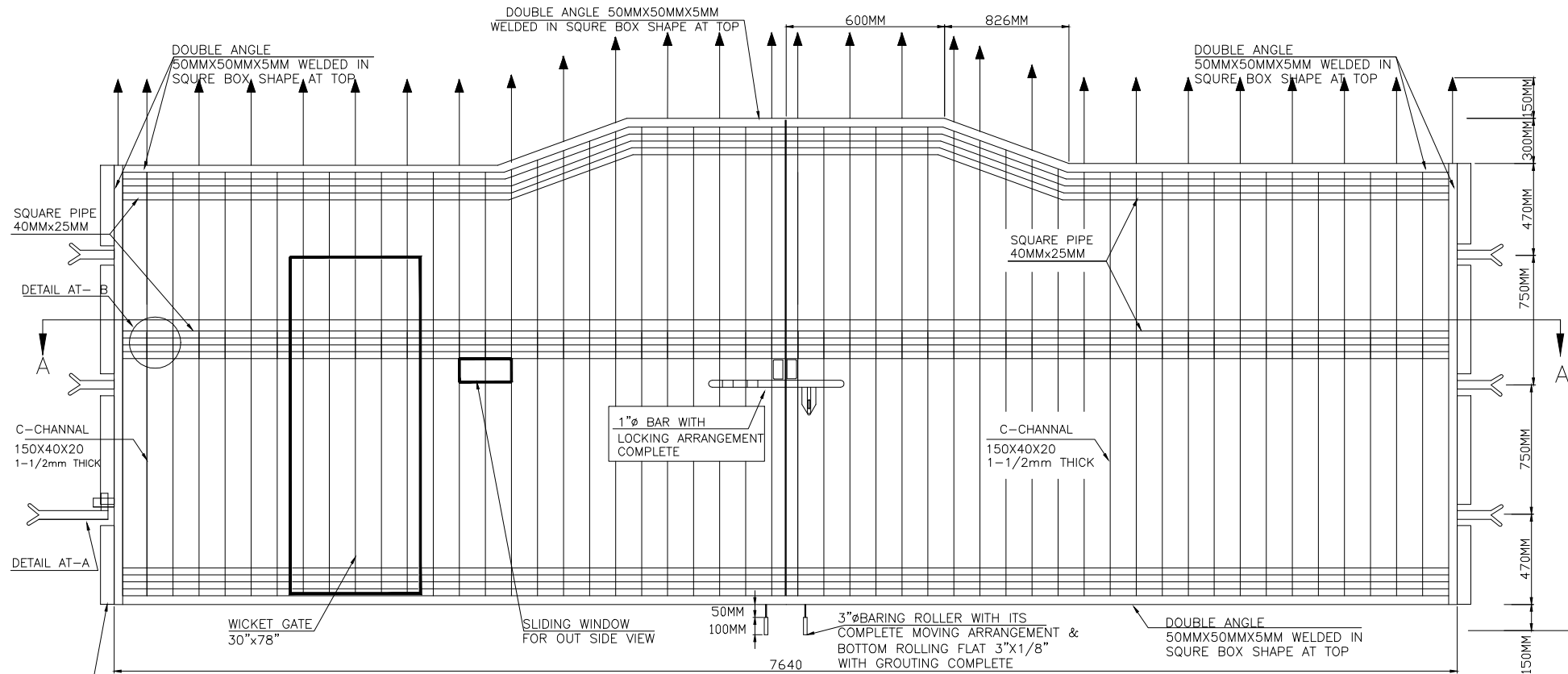
See Detail -1



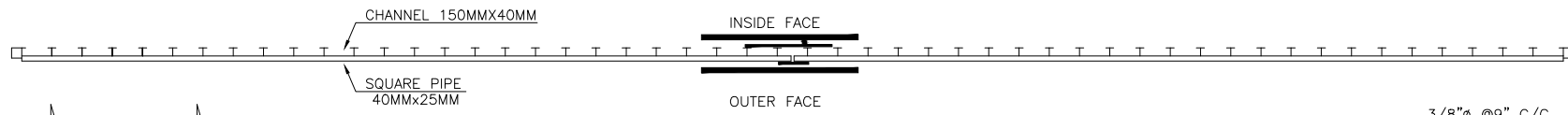
#	DATE	ISSUE FOR CONSTRUCTION	JD	SK	KH
1	23-10-2003	ISSUE FOR CONSTRUCTION	ZS	SK	JK
2	10-08-2004	ISSUE FOR TENDER	ZS	SK	JK
REV	DATE	DESCRIPTION OF REVISION	DRAWN	CHECKED	APPV

Atteck **ATTOCK PETROLEUM LIMITED**

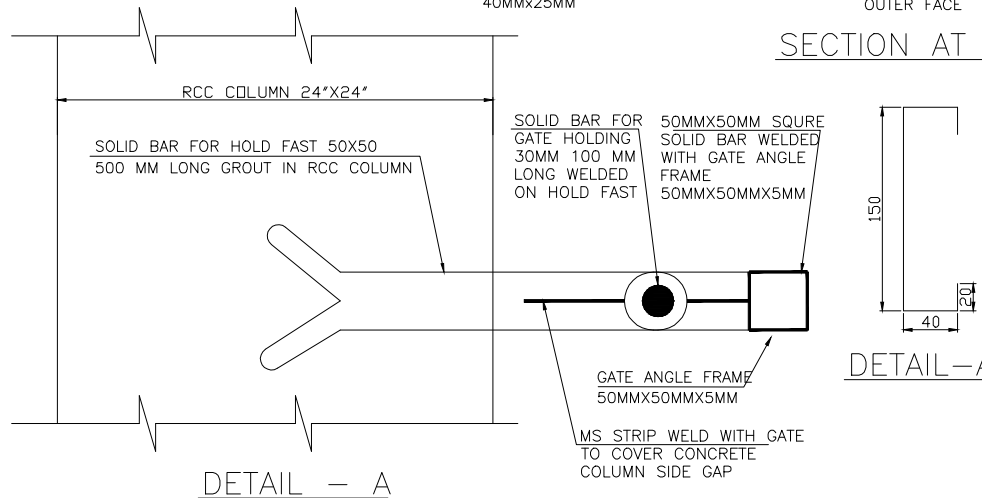
PROJECT:-	MINI STORAGE FACILITY AT MANSEHRA	JOB NO.	
TITLE:-	MAIN GATE ELEVATION DETAILS OF FRONT WALL	SIZE	A3
		SCALE	AS SHOWN
		SHEET	1 OF 1



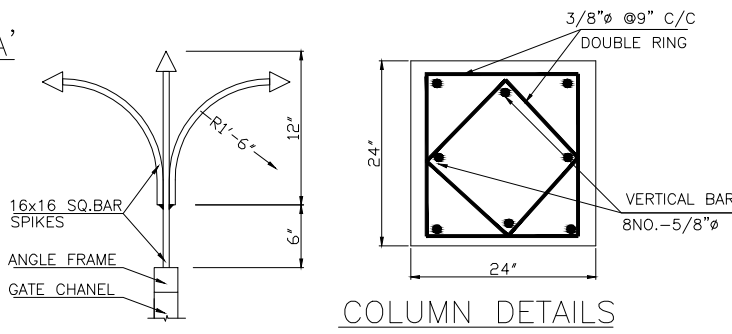
FRONT ELEVATION



SECTION AT A-A'

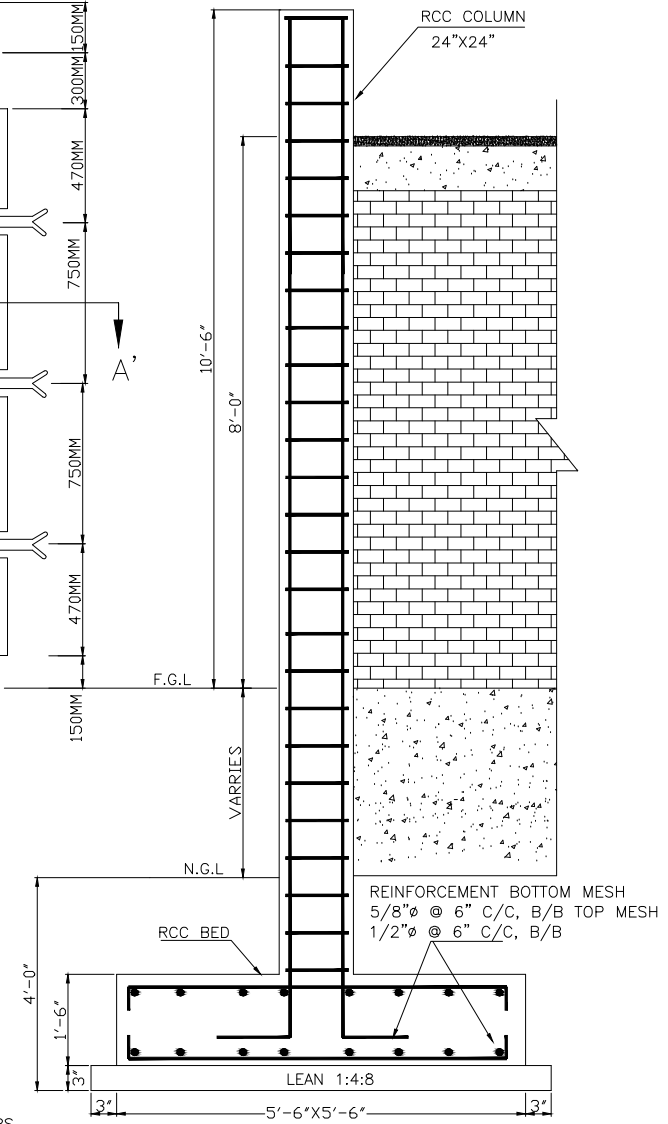


DETAIL - A



COLUMN DETAILS

TYP. SPIKES DETAILS



RCC COLUMN DETAIL

NOTES

1. E 6013 WELDING ELECTRODES WILL BE USED
2. ALL EXPOSED STRUCTURAL STEEL SURFACE TO BE PAINTED WITH THREE COATS OF ENAMEL PAINT UNDER TWO COATS OF RED LEAD PRIMER AFTER POWER TOOL CLEANING.

ISSUED FOR CONSTRUCTION

REV.	DATE	DESCRIPTION OF REVISION	DESIGN	CHECKED	APPR.
0	18-07-2019	ISSUED FOR CONSTRUCTION	HW	TR	JA
0	04-04-2019	ISSUED FOR TENDER	HW	TR	JA

ATTOCK PETROLEUM LIMITED

PROJECT:-	CONSTRUCTION OF OIL DEPORT AT APL MINI STORAGE MANSEHRA	JOB NO.	
		PACKAGE-I	
TITLE:-	MAIN & EMERGENCY GATES FABRICATION & ERECTION DETAILS	SIZE	SCALE
		A-3	AS SHOWN
		SHEET	1 OF 1