

Annexure 1

2.5 SUB CONTRACTOR

Subcontractors or Manufacturers for the following major items of plant, material and services must meet the following minimum criteria, herein listed for that item. Failure to comply with this requirement will result in rejection of the subcontractor but not the Bidder.

| Item No | Description of item | Minimum criteria to be meet | Documents Submission Requirements | Remark |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------|
| 1 | Dredging the River | Completed at least two works in River/Sea section in Last 10 years | Experience certificate shall be produced from Executive Engineer and counter signed by SE or Equivalent | |
| 2 | 33 /3.3 K.V sub station | Completed minimum 1000 KVA substation 2 Nos in last 7 years | Experience certificate shall be produced from Executive Engineer and counter signed by SE or Equivalent | |
| 3 | M.S pipe and D.I pipe – Supply and Laying | Laid and commissioned minimum 700 mm dia for 10 KM length of DI/MS pipe for 2 works within last 7 years | Experience certificate shall be produced from Executive Engineer and counter signed by SE or Equivalent | |
| 4 | Trenchless Technology for Connecting pipe , Rail way crossing | Successfully executed 1000 mm dia MS pipe in Trenchless less Technology 2 Nos in last 7 years | Experience certificate shall be produced from Executive Engineer and counter signed by SE or Equivalent | |
| 5 | Manufacturer of WTP equipment including Indicator, Rate of flow controller, valves, Flash mixer and flash mixture and flocculator and Plate settlers etc | Supplied Equipment for 45 MLD Capacity WTP for 2 WTPS in last 7 years. | Experience certificate shall be produced from Executive Engineer and counter signed by SE or Equivalent | |
| 5 | Operation and maintenance of Entire water supply system consists of Intake works, WTP and Transmission system | Operation and Maintaining the water supply scheme consist of Intake works, WTP and transmission system for at least 3 years in last 7 years | Experience certificate shall be produced from Executive Engineer and counter signed by SE or Equivalent | |
| | | | | |

In the case of a Bidder who offers to supply and install major items of plant and material under the contract, which the Bidder did not manufacture or otherwise produce, the Bidder shall provide the Manufacturer's authorization, using the form provided in Section 4 (Bidding Forms), showing that the Bidder has been duly authorized by the Manufacturer or producer of the related plant and equipment or component to supply and install that item in the Employer's country. Failure to submit the Manufacturer's authorization at the first instance is considered a minor, nonmaterial omission and shall be subject to clarification. However, failure of the Bidder to submit the omitted authorization shall lead to rejection of the Subcontractor or Manufacturer of the item under evaluation in accordance with ITB 16, 17.

ANNEXURE 2

CATHODIC PROTECTION

An Impressed Current Cathodic Protection (ICCP) system shall be installed for underground section of Raw Water pipeline to supplement the external soil side corrosion protection provided by the coat and wrap.

A single CP station shall be installed at the WTP end for protection of entire underground section of pipeline from intake end to the WTP

INSULATING FLANGE

The underground section of pipeline shall be electrically isolated by installation of insulating flanges at interface of above ground and underground pipeline at Intake and WTP ends. The insulating flanges will be flanges exclusively for insulation purpose and should not require handling for operational purpose.

- The underground and above ground side of flanges shall be insulated by :
- A 3 mm thick PTFE gasket
- 1 mm thick PE sleeve on bolts
- 3 mm thick fabric based phenolic laminated washers for bolt head & nuts
- The bolt size shall be 1/8" (3 mm) size smaller and 1/2" (12 mm) longer than standard size.

TRANSFORMER RECTIFIER UNIT

An Automatic single phase indoor Transformer Rectifier Unit of DC output capacity 0-25V and 0-25A capacity shall be installed in a room preferably close to underground pipeline at WTP end. The TRU shall be floor mounted having dimensions of 750mm (L) x 750mm (W) x 1400mm (H) and requiring AC single phase input of 240V, 10A feeder.

ANODE BED

- a. An anode bed shall be installed for draining current from TRU to pipeline through soil.
- b. The anode bed shall be located about 100m from underground portion of pipeline at WTP end and away from other underground metal structures in the vicinity. It shall be preferably installed along compound wall / fencing of plot to avoid any interference to activity in main plant and also be free from possibility of damage due to any excavation work during plant operation.
- c. The size of plot required for the anode bed shall be a trench 60m (L) x 1m (W)
- d. A soil resistivity survey shall be carried out by 4 Pin Wenner Technique at alternative plots to select a low resistivity plot and depth of anode installation to ensure low anode ground bed resistance.
- e. Canistered Mixed Metal Oxide (MMO) anodes shall be used for draining the required current from anode bed. The MMO anode shall be 25mm(ϕ) x 1000mm(L) tubular anodes with 1c x 10 sq.mm XLPE insulated PVC sheathed stranded copper conductor tail cable. The anode to tail cable joint shall be factory assembled and length of cable shall be sufficiently long for termination in Anode Junction Box (AJB) with at least 1M extra loop length. Each anode shall be assembled in a 200mm (ϕ) x 2000mm (L) 22 SWG sheet steel canister with calcined petroleum backfill.
- f. The ground bed shall consist of 10 No. of canistered anodes installed horizontally at 5m spacing in a 52m long trench at depth of low soil resistivity but not less than 2m deep. The individual anode tail cables shall be routed through PE conduit pipe to

middle of trench and brought above ground level through a 150mm (ϕ) PVC pipe. The trench shall be backfilled initially with soft soil to cover the anodes at least to height of 500mm. The partially filled trench shall then be watered and soil allowed to settle around the anodes before backfilling of the trench.

ANODE HEADER CABLE

A 1c x 25 sq.mm annealed high conductivity stranded copper conductor PVC insulated, 650/1100V grade, armored, PVC sheathed cable conforming to IS: 1554-1988 Part-I shall be laid between the AJB and TRU. The cable shall be laid underground at minimum 0.75m depth with sand padding and brick cover. Any cable tray / cable trench on route can be used for cable laying. One end of cable shall be terminated on bus bar in AJB and other end shall be connected to POSITIVE terminal of TRU.

DRAIN CABLE

Two 1c x 25 sq.mm annealed high conductivity stranded copper conductor PVC insulated, 650/1100V grade, unarmored, PVC sheathed cable shall be thermit welded to the underground portion of Raw Water line at WTP end close to the TRU location. The thermit welding shall be at gap of not less than 300mm

MONITORING CABLE

Two 1c x 6 sq.mm annealed high conductivity stranded copper conductor PVC insulated, 650/1100V grade, unarmored, PVC sheathed cable shall be thermit welded to the underground portion of Raw Water line at WTP end close to the TRU location. The thermit welding shall be at gap of not less than 300mm

PERMANENT REFERENCE CELL

High purity copper/copper sulphate reference cells with proven high reliability and minimum 10 years life shall be provided for stable pipe to soil potential measurement and feedback for operation of TRU in Auto Mode.

Two pre packed reference cells each with sufficient length of 1c x 6 sq mm PE insulated PVC sheathed stranded copper conductor unarmored tail cable shall be buried at Bottom of Pipe level at a gap of 10m from each other and about 150mm from pipe surface at location close to where the drain cable and monitoring cables are thermit welded to pipe.

CATHODE JUNCTION BOX

A Cathode Junction Box shall be installed near permanent reference cell installation. The CJB shall be weather proof conforming to IP: 65 fabricated from 10 SWG sheet steel with hinged lockable door/s .The CJB shall be channel mounted on concrete pedestal with bottom entry of cables through 150mm (ϕ) PVC pipe. The following cables shall be terminated in the CJB

- a. 2 Nos. of drain cables from pipeline through PVC conduit pipe
- b. 2 Nos. of monitoring cables from pipeline through PVC conduit pipe
- c. 2 Nos. of reference cell tail cables through PVC conduit pipe
- d. 1 No cathode header cable to TRU negative
- e. 1 No feedback cable to TRU

CATHODE HEADER CABLE

A 1c x 25 sq.mm annealed high conductivity stranded copper conductor PVC insulated, 650/1100V grade, armored, PVC sheathed cable conforming to IS: 1554 Part-I shall be laid between the CJB and TRU. The cable shall be laid underground at minimum 0.75m depth with sand padding and brick cover. Any cable tray / cable trench on route can be used for cable laying. One end of cable shall be terminated on bus bar in AJB and other end shall be connected to NEGATIVE terminal of TRU.

FEEDBACK CABLE

A 4c x 4 sq.mm annealed high conductivity stranded copper conductor PVC insulated, 650/1100V grade, armored, PVC sheathed cable conforming to IS: 1554-1988 Part-I shall be laid between the CJB and TRU. The cable shall be laid underground at minimum 0.75m depth with sand padding and brick cover. Any cable tray / cable trench on route can be used for cable laying. One end of cable shall be terminated on bus bar in AJB and other end shall be connected to feedback terminals terminal of TRU. The cathode header and feedback cable shall be routed together from CJB to TRU.

TEST STATION BOX

Test Station Boxes shall be installed on pipeline route for monitoring the performance of the CP system.

Test Station Boxes shall be installed near the insulating joints and at 0.5km gaps on pipeline ROW which works out to a total of 6 Boxes.

At insulating flanges 1 No of 1c x 25 sq.mm annealed high conductivity stranded copper conductor PVC insulated, 650/1100V grade, unarmored, PVC sheathed cable and 1 No. of 1c x 6 sq.mm annealed high conductivity stranded copper conductor PVC insulated, 650/1100V grade, unarmored, PVC sheathed cable shall be thermit welded on either side of the insulating flange and routed to the test station box through PVC conduit pipes. All the cables shall be terminated in box on phenolic laminated sheet.

At intermediate points 2 Nos. of annealed high conductivity stranded copper conductor PVC insulated, 650/1100V grade, unarmored, PVC sheathed cable shall be thermit welded on pipeline at gap of minimum 300mm and cable routed to the test station box through PVC conduit pipe for termination in box on phenolic laminated sheet.

The Test Station box shall be weather proof fabricated from 10 SWG sheet steel with hinged lockable doors conforming to IP 54. The box shall be welded at bottom to a heavy duty 100mm ϕ x 1500mm long pipe with bend welded at bottom. The pipe will serve as mounting for the box and routing of cables through it.

The Test station box shall be installed about 2.5m from pipeline on concrete pedestal 600mm(L) x 600mm(W) x 800mm (D) with the bend projecting outside concrete foundation about 600mm below ground level for cable entry.

GROUNDING CELL

A two plate zinc grounding cell shall be buried close to insulated joint and the grounding cell cables connected to the 1c x 25 sq.mm cable in test station box.

CRITERIA OF PROTECTION

The pipe to soil potential measurements shall be between (-) 0.9V (OFF) and (-) 1.20V (OFF) with respect to a copper/copper sulphate reference electrode for a fully protected line.

TESTING AND COMMISSIONING

- a. The installed system shall be checked for conformity with specification and all components shall be checked for completion and readiness for commissioning
- b. The natural pipe to soil potential (PSP) of pipeline at all test stations shall be recorded using a portable copper – copper sulfate reference cell.
- c. The CP station shall be put ON in CVCC mode and adjusted to obtain a pipe to soil potential reading of -1.2V at Test Station Box closest to WTP end. Readings shall be repeated after allowing 24 hours and 48 hours polarization. The TRU output shall be adjusted if necessary to get PSP values at all Test stations in range of -1.5V to 1.0V
- d. The current interrupter in TRU shall be activated for interruption cycle of 4 sec ON and 1 sec OFF .The 'ON' and instantaneous' OFF' PSP readings shall be taken at all Test stations preferably using a data recorder.
- e. The TRU output shall be adjusted to get "OFF" PSP readings in range of -1.2V to 0.9V.
- f. The current interruption shall be discontinued after end of survey and the unit shall be operated at final current value in auto mode by setting the INT Ref of unit to the corresponding PSP value.

Annexure 3

Responsibility of contractor

Compliance of NOC from Wildlife Department Compliance of BWSP2 to MoEFCC NOC Conditions (ref. 6th March 2017 NOC from Chief Wildlife Warden, Bihar)

| S.No | Issues discussed (ref. NOC) | Compliance from Project Implementation/ User Agency - BUIDCo | Contractor responsibility |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <p>Custody of the portion of the river course to be used for the project: The Forest & Environment Department, GoB shall retain the custody in the nature of the sanctuary of the portion of river course in the VGDS to be used for this project viz. access channel and dredging operation for that purpose etc.</p> | It was decided an Undertaking would be given by Project Implementation/ User Agency. | Noting the issues indicated by MoEFCC |
| 2 | (II) The project proponent/User agency shall not construct or install any other permanent structure in the sanctuary area and shall not change/obstruct or cause to change the course of flow of the Ganges | It was decided an Undertaking will be given by Project proponent/User agency "as suggested" in NOC. | Noting the issues indicated by MoEFCC. No activity is permitted within VGDS (sanctuary) area and shall not change/obstruct or cause to change the course of flow of the Ganges |
| 3 | <p>(III) a. Regulation and monitoring of project execution and operation: The work plan and time schedule of the initial dredging operations will be intimated in advance to the Divisional Forest Officer (DFO), Bhagalpur who is the Wild Life Warden and subsequent dredging operations will also be periodically informed in advance to Divisional Forest Officer, Bhagalpur. The Divisional Forest Officer Bhagalpur will arrange for observation for the dredging operations and take such steps necessary to minimize damage to the habitat of dolphins.</p> | As agreed work plan and time schedule of the initial dredging operations will be intimated in advance to the DFO and subsequent dredging operations will also be periodically informed in advance to DFO Bhagalpur for their necessary observation. | Planning of dredging with agency and consultation with Project implementation agency. Prepration of dredging plan in consultation with dredging agency, PIU and DSC and submission to PMU for approval. |
| 4 | (III) b. The impact of the dredging of the access channel on the dolphins shall be regularly monitored. The project proponent shall make the necessary arrangement for such monitoring in consultation with Divisional Forest officer, Bhagalpur/Conservator of Forests (CF), Bhagalpur | Project proponent discussed with DFO/CF. The project proponent will make the necessary arrangement on base line data e.g. Flora Fauna and water quality monitoring in consultation with Forest Officer, Bhagalpur/Conservator of Forests, Bhagalpur | Asist project proponent/ implementation and management agency during generation of base line data as per scope of work |
| 5 | (III) c. The project proponent/ user agency will ensure that there is no violation of any of the provisions of Wildlife (Protection) Act, 1972 and other related acts, rules framed by Govt. of India/State Govt. regarding controls and management of rivers and aquatic animals. | The project proponent/ user agency will give undertaking that there will be no violation of Wildlife (Protection) Act 1972 and other related acts/ rules framed by Government of | Give undertaking to Project Implementation Agency that they will not affect any wildlife during implementation of the project and no violation of Wildlife (Protection) |

| S.No | Issues discussed (ref. NOC) | Compliance from Project Implementation/ User Agency - BUIDCo | Contractor responsibility |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | India/State Govt. regarding controls and management of Rivers and aquatic animals. | Act 1972 and other related acts/ rules framed by Government of India/State Govt. regarding controls and management of Rivers and aquatic animals |
| 6 | (III) d. The continuous monitoring of key parameters (on which project is based) will be undertaken by project proponent/ user agency throughout the project life cycle and appropriate actions shall be taken by the user agency in consultation with the Chief Wildlife Warden ,Bihar. | As per suggestion of CF/DFO that project proponent/ user agency clear about the term “project life cycle” and appropriate actions should be taken by the project proponent/ user agency in consultation with the Chief Wildlife Warden, Bihar. | Carry out monitoring as per Environment Management & Monitoring Plan. Assist project proponent/ implementation agency during generation / collection of required data throughout project life cycle |
| 7 | (IV) Supporting the conservation of dolphins and aquatic biodiversity of VGDS: (i) Gangetic Dolphin being National Aquatic Animal, the project proponent/user agency shall bear the cost of the studies regarding monitoring of the hydrology and the quality of water at a periodical basis over an appropriate zone covering downstream and upstream areas surrounding the project site as determined by Chief Wildlife Warden, Bihar and the result of such studies should be communicated to the Environment & Forest Department. | Project proponent/ user agency will finalize monitoring parameters and cost in consultation with DFO/CF and RCCF | Noting the issues indicated by MoEFCC. |
| 8 | (ii) A comprehensive scheme to foster proactive participation of fisherfolks community for dolphin conservation over a stretch of 10 km (about 5 km upstream and downstream each) around the project site will be formulated in consultation with Regional Chief Conservator of Forest, Bhagalpur and implemented through DFO, Bhagalpur for which BUIDCo will bear the expenses till the end of the ADB supported Water supply Development Project. | BUIDCo to finalize fisher participation plan as per suggestion and relevant cost in consultation with RCCF and DFO. | Participation of fisherfolks community consultation along with project implementation and management agency for dolphin conservation |
| 9 | (V) The project proponent/ user agency shall abide by any additional condition or directions imposed by the Chief Wildlife Warden, Bihar, the State Board for Wildlife, or the National Board for wildlife and other competent authorities as deemed necessary in the interest of conservation of Gangetic Dolphin and aquatic biodiversity in the sanctuary landscape based on the factual outcome after the implementation of the project | Noted | To be noted. Requirement to assist project implementation and management authority for necessary compliance |

Provisions relating to safeguards and safety measures at work site in the contract document

| Sr. No | Particulars | Activity |
|--------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Site Environmental Plan(SEP) | The Contractor shall prepare a detailed Site Environmental Plan (SEP) for the work site, base camp, etc , showing arrangements for disposal of sanitary and other waste, location of fuel, and lubricant depots, sheds for equipment, labour and housing facilities, etc., prior to the construction for approval of the Engineer. |
| 2 | Site Safety, Security and Protection of the Environment | The Contractor shall take all necessary precautions against pollution or interference with the supply or obstruction of the flow of, surface or underground water. These precautions shall include but not be limited to physical measures such as earth bunds of adequate capacity around fuel, oil and solvent storage tanks and stores , oil and grease traps in drainage systems from workshops, vehicle and plant washing facilities and service and fuelling areas and kitchens, the establishment of sanitary solid and liquid waste disposal systems, the maintenance in effective condition of these measures, the establishment of emergency response procedures for pollution events, and dust suppression, all in accordance with normal good practice and to the satisfaction of the Engineer. Should any pollution arise from the Contractor's activities he shall clean up the affected area immediately at is own cost and to the satisfaction of the Engineer, and shall pay full compensation to any affected parties. |
| 3 | Protection of Trees and Vegetation | The Contractor shall ensure that no trees or shrubs or waterside vegetation are felled or harmed except for those required to be cleared for execution of the Works. The Contractor shall protect trees and vegetation from damage to the satisfaction of the Engineer. No tree shall be removed without the prior approval of the Engineer and any competent authorities. Should the Contractor become aware during the period of the Contract that any tree or trees designated for clearance have cultural or religious significance he shall immediately inform the Engineer and await his instructions before proceeding with clearance. In the event that trees or other vegetation not designated for clearance are damaged or destroyed, they shall be repaired or replaced to the satisfaction of the Engineer, who shall also impose a penalty to twice the commercial value of any timber affected, as assessed by the Engineer |
| 4 | Use of Wood as Fuel | The Contractor shall not use wood as a fuel for the execution of any part of the Works, including but not limited to the heating of bitumen and bitumen mixtures and the manufacture of bricks for use in the Works, and to the extent practicable shall ensure that fuels other than wood |

| Sr. No | Particulars | Activity |
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| | | are used for cooking , and water heating in all his camps and living accommodations. |
| 5 | Safety and accident prevention officer | Due precautions shall be taken by the Contractor, at his own cost, to ensure the safety and protection against accidents of all staff and labour engaged on the Works, local residents in the vicinity of the Works, and the public travelling through the Works. The Contractor shall have on his staff on Site a designated officer qualified to promote and maintain safe working practices. This officer shall have authority to issue instructions and shall take protective measures to prevent accidents, including but not limited to the establishment of safe working practices and the training of staff and labour in their implementation. |
| 6 | Protective clothing, footwear and relevant protection equipment | The Contractor shall, at his own expense, provide protective clothing and equipment to all staff and labour engaged on the Works to the satisfaction of the Engineer, and on his failure to do so the Employer shall be entitled to provide the same and recover the cost from the Contractor, Such clothing and equipment shall include, at a minimum, protective footwear for workmen undertaking concrete mixing work, protective footwear and gloves for any workmen performing bituminous paving works, protective footwear, clothing, cream, gauntlet-type gloves, hats, safety glasses or goggles and filter masks for workmen undertaking lime stabilisation works, hard hats for workmen engaged on construction at height, and otherwise as appropriate to the job in hand and to the Engineer's satisfaction |
| 7 | First-aid services | The Contractor shall, at his own expense, provide first aid equipment at all camps and work sites to the satisfaction of the Engineer, and shall ensure that at all work sites where 40 or more persons are engaged on the Works there shall at all times be a person qualified in first-aid with access to appropriate first-aid equipment. A first-aid post shall be established at base camp comprising a suitable room with washing and examination facilities, appropriate medical supplies, and staffed on a full-time basis by a qualified paramedical attendant. |
| 8 | Health and pests | The Contractor shall at his own expense and throughout the period of the Contract ensure that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements for his staff and labour, and shall comply with all the regulations and requirements of the local health authorities with respect to disease prevention and control. |
| 9 | Supply of drinking water, sanitation | The Contractor shall so far as is reasonable, having regard to local conditions, provide on the Site and at his expense an adequate supply of drinking water for the use of |

| Sr. No | Particulars | Activity |
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| | | Contractor's staff and work people, together with sanitary facilities (portable toilets or latrines), to the satisfaction of the Engineer |
| 10 | Records of labour and accidents | The Contractor shall maintain full records of numbers, working hours and wages of labour, safety, health and welfare of persons, accidents, and damage to property and make such reports on these matters to the Engineer as he may from time to time prescribe. |
| 11 | Site Clearance – clearing and grubbing | This work shall consist of cutting, removing and disposing of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, top organic soil not exceeding 150 mm in thickness, rubbish etc , from the area of Works which in the opinion of the Engineer are unsuitable for incorporation in the Works, and such other areas as may be specified on the Drawings or by the Engineer |
| 12 | Preservation of Property/Amenities | <p>Trees, shrubs, any other plants, pole lines, fences, signs, monuments, buildings, pipelines, sewers and all facilities within or adjacent to the site which are not to be disturbed shall be protected from injury or damage. The Contractor shall provide and install at his own expense, suitable safeguards approved by the Engineer for this purpose.</p> <p>During clearing and grubbing, the Contractor shall take all adequate precautions against soil erosion, water pollution, etc. Before start of operations, the Contractor shall submit to the Engineer for approval, his work plan including the procedure to be followed for disposal of waste materials, etc., and the schedules for carrying out temporary and permanent erosion control</p> |
| 13 | Disposal of material | All materials arising from clearing and grubbing operations shall be the property of Employer and shall be disposed of by the Contractor as hereinafter provided or directed by the Engineer. |
| 14 | Borrow Materials | Where the materials are to be obtained from designated borrow areas, the location, size and shape of these areas shall be as indicated by the Engineer and the same shall not be opened without his written permission. |
| 15 | Safety precaution | Safety precaution will be taken complying with the Road Work Traffic & Safety. All workers will be advised to wear helmets, boots and gloves while working. There will be a stand by vehicle near site always -if needed in a case of accident. The safety officer inspects several times to inspect safety matter |
| 16 | Eligible materials, equipment and services | The materials equipment and services to be supplied under the contract shall have their origin in eligible source Bidders may be required to provide evidence of the materials, equipment and services |

| Sr. No | Particulars | Activity |
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| 17 | NOCs | Cooperate and coordinate the work with related authorities, other contractor and utilities including their permission before starting the related work |
| 18 | Water Quality analysis | The contractor shall organize to collect raw water from river and the treated water from BWW. The sample collected shall be analysed for all the physical, chemical and bacteriological characteristics |
| 19 | Draft IEE and EMP Updating | Draft Initial Environmental Examination (IEE) and Draft Environmental Management Plan (EMP) -The contractor will be responsible for (i) finalising the draft IEE with EMP based on detailed design, (ii) Submitting the same to the client for approval Complying with the same throughout the contract period. No work on the new water treatment plant will commence prior to obtaining the CFE from PCB |
| 20 | Utility shifting | Telephone lines, electric poles and wires, water lines within the existing rights-of-way (ROW) may have a potential risk of damage. To mitigate the adverse impacts due to relocation of the utilities, PMC/DSC will (i) identify and include locations and operators of these utilities in the detailed design documents to minimise disruption of services during the construction phase; and (ii) require the Contractor to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. |
| 21 | Site selection of construction work camps, stockpile areas, storage areas, and disposal areas | <ul style="list-style-type: none"> • Will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems, etc. • Residential areas will not be considered so as to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). • Disposal will not be allowed near sensitive areas which will inconvenience the community. • The construction camp, storage of fuel and lubricants should be avoided at the river bank. The construction camp site for intake well should be finalized in consultation with DSC and PIU. |
| 22 | Site selection of sources of materials | Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pits (for loose material other than stones) would be included in the design specifications and on plan drawings. Priority of sites will be investigated further by the Contractor at the detailed project stage. If other sites are necessary, these would to be located away from population centers, exiting intakes, streams, cultivable |

| Sr. No | Particulars | Activity |
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| | | lands, and natural drainage systems, and in structurally stable areas even if some distance from construction activities. It will be the Contractor's responsibility to verify the suitability of all material source and to obtain the approval of the Employer. If additional quarries will be required after construction is started, then the Contractor shall use the mentioned criteria to select new quarry sites, with written approval of the Employer. |
| 23 | Sources of Material | The Contractor will be required to Submit to PMC/DSC on a monthly basis documentation of sources of materials. (i) Use quarry sites and sources permitted by government; (ii) Verify suitability of all material sources and obtain approval of Program Management Unit (PMU); (iii) If additional quarries will be required after construction has started, obtain written approval from PMU; and (iv) Submit to PMC/DSC on a monthly basis documentation of sources of materials. |
| 24 | Air Quality | Emissions from construction vehicles, equipment, and machinery used for excavation and construction will induce impacts on the air quality in the construction sites- Contractor will be required to: (i) Consult with PMC/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather; (iii) Use tarpaulins to cover sand and other loose material when transported by trucks; and (iv) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly |
| 25 | Tree cutting on Forest land | If tree-removal will be required, obtain tree-cutting permit from the Banka Forest Division through the Employer, and transplant to PMC/DSC approved areas; Require to plant three (3) native trees for everyone (1) that is removed |
| 26 | Traffic Diversions | Pipe laying works sometimes necessitate short-term diversion of traffic on the roads. To reduce the impact planning of construction will be such that it will minimise traffic diversions. If diversion is necessary then the traffic authorities will be informed sufficiently in advance, permissions obtained, necessary signage erected and the residents forewarned on the alternate routes to be taken |
| 27 | Landscape and Aesthetics | Prepare and implement a Waste Management Plan |
| 28 | Socio-Economic Employment: | The Contractor will be required to: (i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available |

| Sr. No | Particulars | Activity |
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| 29 | Occupational Health and Safety Plan | Develop and implement a site-specific Health and Safety (H & S) Plan which will include measures such as: (a) excluding the public from the site; (b) ensuring all workers are provided with personal protective equipment; (c) training for all site personnel' (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents |
| 30 | Community Health and Safety | The Contractor will be required to: (i) Plan routes to avoid times of peak-pedestrian activities; (i i) Liaise with PMC/DSC in identifying high-risk areas on route cards/maps; (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure; and (iv) Provide road signs and flag persons to warn of dangerous conditions. |
| 31 | Work Camp | The Contractor will be required to: (i) Consult with PMC/DSC before locating project offices, worker camp, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide water and sanitation facilities for employees; (iv) Prohibit employees from poaching wildlife and cutting of trees for firewood (v) Request PMC/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work |
| 32 | Social and cultural resources | Contractor will be required to: (i) Strictly follow the protocol for chance finds in any excavation work; (ii) Request PMC/DSC or any authorized person with archaeological field training to observe excavation (iii) Stop work immediately to allow further investigation if any finds are suspected; and (iv) In form PMC/DSC if a find is suspected, and take any action they require ensuring its removal or protection in situ. Consult municipal authorities, custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals. |
| 33 | Responsibility for implementation of environmental safeguard | EMP-Responsible for carrying out mitigation measures Responsible for carrying out monitoring measures Responsible for reporting |

Requirement of compliance as per Environment Management and Monitoring Plan - part of approved IEE "Bhagalpur Water Supply Phase 2 (BWSP2) Subproject"

Reference Table nos.- Under section VIII of IEE- Environmental Management Plan

Table 48: Pre-Construction EMP Table

Table 49: EMP Table for Construction of Intake Wells and Ancillary Structures

Table 50: EMP Table for Transmission Mains Pipe Laying

Table 51: EMP Table for WTP Construction

Table 52: EMP Table for Dredging impact

Table 53: EMP Table for O&M of Intake Wells, Ancillary Structures and dredging activity

Table 54: EMP Table for O&M of Transmission Mains

Table 55: EMP Tables for O&M of WTP

Table 56: Site- and Activity-Specific Plans/Programs as per EMP

Table 57: Environmental Monitoring Program

Compliance of Rules Regulations

The following legislations are applicable to the subproject:

- Environmental (Protection) Act of 1986, its rules and amendments;
- Environmental Impact Assessment (EIA) Notification of 2006 and 2009;
- Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments;
- The Air (Prevention and Control of Pollution) Act 1981, amended 1987 and The Air (Prevention and Control of Pollution) Rules, 1982 and Amendments;
- The Indian Forest Act, 1927; Forest (Conservation) Act, 1980, amended 1988; Forest (Conservation) Rules, 1981 amended 1992 and 2003; and Guidelines for Diversion of Forest Lands for Non-Forest Purpose under the Forest (Conservation) Act, 1980
- Wild Life (Protection) Act 1972, Amendment Act, 1993 and 2002 and Wildlife (Protection) Rules, 1995.
- Indian Standard (IS) 10500 Drinking Water – Specification, 2012
- Central Pollution Control Board (CPCB) Environmental Standards;
- The Ancient Monument and Archaeological Sites and Remains (Amendment and Validation) Act 2010
- Manufacture, storage and import of hazardous chemical Rules, 1989
- The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR),
- Wetlands (Conservation and Management) Rules, 2010;
- Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016
- Noise Pollution (Regulation and Control) Rules of 2000 as amended up to 2011.
- National Institute of Occupational Safety and Health Criteria for a recommended standard: occupational noise exposure, NIOSH Publication No. 98-126
- The Child Labour (Prohibition and Regulation) Amendment Act, 2016,
- Draft {S.O. 3030(E) dated 9 November 2015 from MoEFCC} and notification of Eco- Sensitive Zone of VGDS

Further Rules and Regulations to comply by contractor during implementation

A. Electric Safety

Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act , 1996 and rule 1998

Rule 47. Electrical hazards:

(1) Before commencement of any building or other construction work, the employer shall take adequate measures to prevent any worker from coming into physical contact with any electrical equipment or apparatus, machines or live electrical circuit which may cause electrical hazard during the course of his employment at a building or other construction work.

(4) The employer shall ensure that, as far as practicable, no wiring, which may come in contact with water or which may be mechanically damaged, is left on ground or floor at a building or other construction Work

- Contractor to ensure all electric appliances used for the BUDIP project should be as per Indian standard codes
- Every electric appliance, circuit board should be place under water proof roof and closed box

Rule 96. Indian Electricity Rules, 1956 (as amended till date)
Every line shall be insulated throughout.

- Replace frayed electrical wires and provide standard connectors for electrical cables jointing. Provide standard connections or switches for handheld devices

Rule 64(1) a, Indian Electricity Rules, 1956 (as amended till date)

- Provide access control measures to all high hazard areas such as control panel /metering area, DG area, etc. Display authorised personnel permitted to access the said high hazard zones

B. Fire safety

Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act , 1996 and rule 1998

Rules 35. Fire protection an employer shall ensure at a construction site of a building or other construction work that—

(a) such construction site is provided with.

(i) fire extinguishing equipment sufficient to extinguish any probable fire at such construction site

- Provide and designated store for storage of HSD and chemicals with sufficient secondary containment and sufficient fire extinguishers.
- The chemicals and flammable material not to be stored within office room and near exit gate of any room

C. Slipping, tripping hazard and storage of material

Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act , 1996 and rule 1998

Rule 42. Slipping, tripping, cutting drowning and falling hazards

(1) All passageways, platforms and other places of construction work at the building or other construction work shall be kept by the employer free from accumulations of dust, debris or similar material and from other obstructions that may cause tripping.

(2) Any sharp projections or protruding nails or similar projections which may cause any cutting hazard to a building worker at the building or other construction work shall be removed or otherwise made safe by taking suitable measures by the employer.

Rule 51. Stacking Of materials :— The employer shall ensure, at a construction site Of a building or other construction work that—

(a) all building materials are stored or stacked in a safe and orderly manner to avoid obstruction of any passageway or place of work ;

Rule 52. Disposal of debris, The employer shall ensure at a construction site of a building or other construction work that—

(a) debris are handled and disposed Of by a method Which does not cause danger to the safety of a person;

(b) debris are not allowed to accumulate so as to constitute a hazard ;

(c) debris are kept sufficiently moist to bring down the dust within the permissible limit ;

(d) debris are not thrown inside or outside from any height of such building or other construction work;

(e) on completion of work, left over building material, article or other substance or debris are disposed of as soon as possible as per prevailing rules of the concerned local body to avoid any hazard to any traffic or person

- Provide proper clean walkway to labour to construction camp with wooden planks/ sand bags or by maintaining proper drainage
- Machinery and material to stored only on designated place to keep walkway clear.
- Clear marking on area identified for storage of waste and usable materials and equipment.

D. Marking on capacity of safe working and safe work load

Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act , 1996and rule 1998

Rule 56. Test and periodical examination of lifting appliances The employer shall ensure at construction site of a building or other construction work that—

(a) all lifting appliances including all parts and gears thereof, whether fixed or moveable, are tested and examined by a competent person before being taken into use for the first time or after it has undergone any alteration or repair liable to affect its strength or stability or after erection on a construction site and also once at least in every five years, in the manner specified in Schedule I annexed to these rules;

(b) all lifting appliances are thoroughly examined by a competent person once at least in every twelve months and where the competent person making such examination forms the opinion that the lifting appliance cannot continue to function safely, he shall forthwith give notice in writing of his opinion to the owner of the lifting appliance ;

Rule 57. Automatic safe load indicators :

(a) The employer shall ensure at a construction site of a building or other construction work that—

(i) every crane, if so constructed that the safe working load may be varied by raising or lowering of the jib or otherwise, is attached with an automatic indicator of safe working loads which give a warning to the operator wherever the load exceeds the safe working load ;

(ii) cut-out is provided which automatically arrests that movements of the lifting parts of every crane if the load exceeds the safe working load, wherever possible ;

(b) the provisions Of sub-clause (i) of clause (a) apply, except where it is not possible to install an automatic safe load indicator, in which case, provision of a table showing the safe working loads at the corresponding inclinations or radii or the jib on the crane shall be considered sufficient.

Rule 61. Identification and marking of safe working load— The employer shall ensure at a construction site of a building or other construction work that—

(a) every lifting appliance and loose gear is clearly marked for its safe working load and identification by stamping or other suitable means ;

- Provide safe load certificates for all weight lifting equipment like Hydra, whines, ropes etc used at construction site.

E. Reversing alarm for vehicle and equipment

Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act , 1996 and rule 1998

Rule 94. General safety. The employer shall ensure at a construction site of a building or other construction work that—

(a) every vehicle or earth moving equipment is equipped with—

(i) silencers ;

(ii) tail lights ;

(iii) power and hand brakes ;

(iv) reversing alarm ; and

(v) search light for forward and backward movement, which are required for safe operation of such vehicle or earth moving equipment

F. Use of PPEs by workers

Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act , 1996 and rule 1998

Rule 54. Use of safety helmets and shoes

The employer shall ensure that all persons, who are performing any work or service at a building Or Other construction work, wear safety shoes and helmets conforming to the national standards

G. Chemical Safety

Manufacture, storage and import of hazardous chemical rules,1989.

Rule 15. Information to be given to persons liable to be affected by a major accident.

(1) the occupier shall take appropriate steps to inform persons outside the site either directly or through district emergency authority who are likely to be in an area which may be affected by a major accident about-

(a) the nature of the major accident hazard; and

(b) the safety measures and the "dos and donts" which should be adopted in the event of a major accident

Rule 17 of Manufacture, Storage and Import of Hazardous Chemical Rules, 1989
Occupier of a facility shall arrange to obtain or develop information in the form of safety data-sheet as specified in Schedule 9. The information shall be accessible upon request for reference.

- As per Material Safety Data Sheet (MSDS) safety instruction for use of chemical to be displayed in local language, the worker using chemical to be trained for emergency situations and safety arrangements as per requirements of MSDS to be made on site

H. Diesel Storage

The Petroleum act 1934 and the Petroleum (Amendment) Rules, 2002

Rule 116. License for storage – Save as provided in sections 7, 8 and 9 of the Act , no person shall store petroleum except under and in accordance with a license granted under these rules : Provided that no license shall be necessary.- (i) for the storage of petroleum in well-head tanks; or (ii) for the storage of petroleum as transit cargo within the limits of a port subject to such conditions as may be specified by the Conservator.

Rule 9. Prevention of escape of petroleum. – All due precautions shall be taken at all times to prevent escape of petroleum into any drain, sewer, and harbour, river or watercourse or over any public road or railway line.

- License for storage of HSD to be procured for storage of HSD at site.
- Provide spill response kit and secondary containment to hazardous material storage. Secondary containment to be atleast 110% of the largest container in the secondary containment

I. Hazardous Waste

Hazardous and Other Wastes (Management and Transboundary Movement) Amendment Rules, 2016

Rule 8.Storage of hazardous and other wastes.- (1) The occupiers of facilities may store the hazardous and other wastes for a period not exceeding ninety days and shall maintain a record of sale, transfer, storage, recycling, recovery, pre-processing, co-processing and utilisation of such wastes and make these records available for inspection

- Authorization for generation and storage of Hazardous waste need to be obtained from BSPCB
- Contract agreement with authorized recycler for Hazardous waste disposal required (Chemical containers, used PPEs, used oil)
- Inventory of Hazardous waste to be prepared and waste to be sold to Authorized recycler within 90 days of its generation as per Hazardous and Other Wastes (Management and Transboundary Movement) Amendment Rules, 2016

J. Interstate labour

Rule 4 of The inter-state migrant workmen (regulation of Employment and Conditions of service) act, 1979

Rule (4) It applies-

(a) to every establishment in which five or more inter-State migrant workmen (whether or not in addition to other workmen) are employed or who were employed on any day of the preceding twelve months;

(b) to every contractor who employs or who employed five or more inter-State migrant workmen (whether or not in addition to other workmen) on any day of the preceding twelve months

- To seek license from concern authority for State for engaging interstate labor

List of Indian labour laws need to comply during implementation of the project

- (i) Workmen Compensation Act,1923- The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

- (ii) Payment of Gratuity Act, 1972 - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- (iii) Employees 'PF and Miscellaneous Provisions Act, 1952-The Act provides for monthly contributions by the employer plus workers @10 % or 8.33 %. The benefits payable under the Act are:
 - (a) pension or family pension on retirement or death as the case may be; (b) deposit linked insurance on the death in harness of the worker; (c) payment of PF accumulation on retirement/death etc.
- (iv) Maternity Benefit Act, 2017 –The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- (v) Contract Labour (Regulation and Abolition) Act,1970-The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.
- (vi) Minimum Wages Act, 1948 - The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.
- (vii) Payment of Wages Act, 1936 - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- (viii) Equal Remuneration Act, 1979 - The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.
- (ix) Payment of Bonus Act, 1965 - The Act is applicable to all establishments employing 20 or more workmen. The Act provides for payments of annual bonus subject to a minimum of 8.33 % of wages and maximum of 20 % of wages to employees drawing Rs. 3,500/- per month or less. The bonus to be paid to employees getting Rs. 2,500/- per month or above up to Rs.3,500/- per month shall be worked out by taking wages as Rs.2,500/- per month only. The Act does not apply to certain establishments. The newly set up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of the Act.
- (x) Industrial Disputes Act, 1947 - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

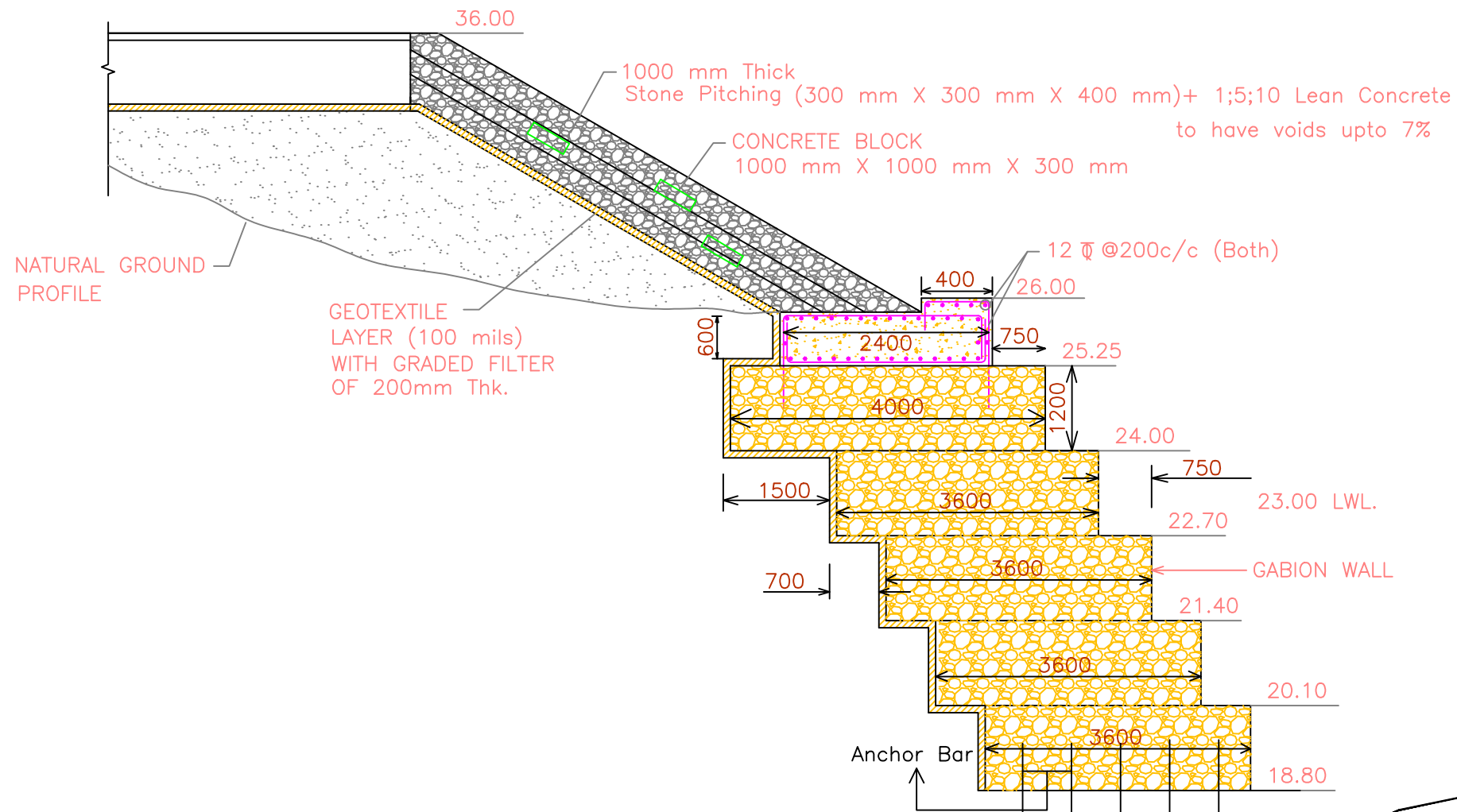
- (xi) Industrial employment (Standing Orders) Act,1946- It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the employer on matters provided in the Act and get the same certified by the designated Authority.
- (xii) Trade Unions Act,1926- The Act lays down the procedure for registration of trade unions of workmen and employees. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities.
- (xiii) Child Labor (Prohibition and Regulation) Act,1986-The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labor is prohibited in Building and Construction Industry.
- (xiv) Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979 - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state).The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.
- (xv) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996 - All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay Cess at rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government. Following are the major requirements under this Act, applicable to this project-

Employer (Contractor) shall-

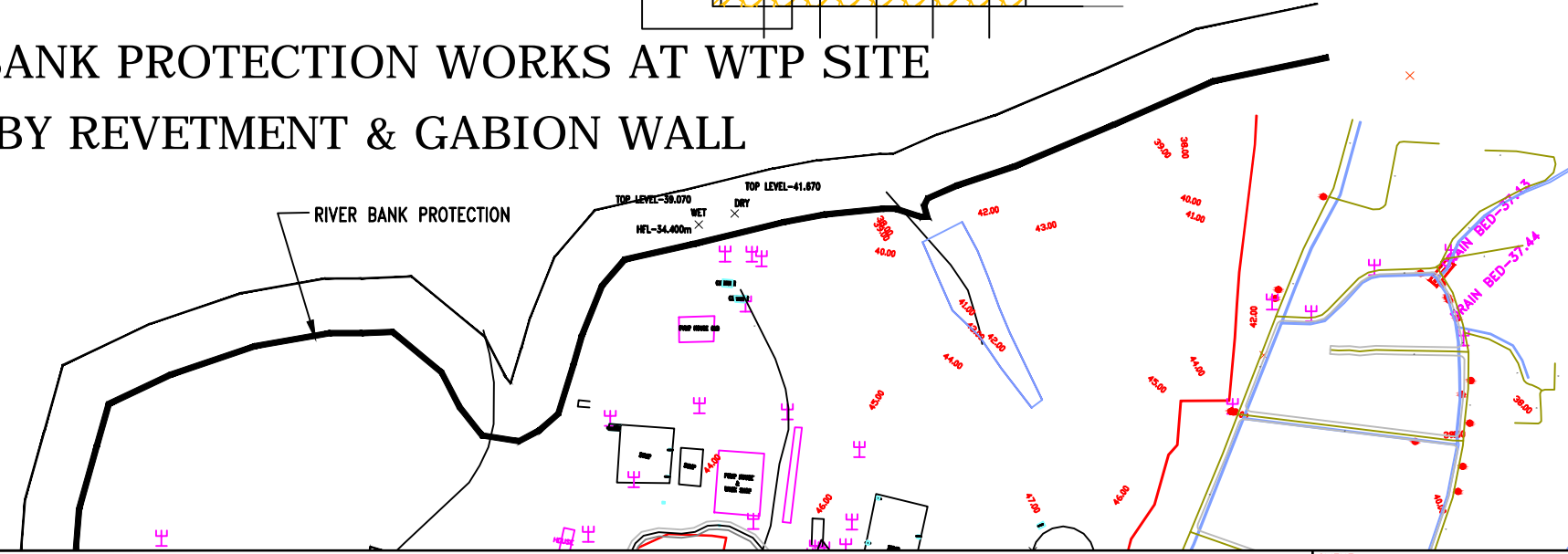
- Provide and maintain, at suitable point, sufficient quantity of wholesome drinking water, such point shall be at least 6 meters away from any washing areas, urinals or toilets
- Provide sufficient urinals and latrines at convenient place, easily accessible by workers
- Provide free of charge, temporary living accommodations near to work sites with separate cooking place, bathing and lavatory facilities and restore the site as pre conditions after completing the construction works
- Provide crèche with proper accommodation, ventilation, lighting, cleanliness and sanitation if more than fifty female workers are engaged
- Provide first aid facilities in all construction sites

For safety of workers employer shall provide-

- Safe access to site and work place
- Safety in demolition works
- Safety in use of explosives
- Safety in operation of transporting equipments and appoint competent person to drive or operate such vehicles and equipments
- Safety in lifting appliance, hoist and lifting gears
- Adequate and suitable lighting to every work place and approach
- Prevention of inhalation of dust, smoke, fumes, gases during construction works and provide
- adequate ventilation in work place and confined space
- Safety in material handling and stacking/un stacking
- Safeguarding the machinery with fly-wheel of moving parts
- Safe handling and use of plants operated by compressed air
- Fire safety
- Limit of weight to be lifted by workers individually
- Safety in electric wires, apparatus, tools and equipments
- Provide safety net, safety sheet, safety belts while working at height (more than 1.6 mtrs as per OSHA)
- Providing scaffolding, ladders and stairs, lifting appliances, chains and accessories where required
- Safety in pile works, concrete works, hot asphalt, tar, insulation, demolition works, excavation, underground construction and handling materials
- Provide and maintain medical facilities for workers
- Any other matters for the safety and health of workers

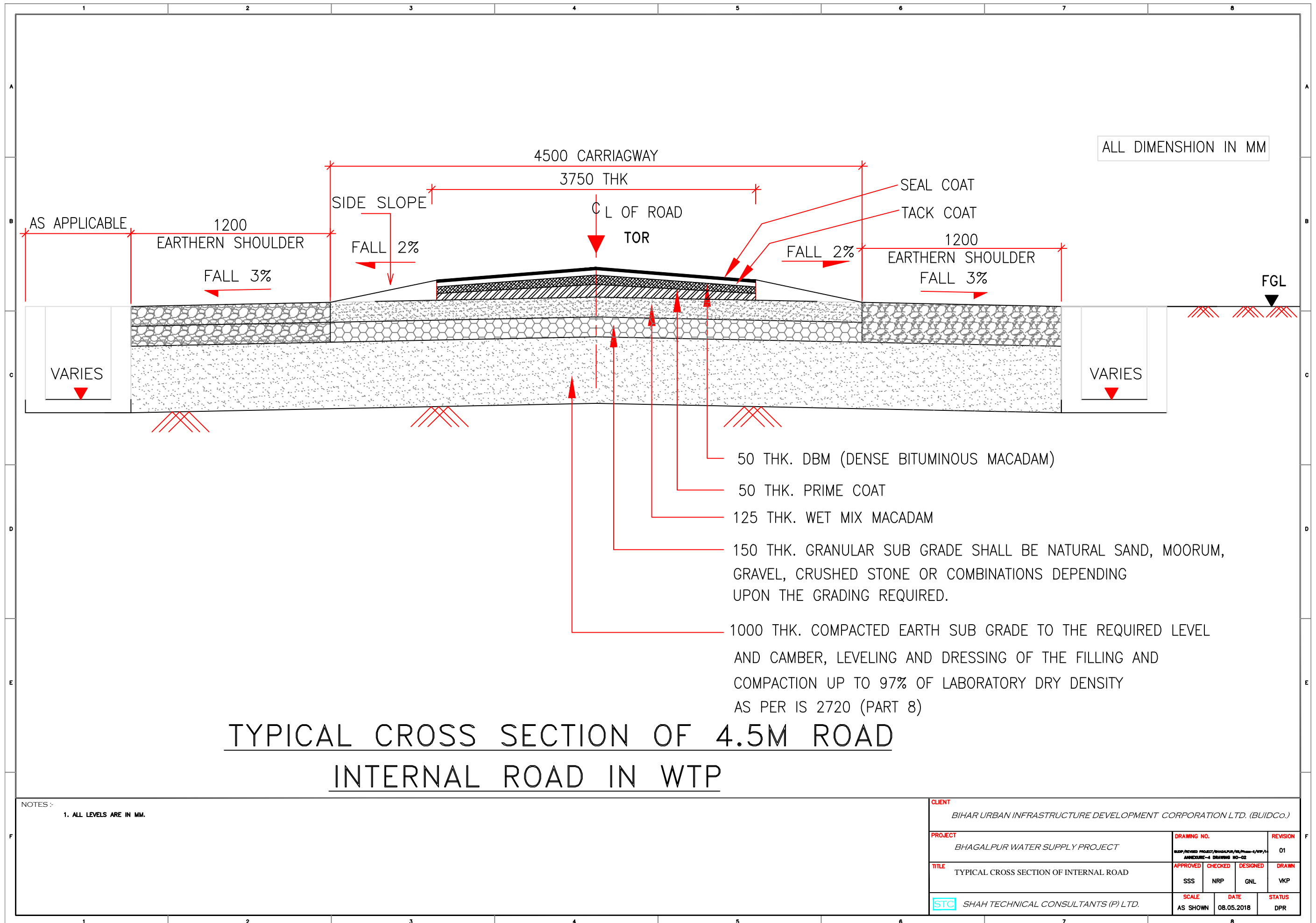


RIVER BANK PROTECTION WORKS AT WTP SITE BY REVETMENT & GABION WALL



NOTES:-
1. ALL LEVELS ARE IN MM.

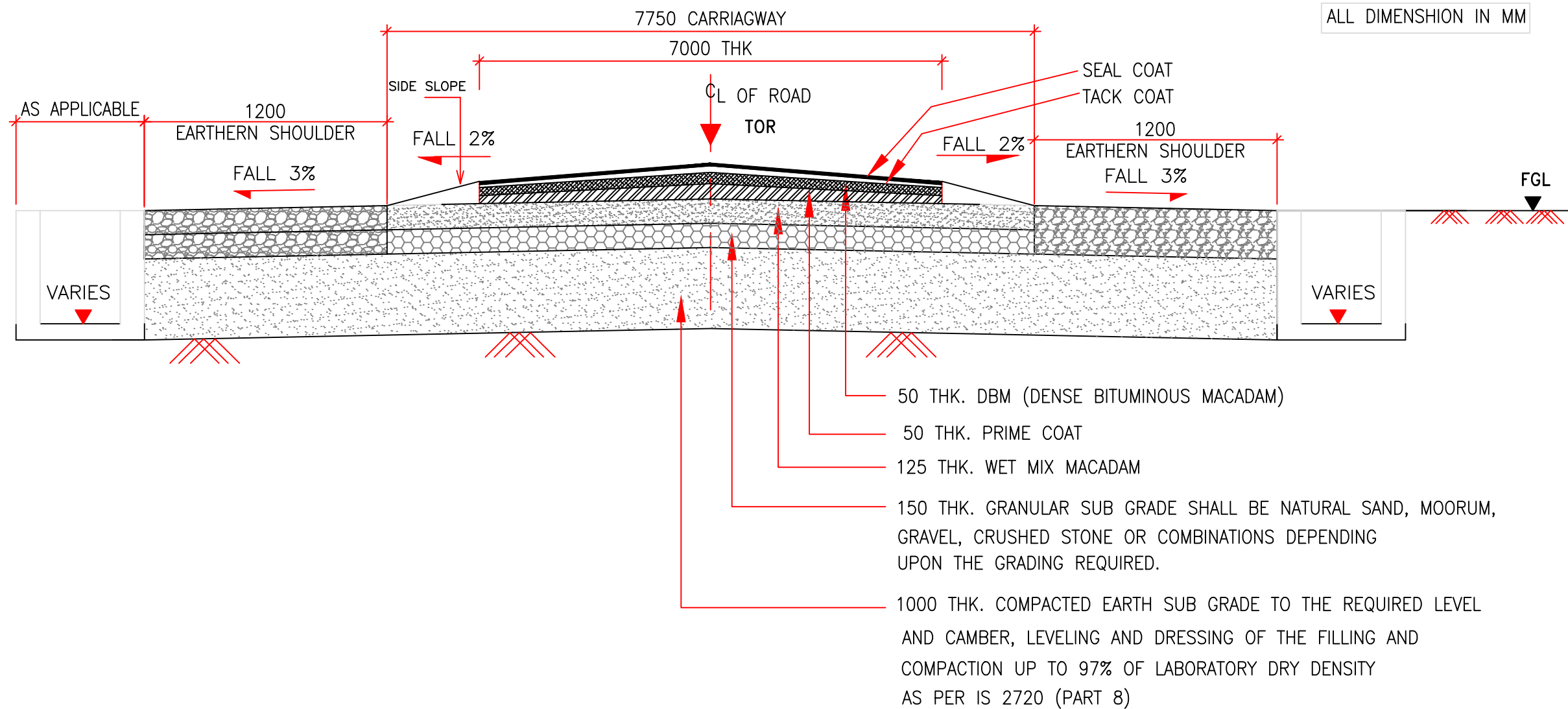
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|-----------------------------------------------------------------------------|--|-----------------------------------------|----------------|
| CLIENT BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LTD. (BUIDCO.) | | | |
| PROJECT BHAGALPUR WATER SUPPLY PROJECT | | DRAWING NO. ANNEXURE-4 DRAWING NO-01 | REVISION 01 |
| TITLE TYPICAL DRAWING OF RIVER PROTECTION AT WTP SITE | | APPROVED SSS | CHECKED NRP |
| | | DESIGNED GNL | DRAWN VKP |
| SCALE AS SHOWN | | DATE 08.05.2018 | STATUS DPR |
| STC SHAH TECHNICAL CONSULTANTS (P) LTD. | | | |



TYPICAL CROSS SECTION OF 4.5M ROAD INTERNAL ROAD IN WTP

NOTES :-
1. ALL LEVELS ARE IN MM.

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|------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------|-----------------------|
| CLIENT BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LTD. (BUIDCO.) | | | |
| PROJECT BHAGALPUR WATER SUPPLY PROJECT | | DRAWING NO. RUP/REVISED PROJECT/BHAGALPUR/WSP/Phase-4/WP/1- ANNEXURE-4 DRAWING NO-02 | REVISION 01 |
| TITLE TYPICAL CROSS SECTION OF INTERNAL ROAD | | APPROVED SSS | CHECKED NRP |
| | | DESIGNED GNL | DRAWN VKP |
| SCALE AS SHOWN | | DATE 08.05.2018 | STATUS DPR |
| STC SHAH TECHNICAL CONSULTANTS (P) LTD. | | | |

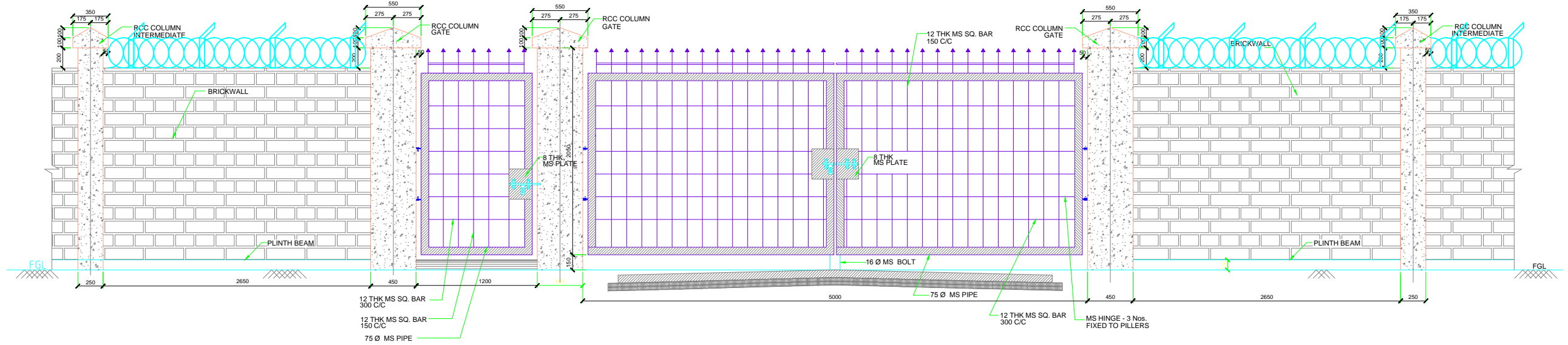


ALL DIMENSION IN MM

TYPICAL CROSS SECTION OF 7.75M ROAD APPROACH ROAD TO INTAKE

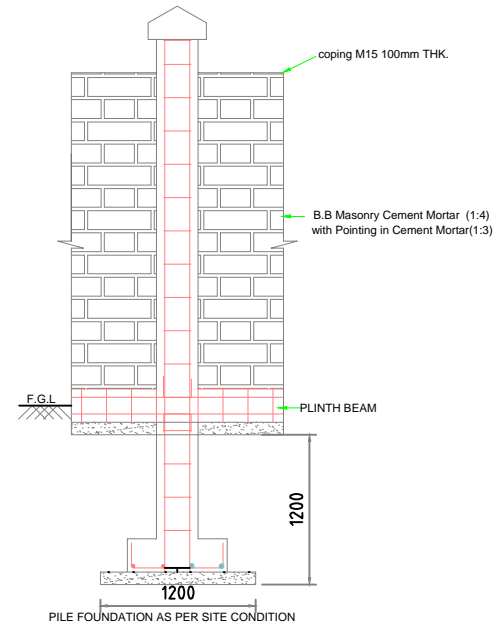
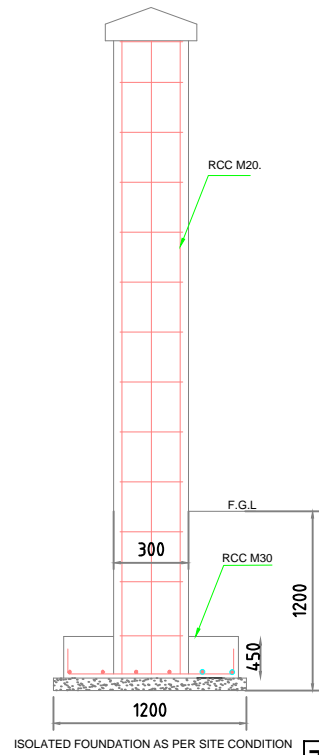
NOTES :-
1. ALL LEVELS ARE IN MM.

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| CLIENT BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LTD. (BUIDCO.) | | | |
| PROJECT BHAGALPUR WATER SUPPLY PROJECT | | DRAWING NO. BUP/PROJ/BS/MA/PUR/18/Phase-1/PP/14 ANNEXURE-4 DRAWING NO-05 | REVISION 01 |
| TITLE TYPICAL CROSS SECTION OF APPROACH ROAD | | APPROVED SSS | CHECKED NRP |
| | | DESIGNED GNL | DRAWN VKP |
| SCALE AS SHOWN | | DATE 08.05.2018 | STATUS DPR |
| STC SHAH TECHNICAL CONSULTANTS (P) LTD. | | | |



ELEVATION OF WICKET GATE WIDE 1200

ELEVATION OF MAIN GATE WIDE 5000



TYPICAL DRAWING OF COMPOUND WALL

NOTES :-
1. ALL LEVELS ARE IN MM.

| | | | | |
|------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------|---------------------------|------------------------|
| CLIENT BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LTD. (BUIDCO.) | | | | |
| PROJECT BHAGALPUR WATER SUPPLY PROJECT | | DRAWING NO. BUP/PPWD/PROJECT/BHAGALPUR/PP/08-1/PP/14 ANNEXURE-4 DRAWING NO-04 | | REVISION 01 |
| TITLE TYPICAL DRAWING OF COUMPOUND WALL | | APPROVED SSS | CHECKED NRP | DESIGNED GNL |
| | | SCALE AS SHOWN | DATE 08.05.2018 | STATUS DPR |
| STC SHAH TECHNICAL CONSULTANTS (P) LTD. | | | | |



UNIT SCHEDULE(Phase I)

| SR.No | NAME OF UNIT | NO OF UNITS. | UNIT SIZE IN MTR. |
|-------|--------------------------------------|--------------|--------------------|
| 1 | CASCADE AERATOR | 1 | 17 m ø |
| 1A | INLET CHAMBER | 1 | 5.0 m x 5.8 m |
| 2 | PARSHALL FLUME | 1 | 1.5 m Throat Width |
| 3 | FLASH MIXER | 2 | 3.2 m ø |
| 4 | FLOCCULATOR | 4 | 12.5 m X 7.0 m |
| 5 | PLATE SETTLER | 2 | 26.4 m X 12.5 m |
| 6 | RAPID GRAVITY SAND FILTER BEDS | 12 | 9.5 X 7.2 |
| 7 | BYPASS | 1 | 2 X 1 |
| 8 | ALUM HOUSE | 1 | 15 m X 20 m |
| 9 | ADMINISTRATIVE BUILDING & LABORATORY | 1 | 14 m X 18 m |
| 10 | GRAVITY THICKENER | 3 | 17 m ø |
| 11 | SLUDGE DEWATERING UNIT | 1 | 20 m X 15 m |
| 12 | CHORINATION BUILDING | 1 | 22 m X 11 m |
| 13 | SLUDGE BALANCING TANK | 1 | 20 m X 20 m |
| 14 | CLEAR WATER TANK PUMP HOUSE | 1 | 30 X 50 |
| 15 | SANTRY POST | 1 | 4 m X 3 m |
| 16 | THICKENED SLUDGE SUMP | 1 | 16 m X 13 m |
| 17 | SUPERNATANT SUMP | 1 | 12 m X 8 m |
| 18 | RAW WATER SUMP | 1 | 15 m X 15 m |
| 19 | LT SUBSTATION | 1 | 20 m X 15 m |
| 20 | CHLORINE CONTACT TANK | 2 | 20 m X 15 m |

NOTES:-
 1. ALL LEVELS ARE IN METER.

INDICATIVE DRAWING

| | | | |
|------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------|-----------------------|
| CLIENT BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LTD. (BUIDCO.) | | | |
| PROJECT BHAGALPUR WATER SUPPLY PROJECT | | DRAWING NO. BUIDP/REVISED PROJECT/BHAGALPUR/MS/Phase-I/WTP/11 Annexure-4 Drawing No-5 | REVISION 01 |
| TITLE GENERAL ARRANGEMENT OF WTP WORK | | APPROVED SSS | CHECKED NRP |
| | | DESIGNED GNL | DRAWN VKP |
| SCALE AS SHOWN | | DATE 08.05.2018 | STATUS DPR |
| STC SHAH TECHNICAL CONSULTANTS (P) LTD. | | | |